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Oxybelis wilsoni, a new species of vine snake from Isla de Roatán, Honduras (Serpentes: Colubridae)

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Abstract: A new species of *Oxybelis* is described from Isla de Roatán, Honduras. It differs from all species of *Oxybelis* in its tan to golden yellow coloration, in having a higher number of subcaudals as well as in other details of color and scutellation. The new species is closely related to *O. fulgidus* and is thought to be derived from a *fulgidus*-like ancestor (i.e., is the sister species to *fulgidus*) that has been isolated in the area of its present range probably since the very late Pliocene. The presence of a yellow population of *Oxybelis* on Isla de Roatán, Honduras, has long been known (Keiser 1969). The status of this insular population has remained uncertain pending the acquisition of additional material (Keiser 1969, Wilson and Meyer 1985). We recently visited Isla de Roatán a number of times and obtained a large series of additional specimens. After examining this new material, and the previously known specimens from this island, we believe that this population represents an undescribed taxon, which should be known as

Key words: New species, Serpentes, Colubridae, *Oxybelis*, Isla de Roatán, Bay Islands, Honduras, Central America.

Oxybelis wilsoni, sp. nov.
Fig. 1a-b, Map Fig. 2

Holotype: National Museum of Natural History (USNM) 318010, an adult male from Rocky Point, Santa Elena on the eastern end of Isla de Roatán, Departamento de Islas de la Bahía, Honduras, collected on 20 November 1989 by J.R. McCranie. *Allotype*, Texas A&M University (TCWC) 67204, an adult female collected near Antiqual on 31 January 1990 by J.D. Villa, J.R. McCranie and J. Parmerlee.

Paratypes: Twenty-three males and 16 females, all from Isla de Roatán. American Museum of Natural History (AMNH) 00000, British Museum (Natural History) (BMNH) 1938.10.4.92, Península Santa Elena., Field Museum of Natural History (FMNH) 34561, 34586, Florida Museum of Natural History, University of Florida (UF/FSM) 28537, 28563, Louisiana State University Museum of Zoology (LSUMZ) 22374, 22398, near Coxen Hole, LSUMZ 21768, 0.5-1..0 km W Coxen Hole, LSUMZ 22365, north side of island; Texas Cooperative wildlife Collection, Texas A&M University (TCWC) 21914, 0.8 km NE Coxen Hole; UF/FSM 28529, 4.8 km W Coxen Hole; Antiqual; USNM 318011-12. In addition to these, we have donated 23 specimens to several museums for which we kdo not have accession numbers yet; these are from the following localities: Coxen Hole; hill NW of Coxen Hole; 0.5-1.0 km W Coxen Hole; along road between Coxen Hole and Sandy Bay; between West End and Sandy Bay; hill above West End Point; Mud Hole [=Blue Harbor]; near Diamond Rock; Rocky Point, Santa Helena [=Helene].

