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NOTES ON A HERPETOLOGICAL COLLECTION FROM THE AZUERO PENINSULA, PANAMA.—The Azuero Peninsula of Panama is herpetologically unknown and it appears worthwhile to record collections made there from July through September 1960. Some specimens were deposited with the University of Illinois Museum of Natural History and are denoted below by numbers in parentheses; the remainder are in my personal collection.

The following species and numbers of specimens were collected in or near Los Santos (7°56′ N, 80°23′ W), Los Santos Province, at an elevation of 16 m: 11 *Bufo granulosus* (five), 11 *Bufo marinus* (four), two *Hyla microcephala* (one), nine *Leptodactylus bolivianus insularum* (six), one *L. labialis*, one *L. poecilochilus*, 17 *Pleurodema brachyops* [?] (nine), two *Kinosternon panamensis*, six *Ameiva ameiva praesignis* (three), 14 *Anolis auratus* (eight), one *A. curtus* [?], two *Basiliscus basiliscus* (one), seven *Gonatodes albogularis fuscus* (three), two *Gymnophthalmus speciosus* (one), two *Mabuya brachypoda*, two *Sphaerodactylus pacificus* [?], one *Dryadophis pleei* (one), one *Enulius flavitorques* (one), six *Leptodeira annulata rhombifera* (four), one *Oxybelis aeneus aeneus* (one), one *Phimophis guianensis* (one).

Other records include five *Dendrobates auratus* (four) from Macaracas (7°56′ N, 80° 31′ W), Los Santos Province, at an elevation of 111 m; and the following from the vicinity of the "Instituto de Agricultura de Divisa" in the municipality of Santa Maria (8°07.5′ N, 80°41.5′ W), Herrera Province, at an elevation of 13 m: two *Eupemphix pustulosus* (one), five *Relictovomer pearsei* (three), one *Pseudoboa neuwiedi* (one), two *Liotyphlops albirostris*.

Single specimens of *Bufo granulosus*, *Gonatodes albogularis fuscus*, *Mabuya brachypoda*, and *Anolis auratus* were also collected at Santa Maria.

I would like to express my gratitude to Dr. Hobart M. Smith of The University of Illinois and to Dr. William E. Duellman of The University of Kansas for their kind assistance in the identification of specimens.—STEPHEN D. BUSACK, *760 Pinnacle Road, Pittsford, New York 14534.*

VIVIPARITY AND OVIPARITY IN THE SNAKE GENERA *CONOPSIS, TOLUCA, GYALOPION,* AND *FICIMIA,* WITH COMMENTS ON *TOMODON* AND *HELICOPS.*—The correlation between life in the cooler climates of higher altitudes and latitudes, and viviparity (including so-called ovoviviparity) in the Squamata is generally well known to herpetologists. It is thought that in situations in which cool temperatures might inhibit the normal development of eggs, it would be advantageous for development to take place inside the body of the mother where a more nearly optimum temperature could be maintained through her behavioral thermoregulation. Reports of the phenomenon are widely scattered throughout the literature, although a recent attempt has been made to summarize this information for snakes (Neill, 1964). The known examples are persuasive, but inadequate knowledge of the reproductive habits of even some common lizards and snakes is an obstacle to further elucidation of this interesting adaptation.

The purpose of this note is to report on viviparity in two high-altitude genera of Mexican snakes, and to contrast this situation with oviparity in two seemingly related genera from lower altitudes and warmer climates. Mention is also made of two South American colubrid genera in which viviparity has long been known but overlooked.

The Museum of Comparative Zoology, Harvard University, has a collection of 104 *Conopsis nasus* (MCZ 19040–19043, 47501–47600) from Alvarez (elev. 7,500 to 8,000 ft), San Luis Potosí, Mexico. The collection was made by W. W. Brown during October and November 1923. Twenty-two females were determined to be gravid and were opened for inspection. The embryos (N = 80) varied in their degree of development from barely recognizable snake embryos lying on a large yolk mass to almost full term. In no case

was an embryo and accompanying yolk mass enclosed in more than a thin, transparent membrane. The average number of embryos per female was 3.6 (range 1 to 6), with the larger females tending to contain more embryos. On the basis of everted hemipenes, sex determinations were made in 21 broods (N = 76) in which the criterion seemed reliable. Of the embryos, 44% were males and 56% females.

The altitudes of the reliable published localities for *Conopsis nasus* in the mountainous regions of central Mexico range between 5,700 and 8,350 ft. In Michoacan, the species has been found "in oak, pine–oak, and fir forest" (Duellman, 1961:92).

The genus *Toluca* is doubtless closely related to *Conopsis*, and some authors (Bogert and Oliver, 1945:378) considered them to be congeneric. The species of both genera are similar in many morphological characters, and they also seem to occur in similar habitats. For this reason several gravid *Toluca lineata* were examined. Three female *T. l. lineata* (MCZ 11360, 11364, 11370) from Guerrero (elev. > 8,200 ft), Hidalgo, contained three, two, and three embryos. Another female (MCZ 17105) from Velasco (elev. > 8,200 ft), Hidalgo, contained three embryos. Two female *T. l. varians* (MCZ 46685–46686) from Acultzingo (elev. 5,759 ft), Veracruz, collected in January 1939, contained five and three embryos. The presence of nothing more than a thin, transparent membrane surrounding these embryos, which were in various stages of development, indicates that the species is viviparous. This conclusion is supported by Smith's (1943: 489) observation of a female *T. l. varians* which has "a number of well-developed young, nearly ready for birth, in the uteri."

T. lineata has been recorded from localities in the central Mexican highlands between 4,000 and 9,300 ft. Duellman (1961: 110) reported that in Michoacan the species occurs in coniferous and pine–oak forests.

