

OCCASIONAL PAPERS OF THE MUSEUM OF
ZOOLOGY

UNIVERSITY OF MICHIGAN

ANN ARBOR, MICHIGAN

UNIVERSITY OF MICHIGAN PRESS

THE SUBSPECIES OF *SISTRURUS MILIARIUS*¹

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SEVERAL authors have commented upon variations in *Sistrurus miliarius* from different parts of the range of the species but no one appears to have assembled enough material for a thorough comparative study. During the past few years, along with studies of other crotalid snakes, I have given considerable attention to the genus *Sistrurus*. Over 300 specimens of *S. miliarius*, all of the available material known to me in various collections in the United States, have been examined. On the basis of data obtained from this series it became apparent that examples from localities west of the Mississippi River differ from specimens from Florida in coloration, pattern, and certain structural characters, and that representatives from the Carolinas exhibit comparable differences from those of each of the other two regions. Furthermore, these differences appear to maintain a fair degree of constancy over appreciable areas, and intergrading individuals occur in intermediate geographical localities. From these considerations, it seems that *miliarius* is represented by three distinct geographic races: one in Florida and the lower southeastern Coastal Plain; another in the Carolinas and the higher Coastal Plain of Georgia and Alabama; and a third west of

¹ Contribution from the Zoological Laboratory of the University of Michigan.

the Pearl River Valley of Mississippi, in Louisiana, Texas, Oklahoma, Arkansas, and southeastern Missouri.

I therefore suggest that the name *miliarius* be restricted to the subspecies of the Carolinas, and that the other two forms be recognized under the new names proposed below.

A discussion of variation, distribution, and relationships, together with a review of the literature and acknowledgments to the many institutions and individuals who have been of assistance in various ways, is included in a forthcoming paper.

Sistrurus miliarius barbouri, new subspecies

DIAGNOSIS.—The most striking characteristic of this form is its generally dark coloration which alone is usually sufficient to separate it from either of the other 2 subspecies. Other distinctive characters are the obscure head pattern, 3 rows of dark blotches on each side of the main series, and the white ventral surface heavily blotched or distinctly spotted with black or very dark brown. It also has a higher average number of ventrals (5 to 10) than either of the others, and differs further from the western form in having the scale row formula 25-23-17 instead of 23-21-17.

TYPE SPECIMEN.—Museum of Comparative Zoology, No. 12512, adult male, collected at Royal Palm Hammock, 12 miles west of Homestead, Dade County, Florida, by Dr. Thomas Barbour in 1919. Paratypes: Museum of Comparative Zoology, Nos. 12509, 12510, and 12511, from the same locality.

DESCRIPTION OF TYPE.—Top of head flat, covered by 9 shields: 2 internasals, 2 prefrontals, frontal, 2 supraoculars, and 2 parietals which are recurved at the posterolateral borders. The rostral is higher than wide, truncate at the top. The 2 preoculars, the lower of which is divided vertically, are separated from the postnasal on each side by a single high loreal which is in broad contact above with the prefrontal. The lower edge of the loreal forms the antero-dorsal border of the maxillary pit. There are 4 postoculars and 1 large anterior subocular on each side. The supralabials are 10 on each side, the third and fourth separated from the orbit by 1

scale, the anterior subocular. The scales of the lowest row of temporals are smooth, those of the upper rows keeled. There are 10 infralabials on each side, the first pair meeting in a long median contact behind the mental. One pair of chin shields, about $1\frac{1}{2}$ times as long as broad, followed by 4 pairs of median gular scales. The first ventral scute is separated from the posterior infralabials by 5 rows of lateral gulars. Dorsal scale rows 25 a short distance back of the head, 23 at mid-body, and 17 just anterior to the tail; all rows are keeled at mid-body. Ventrals 143, caudals 36, the distal 4 divided. Anal plate not divided.

Total length 493 mm.; length of tail 63 mm. The rattle is composed of an incomplete set of four segments about equal in size.

Dorsal ground color brownish gray, densely stippled with brownish black. Top of head, rostral, nasals, loreals and preoculars brownish black. Upper labials almost all black; mental and lower labials white blotched with black. A blackish brown, light-edged stripe about 3 scales wide extends from the eye to the back of the head, 3 scales posterior to the angle of the mouth. A pair of elongate black blotches in the occipital region. A mid-dorsal series of 34 subovate black blotches from neck to base of tail. Anteriorly the individual blotches are narrowly outlined with white; posteriorly the edges are indistinct. Three lateral series of grayish black blotches on each side. The spots of the uppermost lateral series are less distinct and alternate with those of the mid-dorsal row; some of them extend across the midline as faint crossbands. The spots of the mid-lateral row are more conspicuous and are opposite those of the mid-dorsal series. The blotches of the lowest lateral row alternate with those immediately above and lie partly on the edges of the ventral scutes. The mid-dorsal stripe of reddish brown, which is conspicuous in some individuals of this species, is represented in the type specimen by a few bright brown scales between the occipital blotches and between the spots of the neck and anterior portion of the body. The dorsal pattern of the tail consists of 9 brownish black blotches broadening

into crossbands and becoming lighter in color posteriorly. Ventral ground color of body and tail cream, heavily blotched and stippled with deep brownish black.

Paratypes Nos. 12509 and 12511 are similar to the type in coloration, but a few of the anterior blotches of the mid-dorsal series are divided medianly, the halves alternating with one another. No. 12510 is more intensely colored and is a particularly handsome specimen. The ground color of dark grayish brown is densely stippled with dark gray. The mid-dorsal reddish brown stripe is very conspicuous between the brownish black spots of the dorsal series. The dark blotches of the main series are narrowly outlined with white and toward the posterior part of the body expand laterally, connecting with the spots of the mid-lateral series to form crossbands. The ventral surface is white with large, distinct spots of deep brownish black.

