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DISTRIBUTION AND VARIATION OF A NEW SUB-
SPECIES OF WATER SNAKE, *NATRIX CYCLO-
PION FLORIDANA*, WITH A DISCUSSION
OF ITS RELATIONSHIPS¹

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IN examining some specimens of *Natrix cyclopion* from Louisiana, a striking difference in coloration was noted between those and Florida specimens. Reference to data on scutellation of numerous specimens, in the files of Dr. Frank N. Blanchard, indicated a geographic segregation in other features as well between specimens from Florida and those from the Mississippi Valley. Further study of specimens from various museums confirmed the suspicion that this species occurs in two distinct geographic races. The name *cyclopion* must be restricted to the western form, which thus becomes *Natrix cyclopion cyclopion*; for the other I propose the name

Natrix cyclopion floridana, new subspecies

DIAGNOSIS.—Similar to *Natrix cyclopion cyclopion* (Duméril and Bibron) in having the eye separated from the upper labials by subocular scales but with the following distinctive differences: belly dominantly white or yellowish in-

¹ Contribution from the Department of Zoology of the University of Michigan.

stead of dominantly brown as in *cyclopion*; scale rows usually 29 in males and 31 in females, instead of 27 and 29, respectively, in *cyclopion*; subcaudal scutes average 82 in males and 73 in females, as contrasted with 73 and 64, respectively, in *cyclopion*; tail length divided by total length averages .269 in males and .249 in females, as contrasted with .249 and .225, respectively, in *cyclopion*; ventrals for males and females together average 137, as contrasted with 142 in *cyclopion*; lateral bars average 52, compared with 45 in *cyclopion*. Detailed differences are shown in Table I on page 4.

TYPE SPECIMEN.—Museum of Zoology, University of Michigan, No. 77229, adult female, collected near Leesburg, Florida, at the Alsa-Brook Prairie between Lake Griffin and Lake Yale by a collector for Ross Allen, March, 1935. Paratypes: Museum of Zoology, University of Michigan, Nos. 57066, 57376, 57387, 75644, 75645, 77230, 77231, 77232, 77233, 77234; Museum of Comparative Zoology, Nos. 44, 14805, 14807, 14809, 14810, 22670, and 38577; United States National Museum, Nos. 72590, 83440, 84272, 85268, 85269; Charleston Museum, Nos. 33.53.2, 33.53.3, 33.63.2; Carnegie Museum, Nos. 2113, 2125, 8367; Toledo Zoological Society, No. 26 and *cyclopion* specimens D, E, and F; Frank N. Blanchard's collection, Nos. 384, 385, 386, 387, 388; and C. C. Goff's collection 1, 3, 4, 5.

Four specimens (Nos. 3466, 8221, 8589, 8590) from the Field Museum of Natural History were examined by Karl P. Schmidt, and data obtained by him were used in this study.

DESCRIPTION OF TYPE SPECIMEN.—Upper labials, 8; lower labials, 12 on left side, 13 on right; oculars, 4 on left side, 5 on right; anterior temporals, 2 on left side, 3 on right; nasal divided; internasals, 2; prefrontals, 2; frontal, 1; parietals not reduced; rostral wider than high; ventrals, 135; caudals, 71; scale rows, 31-31-29-27-25-23-21.

Total length, 1054 mm.; tail length, 239 mm.; tail length 22.7 per cent of total length.

The ground color is greenish brown. Above is a pattern of blackish, transverse bars, one scale or less in width and two or three scales apart, which alternate (and in some cases con-

nect obliquely) with similar bars on the upper part of the sides. Some of these lateral bars connect obliquely with a similar set of bars still lower on the sides, forming in all a rather complex pattern. Many of the lowest bars are formed by one or two rows of brown scales, some of which have patches of black on their anterior margins. Between the lower bars the color is a gray-green up to the seventh scale row, where it blends into the ground color on the back. The pattern is very obscure anteriorly. The head is uniform greenish brown above, lighter on the lower part of the upper labials, and yellowish beneath. The ventrals are whitish, stippled with gray and brown on their outer and anterior margins, especially on the posterior ventrals. The caudal scutes are gray, each with a white spot which sometimes covers half the area of the scale.²

COMPARISON OF *FLORIDANA* WITH *CYCLOPION*.—The most striking difference in appearance between the two forms of *cyclopion* is in the belly color. In *floridana* the belly is predominantly whitish or yellowish. The ventrals, especially the posterior ones, may have dark markings on their lateral and anterior edges, but they are mostly light in color. The caudals may often have more than half of their area covered with gray or brown, but they are never deeply colored. In *cyclopion*, on the other hand, the posterior two-thirds of the body is predominantly dark brown, generally with white or yellow semicircular markings on each ventral, the posterior edge of the ventral forming the straight edge of the marking.

