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TWO NEW SNAKES, GENUS *GEOPHIS*,  
FROM MICHOACAN, MEXICO

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FIELD work during the summer of 1958 in the mountains in the southern part of the state of Michoacán, México, revealed the presence of two undescribed species of *Geophis*. Both have 15 rows of dorsal scales, a characteristic shared by eight other Mexican species, including the recently described *aquilonaris* (Legler, 1959) and *tarascae* (Hartweg, 1959). One of the new species is characterized by the presence of numerous black cross bands; henceforth it may be known as:

*Geophis nigrocinctus*, new species  
(Pl. I and Fig. 1)

DIAGNOSIS.—A species of *Geophis* with dorsal scales smooth and in 15 rows; differs from other species in this group in having the following combination of characters: no anterior temporal, 161 to 170 ventrals, 41 to 50 caudals, dorsal pattern with many narrow black cross bands on a dull brick-red ground color, and venter cream with black spots.

HOLOTYPE.—University of Michigan Museum of Zoology No. 118841; from Dos Aguas, Michoacán, México (2100 meters), collected by John Wellman, June 18, 1958; original number, WED 12433.

PARATOPOTYPES.—UMMZ 118842 and 118843.

DESCRIPTION OF HOLOTYPE.—An adult male with smooth dorsal scales in 15 rows; ventrals, 163; caudals, 50; upper labials, 6-6, third and fourth enter orbit, fifth largest and in broad contact with parietal; lower labials, 6-6, fourth largest, first pair in contact behind mental, first, second, third, and fourth in contact with anterior chinshield, fourth in contact with posterior chinshield; anterior chinshields half again as long as posterior ones; snout bluntly rounded, not protruding; portion of rostral visible from above equals half the length of internasals, which are rounded laterally and slightly more

than half the length of the prefrontals; prefrontals nearly as wide as long, in contact with eye; frontal as long as parietal suture; supraocular large, half again the size of the postocular; nasal completely divided; loreal nearly twice as long as high; no preocular; one postocular with rounded posterior edge; no anterior temporal; a single small secondary temporal about twice as long as high; a large tertiary temporal; eye large, its diameter greater than its distance from the labial border and equal to one half its distance from the snout; maxillary teeth, 7, long, slender, and only moderately curved backward; posterior to the last tooth, maxillary greatly expanded and laterally compressed. Body length, 289 mm.; tail length, 79 mm.; tail/body ratio, 27.3 per cent.

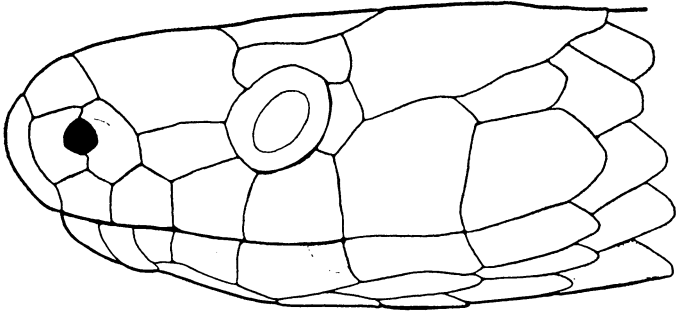


FIG. 1. Head of holotype of *Geophis nigroinctus* (UMMZ 118841)

Hemipenis with two large basal spines laterally; smaller spines arranged in irregular rows around medial part of organ, distal half covered with blunt spinules.

Dorsal ground color dull reddish brown anteriorly, changing to a dull grayish brown posteriorly; 47 black cross bands extend laterally onto first scale row or edges of ventrals; first black band begins immediately behind parietals and extends posteriorly for five scales; it is followed by a cream interspace one scale long; second band, four scales in length; third and fourth, three scales long; each followed by an interspace one scale long; the succeeding bands are two scales in length, except posteriorly where they are reduced to one scale; bands do not become narrower laterally; interspaces of ground color are two or three scales long at midbody and posteriorly; anteriorly, black bands bordered by a narrow cream line; dorsal surface of tail dark grayish brown with many indistinct dark bands; top of head

black, irregularly and faintly mottled with light brown; lower edges of upper labials cream; postlabials and temporals mottled with brownish cream; lower labials and chin cream, irregularly spotted with black; belly cream with squarish black spots irregularly arranged in two longitudinal rows; lateral edges of most ventrals black; under surface of tail colored like belly.

In life the ground color was dull brick red, the bands black, the anterior ones outlined by narrow cream lines. The belly was cream, spotted with black.

