Catalogue of American Amphibians and Reptiles.

Regester, K.J. 2000. *Plethodon electromorphus*.

Plethodon electromorphus Highton
Northern Ravine Salamander

Plethodon electromorphus Highton 1999a:66. Type locality, "at locality 35, 274 m elevation, Cedar Creek State Park, Gilmer County, West Virginia," (38°52'34"N, 80°51'03"W), USA. Holotype, National Museum of Natural History (USNM) 507747, an adult male, collected 5 October 1996 by D.E. Green (not examined by author).
Plethodon richmondi: Netting and Mittleman 1938:288.
Plethodon richmondi richmondi: Highton and Grobman 1956: 187.

• **CONTENT.** No subspecies are recognized.

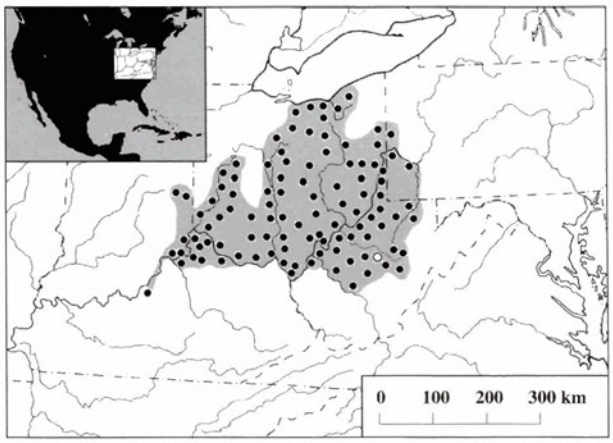
• **DEFINITION.** *Plethodon electromorphus* is a small eastern plethodon of the *P. cinereus* group. It is characterized by an elongate body with short legs that are set far apart, and is frequently described as a "worm with legs." The tail is round in cross-section, slightly compressed laterally, and comprises approximately 50% of TL. The TL ranges from 65–143 mm. Females are slightly larger than males. Sexual maturity is attained at approximately 40 mm SVL. Males can be distinguished by the presence of cloacal papillae and a large crescent-shaped mental gland.

In adults, the dorsum and lower sides are uniformly deep brown to nearly black and lack conspicuous markings. The entire dorsal surface is sprinkled with small gold to greenish-gold and larger silvery-white flecks. Slight to moderate amounts of white to pale gray flecking is scattered ventrolaterally, as well as on the sides of the head, where it may be particularly abundant behind the eyes. With the exception of small and irregular light blotches, similar in color to those of the lower sides, the venter is uniformly dark. The throat is lighter in color, giving a mottled effect, and has a well-developed gular fold. The undersurface of the tail is uniformly slate gray to black. The pupil of the eye is black with brassy flecks on the iris above and below.

Juveniles are similar in coloration to the adults. Hatchlings are light gray above and have an immaculate venter. The dorsum is patterned with a large number of small white spots on a network of black. Embryos have an abundance of red pigment that forms a narrow dorsal stripe in late development. The coloration may remain after hatching, frequently on the cheeks, front legs, and sides. Hatchlings measure 14–15 mm SVL.

The number of trunk vertebrae varies geographically, forming a cline ranging from a mean of 21 in northern Ohio to 22–23 in southern Ohio, West Virginia, and northern Kentucky. The intercostal spaces between adpressed toes number 9–11. The vomerine teeth, totaling 6–16, occur in two short series and extend to or beyond the outer edge of the internal nares. The parasphenoid teeth occur in two narrowly separated club-shaped patches. Fingers are slightly webbed at the base and 3, 2, 4, 1 in order of length. Toes are webbed to the second joint and 3, 4, 2, 5, 1 in order of length. The first fingers and first toes are entirely within the web.

• **DIAGNOSIS.** The Northern Ravine Salamander differs from other small eastern *Plethodon* in having a higher costal groove count (20–22), relatively longer tail, and uniformly dark venter and throat. Although this species superficially resembles dark morph *P. dorsalis* and unstriped *P. cinereus*, the former usually has some red-orange pigment present and the latter a mottled "salt and pepper" venter. In contrast, *P. hoffmani* has a whiter throat and some white and brown mottling on the venter. *Plethodon wehrlei* is stouter-bodied and has proportionally longer legs.



MAP. Range of *Plethodon electromorphus*; the circle marks the type locality and dots represent most known localities.

FIGURE. Photograph of living *Plethodon electromorphus* from Lake White, Pike Co., Ohio (photograph courtesy of R. Wayne Van Devender).

No known morphological characters distinguish this species from its more southern sibling species, *P. richmondi*. Locality and differences in protein characteristics, detectable by electrophoretic analysis, distinguish the two species. Some populations of *P. electromorphus* and *P. richmondi* show a mean difference of one trunk vertebrate on either side of a contact zone along and south of the Ohio River (Highton 1999a).

• **DESCRIPTIONS.** Detailed descriptions were given by Bishop (1943), Green and Pauley (1987), Highton (1962, 1999a), Minton (1972), Netting and Mittleman (1938), Petranka (1998), and Pfingsten and Downs (1989). Brief descriptions are provided by Behler and King (1979), Blair (1957, 1968), Cochran and Goin (1970), Conant (1958, 1975), Conant and Collins (1991, 1998), Green and Walker (1954), and Smith (1978). Wallace and Barbour (1957) and Duellman (1954) provided descriptions of hatchlings and juveniles, respectively.

