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GENERIC STATUS OF *OPHEODRYS MAYAE*, A COLUBRID SNAKE ENDEMIC TO THE YUCATAN PENINSULA[1]

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Eurypholis (=*Opheodrys*) *mayae* was described in 1936 by Helen T. Gaige on the basis of a single juvenile specimen (UMMZ 73082) from Dzitás, Yucatán, México. She made the generic allocation with reluctance, but concluded that *mayae* more nearly resembled *O. vernalis* (with which *O. aestivus* was not then considered to be congeneric) in general appearance and scutellation than it did members of any other known genus. Gaige also noted that her snake bore some resemblance to the description of *Symphimus leucostomus* (Cope, 1869), but Doris Cochran compared the type specimens and informed her that *S. leucostomus* "has much narrower dorsal scales, a shorter snout, a shorter frontal, longer post-genials and a different color pattern." Hartweg and Oliver (1940) commented on the striking resemblance between *S. leucostomus* and *O. mayae*, but they did not challenge the generic allocation of *mayae*.

When, in assembling material for a study of the cranial osteology of New World *Opheodrys* (Schaefer, 1965), we received a specimen of *O. mayae*,

[1] A preliminary report on this study was presented in 1965 at the meeting of the Southeastern Division of the American Society of Ichthyologists and Herpetologists in New Orleans. Publication has been delayed by the periodic acquisition of additional specimens.

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it was readily apparent that *mayae* differs significantly from *aestivus* and *vernalis*. In attempting to ascertain the generic affinities of *mayae*, we decided to reexamine its resemblance to *Symphimus leucostomus*. Now, after having examined 59 specimens of *mayae* and 14 of *leucostomus*, we conclude that differences between the two species are relatively small and the resemblances considerable. The evidence presented here clearly demonstrates that *mayae* is not a species of *Opheodrys* and should be placed in the genus *Symphimus*.

Analysis of Characters

Color Pattern.—Both *Opheodrys aestivus* and *O. vernalis* have a uniformly green dorsum and a yellow, yellowish white, or yellowish green venter. The color patterns (Fig. 1) of *Symphimus leucostomus* and "*O.*" *mayae* are similar, and differ from that of *Opheodrys*.

The following description of *Symphimus leucostomus* is a composite based on Larry D. Wilson's color notes from a living specimen and our examination of preserved material (the primary changes in preservative are fading of yellows and darkening of the tan to gray brown). The dorsum is tan with a brown stripe occupying the vertebral row of scales and one-half to three-quarters of each paravertebral row. The vertebral stripe is bordered by black paravertebral stripes, which occupy from one-half to one-quarter of each paravertebral row and one-half to one-quarter of the row immediately below (the 6th). The vertebral and paravertebral stripes gradually fade out posteriorly and are rarely evident on the tail. The anterolateral edges of the scales in the vertebral row and the adjacent anterolateral edges of the paravertebral scales are yellow. The top of the head is tan, the supralabials, rostral, lower edge of the nasal, infralabials, most of the gulars, and scale rows 1-3 immediately behind the head are bright yellow. A black stripe typically extends from the posterior edge of the nasal (in some specimens the stripe originates posterior to the eye) along the lower edge of the loreal, preocular, lower postocular, anterior and lower posterior temporals, and the upper edge of the last three supralabials onto the neck. There it becomes indistinct, usually within two head lengths, and forms a narrow, irregular lateral stripe along the common border of scale rows 3 and 4. In some individuals only the skin between these scale rows is darkly pigmented. The venter appears to be white anteriorly, but the anterior portion of each ventral scute is yellow. Posteriorly this coloration (which becomes cream in appearance) is progressively more restricted to the medial portion of the ventrals by an ever greater encroachment of tan coloration from the sides of