VARIATION.—The two paratypes are females with 161 and 170 ventrals, and 41 caudals in the former; the latter has an incomplete tail. One has a body length of 293 mm., a tail length of 63 mm., and a tail/body ratio of 21.5 per cent; the second specimen has a body length of 243 mm. The only significant deviation from the type in scutellation is displayed by UMMZ 118842 which has only five upper labials on each side; the fifth and sixth are fused. The paratypes have 56 and 60 dark cross bands on the body. In both, the top of the head is brown, heavily mottled with black. In the smaller specimen (UMMZ 118843) the dorsal ground color is lighter than that in the holotype; also, the belly is more heavily spotted. In the other individual, the first body band is divided by a median longitudinal cream stripe; the belly has less black spotting than displayed by the holotype.

REMARKS.—The type was found in a rotten pine stump; the others were found beneath logs. The general habitat where these snakes were found consists of extensive pine-oak forest often enveloped in clouds.

The second species has a dark, unicolor dorsum; since it has no trace of a variegated color pattern, it may be known as:

***Geophis incomptus***, new species

(Pl. I and Fig. 2)

DIAGNOSIS.—A species of *Geophis* with smooth dorsal scales in 15 rows and an anterior temporal; differs from only other known species with these characteristics (*maculiferus*) in having two postoculars instead of one, six or seven lower labials instead of five, no light color on snout, and anterior edges of the ventrals dark.

HOLOTYPE.—University of Michigan Museum of Zoology No. 118840; from Dos Aguas, Michoacán, México (2100 meters), one of a series collected by William E. Duellman and John Wellman, June 18, 1958; original number, WED 12437.

PARATOPOTYPES.—UMMZ 118836–118839.

DESCRIPTION OF HOLOTYPE.—An adult male with smooth dorsal scales in 15 rows, faint keels present on vertebral and paravertebral rows in the anal region; ventrals, 150; caudals, 35; upper labials, 6–6, third and fourth enter orbit, fifth largest and in contact with upper postocular, but separated from parietal by anterior temporal; lower labials, 7–7, first pair meet behind mental, first, second, third, and fourth in contact with anterior chinshield, fourth in contact with posterior chinshield; anterior chinshields twice length of posterior ones, which are separated from one another by an azygous scale as large as a posterior chinshield; snout narrowed slightly, rounded, and somewhat protruding; portion of rostral visible from above equal to

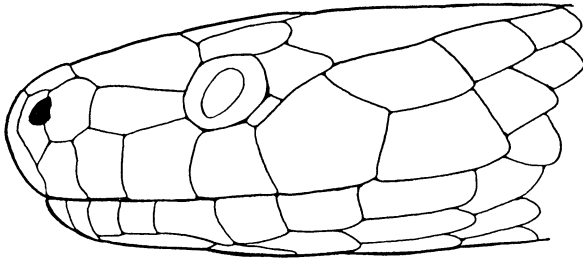


FIG. 2. Head of holotype of *Geophis incomptus* (UMMZ 118840)

length of internasals, which are less than half length of prefrontals; prefrontal in contact with eye; frontal not quite as long as parietal suture; supraocular of medium size, roughly rectangular; upper postocular triangular, nearly as large as supraocular; lower postocular small, rectangular, lying along postero-ventral edge of orbit and in contact with fourth upper labial; nasal completely divided; loreal twice as long as high; no preocular; a rectangular anterior temporal, with its antero-dorsal corner in contact with upper postocular; two large secondary temporals; no tertiary temporals; eye of moderate size, its diameter greater than its distance from labial border and slightly less than one-half its distance from snout; maxillary teeth, 12, subequal in length, and moderately curved backwards; tips of posterior teeth slightly recurved, giving tooth a shallow S-shape; posterior process of maxillary expanded and laterally compressed. Body length, 230 mm.; tail length, 45 mm.; tail/body ratio, 19.6 per cent.

Hemipenis covered with spines, those on basal part moderate in size; distally, spines are smaller and more slender.

The dorsum is olive brown; tips of scales black; dorsal color includes first scale row; ventrals cream, anterior edge of each black; underside of tail black; top of head black; at least lower half of upper labials, all of lower labials, and chin yellow.

In life the dorsum was gunmetal bluish black; the belly was pale yellow with bluish black transverse markings; the labials and chin were yellow.