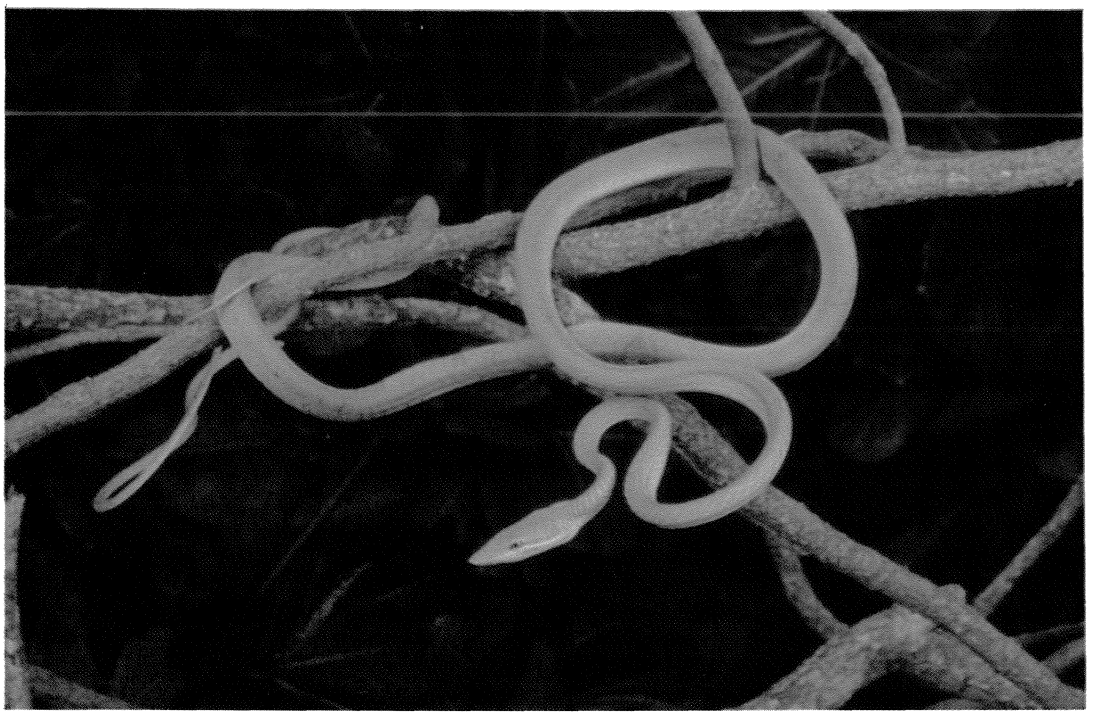

Fig. 1 A

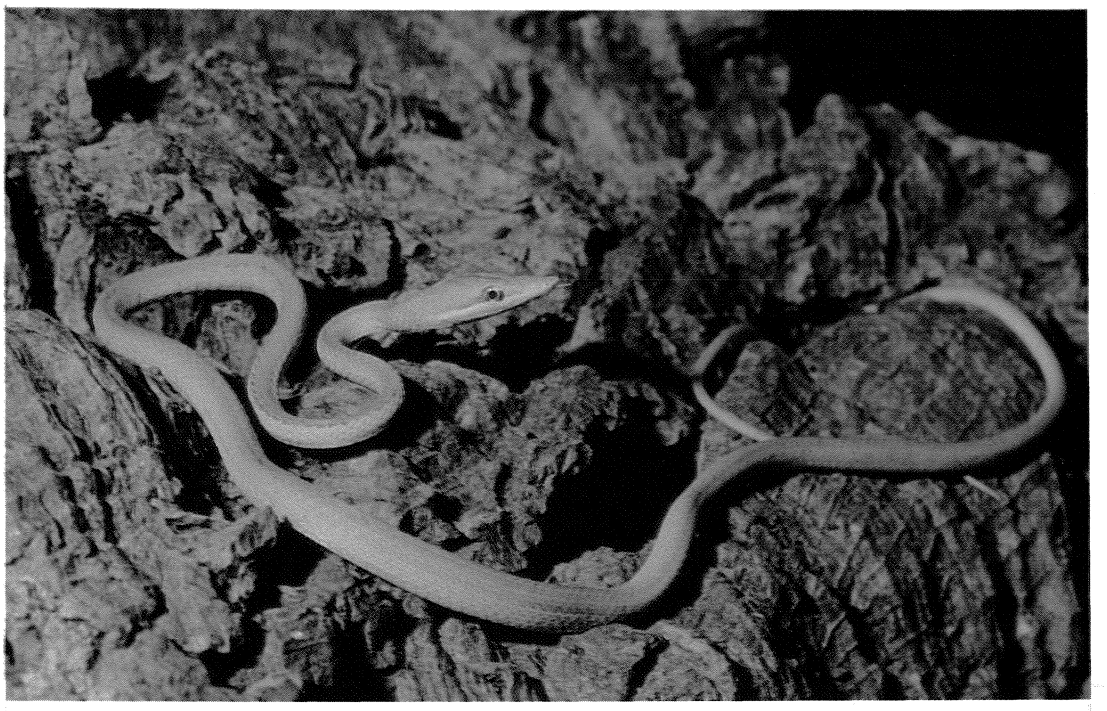

Fig. 1 B

Fig. 1. Above, *Oxybelis wilsoni* n. sp., adult paratype, photographed by Jim Bridges. Middle, *Oxybelis wilsoni* n. sp., a hatchling living at the Philadelphia Zoo, courtesy of John D. Groves. Bottom, *Oxybelis fulgidus,* adult from Cerro Baúl, Oaxaca, México. Photograph by C. S. Lieb.