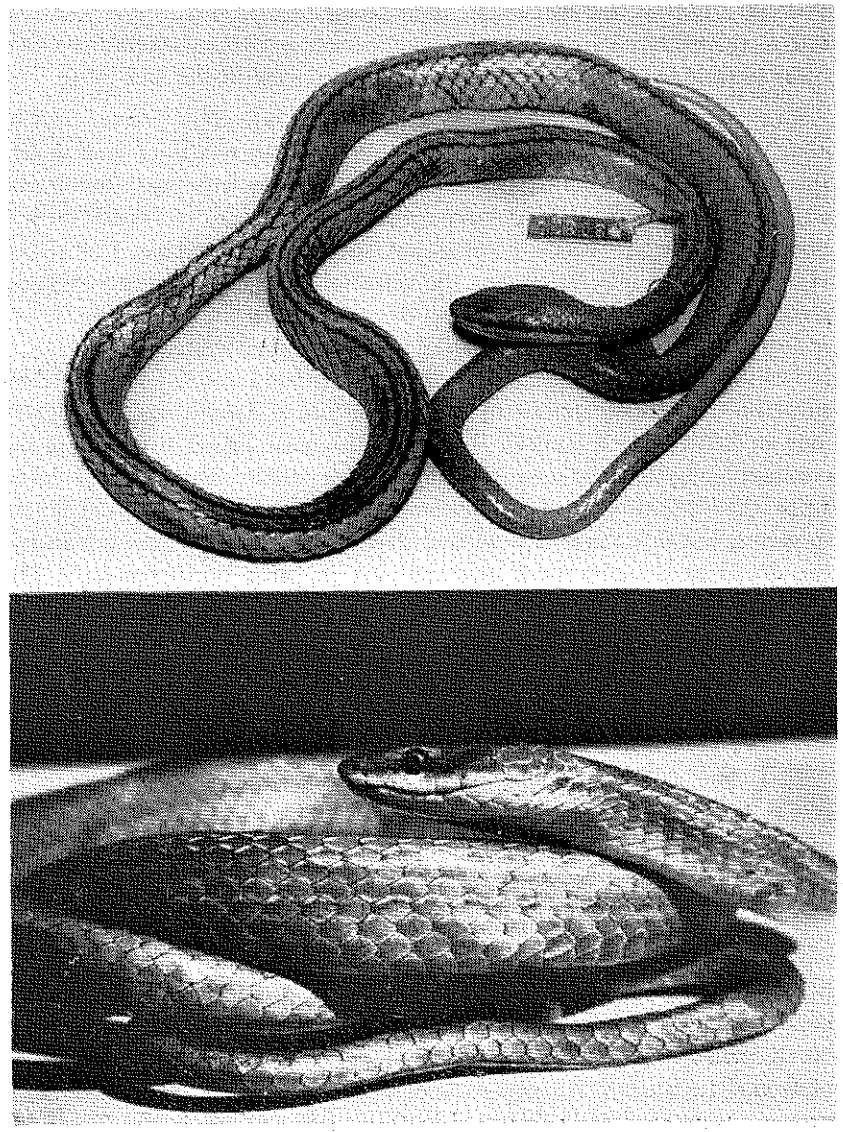

Figure 1. *Upper*: Dorsal color pattern of *Symphimus leucostomus* (USNM 30310, cotype). *Lower*: Dorsal color pattern of "*Opheodrys*" *mayae* (UCM 18623). Latter photograph from a Kodachrome.

the body. In some individuals the cream coloration persists as a very narrow line to the vent and even onto the anterior subcaudals; in others the cream color is entirely obliterated a short distance anterior to the anal plate.

Our color notes for a living specimen of "*Opheodrys*" *mayae* (UCM 18623) were provided by C. J. McCoy. Its dorsum was light gray in life (preserved specimens might be termed light gray brown); the anterolateral edges of each scale were a "rich orange-yellow," although this condition was not apparent except when the skin was stretched or the body bent (it is visible without manipulation near the vertebral row in some preserved specimens). Although not mentioned in the color notes for UCM 18623, examination of the preserved specimen reveals a broad vertebral stripe of a brownish shade somewhat darker than the ground color. The vertebral stripe of "*O.*" *mayae* appears to differ from that of *Symphimus leucostomus* only in lacking black borders. A narrow, irregular lateral stripe along the common border of scale rows 3 and 4 is faintly visible. The dark supralabial stripe characteristic of *S. leucostomus* is present in some *mayae* and absent in others, but in no case is it as well developed as in *leucostomus*.. In life the dorsal head scales were gray outlined in "rich brown-orange." The lower two-thirds of the supralabials were white tinged with very light yellow near the edge of the lip, and the throat and neck were white. In most specimens of *mayae* there is more encroachment of dark pigment from the sides of the body onto the venter than in *leucostomus* so that the greater part of the venter is gray brown.

