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## The Distribution and Variation of the Western Earth Snake,

### *Virginia valeriae elegans* (Kennicott) in Iowa<sup>1</sup>

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Western earth snakes, *Virginia valeriae elegans*, were known in Iowa from only three specimens and considered very rare until the present study. Intense effort to find them in the last two years produced specimens from only the lower Des Moines and Chariton River drainages. The snakes were found to be closely associated with timbered, rocky terrain near streams and to be poten-

tially endangered where timber is permanently removed. Sampling showed two geographic areas in the Des Moines River drainage inhabited by this snake; specimens from the two areas were very similar morphologically. Iowa specimens usually lack the light vertebral stripe characteristic of the species in most of its range and have small, dark spots on the head and neck. Meristic variation is slight.

INDEX DESCRIPTORS: Western Earth Snake; *Virginia valeriae elegans*; Snakes of Iowa; Western Earth Snake Variation.

The only published report of the western earth snake, *Virginia valeriae elegans*, from Iowa was that of Guthrie (1926) based on two specimens that apparently were never preserved in a research collection. By the fall of 1948 three other Iowa specimens had appeared and were preserved in collections at the University of Michigan and Iowa State University. Extensive field work during 1971 and 1972 produced 19 additional specimens including a litter of seven young born to a captive. These specimens expanded the known range of the species in the state by two counties and provided an opportunity to examine meristic and color variation where samples had been insufficient to do so before.

#### DISTRIBUTION AND HABITAT

The first Iowa specimens reported by Guthrie (1926) were collected near Keosauqua in Van Buren County. In 1933 one specimen was obtained by Paul Errington from Des Moines in Polk County and deposited in the Iowa State research collection as ISC 389. In 1939 Dr. Reeve Bailey deposited a second specimen in the ISU collection (ISC 388), this one obtained by Mr. Chastain, park custodian for Keosauqua State Park where the snake was collected. A third specimen was obtained in 1948 from Des Moines by Mr. E. B. Speaker and deposited in the University of Michigan collection as UMMZ 99291. In 1944 the Errington specimen (ISC 389) was transferred to the University of Michigan as UMMZ 93078. The 12 additional specimens collected in 1971 and 1972 and the seven young born to one of them are deposited in the research collection at Drake University where they bear collection numbers JLC 3644, 3648, 3761, 3858, 3862, 3868, 3873, 3877, 3879-85; BKJ 15, 172, 173; TAW 4 and

data tags. The 22 specimens now available represent seven different localities in four Iowa counties (Fig. 1).

All specimens of earth snakes from Iowa were found within two miles of a major (i.e., named) river and all but one were collected in the Des Moines River drainage. The one exception was taken a short distance from the Chariton River, a stream that runs parallel to the Des Moines in south-central and southeastern Iowa.

The general Iowa habitat for this species can be described as rocky woodland riparian or rocky woodland-meadow edge. Of 12 specimens for which precise notes on habitat at the collecting site exist, 11 were found in or near dense woodland. This includes one specimen removed from the stomach of a ringneck snake (*Diadophis punctatus arnyi*) collected along a stream in a grazed woodland. The specimen not found in woodland had been run over by a tractor in a field less than one mile from the Des Moines River and only about 2000 feet from terrain that had been recently cleared. Six of the same 12 specimens were collected within 50 feet of a stream and nine were taken within 1000 feet of a stream. Earth snakes were most frequently found under stones in wet or poorly drained places. Of the same 12 snakes, eight were collected under stones, one in a wet rotten log, one on a wooded forest trail, one in the stomach of the *Diadophis* mentioned previously, and one in a field. An additional specimen for which we have no other habitat data (also run over by a tractor) was taken in a field. Of the eight snakes collected under stones, three were wet at the time of capture. All of the snakes collected under stones were on distinctly moist soil or were in poorly drained areas where a light rain would cause pooling of water.

The conclusion that *Virginia valeriae elegans* is typically a woodland snake, most often found under stones, is supported by the works of others. Hurter (1911) mentioned that all of the specimens he found (in Missouri) were under rocks, although he further stated that he "caught one sliding over a narrow path in heavily timbered bottom lands." Anderson (1965) in Missouri and Smith (1961) in Illinois mention that they are found on rocky, timbered hillsides. Anderson (1961) further states that they are usually found "above stream valleys" and supports the observation that the snakes are very