RANGE.—This form inhabits the lower Coastal Plain of the southeast from southern South Carolina and southern Georgia, throughout Florida, and west along the Gulf Coast, to the Pearl River Valley of Mississippi. It intergrades with *Sistrurus miliarius miliarius* near Charleston, South Carolina, and perhaps in other localities in Georgia and Alabama, and with the western race between Biloxi, Mississippi, and the eastern boundary of Louisiana.

This subspecies is named for Dr. Thomas Barbour in consideration of his many contributions to the herpetology of Florida.

Sistrurus miliarius streckeri, new subspecies

DIAGNOSIS.—The smaller number of anterior scale rows, 23–21–17, will separate most specimens of this subspecies from *miliarius* and *barbouri* each of which normally has 25–23–17. The pattern is distinct and very irregular: the blotches of the mid-dorsal series are conspicuously wider than long; there are but 1 or 2 series of spots on the sides, those of the mid-lateral series are usually higher than wide; the dark pigment of the ventral surface is diffuse, and the ventral blotches are usually not wider than 1 scute. The average number of ventrals is lowest in this form.

TYPE SPECIMEN.—Museum of Zoology, University of Michigan, No. 76751; adult male. Collected near Imboden, Lawrence County, Arkansas, by B. C. Marshall. Paratype, Museum of Zoology, University of Michigan, No. 76752; adult male, same locality.

DESCRIPTION OF TYPE.—Crown covered by 9 plates, arranged symmetrically: a pair of internasals, a pair of prefrontals, a single 5-sided frontal, a pair of supraoculars, and a pair of parietals. Rostral higher than wide, apex truncate. Canthus rostralis distinct; edges of prefrontals, frontal, and parietals recurved. Nasals 2 on each side with nostril in suture between, anterior larger. Preoculars 2, the lower divided by a median vertical suture. Loreals 1 on each side, each almost as high as postnasal, in contact with prefrontal, and completely separating postnasal from preocular. Orbit separated from third and fourth supralabials by 1 large anterior subocular, and from the fourth and fifth supralabials by 2 scales the upper of which is very small. Postoculars 5 one each side. Supralabials 11 on the left side, 10 on the right. Infralabials 11 on each side. Temporals keeled, except those of the lowest row. First pair of infralabials in broad contact at the mid-line immediately posterior to the tip of the mental. One pair of chin shields, each about twice as long as wide. Four transverse rows of median gulars; first ventral scute separated from posterior infralabials by 5 rows of lateral gulars. Dorsal scale rows 23–21–18, all strongly carinate except those of the lowest row of each side on which the keels are faint. Ventral scutes 126; anal plate not divided; subcaudal scales 33, the last 2 divided.

Total length 535 mm.; length of tail 68 mm. Rattle incomplete, consisting of 3 segments.

Dorsal ground color of fresh specimen in alcohol pale grayish brown, lightly stippled and flecked with brown. Top of head with irregular brown blotches on internasals and prefrontals, a wide transverse bar of pale brown on frontal and supraoculars, and a pair of undulating stripes extending backward from the posterior edges of the supraoculars to the neck. An

indistinct vertical brown streak in the middle of the nostril; a brown spot on the nasal scales above nostril. A conspicuous cheek stripe of dark brown extends from the orbit to the angle of the jaw, and beneath this is a white line from below the orbit to the last supralabial. Supralabials stippled with brown, more densely posteriorly. Mental, infralabials, chin shields, and gulars cream, irregularly stippled, flecked, and blotched with brown.

The body pattern consists of a median dorsal series of dark brown blotches, about 30 in number, some divided and alternating, and 2 lateral series of brown blotches, the lowest of which is less distinct and lies partly on the ventral surface. The blotches of the dorsal series are conspicuously wider than long, with irregular margins, and narrowly outlined with white. An indistinct mid-dorsal stripe of reddish brown, on the scales of the median row and portions of the adjacent rows, extends from the occipital region to the base of the tail. The blotches of the upper lateral series are opposite those of the dorsal series, noticeably higher than wide, and irregularly outlined with white. There are 11 irregular transverse brown bands on the tail.

Ventral surface cream, irregularly blotched laterally with grayish brown. The blotches are variable in size and sharpness, and in the main each is confined to a single ventral scute.

RANGE.—*Sistrurus m. streckeri* ranges from the Pearl River Valley, Mississippi, where it intergrades with *barbouri*, north on the west side of the Mississippi River into southeastern Missouri, and west to central Oklahoma, central and southern Texas. It is not known to occur east of the Mississippi River except in southeastern Louisiana and southern Mississippi.

This subspecies is named in honor of the late Dr. John K. Strecker of Baylor University, Waco, Texas, whose papers on amphibians and reptiles of Texas and Arkansas have filled many gaps in a knowledge of these groups.

With the exception of some individuals from areas of intergradation, the following key will distinguish most representatives of the three subspecies of *Sistrurus miliaris*:

1. Dorsal coloration dark gray to black; ventral surface white, heavily blotched with dark brown or black; head markings obscure; lateral spots in 3 series *barbouri*
- ◆ Dorsal coloration brown or light gray; ventral surface cream, moderately flecked with brown or gray; head markings distinct; lateral spots in 1 or 2 series 2
2. Scale rows usually 23-21-17 (75%); dorsal spots reduced in size, conspicuously wider than long, edges irregular; lateral spots usually higher than wide; pigmentation of ventral surface diffuse, indistinct blotches confined to individual scutes *streckeri*
Scale rows usually 25-23-17 (77%); dorsal spots oval or subcircular, edges more even; lateral spots usually round, not conspicuously higher than wide; pigmentation of ventral surface more restricted to indistinct blotches occupying two adjacent scutes *miliaris*