Form and proportions.—The mensural and meristic features of all available specimens of *Symphimus leucostomus* and "*Opheodrys*" *mayae* are summarized in Table I. Similar information for *Opheodrys aestivus* and *O. vernalis* is presented in the text and omitted from the table because the available data are not nearly as complete.

All four species are relatively slender snakes having a moderately short head and a long tail. The head constitutes 4.7% of body length in "*Opheodrys*" *mayae* and 12 *O. vernalis*, 4.3 in *Symphimus leucostomus*, and 4.2 in 30 *O. aestivus*. The muzzle is relatively long in three of the species (77.5% of frontal length in "*O.*" *mayae*, 73.6 in 8 *O. aestivus*, and 69.5 in *S. leucostomus*) but apparently shortened in *O. vernalis* (58.0% in 4). The latter is also the smallest of the four species, the maximum recorded length being 650 mm (Wright and Wright, 1957), as compared to 810 in *S. leucostomus*, 847 in *O. aestivus* (Smith, 1961), and at least 890 in "*O.*" *mayae* (extrapolated; the longest specimen examined has an incomplete tail). Although the

TABLE 1. VARIATION IN MENSURAL AND MERISTIC FEATURES OF "*OPHEODRYS*" *MAYAE* AND *SYMPHIMUS LEUCOSTOMUS*.

Character		"*O.*" *mayae*	*S. leucostomus*
Tail/Total Length (%)	♂♂	37.1(34.8-40.1)26[1]	33.1(30.9-36.1)8
	♀♀	34.7(32.8-36.8)19	30.7(30.1-31.2)3
Head/S-V Length (%)		4.7(4.0-5.0)36	4.3(4.0-4.6)8
Eye/Head Length (%)		14.3(12.7-15.8)37	14.6(13.1-16.1)10
Muzzle/Frontal Length (%)		77.5(67.9-92.6)43	69.5(60.5-75.6)11
Anterior/Posterior Genial Length (%)	♂♂	93.9(82.4-106.8)23	103.8(86.4-127.5)7
	♀♀	90.6(75.2-109.3)17	93.0(63.8-119.2)4
Ventrals	♂♂	155.8(150-165)32	166.6(162-174)8
	♀♀	157.9(151-165)25	177.8(174-181)4
Subcaudals	♂♂	130.1(120-146)28	114.8(107-122)9
	♀♀	118.9(115-125)20	109.8(106-113)3
Supralabials		5 + 5 − 1 6 + 6 − 49 6 + 7 − 8	6 + 7 − 1 7 + 7 − 13

[1] Mean (range of variation) number of specimens.

characters are difficult to quantify, "*O.*" *mayae* and *S. leucostomus* appear to have wider heads and somewhat stockier bodies than the other two species. The "*O.*" *mayae* and *S. leucostomus* we measured have a proportionately smaller eye (14.3 and 14.6% of head length, respectively) than either *O. vernalis* (17.4% in 4) or *O. aestivus* (17.1% in 8).

Scutellation.—*Opheodrys aestivus* has keeled dorsal scales arranged in 17 rows; the other species have smooth scales in 15 rows. "*O.*" *mayae* usually has 6 supralabials on each side of the head; the other species characteristically have 7. *Symphimus leucostomus* has each internasal fused with the adjacent nasal; these scales usually are separate in the other species.