Although the summary in Table I shows the two forms to be markedly distinct in some features, even in these the extremes of variation overlap. This leads one to suspect intergradation where the ranges meet. Specimens from this area are not at hand, but it seems probable that such will be found between Mobile, Alabama, and Leon County, Florida. A specimen from Beachton, Georgia, although typical of *flori-*

² A photograph of a specimen of this subspecies may be found in R. L. Ditmars' *The Reptile Book* (1908), Pl. 78, under the name of *Tropidonotus cyclopium*.

TABLE I
COMPARISON OF DIFFERENTIAL CHARACTERS IN THE TWO SUBSPECIES

Character	Subspecies	Males			Females		
		No. of specimens	Extremes	Averages	No. of specimens	Extremes	Averages
Maximum number of scale rows	<i>cyclopion</i>	34	27-30	27.5	40	28-33	29.6
	<i>floridana</i>	15	29-31	29.3	37	29-33	31.3
Caudals	<i>cyclopion</i>	30	68-78	72.9	35	57-70	64.3
	<i>floridana</i>	12	80-84	82.2	20	69-78	73.1
Tail length % of total length	<i>cyclopion</i>	28	23.9-26.4	24.9	35	19.9-24.9	22.5
	<i>floridana</i>	11	25.2-30.3	26.9	19	20.2-23.2	24.4
Males and females							
Ventrals	<i>cyclopion</i>	No. of specimens		Extremes		Averages	
	<i>floridana</i>	73		136-148		141.7	
Lower labials	<i>cyclopion</i>	54		132-142		136.8	
	<i>floridana</i>	74		10-13		11.8	
Lateral bars	<i>cyclopion</i>	52		11-14		12.5	
	<i>floridana</i>	38		41-50		44.7	
		20		49-57		52.4	

dana in the other scale counts, is the only female of this form with 29 rows of dorsal scales. One specimen from Gainesville is a typical *cyclopion* in all respects, so that it cannot be considered an intergrade, but from its unexpected locality it must be regarded as in need of verification and its locality is therefore not shown on the distribution map.³

RANGE AND HABITAT.—Specimens and published records show the new subspecies to occur throughout peninsular Florida, northwest to the vicinity of Tallahassee and north-

³ This specimen (Museum of Zoology, University of Michigan, No. 57032) is a female with 29 scale rows, 141 ventrals, and 64 caudals: the tail is 22.5 per cent of the total length; and the ventral coloration is predominantly brown. Other specimens from Gainesville are typically *floridana*.

east along the coast to Gough, Berkeley County, South Carolina. The specimen from Beachton, in southwestern Georgia, while best referable to this form, is somewhat intermediate between it and *N. c. cyclopion*.

The subspecies *cyclopion* is a Mississippi Valley form. It is known from Mobile County, Alabama, west through Louisiana, and north through the lowlands to southern Illinois. The single record for Texas needs verification, but it is reasonable to expect the subspecies along that coast. The known locality records for both forms are shown on the map. Samuel Garman (1883) included Ohio within the range, evidently basing this on two specimens in the Museum of Comparative Zoology, both numbered 163 and entered as collected by J. Clark. No other records for this state have been given nor has the species been reported from Indiana or Kentucky. Roger Conant, who has collected extensively in Ohio and especially in the southwestern part where the form would be most likely to occur, believes that it does not exist in the state. It is evident that further material is needed to establish Ohio as a locality.

As may be noted from the map, locality records for this species are relatively few. It seems to be of more restricted habitat than most forms of *Natrix*. Brown (1901) states that it is found, but not plentifully, up the Mississippi. Strecker and Frierson (1926) note that it appears to be confined to certain local environments. When the habitat is mentioned in literature, it seems that in all instances the species has been taken in sluggish streams, lakes, or ponds. Viosca (1924) refers to it as widely distributed throughout Louisiana; Allen (1932) finds it common in the swamps and brackish marshes of southern Mississippi; and Van Hyning (1933) considers it common in Alachua County, Florida. In a letter concerning its distribution in South Carolina, E. B. Chamberlain considers that it is probably confined to the coastal section and that in that region it has been found only in the open rice fields. It thus appears to reach its greatest abundance in regions of quiet water.

The subspecies *floridana* has been taken in the following localities: Gough, Berkeley Co., South Carolina; Beachton, Grady County, Georgia; Leon County, Gainesville and Micanopy, Alachua County, Eureka, Marion County, Alsa-Brook Prairie, Eustis, and Leesburg, Lake County, Inverness, Citrus County, Oakland, Orange County, Pasco County, Sebastian, Indian River County, La Belle, Henry County, Kremer Island and Palm Beach, Palm Beach County, and Hialeah, Lemon City, and Miami, Dade County, Florida.