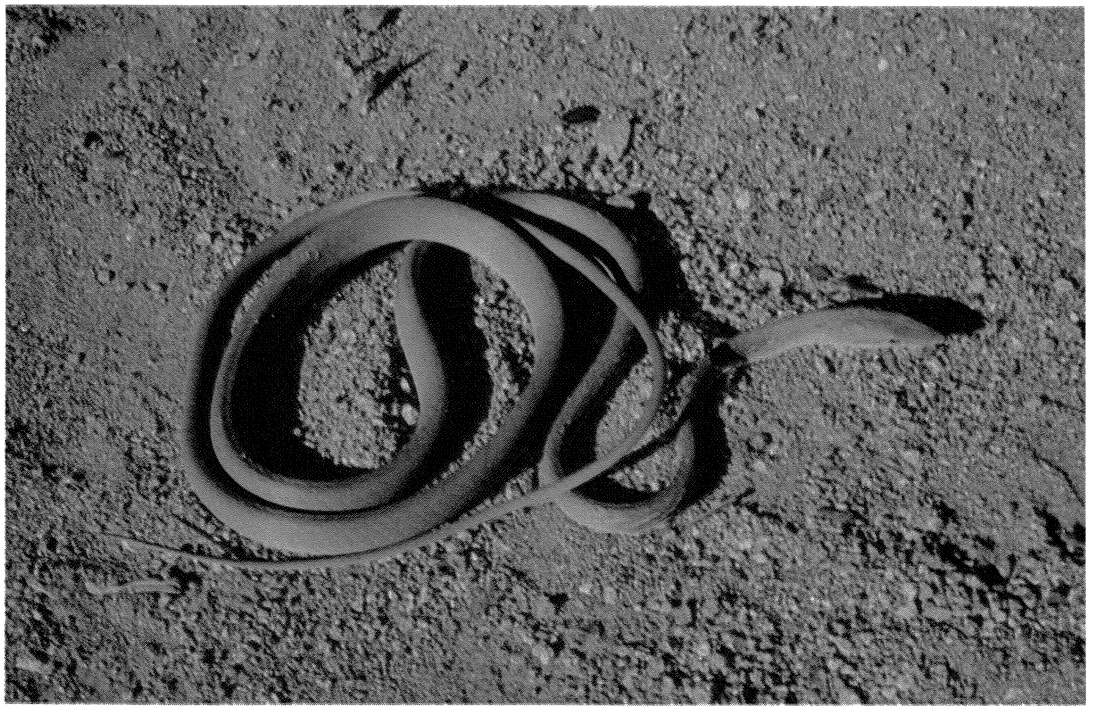

Fig. 1 C

LDW and USNM-FN are field numbers of L.D. Wilson and the National Museum of Natural History respectively.

Diagnosis: *oxybelis wilsoni* differs from the closely related *O. fulgidus* (characters for the latter inparentheses) in having yellowish-brown dorsal and lateral surfaces (bright green to blue-green dorsally, pale green to sky blue laterally), yellow to yellowish-brown ventral surfaces between the paired ventrolateral stripes (yellowish-green to sky blue), a yellowish-brown to yellow tongue (green), white skin between the scales on the neck (pigmented), and 169-189 subcaudals in males and 164-175 in females (143-171 in males and 133-163 in females). *Oxybelis wilsoni* can be distinguished from the remaining four species in the genus *(aeneus, argenteus, boulengeri,* and *brevirostris)* by the following combination of characters: a uniformly yellowish-brown dorsum; paired yellowish-white to white ventrolateral stripes for full length of body; ventral scales between ventrolateral stripes uniform yellow to yellowish-brown; a yellow iris; a yellowish-brown to yellow tongue; inside of mouth unpigmented; snout elongate and pointed; no loreal; prefrontal usually in contact with the second, third, and fourth supralabials; 9-12 supralabials (usually 10, occasionally 11, rarely 9 or 12), usually with fifth, sixth, and seventh or occasionally sixth, seventh, and eighth entering orbit; 9-12 infralabials (usualle 10 or 11); dorsal scale row formula usually 17-17-13; 201-212 ventrals in males, 202-217 in females; 169-189 subcaudals in males, 164-175 in females; anal plate divided; total length to ca. 2000 mm; tail length/snout vent length ratio 0.552-0.,589 in males, 0.507-0.527 in females; eye diameter/head length ratio 0.104-0.152.