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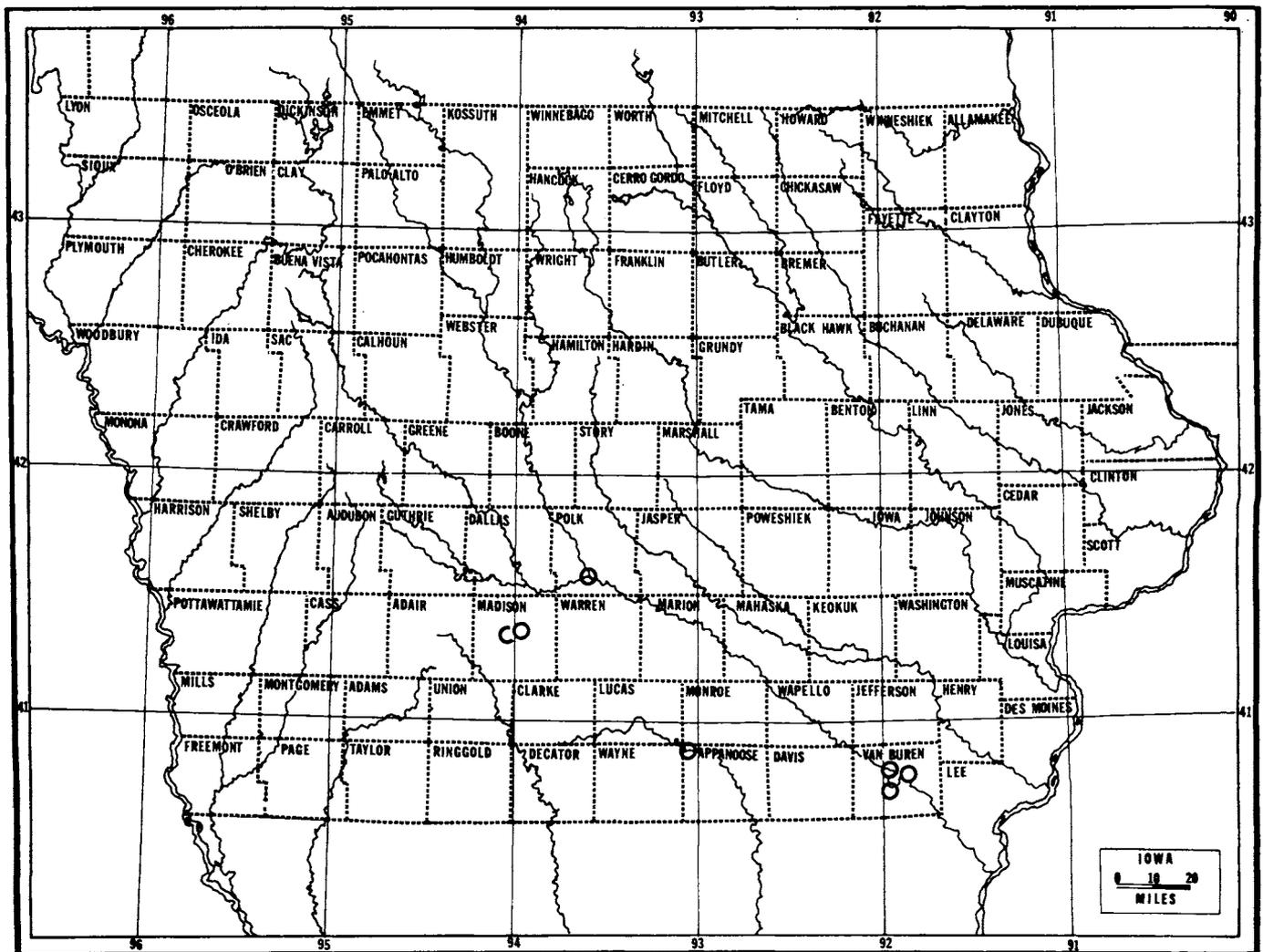


Figure 1. Localities for western earth snakes (*Virginia valeriae elegans*) in southern Iowa. Specimens from Madison County are near the Middle River (not shown) in the Des Moines River drainage.

secretive. Edgren and Ward (1952) found a specimen in a shrub-covered abandoned field in Indiana.

Judging from these observations, the range of this species in Iowa may be limited by the absence over a large geographic area of a combination of loose stones on the soil surface, timber and flowing streams. The fact that the Polk and Madison County localities constitute the northernmost records for the species nation-wide and that other localities are rather sparse north of central Missouri, Illinois, and Indiana may indicate that temperature or growing season also limits Iowa distribution, especially when habitat is not ideal. It can be expected that further clearing of timber to produce grazing land in southeastern Iowa will further limit the range of this animal within the state.

VARIATION

The earth snakes from Iowa now available for study come from two geographic areas. Nine adult specimens are from Van Buren and Appanoose counties in southeastern Iowa.

One of these produced seven young which also reflect the range of variation in that part of the state. Six specimens, one partially digested juvenile and five adults, are available from Madison and Polk counties in southcentral Iowa. Variation in the adults from these two areas is presented in Table 1. This table also compares the characters of the grouped adults with those of the litter of offspring and its female parent.

