

AMPHIBIA: CAUDATA: AMBYSTOMATIDAE

AMBYSTOMA BARBOURI

Catalogue of American Amphibians and Reptiles.

Kraus, F. 1996. *Ambystoma barbouri*.

***Ambystoma barbouri* Kraus and Petranka**
Streamside Salamander

Ambystoma microstomum: Morse, 1904:110 (part).

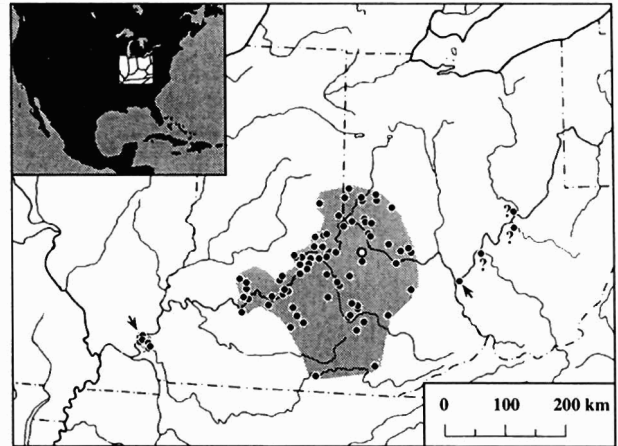
Ambystoma texanum: Dury and Williams, 1933:2.

Ambystoma barbouri Kraus and Petranka, 1989:95. Type locality, "tributary of Harris Creek which flows parallel to U.S. Hwy. 27, 4.6 km S of the Licking River, Pendleton County, Kentucky." Holotype, University of Michigan (UMMZ) 182844, a mature female collected 15 March 1980 by J.W. Petranka and C.K. Smith (examined by author). Sixty-five paratypes, all at UMMZ, from Kentucky, Ohio, and Indiana.

• **Content.** No subspecies are recognized.

• **Definition.** *Ambystoma barbouri* is a sibling species of the more widespread *A. texanum*, and older references usually are under the latter name (or "stream form *A. texanum*"), or are composites of the two species, or cannot clearly be attributed to one or the other species.

Ambystoma barbouri is a medium-sized ambystomatid salamander attaining a size of 96 mm SL and 168 mm TL (Conant and Collins, 1991). The head is relatively small, with a short rounded snout. The body is relatively stout, of a flaccid appearance, and usually with 14-15 distinct costal grooves. The tail is relatively short and thick, with distinct costal grooves corresponding to the vertebrae. The color pattern consists of gray or brown lichenose markings on a black ground color. The maxil-



Map. Distribution of *Ambystoma barbouri*. The circle represents the type locality; dots represent sites for which exact locality information is available, except those indicated by question marks which represent populations of uncertain status.

lary, premaxillary, and dentary teeth occur in multiple rows; the maxillary and premaxillary teeth in post-metamorphic individuals have short spatulate lingual cusps; the dentary teeth undergo a postmetamorphic transformation from spatulate to long pointed lingual cusps. The pterygoids are flat ventrally and lack an anterior flange; the squamosals are broad (length < 3x narrowest width); the dorsal process of the premaxilla is relatively broad. The hyobranchial system has a lyre-shaped otoglossal cartilage heterocontinuous across its anteriormost aspect, first radials that extend anterior to the ceratohyals, and a *musculus rectus cervicis profundus* with a fleshy insertion.



Figure. Adult *Ambystoma barbouri* from French Park, Amberley Village, Hamilton County, Ohio (KU 204782). Photograph by Suzanne L. Collins, courtesy of The Center for North American Amphibians and Reptiles.

A relatively small complement (average less than half that of the similar *A. texanum*) of large eggs is laid singly and cryptically attached to the undersides of flat stones in first-order streams and stream pools. These hatch at approximately twice the weight and at a slightly more advanced developmental stage compared with *A. texanum*.

• **Diagnosis.** *Ambystoma barbouri* is distinguished from the closely related *A. texanum* by the cusp shape of the maxillary and premaxillary teeth; post-metamorphic ontogenetic transformation of the dentary teeth; a higher number of maxillary, premaxillary, and vomerine teeth; broad dorsal process of the premaxilla; stockier habitus; relatively thicker and rounder tail, well-impressed by caudal grooves; large egg and hatching size; and mode of egg attachment.

Ambystoma barbouri is easily distinguished from all other *Ambystoma*, except *A. annulatum*, *A. cingulatum*, and *A. texanum*, by having more than a single row of teeth on the maxillary, premaxillary, and dentary bones; flat pterygoids lacking an anterior flange; broad squamosals; and a lyre-shaped otoglossal cartilage. *Ambystoma barbouri* differs from *A. annulatum* and *A. cingulatum* in the heterocontinuous nature of the otoglossal cartilage, the fleshy insertion of the *m. rectus cervicis profundus*, and the long first radials.

Ambystoma barbouri also is readily distinguished from all *Ambystoma* except *A. mabeei* and *A. texanum* by its color pattern and habitus.

• **Descriptions.** Due to confusion of *A. barbouri* with *A. texanum*, most descriptions are composites of the two species, or are general enough to apply to either, and are under the name "*A. texanum*;" these include Morse (1904), Bishop (1943), Anderson (1967), Barbour (1971), Minton (1972), Green and Pauley (1987), and Pflingsten and Downs (1989). However, adult morphology and distinguishing features were described by Kraus and Petranka (1989), and accurate general descriptions are in Minton (in press) and Petranka (in press). Brandon (1961) described the larvae of *A. barbouri*, and Petranka (1982a, 1984b) and Minton (in press) discussed characters distinguishing larval *A. barbouri* from *A. texanum*. Eggs are described by Petranka (1982a). Allozyme comparisons of *A. barbouri* with other *Ambystoma* are given in Kraus and Petranka (1989) and Shaffer et al. (1991). Several internal morphological characters are described by Kraus (1988) under the name "*Ambystoma* sp."