Description of the holotype: An adult male, 1982 mm in total length; tail length 719 mm (56.9% of snout-vent length); head length 45.9 mm; head width 18.9 mm at broadest point; head distinct from neck; snout elongate, projecting well in front (2.6 mm) of lower jaw; eye large, 5.2 mm in diameter; eye diameter/head length ratio 0.113; pupil round; rostral about 1.4 times broader than high; internasals about 2.3 times longer than wide, laterally contacting the nasal; prefrontals large, about

1.7 times longer than wide, laterally contacting the second, third, and fourth supralabials; median prefrontal suture about 0.7 times as long as frontal; frontal about 1.7 times longer than wide; supraoculars 1.5 times longer than wide; parietals about 1.6 times longer than wide, median suture 0.7 times as long as frontal; nostrils located at about midlength of and a little below midline of elongate, single nasal, which laterally contacts the rostral and first and second supralabials; no loreal; 1-1 preoculars; 2-2 postoculars; 2+3+1 temporals on left side, 1+3 on right, 11-10 supralabials, fifth, sixth, and seventh entering orbit, fourth and fifth contacting preoculars, seventh and eighth contacting lower postocular, eighth largest on left side and ninth largest on right; mental 1.9 times wider than long, separated from chinshields by first pairs of infralabials, which contact each other medially; two pairs of chinshields, posterior pair about 1.9 times longer than anterior pair; anterior pair of chinshields in contact medially anteriorly, then separated by 1+2 gulars, the latter followed by four more gulars and two preventrals; 10-11 infralabials, first four on left side and first five on right contacting anterior chinshields, sixth on left side largest and seventh and eighth largest on right; 17 dorsal scale rows at one head length behind head, 17 at midbody, and 13 at vent; scale reduction formula $17^{3+4(133)}$ 16-V8 (136 $15^{2+3\ (137)}$ 14 -V7 (141) 13; six middorsal scale rows at midbody weakly keeled; six dorsal scale rows at level of tenth subcaudal; no apical pits apparent; 209 ventrals; anal plate divided; 183 subcaudals, paired.

The hemipenis is bilobed with a deep, simple (but slightly forked near the apex), oblique *sulcus spermaticus*. The *sulcus* terminates on the longest lobe at a point slightly beyond the level of bilobation. The everted organ is 10 subcaudals long. Large spines are present basally, rapidly decreasing in size anteriorad and becoming spinulate over most of proximal one-half or organ. Approximately the distal one-half is calyculate, with some of the ridges spinulate. The area of the longest lobe facing the other lobe is naked beyond the point of bilobation.

In life, the dorsal ground color was yellowish-brown throughout including the lateral portion of the body and tail; supralabials yellow; yellowish-brown eye stripe present from posterior end of nostrils to posterior end of head, bordered below with yellow throughout and above with yellow anterior to eye; iris yellow; paired ventrolateral stripes beginning at posterior end of head and extending to vent, yellowish-white anteriorly turning to white for about last two-thirds of length; underneath of head and anterior one-third of venter between ventrolateral stripes yellow, changing to pale yellow from about midventer to end of body; subcaudal surface of tail pale yellow; skin between scales on neck white; tongue yellowish-brown above, yellow below; inside of mouth unpigmented.

