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In his treatise on the morphology of ringneck snakes, Blanchard (1942) described the distribution of the two subspecies of ringneck snakes in Arkansas [Mississippi ringneck *(D. punctatus stictogenys)* and prairie ringneck *(D. punctatus arnyi)*] as being "south of the Ozark uplands. . ." and "the higher parts of Arkansas", respectively. Blanchard drew his conclusions based on only a very limited sample (n = 11) of these snakes from Arkansas. Since then, range maps, beginning with one by Wright and Wright (1957) and followed by those of Conant (1958, 1975) and Conant and Collins (1991), have generally followed Blanchard by separating the two subspecies along a boundary which generally splits the two natural physiographic regions of the state into the Mississippi Delta and Gulf Coastal Plain (the lowlands) and the Interior Highlands (Ozark Mountains in the north and the Ouachita Mountains in the south). As a rule, this boundary between natural divisions does not prevent range extensions between the two regions by most terrestrial snakes. However, exceptions include the ranges of a few highly aquatic snakes of the lowlands as illustrated by Conant and Collins (1991) [e.g., the western mud snake *(Farancia abacura reinwardtii)* and the broad-banded watersnake *(Nerodia fasciata confluens)*]; these snakes are not distributed into the highland region and are presumably limited by the abrupt rise in relief features at the edge of the highlands (Fig. 1).

The present study was initiated to gather morphological data on a large sample of ringneck snakes in order to update the distribution of *D. punctatus* in the state. This investigation examined morphological features, such as scale counts and ventral spotting pattern, which have traditionally been used to separate the two subspecies in the state as well as in other parts of the species' range (Gehlbach, 1974; Conant and Collins, 1991).

A total of 252 ringneck snakes was examined during this study. Most of the specimens were collected since 1984 and have been housed in the Arkansas State University herpetological collection. All snakes were sexed; the snout-vent length (SVL) and tail length were measured to the nearest mm. Meristic data of selected scutellation features were obtained from most snakes. For example, the number of dorsal scale rows on all snakes was counted at two regions of the body; i.e., near the neck and at midbody (Gehlbach, 1974). Another count at a third body region, just anterior to the vent, was also conducted on some specimens. The number of ventrals and subcaudals was derived from a subsample of adult snakes; the ventral spotting pattern in each specimen was noted. Mean values of various scale counts are accompanied by ± one standard deviation.

Ventral spotting pattern.––Compared to Mississippi ringneck snakes, prairie ringneck snakes in Arkansas possess a highly variable ventral spotting pattern. This feature was dramatically illustrated as six different types in a localized Kansas population of *D. p. arnyi* (Fitch, 1975). On the other hand, *D. p. stictogenys* is less variable and usually possesses a double row of ventral spots which extend the length of the body. Because the double row of belly spots can occur in either subspecies, this character was mostly ineffective as a reliable diagnostic character in samples from most of northern Arkansas.

Morphometric dimensions and scale counts.––Adult body size in both subspecies of ringneck snakes was mostly similar in the samples examined; females are always larger and longer than males. In the present study the largest specimen, a female *D. p. arnyi* measuring 331 mm SVL, was considerably greater in size than the largest male (270 mm SVL). In *D. p. stictogenys*, these measurements were 284 and 285 mm SVL, respectively. Males possess fewer ventrals than females but have a greater number of subcaudals (Ernst and Barbour, 1989). The average number of ventrals in male and female *D. p. arnyi* was 152.7 ±5.7 (n = 18; range, 144-163) and 160.7 ±6.5 (n = 14; range, 152-175). In *D. p. stictogenys* these scale counts were fewer in number averaging 148.7 ±9.7 (n = 7; range 137-165) and 150.8 ±15.2 (n = 9; range, 122-171), respectively. The average subcaudal count for male and female *D. p. arnyi* was 48.3 ±3.7 (n = 18; range 42-52) and 41.9 ±3.5 (n = 13: range, 36-47), respectively, whereas the same count for a subsample of *D. p. stictogenys* was 49.6 ±5.5 (n = 7; range, 45-50) and 40.1 ±2.2 (n = 7; range, 37-43).