The following characters were examined in this study: total length, tail length, tail length divided by total length, width of head (greatest width of head anterior to posterior edge of parietal scales), keeling of scales on anterior 1/3 of body, keeling of scales on posterior 1/3 of body, number of dorsal scale rows anterior (counted one head-length posterior to head), mid-body, and posterior (counted one head-length anterior to anus), number of ventral scales (Dowling count), number of subcaudal scales (excluding terminal spine), condition of anal plate (single or divided), presence of apical pits on scales, number of supralabial scales, number of infralabial scales, number of preocular scales per side, presence of loreal scales, number of internasal scales, number of nasal

TABLE 1. A COMPARISON OF SOUTHEASTERN AND SOUTHCENTRAL IOWA POPULATIONS OF *Virginia valeriae elegans* WITH A LITTER OF SEVEN YOUNG AND ITS FEMALE PARENT\*

		Total Length (mm)	Tail Length: Total Length	Ventral Scales	Subcaudal Scales	Anterior Dorsal Scales	Supralabial Scales	Infralabial Scales
Madison and Polk Country Adults	R	180-301	.152-.211	124-128	31-45	17-17	12-14	9-13
	$\bar{X}$	230.6	.183	126.2	38.8	17.00	12.40	11.40
	N	5	5	5	5	5	5	5
Appanoose and Van Buren County Adults	R	183-285	.133-.223	118-132	30-43	16-17	11-12	8-13
	$\bar{X}$	221.4	.186	125.4	39.1	16.89	11.89	11.11
	N	8	8	8	8	9	9	9
Litter	R	93-100	.160-.202	120-131	32-43	15-17	11-12	10-12
	$\bar{X}$	97.3	.186	124.3	40.0	16.71	11.86	11.28
	N	7	7	7	7	7	7	7
Parent of Litter (Van Buren County)	—	285	.133	132	30	17	12	12

\* The parent of the litter is included in the Appanoose and Van Buren County sample.

scales per side, number of prefrontal scales, number of parietal scales, frontal scale length, distance from anterior tip of frontal scale to anterior-most portion of the rostral scale, presence of dark spots on head and neck, and presence of dorsal light stripe. Most of these characters were used by Blanchard (1923) and all were used by Pisani and Collins (1971) in their studies of *Virginia*. The characters appearing after examination to show the greatest meaningful variation are presented in Table 1 or are discussed further.

Males and females are lumped in the calculations for Table 1 even though some characters (total length, tail length, number of ventral and subcaudal scales) tend to differ between the sexes (see Blanchard, 1923, and Pisani and Collins, 1971). This was done because the sex of one of the damaged specimens and most of the juveniles was not determined with certainty. Among the eight undamaged adults from Van Buren and Appanoose counties, seven were males and one was female. Of the five undamaged adults from Polk and Madison counties, four were males and one was female. Data from the partially digested Madison County juvenile are not included in Table 1.

Variation within most of the characters examined was strikingly small. There was no variation in any of the following characters: number of mid-body and posterior dorsal scale rows (17 in all specimens), condition of anal plate (divided in all specimens), presence of apical pits (always absent), number of internasal scales (always two), loreal scales (always present), nasal scales (two on each side in all specimens), number of prefrontal scales (two in all specimens), dark spots on head and neck (always present), and distinct dorsal light stripe (always absent). Blanchard (1923) mentioned that the dorsal light stripe may be present or absent and that the head is uniformly dark above or slightly mottled with black. All the freshly captured Iowa specimens examined were tan to reddish-brown dorsally with an immaculate white belly. They were without markings after preservation except for the few small, black spots on the head and neck. One specimen had a faint dorsal light stripe when alive (Bailey, personal communication).

Slight variation was observed in the following characters

but found not to be correlated with geographic locality: width of head (varied with body length), keeling of anterior body scales (weakly keeled on only one of the litter of young and not keeled on any of the adults), keeling of posterior body scales (weakly keeled on all of the litter but not on their parent; weakly keeled on 10 of the 12 other adult snakes where this character could be examined), preocular scales (absent on all snakes except two; one of the litter had one right preocular and one adult had two preoculars on each side), frontal scale length and frontal-rostral length (varied with length of snake only).

In summary, Table 1 and the foregoing observations indicate no consistent differences between the two Iowa populations studied. Variation is so small that this is implied even though sample sizes are too small for meaningful statistical tests to be applied. The small range of variation is reflected in the litter of seven young. In all instances in Table 1, except infralabial scales and total length, the means for the litter of young were equal to or between the means for the two adult populations. The variation in Iowa fell within the combined ranges observed by Pisani and Collins (1971) and Blanchard (1923) and were approximated by the characters described for the holotype by Pisani (1972). The characters for *Virginia valeriae elegans* in Iowa are typical for the subspecies as reported elsewhere with the exception that Iowa specimens uniformly lack a distinct light dorsal stripe and all other body markings except the small black spots on the head and neck, the latter a feature uniformly present.

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