Variation in the paratypes: Variation in color and pattern is minimal in the adult paratypes. Juveniles tend to have a more brownish tinge to their dorsal and ventral surfaces than do the adults. Two neonates hatched at the Philadelphia Zoo had a greenish tinge than over the yellowish-brown coloration. Eye diameter/head length ratios (0.104-0.152) have their highest values in juveniles (0.140-0.152). Variation in scalation is as follows: usually no loreal, but one specimen (LDW 9170) has a small loreal on one side; postoculars usually 2-2, but two specimens (LDW 9196, USNM FN 187502) have one on one side, and three specimens (BM 1938.10.4.92, LDW 9038, LSUMZ 22365) have three on one side; 9-12 supralabials (usually 10, occasionally 11, rarely 9 or 12), with the fifth, sixth, and seventh usually entering the orbit (occasionally the sixth, seventh, and eighth); 9-12 infralabials (usually 10 or 11), with the first four or the first five in contact with the anterior chin shields (rarely the fourth is reduced in size and excluded from contacting the chin shields); prefrontal usually contacts the second, third, and fourth supralabials (rarely the second through the fifth or the first through the fourth); temporals usually 1+2, but occasional specimens have an extra anterior or posterior temporal; 201-212 (x= 205.9) ventrals in males, 202-217 (x= 212.8) in females; 169-189 (x= 180.2) subcaudals in 17 males with complete tails, 164-175 (x= 172.0) in 5 females with complete tails.

Etymology: Oxybelis wilsoni is named in honor of our good friend Larry David Wilson, in recognition of his numerous contributions to

the knowledge of the herpetofauna of Honduras, and on the occasion of his fiftieth birthday.

Natural history notes: *Oxybelis wilsoni* is primarily arboreal, but can occasionally be found on the ground. Only two specimens of the large series recently collected (both juveniles) were taken on the ground. The remaining specimens were found waist-height to about 10 m above the ground in tall grasses, bushes, and trees. Another indication of the arboreal tendencies of this species is that specimens dislodged from their arboreal perches would, upon hitting the ground, immediately raise their bodies upward searching for the nearest object to climb instead of trying to escape on the ground. This was done even in areas where tall grasses would make escape relatively easy. One specimen that landed next to where McCranie was standing, emerged from the waist high grass and attempted to climb up his body. The species was commonly found in Acacia bushes growing alongside roads between Coxen Hole and West End and east of Oak Ridge, as well as in various trees used as fence rows along these same roads. The species was also collected in fence rows in pastures on the hillsides above Coxen Hole. A single specimen was found in an isolated ironwood tree (*Laplacea* sp.) in a pasture near the western tip of Isla de Roatán. On the eastern end of the island (Santa Elena), the species was found in buttonwood (*Conocarpus erectus*) and sea grape trees (*Coccoloba* sp.). Wilson and Hahn (1973:131) also stated that "one specimen was collected high in a mango tree and another about 3 meters up in a tree" near Coxen Hole. These authors also reported that a single "road kill" carcass was also found.

Oxybelis wilsoni is known only from Isla de Roatán where it occurs throughout the island