TABLE I  
VARIATION IN TYPE SERIES OF *Geophis incomptus*

UMMZ Number	Sex	Ventrals	Caudals	Upper Labials	Lower Labials	Postoculars
118837	♂	146	36	6-6	7-7	2-2
118840	♂	150	35	6-6	7-7	2-2
118836	♀	152	34	6-6	7-7	2-2
118838	♀	154	34	6-6	7-6	1-1
118839	♀	154	33	6-6	6-6	2-2

VARIATION.—All of the paratypes are colored like the holotype, although two (UMMZ 118837 and 118839) do not have distinct dark tips on the dorsal scales. In life, the ground color varied from lavender-brown to bluish back or bluish gray; the latter color may have resulted from the imminence of skin shedding. Variation in scutellation is shown in Table I. In those specimens with six lower labials, the third and fourth are fused. In one specimen, only an enlarged upper postocular is present; on the right side, the fifth upper labial enters the orbit. The posterior chinshields are highly variable; in one specimen there are three; in another there is a pair of large scales immediately posterior to the chinshields. In UMMZ 118838, the internasals are reduced and separated by the rostral, which touches the prefrontals. The largest specimen is a female (UMMZ 118838) with a body length of 320 mm. and a tail length of 59 mm. The tail/body ratio in males varies from 19.6 to 20.7 per cent, in females, from 16.9 to 18.8 per cent.

REMARKS.—All specimens were found beneath rocks near the base of an extensive limestone outcropping at the edge of a meadow in pine-oak forest.

#### DISCUSSION

Important characters of scutellation in the genus *Geophis* appear to be (1) the number of dorsal scale rows (15 or 17) and (2) the presence or absence of an anterior temporal. Both of these characters

appear to be relatively constant within a species; which, if either, is more indicative of phylogenetic relationships cannot be determined with any degree of certainty at this time.<sup>1</sup> For the purposes of this discussion, the forms with 15 scale rows are considered as a unit. In México, ten species are recognized; extralimital forms occur in Costa Rica and Panamá.

Only two species (*incomptus* and *maculiferus*) possess an anterior temporal. In other aspects of scutellation these species are also similar; the major differences, as noted in the diagnosis of *incomptus*, are in the number of lower labials and in the presence or absence of a lower postocular; *maculiferus* also has fewer ventrals and caudals than *incomptus*. Both are unicolor, dark above, except for the light snout in *maculiferus*; *incomptus* has dark-edged ventrals whereas the belly in *maculiferus* is unicolor cream. On the basis of the presence of an anterior temporal and the gross similarity in coloration, it is logical to consider these species more closely related to one another than to the others. Both inhabit pine-oak forests; their ranges are separated by the low, arid Tepalcatepec Valley.

Among the species of *Geophis* with 15 dorsal scale rows, *cancellatus*, known only from two females from Chicharras on the Pacific slopes of the Sierra Madre in Chiapas, is distinguished from all others by the absence of internasals and the low number of caudals. It has 6 upper labials, 171 ventrals, 21 to 23 caudals, and 28 to 32 dark cross bands on a cream body (Smith, 1941). Its relationships with other members of the group are not clear; possibly it belongs with the other species having a high number of ventrals and some form of cross bands on the body, namely, *aquilonaris*, *dugesi*, *nigrocinctus*, and *tarascae*. Of these four, *dugesi* is the most distinctive in having 150 to 158 ventrals, one to seven light bands on the anterior half of the body, and a unicolor venter. The others have a greater number of ventrals (*aquilonaris*, 173–183; *nigrocinctus*, 161–170; and *tarascae*, 165–179). With respect to coloration, *tarascae* has a light dorsum with irregular narrow transverse bars becoming indistinct posteriorly, and a row of spots on the belly, whereas *nigrocinctus* has distinct black bands on a reddish brown dorsum and a heavily spotted venter; *aquilonaris* has broad black, and narrow white, rings the length of the body. On the basis of the similarity in scutellation, *aquilonaris*, *nigrocinctus*, and *tarascae*

<sup>1</sup> Of the seven known specimens of *G. aquilonaris*, one has an anterior temporal on one side. A specimen of *G. petersi* (UMMZ 104698) shows, erratically, both 17 and 15 scale rows. Apparently one of the syntypes of *G. chalybeus* has 15 scale rows (Smith, 1941); other known specimens have 17 rows.

appear to be more closely related to one another than to *dugesi*. The recorded localities of *tarascae* and *nigrocinctus* are in montane environments separated by the low, arid Tepalcatepec Valley; *aquilonaris* is known from the barranca region in southwestern Chihuahua. It is possible that *dugesi* may occur sympatrically with *tarascae*.

The remaining three species appear to be the most specialized members of the group. They have small, pointed heads, small eyes, and small supraoculars. Of these species, *petersi* and *sallaei* are similar in many respects; *sallaei* has fewer ventrals, weakly keeled dorsal scales, except those on anterior part of body, and less acutely pointed head than *petersi* (Smith, 1942). Both are unicolor brown above, light below. Contrariwise, *semidoliatus*, the only species of this group in eastern México, has black saddles on a red dorsum.

With the exception of several large series of *semidoliatus*, no more than eight specimens of any of these species are in museum collections. To aid in the identification of *Geophis* with 15 scale rows from México the following key is offered.