• **Illustrations.** Color photographs of adult *A. barbouri*, under the name "*A. texanum*," are in Barbour (1971), Green and Pauley (1987), and Evers (1992). Minton (in press) and Petranka (in press) also provided color photographs of adults. Color photographs of a larva (Pflingsten and Downs, 1989, as *A. texanum*), of eggs (Minton, in press), and of embryonic melanophores (Olsson, 1994) also have been published. Black and white photographs are of adults and larvae (Petranka, in press), of the preserved holotype and adult dentition (Kraus and Petranka, 1989); of eggs and habitat (Kraus and Petranka, 1989; Petranka, in press); of antipredator immobility posture (Brodie et al., 1974; Petranka, in press); and of neural crest and embryonic xanthophores (Olsson, 1994). Line drawings of larvae are in Brandon (1961, as *A. texanum*), and of the premaxilla in Kraus and Petranka (1989).

• **Distribution.** *Ambystoma barbouri* is found in central Kentucky, southwesternmost Ohio, southeasternmost Indiana, with a geographical isolate in Livingston County, Kentucky (Petranka, 1982a; Kraus and Petranka, 1989). The distribution of this species in eastern Kentucky and adjacent areas is uncertain. Barbour (1971) said it is rare in the Eastern Coalfields region of Ken-

tucky, and I know of only one documented locality. Specimens from Wayne County, West Virginia (Green and Richmond, 1940; Green, 1961) are *A. barbouri*, but other specimens from Washington County, Ohio (Seibert and Brandon, 1960), and from Mason and Wood counties, West Virginia (Green and Pauley, 1987), are of uncertain status (Kraus and Petranka, 1989). These may represent *A. barbouri*, *A. texanum*, or hybrids between the two, but at least one of the Washington County, Ohio specimens is *A. texanum* (pers. obs.). *Ambystoma barbouri* is parapatric with *A. texanum* in Hancock County, Kentucky, and Scott County, Indiana. These two species are sympatric in Livingston County, Kentucky, and may be or have been sympatric along the Ohio River Valley (Adams, Hamilton, and Washington counties, Ohio) and in Montgomery County, Ohio (Kraus and Petranka, 1989). Current sympatry and ecological relationships of the two species in these regions require further assessment, which may be difficult because of massive habitat alteration along the river floodplains that would have contained *A. texanum* and the ecotones with upland habitats where the two species would have met. Exact localities are provided in Dury and Williams (1933), Welter and Carr (1939), Green and Richmond (1940), Brandon (1961), Green (1961), Ashton (1975), Keen (1975), Petranka (1982a, 1984a), and Kraus and Petranka (1989).

• **Fossil Record.** No fossils of this species have been reported.

• **Pertinent Literature.** General accounts in Morse (1904), Bishop (1943), Anderson (1967), Barbour (1971), Minton (1972), and Pflingsten and Downs (1989) are composites of *A. barbouri* and *A. texanum*. Accurate general accounts of *A. barbouri* are in Minton (in press) and Petranka (in press), and a less detailed general account is in Conant and Collins (1991). Other papers listed by topic: breeding habits (Dury and Williams, 1933; Brandon, 1961; Barbour, 1971; Keen, 1975; Petranka, 1982a, 1984a); courtship behavior (Petranka, 1982b); clutch size (Petranka, 1984a); egg and embryonic size (Petranka et al., 1987); embryonic survivorship (Petranka, 1984b; Sih and Maurer, 1992); embryonic pigment pattern formation (Olsson, 1994); habitat use (Craddock and Minckley, 1964; Petranka, 1982a; Holomuzki, 1991; Kats and Sih, 1992); adult antipredator behavior (Brodie et al., 1974; Kats and Sih, 1992); phylogenetic relationships (Kraus, 1988; Shaffer et al., 1991). The remaining literature is concerned with larval ecology and includes the following topics: growth rates (Petranka, 1984b, 1984c; Petranka and Sih, 1986, 1987; Holomuzki, 1991; Huang and Sih, 1991a; Maurer and Sih, 1996); movements (Petranka et al., 1987; Holomuzki, 1991; Huang and Sih, 1991a; Sih et al., 1992; Maurer and Sih, 1996); densities (Petranka and Sih, 1986; Huang and Sih, 1991a); predation (Petranka, 1983, 1984b; Kats, 1986; Petranka et al., 1987; Huang and Sih, 1991b; Sih, 1992); survivorship (Petranka, 1984b; Petranka and Sih, 1986, 1987; Huang and Sih, 1990, 1991a; Holomuzki, 1991; Sih et al., 1992); response to hypoxia (Branch and Altig, 1983); effects on prey species (Huang and Sih, 1990, 1991a, 1991b; Sparkes, 1996); feeding behavior (Smith and Petranka, 1987; Sih and Petranka, 1988; Huang and Sih, 1990, 1991a, 1991b; Sih and Moore, 1990); diet (Smith and Petranka, 1987); antipredator behavior (Kats, 1988; Sih et al., 1988, 1992; Holomuzki, 1989; Huang and Sih, 1990; Sih and Kats, 1991, 1994; Sih, 1992; Sih and Moore, 1993); temperature preferenda/tolerances (Keen and Schroeder, 1975; Dupré and Petranka, 1985); and selective forces (Petranka et al., 1987; Petranka and Sih, 1987; Sih, 1992; Sih et al., 1992; Sih and Moore, 1993).

• **Etymology.** The trivial name is a patronym honoring Roger W. Barbour for his contributions advancing the understanding of Kentucky's natural history.

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