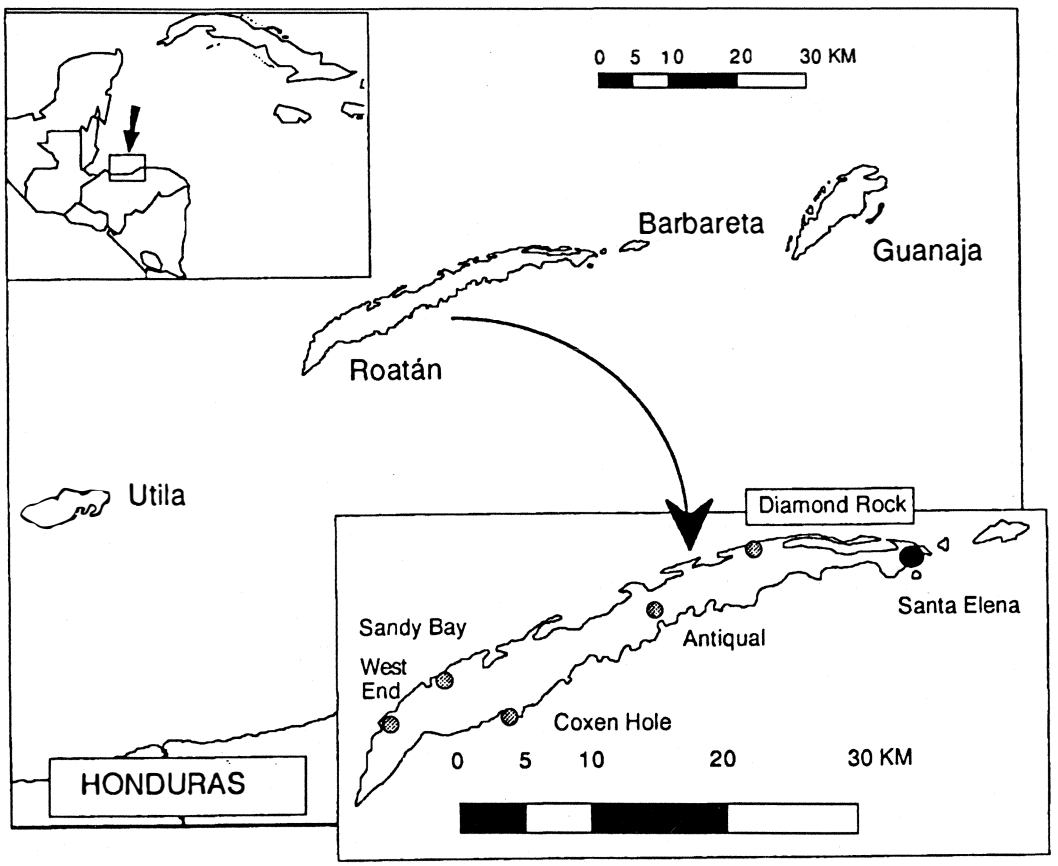

Fig. 2. The Bay Islands of Honduras showing localities mentioned in the text. Solid circle marks provenance of holotype.

(Fig. 2). The easternmost portion of Roatán is usually called Isla de Santa Elena, although the latter is not an island in the strict sense, but is a peninsula separated from Isla de Roatán proper only by a mangrove forest about 6 km long and one narrow (ca 7-8 m wide), shallow, natural channel through the mangroves. Residents of Santa Elena also say that O. wilsoni likewise occurs on Islas de Morat and Barbareta to the east of Santa Elena, although two and one-half days of collecting on the latter island failed to produce any specimens. In addition, the two people living on Barbareta at the time of our visit were shown live specimens of this species. Neither had ever seen a specimen of this snake on the island. We also spent two days on Isla de Guanaja and showed numerous residents color photographs of both *O. wilsoni* and *O. fulgidus.* None of the people questioned had ever seen either of these snakes on Guanaja. Therefore, we believe that *O. wilsoni* does not occur on Barbareta or Guanaja islands.

A juvenile *O. wilsoni* (LDW 9187) contained an adult *Sphaerodactylus rosaurae* in its stomach. A large specimen (LDW 9165) was found with an adult female *Basiliscus vittatus* in its mouth. When grasped, the snake released the lizard, which was dead. Another specimen ate an adult *Anolis allisoni* in the collecting bag. Two adults (LDW 9037-38) kept alive for a while in Miami readily fed on adult *Anolis sagrei.* Other captive individuals ate small birds, albino mice and small lizards.

Recently-caught O. wilsoni are aggressive and bite viciously. Three individuals kept captive by Villa and handled frequently became less agressive with time and stopped biting.

Adults are frequently parasitized by ticks, especially around the head region. Also, most large adults have lost portions of their tail.

DISCUSSION

Prior to the description of *O. wilsoni* in this paper, five species (*aeneus, argenteus, boulengeri, brevirostris,* and *fulgidus*) were recognized in the genus *Oxybelis* (Keiser 1974, 1989). *Oxybelis wilsoni* is closely related to the green vine snake, O. fulgidus, which ranges from the Isthmus of Tehuantepec, México, on the Pacific versant and the Yucatán Peninsula, México, on the Caribbean versant southward into South America east of the Andes to central Brazil (an apparently isolated population also occurs in southern Veracruz, México [Pérez-Higareda and Smith 1987). In fact, specimens of *O. wilsoni* have previously been tentatively referred to O. fulgidus (Keiser 1969, Wilson and Hahn, 1973; Wilson and Meyer 1985). There were several reasons for the uncertainty expressed by these authors, even though Keiser (1969) did note differences in subcaudal counts between the yellow and green snakes. These reasons are listed below and are succeeded by a discussion of each.