The degree of sexual dimorphism in the numbers of ventrals and subcaudals varies considerably. In all cases the females have a greater mean number of ventrals, but the difference in means is as little as 2 in "*O.*" *mayae* and 4½ in *O. aestivus* (Smith, 1961) and as much as 10 or 11 in *S. leucostomus* and western populations of *O. vernalis* (Grobman, 1941). Males have the longer tail in all four species, but the difference in means is only

5 scales in *S. leucostomus*, whereas it is 9½ in *O. aestivus* (Smith, 1961), 11 in "*O.*" *mayae*, and 12 or 13 in *O. vernalis* (Grobman, 1941).

With regard to Cochran's statements (in Gaige, 1936) about various differences in scutellation between *Symphimus leucostomus* and "*Opheodrys*" *mayae*, we could find no basis for her claim that *S. leucostomus* "has much narrower dorsal scales" than "*O.*" *mayae*. Moreover, although Cochran claimed otherwise, the posterior genials are slightly longer proportionately in *mayae*. Although her sample was extremely small, she did examine two of the three specimens of *leucostomus* that have the shortest posterior genials. Also, the frontal is of the same proportionate length in *leucostomus* as in *mayae*, instead of being shorter in the former.

Hemipenis.—The everted hemipenis of *Ophyeodrys aestivus* (as seen in nine specimens from Louisiana and Arkansas) is a single subcylindrical organ with a simple sulcus spermaticus that terminates in the center of the apex. The proximal one-third (or less) of the organ is spinose, with the spines arranged in six or seven transverse rows and becoming progressively smaller distally. No large spines occur near the sulcus; instead there are spinules in this area as well as between the most proximal large spines. The distal two-thirds (or more) of the hemipenis is calyculate, the calyces being uniformly small and relatively shallow. There are approximately 35-40 irregular transverse rows of calyces between the fair well-demarcated distal edge of the spinose zone and the apex, where a small circular nude area surrounds the terminus of the sulcus. The walls of the calyces are either spinulate or papillate.

The everted hemipenis of *Opheodrys vernalis* (as seen in two Pennsylvania specimens) is generally similar to that of *O. aestivus*, but it is not nearly as elongated, has fewer spines, and has a much larger circular nude area apically. *Opheodrys vernalis* also has fewer calyces (approximately 20-25 rows occupying slightly more than half the length of the organ), but these are somewhat larger and deeper than those of *O. aestivus*. The hemipenis that Dowling and Savage (1960, Fig. 5B) figured as that of *O. aestivus* more nearly resembles the *O. vernalis* hemipenes we have seen. If their specimen was correctly labelled and fully everted, the variation in *O. aestivus* must be much greater than was evident in our series.

The everted hemipenis of *Symphimus leucostomus* differs from those of *Opheodrys aestivus* and *O. vernalis* in shape and in several details of ornamentation. It is a single flask-shaped organ (the distal three-eighths is constricted) with a simple sulcus terminating in the center of the apex. The proximal one-quarter of the hemipenis is nude and is followed by a region of moderately large, densely packed spines set in large fleshy lobes. In the distal portion of the spinose region, the lobes are interconnected by low, thin walls to form shallow calyces. Distally the walls of the calyces become progressively higher and the spines decrease in size, so that the distal one-third or so of the organ is predominantly calyculate. The walls of the calyces appear spinulate throughout, but possibly are papillate near the apex. The apical region has slight elevations on either side of the terminus of the sulcus, but no well-defined nude area exists other than the very narrow strip that runs along both sides of the sulcus for its entire length.

No fully everted hemipenes of "*Opheodrys*" *mayae* were available, but we attempted to reinflate the hemipenes of CM 45305. We are not entirely satisfied that we were able to evert them to their fullest extent, nevertheless it is apparent that the "neck of the flask" seen in *Symphimus leucostomus* is lacking and the sulcus spermaticus appears to terminate on the side of the calyculate area rather than at the apex. The latter condition may be real or an artifact of somewhat less than maximum inflation. Aside from these features, the differences between the two species appear to be generally of the same type and of the same order of magnitude as those we have seen in *Opheodrys*. "*O.*" *mayae* seems to have fewer spines than *S. leucostomus*, and the calyces are definitely papillate distally. The *in situ* hemipenis is much shorter in "*O.*" *mayae* (it extends 7 or 8 subcaudal lengths in six *mayae*, 10 to 15 in six *leucostomus*; the *m. retractor penis magnus* extends 19 or 20 subcaudal lengths in two *mayae*, 36 in one *leucostomus*), which probably reflects the absence of the "neck of the flask."