The subspecies *cyclopion* has been taken at Bluff Lake, Union County, and Olive Branch, Alexander County, Illinois; Reelfoot Lake, Obion County, Tennessee; Butler and Dunklin counties, Missouri; Pulaski County, Arkansas; Gueydan and Abbeville, Vermilion Parish, Avery Island, Iberia Parish, New Orleans, New Orleans Parish, Louisiana; Black Bayou, Victoria County, Texas; Biloxi, Harrison County, Mississippi; and Mobile, Mobile County, and Tuscaloosa County, Alabama.

VARIATION.—In *floridana* an interesting geographical variation appears in an apparent tendency for a number of specimens from the southern part of Florida, specifically from the region about Miami, to have no, or very faint, dark markings on the ventral surface, and even on the caudal scutes. Two live specimens observed had the greenish ground color replaced by a copper-brown. I was informed that another preserved specimen had the same appearance in life. Two others I suspect of having been similarly colored. Greenish specimens change very little in preservation, but the copper-brown ones tend to fade to a certain extent, causing the general ground color to be lighter and the crossbars to appear darker by contrast. It is evident that more material is needed from the extreme southern part of the state to determine the constancy of this variation. It would be best, therefore, to have records of the color before the specimens are preserved. Aside from the color variations the form seems very constant in the characters studied.

Natrix cyclopion cyclopion was first described by Duméril and Bibron (1854) under the name of *Tropidonotus cyclopion*.

The type specimen was from New Orleans, and was described as having the following scale counts and proportions: scale rows 29, ventrals 144, caudals 65, upper labials 7, and tail 21 per cent of the total length. According to the description the specimen was probably a female and is typical of the form here treated as a subspecies except in the number of labial plates. Of 74 specimens examined none had 7 upper labials, 3 specimens had 9 on one side, all others 8. There is a slightly greater variation in *floridana*. In 52 specimens 2 had 7 on one side, 2 had 9 on each side, 3 had 9 on one side, and all others had 8. The number 7 in the original description of *cyclopion* may have been an error or a misinterpretation.

In *cyclopion* as in *floridana* features of geographical variation deserve mention. Of 9 males from the northern part of the range (Illinois, Missouri, and Tennessee), 4 had only 25 rows of scales on the anterior part of the body, and the other 5 had 27. In Louisiana of 10 males only 1 had 25, 1 had 26, and the other 8 had 27. This is too small a number on which to base any conclusions, but it may show a possible tendency for a reduction in size in the northern part of the range. The specimens from Texas had the highest number of scale rows of the *cyclopion* group. Of the 8 males from there 1 had 30, 3 had 29, and 4 had 27 rows. Of the 26 males from the other areas only 4 had as high as 29. Of the 12 females from Texas 1 had 33 scale rows, 5 had 31, and 1 had 30, leaving only 5 with 29 rows. Of the other 27 females of *cyclopion* only 5 had 31 rows, while 20 had 29, and 2 specimens had only 28. The number of lateral bars and caudal scutes in the Texan specimens averages a little higher than the others and the ventrals slightly fewer. In these respects they approach more closely the Floridan form than do specimens from the Mississippi Valley.

RELATIONSHIPS.—From this study some information as to the relationships between these two forms may be gained. Since they are evidently very closely related, so close as to leave scant reason for regarding them as separately derived from a third form, only the possibility of one being a deriva-

tive of the other has to be considered. The coloration of the ventral surface seems to give evidence on this question. In *cyclopion* the dark pattern is present on the posterior two-thirds of the length. In *floridana* this same pattern is found distinctly only on the tail, on the posterior ventrals it is sometimes present indistinctly. In some specimens from southern Florida even the tail pattern is very indistinct, and it may be absent. From these facts it would seem that either the coloration in *floridana* may be interpreted as due to a fading of the dark pattern of *cyclopion* or that this pattern developed first very faintly on the tail and, having become intensified, spread forward until the greater part of the ventral surface was covered. The change by fading appears far more plausible. This indicates the derivation of *floridana* from *cyclopion*. Supporting this view is the essentially peninsular distribution of *floridana*, combined with the fact that the palest specimens are farthest south.

If on the basis of coloration and geographical distribution *cyclopion* is accepted as ancestral to *floridana*, it must be determined if any other factors conflict with this. The larger form seems to be *floridana* as indicated by measurements of specimens and by the greater number of scale rows. This is the same type of variation found by Blanchard (1921) to characterize the king snake, *Lampropeltis getulus floridana*, a derivative of *L. getulus getulus*. In the king snake, too, the number of dorsal bars increases as it does in *N. cyclopion floridana*. Other differences shown in Table I seem to have no bearing on the question of direction of relationship.

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PLATE I

Locality records for *Natrix cyclopion cyclopion* (squares) and *N. c. floridana* (circles). Localities of specimens used in this study are indicated by solid symbols, literature records that are apparently authentic are represented by hollow symbols, and type localities by inclosed symbols.

A NEW SUBSPECIES OF WATER SNAKE

PLATE I