Dorsal scale rows.––The number of dorsal scale rows (i.e., 17-17 for *D. p. arnyi* and 15-15 for *D. p. stictogenys*) was the most useful diagnostic feature that was used to distinguish specimens from Arkansas (Fig. 1); this character has been used in the past by various authors to separate these subspecies (e.g., see Blanchard, 1942; Smith,

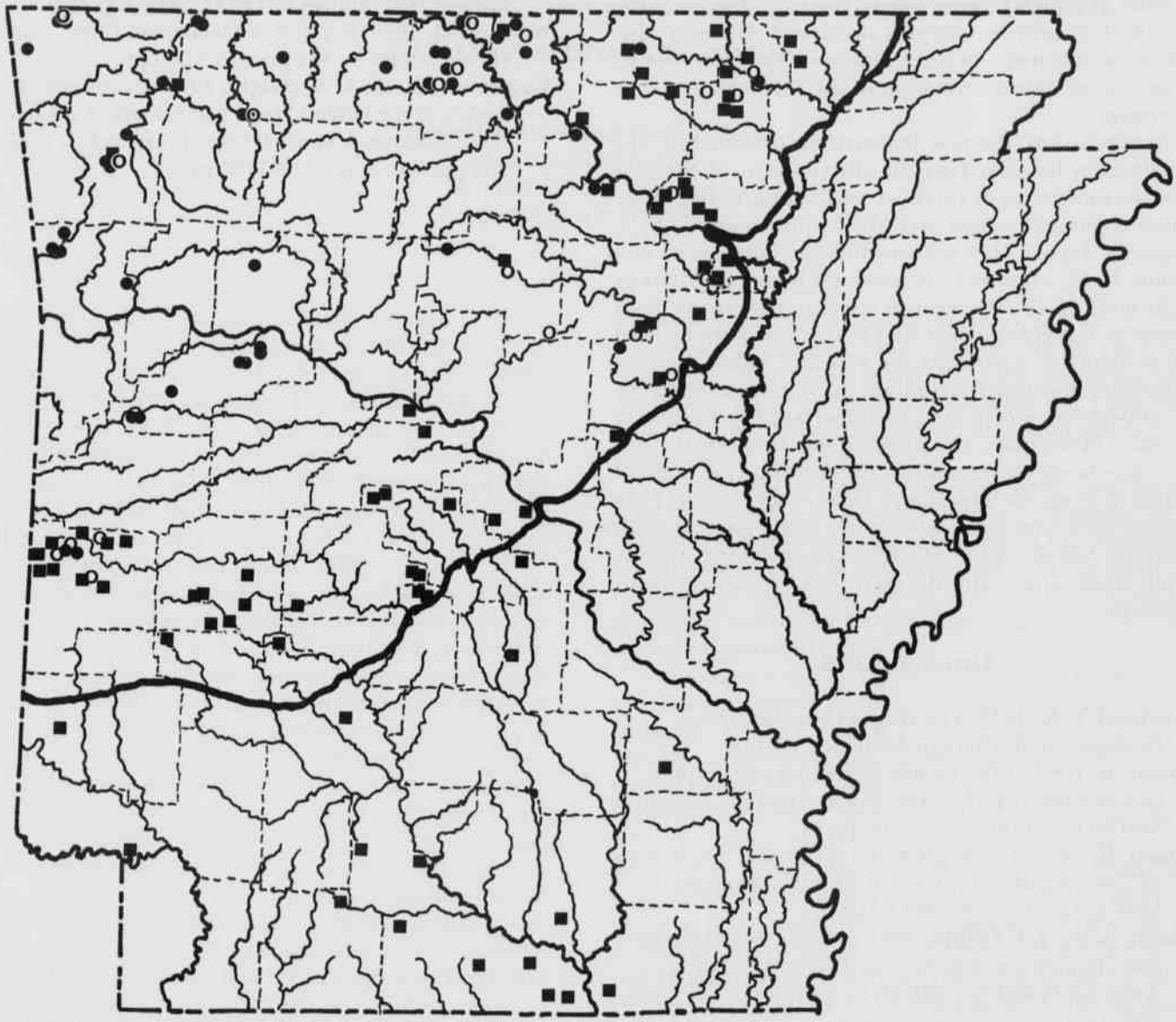

Fig. 1. Distribution of two subspecies of ringneck snake, *Diadophis p. arnyi* and *D. p. stictogenys,* in Arkansas. Solid circles = *D. p. arnyi*, squares = *D. p. stictogenys*, and open circles = *D. p. arnyi* X *stictogenys* intermediate specimens. Bold line extending from the lower left to the upper right in the state represents a boundary line separating the Interior Highlands from the Mississippi Delta and Gulf Coast Plain regions (see text for explanation).