The hemipenes of *Symphimus leucostomus* and "*Opheodrys*" *mayae* differ from those of the other two species primarily in having an extensive nude basal area, in having a very gradual transition between the spinose and calyculate areas, and in lacking a distinct nude area apically.

Myology.—The superficial temporal musculature of all four species is basically similar with one marked exception. In "*Opheodrys*" *mayae* and *Symphimus leucostomus*, the *m. adductor externus superficialis* originates from the anterolateral edge of the parietal shield and from virtually the entire posterior border of the postorbital, thus concealing the Harderian gland from view. In *O. aestivus* and *O. vernalis* the muscle's origin does not extend below the midway point on the postorbital, and the Harderian gland is largely exposed. Also, the gland is larger in *O. aestivus* and *O. vernalis* than in the other two species.

TABLE 2. TOOTH-COUNT VARIATION IN *SYMPHIMUS* AND *OPHEODRYS*

Species	Maxilla	Dentary	Palatine	Pterygoid
S. leucostomus	24.8(23-26)7[1]	27.0(27)1	13.0(13)2	19.0(18-20)2
"O." mayae	21.9(20-26)12	22.0(22)2	10.8(10-11)4	17.5(17-18)2
O. aestivus	21.6(19-24)38	24.0(22-26)38	13.4(12-17)38	16.4(14-18)38
O. vernalis	17.7(16-21)22	20.3(18-23)13	12.7(11-15)15	15.0(14-17)16

[1] Mean (range of variation) number of individual counts, not specimens.

Osteology.—There do not appear to be any particularly significant differences in the number of teeth present on the various dentigerous bones of the four species (Table 2); in most cases *Opheodrys vernalis* has the fewest teeth, *Symphimus leucostomus* the most. However, *S. leucostomus* and *"O." mayae* resemble each other and differ from the other two species in at least 9 osteological characters. The former have: the teeth relatively large and stout versus relatively small and slender in *Opheodrys*; the medial process

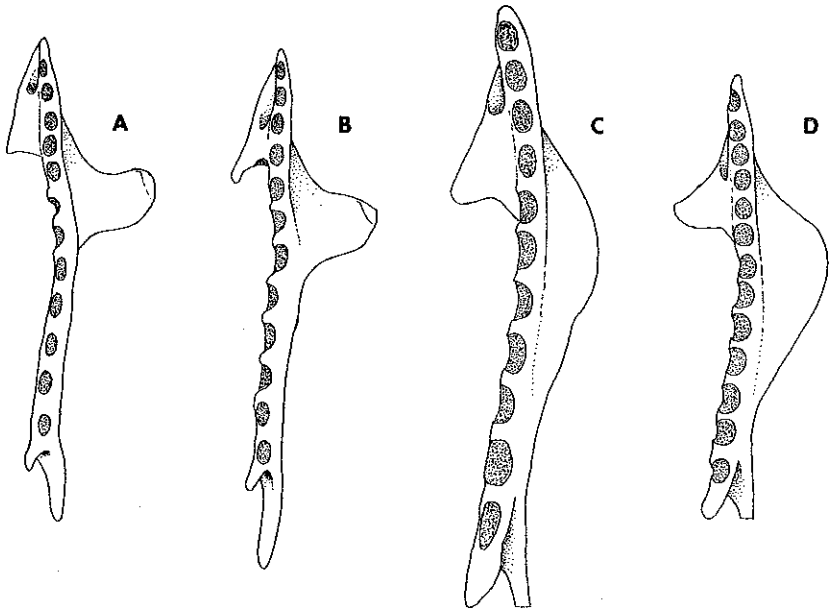

FIGURE 2. Ventral view of the right palatine of (A) *Opheodrys vernalis*; (B) *O. aestivus*; (C) *"O." mayae*; and (D) *Symphimus leucostomus*. The edentulous pterygoid process is not illustrated in the latter two species since it is not visible in the articulated skull.