1. Green *Oxybelis* were believed to occur with the yellow ones on Roatán, resulting in the presumption that the green and yellow snakes were dichromatic populations of *O. fulgidus.* Wilson (*in* Keiser 1969) discussed a "mummified" *Oxybelis* from Roatán, which was not preserved, that "...was in very bad shape, but good enough to tell that it had been green in life". Wilson and Hahn (1973) stated that this same specimen was "...probably green in life" and Wilson and Meyer (1985) said that it "...appeared to have been green in life". Wilson (*in* Keiser 1969) after "checking.. with the natives" was of the opinion that "... it appears that the 'yellow snake' in found only on the south side of the island, and that a snake which looks exactly like this animal, differing only in being freen, is found on the north side of the island". Wilson and Meyer (1985) reiterated this yellow snake vs green snake scenario, which was said to be founded "upon questioning a native boy". Thus, there are no firm records of green Oxybelis from Roatán, only the conjectural evidence from a "mummified" snake of uncertain color that was not saved, and apparently the testimony of a single "native boy". One of the main objectives of our recent trips to Roatán was to ascertain if green Oxybelis actually do occur there. We found that the yellow snakes are not restricted to the south side of the island, as previously speculated, but that they occur throughout the island. Also, we were fortunate in having invaluable field assistance from some very knowledgeable and reliable lifelong residents of Isla de Roatán (see Acknowledgments). None of these people knew of a green snake of any kind on Roatán, but they were well acquainted with, and knew

exactly where to look for the yellow snakes. In addition, all residents of Santa Elena (where yellow *Oxybelis* are extremely abundant) questioned stated that there were no green snakes there. Therefore, we believe that green *Oxybelis* do not occur on Roatán. The hatchlings born at the Philadelphia zoo (Fig.1b) however, have a slightly greenish shade over the yellow color. Of this shade if found in all neonates throught the island this may have helped perpetuate the belief that green *Oxybelis* occur on Roatán.

2. Other color phases, besides a green one, were believed to exist within the range of *O. fulgidus.* Keiser (1969), the chief investigator heretofore of the status of the yellow snakes, also believed that melanistic specimens of *O. fulgidus* occurred in southeastern Nicaragua. However, the paper cited by Keiser as the source for this information (Villa 1964) referred to *Chironius,* not *Oxybelis.* All known specimens of *O. fulgidus* from throughout its vast geographic range are green dorsally.

3. Few Bay Island specimens of these snakes were available to these workers. Only five Bay Island specimens (all yellow snakes from Isla de Roatán) were available to Keiser 91969) when he examined the status of the Bay Island snakes. Wilson and Hahn (1973) and Wilson and Meyer (1985) listed seven additional Bay Island specimens, including a green specimen fromIsla de Utila, to the west of Isla de Roatán, but these apparently have not been examined heretofore by anyone in conjunction with the previously known material. The recent three trips to Roatán resulted in three, twenty-two, and five additional yellow snakes, respectively. Examination of all of the Bay Island specimens indicates that the yellow snake from Roatán can be consistently distinguished from the green *Oxybelis* (in addition to color) in having a higher number of subcaudals. Edmund D. Keiser provided us with scale counts for a series of *O. fulgidus* mostly from México and Central America. The subcaudal counts for these specimens range from 146 to 171 (x= 159.9) in 69 males with complete tails and from 133 to 163 (x= 155.0) in 35 females with complete tails compared to 169-189 (x= 180.3) in 18 Roatán males with complete tails and 164-175 (x= 172.0) in 5 Roatán females with complete tails. In addition, two Roatán males (LDW 9163, 9179), with their tail tips missing, have 171+ and 172+ subcaudals and five Roatán females (LDW 9170, 9167, 9169, 9180) have 168+ to 175+ subcaudals, all of which are at the upper limits or are higher than the maximum known number for *O. fulgidus.* Only two males in Keiser's series (DMNH 36191 with 171 and FMNH 68096 with 170) show marginal overlap with any of the Roatán specimens. Published reports of subcaudal range in *O fulgidus* includes Cunha and Nascimento (1978)' who gave a range of 144-162 subcaudals for 135 O. fulgidus from Pará, Brasil; Dixon and Soini (1977) gave 143-156 for 3 males and 147 for one female from Perú; Lancini (1963) gave 147-159 for 3 males and 147 for one female from Islas de Patos, Venezuela; Roze (1966) gave a range of 139-165 for Venezuelan specimens. None of these South American records show any overlap with the Roatán specimens in subcaudal counts. The green female specimen from Utila agrees with the green *Oxybelis* from the mainland in having a low number of subcaudals (153).