1. An anterior temporal present ..... 2  
No anterior temporal ..... 3
2. Belly unicolor light; one postocular; 5 lower labials (southern slopes of Sierra Madre Occidental in Michoacán) ..... *maculiferus*  
Belly cream with anterior edges of ventrals dark; 1 or 2 postoculars; 6 or 7 lower labials (Sierra de Coalcomán, Michoacán) ..... *incomptus*
3. Internasals absent; dorsal color pattern of dark cross bands on cream ground color (Pacific slopes of Sierra Madre in Chiapas) ..... *cancellatus*  
Internasals present ..... 4
4. Snout narrowed; less than 150 ventrals, *or*, if more than 150, dorsal color pattern consisting of black saddles on red ground color ..... 5  
Snout not noticeably narrowed; 150 or more ventrals; color pattern not consisting of black saddles on red ground color ..... 7
5. Dorsum red with black saddles; 5 (sometimes 4) upper labials (foothills of Sierra Madre Oriental from Hidalgo to Oaxaca) ..... *semidoliatus*  
Dorsum unicolor dark; six upper labials ..... 6
6. Ventrals 140 or more; scales smooth; head distinctly narrowed (mountains of central and southern Michoacán) ..... *petersi*  
Ventrals less than 140; scales weakly keeled posteriorly; head moderately narrowed (Pacific slopes of Sierra del Sur in Oaxaca) ..... *sallaei*
7. Ventrals less than 160; dorsum bluish gray with light transverse bands anteriorly; venter unicolor light (Mexican Plateau in Michoacán) ..... *dugesi*  
Ventrals more than 160; coloration not as described ..... 8
8. Color pattern consisting of alternating black and white rings encircling body (Southwestern Chihuahua) ..... *aquilonaris*  
Color pattern not consisting of black and white rings ..... 9

9. Dorsum reddish brown with distinct black bands for length of body; venter heavily spotted (Sierra de Coalcomán, Michoacán) ..... *nigrocinctus*  
 Dorsum light grayish brown with narrow irregular black band-like markings anteriorly; venter with a single row of small spots (southern edge of Sierra Madre Occidental near Uruapan, Michoacán) ..... *tarascae*

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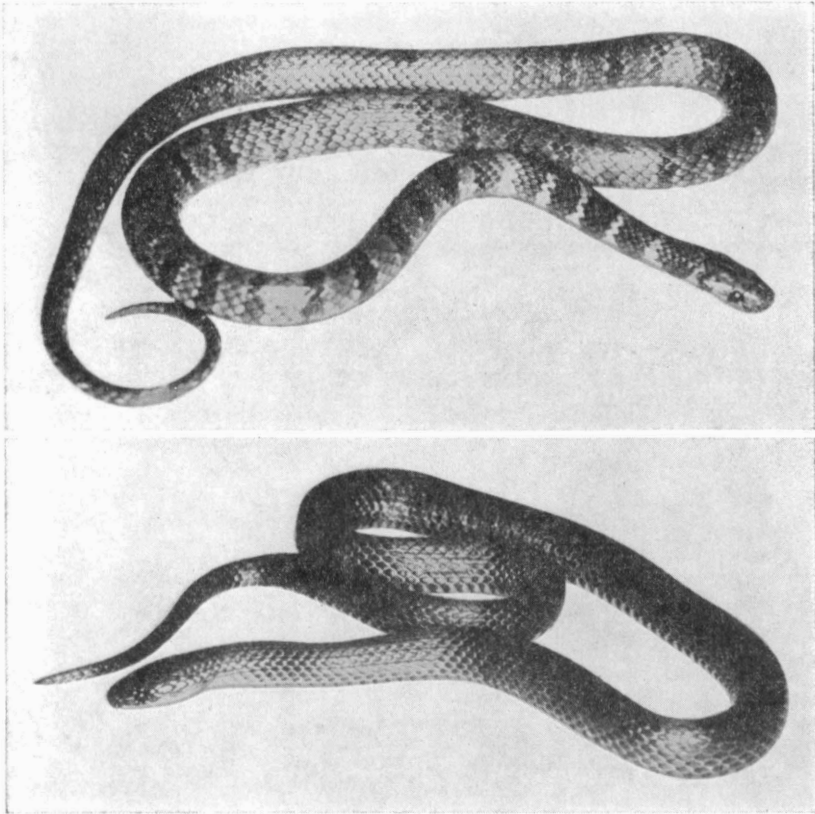


PLATE I

UPPER: Photograph of living specimen of *Geophis nigrocinctus* (now UMMZ 118841).

LOWER: Photograph of living specimen of *Geophis incomptus* (now UMMZ 118836).