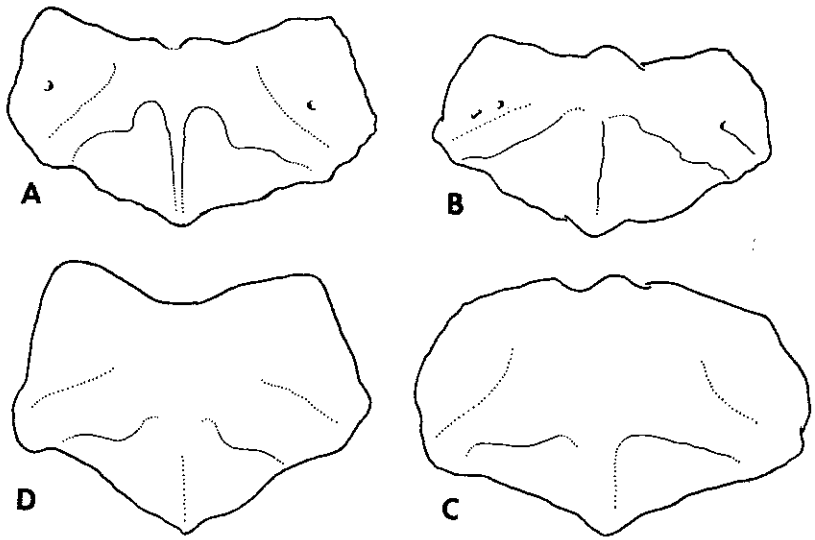

FIGURE 3. Dorsal view of the supraoccipital of (A) *Opheodrys aestivus*; (B) *O. vernalis*; (C) *"O." mayae*; and (D) *Symphimus leucostomus*.

of the palatine long and flangelike versus relatively short and recurved in *Opheodrys* (see Figure 2); a firm connection between palatine and maxilla versus a relatively flexible ligamentous connection in *Opheodrys*; the premaxilla in lateral profile with a prominent anteroventral projection versus a more nearly vertical profile in *Opheodrys*; the upper edge of the interorbital foramen not closely approaching the roof of the orbit versus closely appproaching the roof in *Opheodrys*; the parietal crests fairly well developed versus poorly developed in *Opheodrys*; more than half the length of the supraoccipital at its midline lying anterior to the supraoccipital crests versus less than half in *Opheodrys* (see Figure 3); the supratemporal slightly reduced versus greatly reduced in *Opheodrys*; a ventral keel on the sphenoid versus no keel in *Opheodrys*.

CONCLUSIONS

The foregoing character analysis demonstrates that *"Opheodrys" mayae* does not belong in the genus *Opheodrys* but should be known henceforth as *Symphimus mayae* (Gaige), new combination.

The relationships of the genus *Symphimus* are not clear. Cope's (1869) suggestion that perhaps *Symphimus* ought to be placed closest to *Opheodrys*