• **ILLUSTRATIONS.** Conant (1958) provided a black and white drawing in lateral view. Conant (1975) and Conant and Collins (1991, 1998) provided the same line drawing of Conant (1958), but it was colored. Smith (1978) also included a color drawing of a lateral view. The venter was illustrated by the same line drawing in Conant (1958, 1975) and Conant and

Collins (1991, 1998). Highton (1962) included line drawings of the mental gland and a premaxillary tooth of *P. cinereus*, "similar to *P. richmondi*." Bishop (1943) presented black and white photographs of a preserved female specimen in dorsal and ventral views. Behler and King (1979), Green and Pauley (1987), and Pfingsten and Downs (1989) each contained one color photograph.

• **DISTRIBUTION.** The species ranges from southeastern Indiana, Ohio (except the northwestern part of the state), northern Kentucky from Jefferson County east to Bracken County and south to southern Gallatin and Grant counties, southwestern Pennsylvania, and northern West Virginia east of the New and Kanawha rivers and north of the Teays River Valley (Highton 1999a).

The Northern Ravine Salamander is completely terrestrial and is typically found under logs, stumps, leaf litter, and stones on the moist wooded slopes of valleys and ravines. It is rarely found on the dry crests of ridges, hilltops, or valley floors. The species also has been reported along stream margins, within a few centimeters of water, in Ohio (Pfingsten 1989). It exhibits a cover preference for rock and is frequently found in high densities on wooded talus slopes.

• **FOSSIL RECORD.** None.

• **PERTINENT LITERATURE.** Published references to the species are listed by topic: **aggression** (Thurow 1976), **biogeography** (Highton 1999a), **body proportions** (Thurow 1968), **courtship** (Arnold 1977), **demography** (Pfingsten and Downs 1989), **descriptions** (Bishop 1943; Behler and King 1979; Bishop 1943; Blair 1957, 1968; Cochran and Goin 1970; Conant 1958, 1975; Conant and Collins 1991, 1998; Duellman 1954; Green and Pauley 1987; Green and Walker 1954; Highton 1962, 1999a; Minton 1972; Netting and Mittleman 1938; Petranka 1998; Pfingsten and Downs 1989; Smith 1978), **diagnostic characters** (Conant 1958, 1975; Conant and Collins 1991, 1998; Highton 1962, 1999a; Netting 1939; Pauley 1979; Pfingsten and Downs 1989), **diet** (Duellman 1954, Minton 1972, Seibert and Brandon 1960), **distribution** (Bishop 1943, Dury and Gessing 1940, Green and Walker 1954, Netting 1939), **distributional relationships** (Grobman 1944, Highton 1972), **eggs** (Duellman 1954, Wallace and Barbour 1957), **electrophoretic studies** (Highton 1999a, 1999b), **evolution** (Highton 1999a, Wake 1966), **habitat** (Bishop 1943, Duellman 1954, Minton 1972, Netting 1939, Netting and Mittleman 1938), **habits** (Duellman 1954, Green and Pauley 1987, Minton 1972, Pfingsten and Downs 1989), **hatchlings** (Wallace and Barbour 1957), **hybridization** (Highton 1999a, 1999b), **keys** (Bishop 1943; Blair 1957, 1968; Green and Pauley 1987; Highton 1962; Minton 1972; Petranka 1998; Powell et al. 1998), **life cycle** (Jewell and Pauley 1995), **life history** (Petranka 1998), **measurements** (Duellman 1954, Green and Walker 1954, Hirschfeld 1962, Minton 1972, Netting and Mittleman 1938, Pfingsten and Downs 1989, Wallace 1969), **osteology** (Wake 1966), **phenotypic variation** (Highton 1962, 1999a, 1999b; Thurow 1968), **phylogeny** (Highton 1999a, Thurow 1968, Wake 1966), **range maps** (Bishop 1943; Behler and King 1979; Conant 1958, 1975; Conant and Collins 1991, 1998; Grobman 1944; Highton 1962, 1972; Smith 1978), **reproduction** (Duellman 1954, Jewell and Pauley 1995, Pfingsten and Downs 1989, Seibert and Brandon 1960, Wallace 1969, Wood 1945), **seasonal availability** (Duellman 1954, Minton 1972, Pfingsten and Downs 1989), **sexual dimorphism** (Pfingsten and Downs 1989, Wallace 1969), **speciation** (Highton 1999a), **state distribution maps** (Green and Pauley 1987, Minton 1972, Pauley 1979, Pfingsten and Downs 1989, Siebert and Brandon 1960, Wallace 1969), **tail enlargement** (Duellman 1954, Green and Pauley 1987, Netting 1939), and **taxonomy** (Grobman 1944, Highton 1962, Thurow 1968).

• **REMARK.** Minton (1972) provided a black and white photograph of a specimen from Bedford County, Pennsylvania. The specimen illustrated was collected within the range of the species presently defined as *P. hoffmani*.

• **ETYMOLOGY.** The specific name *electromorphus* refers to the electrophoretic differences in protein charactersitics that distinguish this species from *P. richmondi*.

• **COMMENTS.** Until the original description of *P. richmondi* by Netting and Mittleman (1938), the species was regarded as a black morph of *P. cinereus*. Highton (1999a) demonstrated that the taxon traditionally defined as *P. richmondi* consisted of two parapatric sibling species with a mean Nei genetic distance of 0.25, and described the northern form as *P. electromorphus*. In northern Kentucky, *P. richmondi* and *P. electromorphus* hybridize in a narrow zone of contact, where the amount of introgression is low (Highton 1999b). Hybridization with *P. cinereus* also occurs in Wooster County, Ohio.

Pending further investigation these sibling species are assumed to have similar natural histories. The pertinent literature describing general habits and morphology and encompassing the geographic ranges of both species have been included (e.g., field guides, keys, major life history summaries). All other information is drawn from studies conducted only within the distribution described. Regester (2000) provides additional information on *P. richmondi* that may be applicable.

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Primary editor for this account, Harold A. Dundee.

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