Isla de Utila lies on the continental shelf within the 20 fm depth contour (Map TPC-K-25B, Defense Mapping Agency Aerospace Center, St. Louis Air Force Station, Missouri 63118). Since sea level in the Caribbean region was at least 100 m lower during the last Pleistocene glacial period, the Wisconsin-Würm, 13,000 to 18,000 years BP (Buskirk 1985, Haffer 1987, Pregill and Olson 1981), Utila was apparently continuous with the mainland at that time. On the other hand, Roatán lies outside the 500 m depth contour (at about 500 fm according to Kornicker and Bryant 1969) and no doubt has been isolated the mainland for a considerably longer period of time. Vinson and Brineman (1963) believed that Roatán was continuous with Utila and the mainland from the early Tertiary until at least the Pliocene. Williams and McBirney (1969) believed that subsidence of the foreland (which included the Bay Islands) that bordered present-day northern Honduras occurred during the late Pliocene and early Pleistocene. The Bay Island are all that remains above sea level today of this foreland. We suggest that *O. wilsoni* evolved *in situ* from a *fulgidus*-like ancestor (i.e., *wilsoni* is the sister species of *fulgidus*) that was widespread across this foreland connecting Roatán to the present-day Honduran mainland in the Pliocene. Haffer

(1987) stated that "high stands of interglacial world sea-level compared to present sea-level decreased from about +180 and +100 m during two interglacials of the latest Pliocene, to +60, +30, and +17 m during successive Pleistocene interglacials...". The highest elevation on Roatán is 235 m and there are numerous hills above 100 m throughout the length of the island. Therefore, substantial portions of the higher elevations of present-day Roatán probably have remained above sea level since the latest Pliocene, allowing for the continuous isolated existence and speciation of the *fulgidus*-like ancestor into the present-day *O. wilsoni*. Moreover, since Utila was apparently recently connected to the Honduran mainland, *O. fulgidus* may have reached that island at that time or gene exchange could have taken place between populations previously isolated but reconnected during Pleistocene glacial periods.

A vicariant event like the one described above, rather than overwater dispersal for the Bay Island *O. wilsoni* and *O. fulgidus,* is further supported in that *O. fulgidus* appears to be a poor overwater colonist. Throughout its extensive geographical range, *O. fulgidus* is known to occur on only one other island besides Utila, the Isla de Patos, Venezuela (Lancini 1963; Emsley 1977). Isla de Patos is located in the Golfo de Paria between the Península de Paris, Venezuela, and the continental island of Trinidad. Inasmuch as Trinidad is believed to have become separated from the South American mainland only about 10,000 years ago (Emsley 1977), a similar history for the Isla de Patos population as that described above for Utila is suggested.

The presence of a reptilian species endemic to one or more of the Bay Islands would not be unexpected. Other endemics include several lizards (*Ctenosaura bakeri* [Stejneger 1901], *C. oedirhina* [de Queiroz 1987], *Phyllodactylus palmeus* [Dixon 1968]' *Sphaerodactylus rosaurae* [Parker 1940] and a snake, *Micrurus ruatanus* [Günther 1858; see Wilson 1984]), as well as two other undescribed species and four other subspecies which were not recognized by Wilson and Hahn (1973).

RESUMEN

Se describe una nueva especie de serpiente colúbrida, *Oxybelis wilsoni* de la isla de Roatán, Honduras. La especie es más parecida a *O. fulgidus* y probablemente es su especie hermana. Difiere de todas las especies del género por ser de color amarillo dorado, por el alto número de escamas subcaudales y por otras características de escamación.

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