Comparisons with the seemingly related *Gyalopion–Ficimia* complex are of interest. Wright and Wright (1957:285) reported that *Gyalopion canum* is oviparous. The species is confined to the hot, arid areas of southeastern Arizona, southern New Mexico, western Texas, and the central plateau of Mexico.

G. quadrangularis, the only other species in the genus, is also oviparous. During the summer of 1961, William Burley and I collected two gravid *G. quadrangularis* in Sinaloa, Mexico. One female (Stanford University 23808), collected approximately 28 miles NW Elota on 12 July, contained six whitish eggs. The most anterior egg in the oviduct measured 8.0 × 4.5 mm and the remaining eggs had an average size of 12.5 × 5.0 mm. The second female (SU 28810), collected 29 miles NW Mazatlán on 4 July, contained three eggs, the average size of which was 22.3 × 6.8 mm. The flexible, opaque shell surrounding the yolk mass indicated that these females would have laid eggs.

G. quadrangularis is known only from the semiarid coastal plain of northwestern mainland Mexico northward through central Sonora to extreme south central Arizona.

Ficimia olivacea (subspecies *streckeri*) is reported to be oviparous (Wright and Wright, 1957:281). The species ranges from extreme southern Texas along the Gulf coast to northeastern Oaxaca and does not appear to occur much above 4,000 ft.

Ficimia publia is also oviparous, judging from the two large, whitish eggs (average size 28.0 × 9.5 mm) found in a female (MCZ 71666) from the Cayo District, British Honduras. This species is generally found below 4,000 ft from Guerrero and southern Veracruz south to Honduras.

Unfortunately, nothing is known of the reproductive habits of the other two species of *Ficimia* (*F. ruspator* and *F. variegata*). Such data are also lacking for the three species of *Pseudoficimia*, the genus that appears to be most closely related to the *Conopsis–Toluca* group.

In his review of viviparity in snakes Neill (1964:37) reported that *Thamnodynastes* is the only viviparous non-"natricine" colubrid genus in the New World. However, he overlooked a paper by Amaral (1927, see also do Valle and de Souza, 1942) that reported ovoviviparity in the South American colubrid (xenodontine) genera *Tomodon* and *Helicops* as well as in *Thamnodynastes*. Neill (1964:50) has suggested that the arboreal habits of *Thamnodynastes* make viviparity advantageous. Viviparity in *Tomodon* is not readily explained on ecological grounds, although in *Helicops*, which is so highly adapted to an aquatic existence, viviparity would be a decided advantage (see Neill, 1964:40–41).

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ON THE STATUS OF THE TEIID LIZARD *CNEMIDOPHORUS CELERIPES* DICKERSON.—The teiid lizard *Cnemidophorus celeripes* was described by Dickerson (1919) from two specimens collected by C. H. Townsend on Isla San Jose, Gulf of California. Despite its early discovery, this species has been seldom collected and its status has remained uncertain. Schmidt (1922) said of *celeripes*, "Aside from the species related to *C. martyris* Stejneger, they [two specimens of *celeripes*] certainly represent the most distinctive of the insular species of this genus in the Gulf of California. . . ." Van Denburgh (1922) observed, "It [*celeripes*] is a large, ornate, and very distinct species." Burt (1931), however, reduced *celeripes* to a subspecies of *C. tesselatus* (= *C. tigris* in part) and remarked, "The whiptail of San Jose Island is distinguished from *tesselatus* only by the presence of reddish or pinkish in the ventral coloration. . . ." Smith and Burger (1949), who correctly applied the names *tesselatus* and *tigris*, also retained *celeripes* as a subspecies of *C. tigris*.

At the writing of this paper no fewer than 13 subspecies are recognized under the name *tigris*. The diversity found within this group approaches that found in all the remaining species of the genus. There is a size differential of about 50 mm between *canus* (maximum snout-to-vent length 76 mm), the smallest "subspecies," and *celeripes* (MSVL 127 mm), the largest "subspecies." Burt (1931), the last reviser of the genus *Cnemidophorus*, used characters which often did not distinguish unrelated forms, let alone closely related species. Why, then, we should persist in lumping certain forms with *C. tigris* may be questioned. Acquisition of specimens of *celeripes* has prompted us to reevaluate its status as a subspecies since recent authors (Smith and Taylor, 1950), presumably because of a lack of specimens, have perpetuated Burt's taxonomy. To date we have examined over 1,000 specimens representing all insular and continental forms of the *tesselatus* species group (*in sensu* Burt, 1931). Fourteen specimens of *Cnemidophorus celeripes* are clearly among the most distinctive and easily recognized.

Comparisons

Size.—Adults of *C. celeripes* may be distinguished from all subspecies of *C. tigris* by their large size (MSVL of males as much as 127 mm). Only *C. tigris rubidus* of Baja California Sur and several adjacent islands reaches as much as 105 mm in SVL. We consider the great size differential of *celeripes* and *tigris* to be most significant and this characteristic alone, in our opinion, is justification for granting *celeripes* full specific rank. Zweifel (1962) reported that geographical variation in a species of *Cnemidophorus* most often involves color pattern, with size and scutellation changing relatively little or not at all. The subspecies of *Cnemidophorus tigris* do exhibit geographical variation in scutellation, but we confirm that there is little demonstrable geographical variation in size.

Color pattern.—Adults of *C. celeripes* have a dorsal body pattern consisting of a blackish ground color with four or six stripes which are irregular in outline and pale cream yellow in color. There is a pair of paravertebrals which originate posterior to the parietals and terminate at the base of the tail, a pair of dorsolaterals which originate on the superciliaries and terminate at the base of