1961; Gehlbach, 1974; Conant and Collins, 1991). Intergrades between the two subspecies possessed intermediate dorsal scale row counts of 15-16 and 16-17.

Region of intergradation and sympatry.––Through the use of dorsal scale row counts, a rather broad region of integradation was determined to exist between *D. p. arnyi* and *D. p. stictogenys* in Arkansas; this region included nearly all of the Interior Highlands (Fig. 1). Previous distribution maps (those mentioned above) have failed to depict this zone; yet, evidence is available to indicate an integradation zone for these subspecies from surrounding states [i.e., for southeastern Missouri (Johnson, 1987), southern Illinois (Minton and Minton, 1948; Smith, 1961), and southeastern Oklahoma (Webb, 1970)]. Webb (1970) mentioned the occurrence of *D. p. stictogenys* in southeastern Oklahoma, but stated that further study was required there to determine its status. In northern Arkansas, much of the Salem Plateau (extending from Randolph County over to Marion County and then south to Independence County) is inhabited by *D. p. stictogenys*. In addition, this subspecies extends northward well into the Fourche Mountains subdivision of the southern

Ouachita Mountains. Surprisingly, even highland populations of *D. p. arnyi* in extreme northwest Arkansas also show some influence by *D. p. stictogenys* (possibly due to its association with an extension of the Salem Plateau into that region).

In conclusion, the new information provided by this investigation has clarified the distribution of the two Arkansas subspecies of ringneck snake (prairie ringneck–*Diadophis punctatus arnyi* and Mississippi ringneck–*D. p. stictogenys).* Typical *D. p. arnyi* exhibit the dorsal scale row formula 17-17, whereas *D. p. stictogenys* is characterized by the formula 15-15. The ventral spotting pattern for both subspecies is highly variable and normally cannot be used with certainty in separating the two taxa within the area of sympatry. General distribution maps have depicted the two subspecies occupying nonoverlapping ranges in Arkansas. Historically, the dividing line between the two races has been the boundary separating the Interior Highlands from the Mississippi Delta/Gulf Coastal Plain physiographic provinces. The results of the present study identify a broad region of sympatry and integradation which does not coincide strictly to physiographic provinces.

Literature Cited

Blanchard, F. N. 1942. The ring-neck snakes, genus *Diadophis*. Bull. Chicago Acad. Sci. 7:1-144.

Conant, R. 1958. A field guide to reptiles and amphibians of eastern and central North America. Houghton Mifflin Co., Boston, xv + 366 pp.

Conant, R. 1975. A field guide to reptiles and amphibians of eastern and central North America. Houghton Mifflin Co., Boston, xviii + 429 pp.

Conant, R. and **J. T. Collins.** 1991. A field guide to reptiles and amphibians of eastern and central North America. Houghton Mifflin Co., Boston, xviii + 450 pp.

Ernst, C. H. and **R. W. Barbour.** 1989. Snakes of eastern North America. George Mason Univ. Press, Fairfax, Virginia, vii + 282 pp.

Fitch, H. S. 1975. A demographic study of the ringneck snake (*Diadophis punctatus)* in Kansas. Misc. Publ. Univ. Kansas Mus. Nat. Hist. No. 62, 53 pp.

Gehlbach, F. R. 1974. Evolutionary relations of southwestern ringneck snakes *(Diadophis punctatus).* Herpetologica 30:140-148.

Johnson, T. R. 1987. The amphibians and reptiles of Missouri. Missouri Dept. Cons., Jefferson City, xi + 368 pp.

Minton, S. A., Jr. and **J. E. Minton.** 1948. Notes on a herpetological collection from the Middle Mississippi Valley. Amer. Midl. Nat. 40:378-390.

Smith, P. W. 1961. The amphibians and reptiles of Illinois. Bull. Illinois Nat. Hist. Surv. 28:1-298.

Webb, R. G. 1970. Reptiles of Oklahoma. Univ. Oklahoma Press, Norman, xi + 370 pp.

Wright, A. H. and **A. A. Wright.** 1957. Handbook of snakes of the United States and Canada. Comstock Publ. Associates, Cornell Univ. Press, Vol. 1, xviii + 564 pp; Vol. 2, ix + 565-1105 pp.