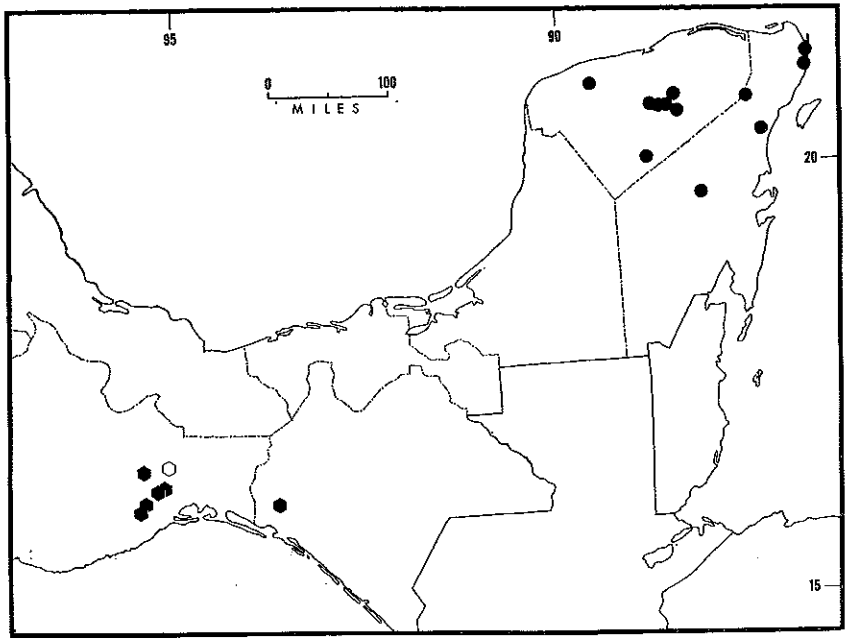

FIGURE 4. Distribution of *Symphimus leucostomus* (hexagons) and *S. mayae* (circles) in southern Mexico. Solid symbols represent specimens examined; hollow symbols represent literature records. We have not mapped an isolated record of *S. leucostomus* (based on USL 12348) from 14.2 mi. S La Huerta, Jalisco. Although the site lies more than 650 miles west-northwest of the other localities, we do not doubt the validity of the record.

in his classificatory scheme is not unreasonable, but if so the two genera have diverged to a marked degree. On the other hand, the similarities between them may merely reflect parallel evolution into elongated insectivorous[3] colubrines of moderate size from a more generalized colubrine stock. Dunn (1928) indicated that *Symphimus* is allied with *Synchalinus* (=*Pseustes*) and *Phrydops* (=*Amastridium*), but neither association would appear to warrant serious consideration.

The peculiar disjunct distribution of *Symphimus* (Figure 4), with one species (*mayae*) confined to the outer portion of the Yucatan Peninsula and

[3] We have no specific data for *Symphimus leucostomus*, but the digestive tracts of four *S. mayae* (FMNH 36386, 36388, 36391, 36393) from Yohdzonot, Yucatán, contained remains of gryllacridids, mantids, tettigoniids, noctuids, and some unidentifiable orthopterans.

the other (*leucostomus*) almost exclusively limited to the southern half of the Isthmus of Tehuantepec, finds parallels in the iguanid lizard genus *Enyaliosaurus* and in the hylid frog genus *Triprion* (see Trueb, 1970: 697, for a discussion of the possible history of these disjunctions).

Specimens Examined

Symphimus leucostomus.—Chiapas: 15 km N Arriaga (KU 151899). Jalisco: 14.2 mi. S La Huerta (USL 12348). Oaxaca: Locality unspecified (USNM 30311); Chihuitán (USNM 30310); Cerro Guiengola (UIMNH 18772); Guienigati-Guevea (UIMNH 36839); Santiago Guevea (FMNH 105195); Mixtaquilla Mt., 6 leagues N Tehuantepec (UMMZ 82597); Cerro San Pedro (AMNH 65871); San Pedro del Istmo (UIMNH 40895); Santa Lucía near Tehuantepec (AMNH 68027, UIMNH 37144); Tres Cruces Mt., 32 km SW Tehuantepec (UMMZ 82595-96).

Symphimus mayae.—Quintana Roo: 23 km W Felipe Carillo Puerto (CM 45301); La Vega (USNM 46531); 65 km S Puerto Morelos (EAL 2867); Pueblo Nuevo de X-Can (CM 45786-90, 45792-94, 46846-48, 46885-86, 47047-48, 49065, 49116, 49166, LSUMZ 27779). Yucatán: Chichén Itzá (AMNH 64560, FMNH 36384-85, 36392, UMMZ 83297); Dzibilchaltún (FMNH 153519, 153566); Libre Unión (FMNH 36389); Peto (CM 45302-05); Pisté (CM 46965, 47149, 49805-10, 49812-17, LSUMZ 27780, UCM 18623); Yohdzonot (FMNH 36383, 36386-88, 36390-91, 36393-94).

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