

STUDIES ON THE FAUNA OF CURAÇAO AND OTHER
CARIBBEAN ISLANDS: No. 128.

A SYSTEMATIC REVIEW OF THE HISPANIOLAN
SNAKE GENUS *HYPSIRHYNCHUS*

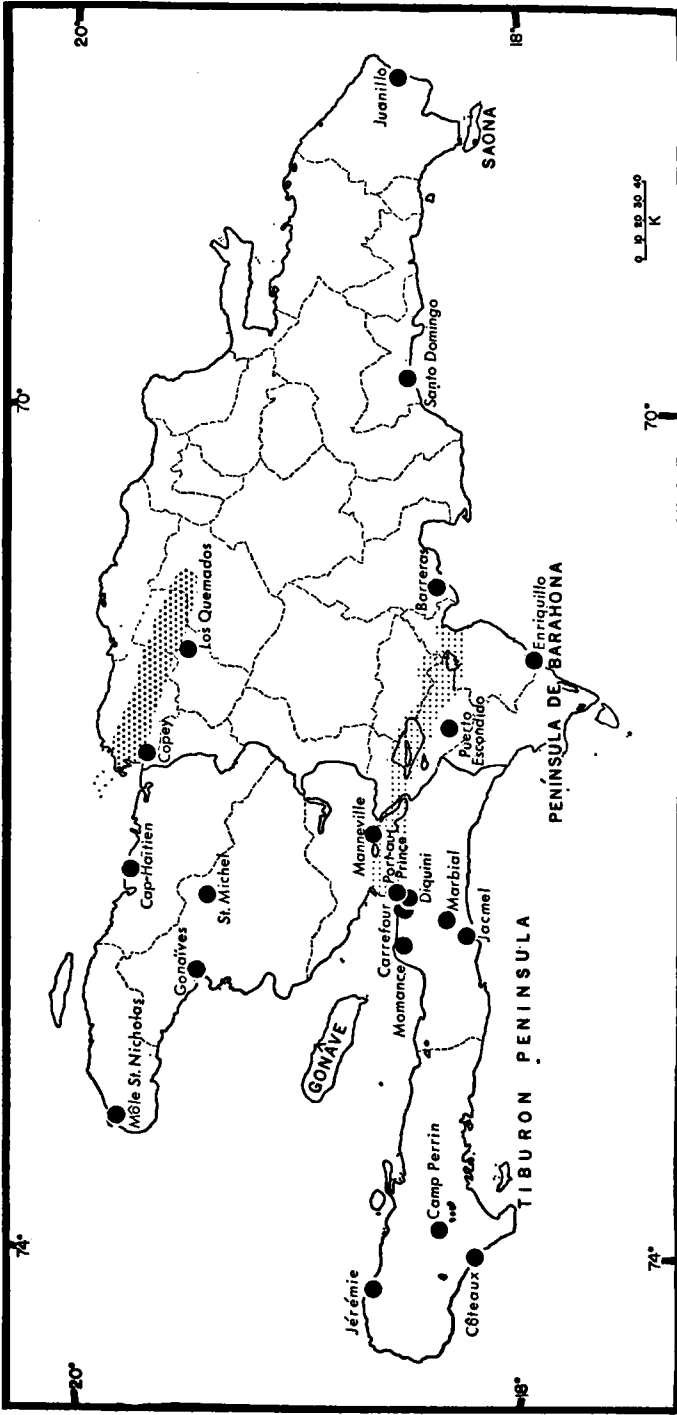
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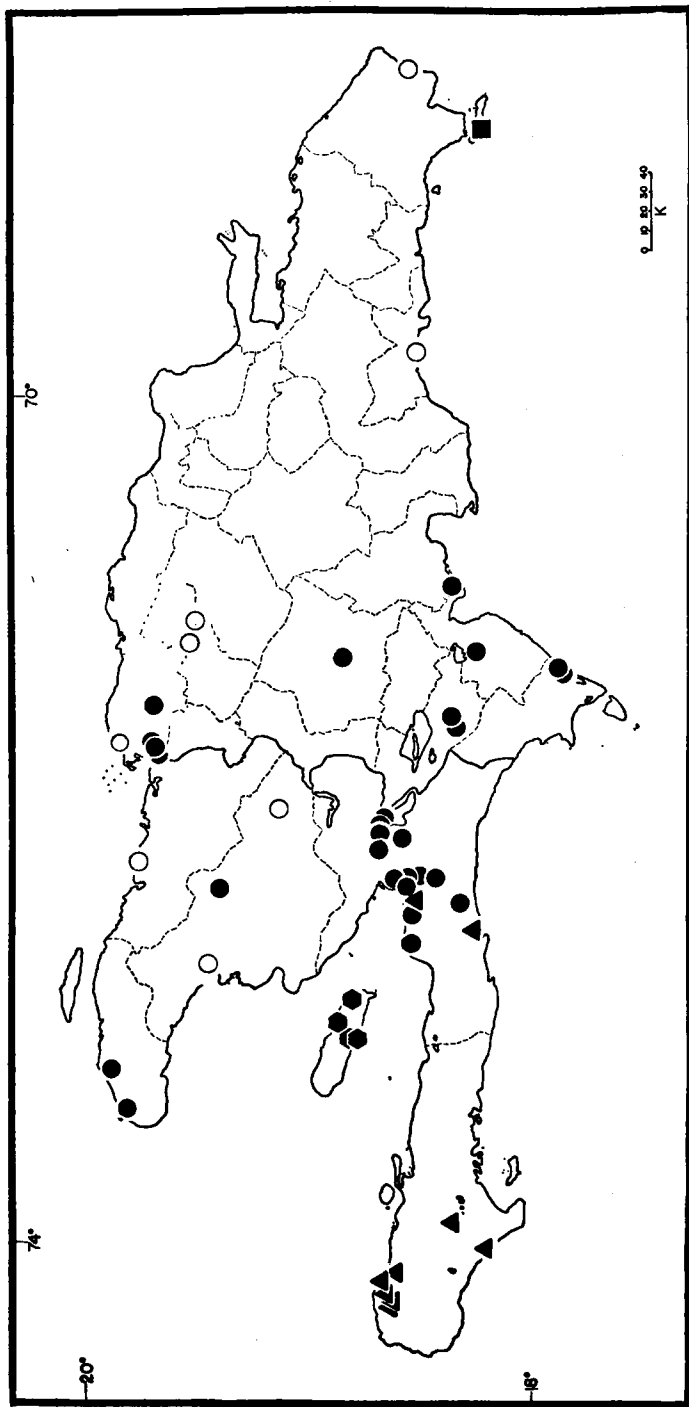
One of the least known of the endemic Hispaniolan colubrid snake genera is *Hypsirhynchus*. The genus was proposed by GÜNTHER (1858) for one specimen of a new snake, purportedly from the island of Barbados, to which he gave the name *H. ferox*. COPE (1862) later described *H. scalaris* from Hispaniola (type locality – near Jérémie, Département du Sud, Haïti). This species differed from *H. ferox* in that *H. scalaris* lacked a loreal scale; the pattern and coloration were said to be quite different from those stated by GÜNTHER to be typical of his species. COPE (1879) established that *H. ferox* was Hispaniolan rather than Barbadian and considered *H. scalaris* as distinct from *H. ferox*. BOULENGER (1894) regarded *H. scalaris* as identical to *H. ferox*. However, COCRAN (1941) noted that the holotype of *H. scalaris* differed from other *H. ferox* which she examined in that it lacked a loreal; she also pointed out that the loreal scale was reduced in some specimens of *ferox*. Only DUNN (1932) seriously questioned the status of *Hypsirhynchus* as a distinct genus. DUNN suggested that *Hypsirhynchus* be considered congeneric with the widespread Antillean *Dromicus*. MERTENS (1939) pointed out that, although



Hypsirhynchus was indeed close to *Dromicus*, the former differed from the latter in having a vertically elliptical pupil. The problem is made somewhat more complex in that the Antillean snakes presently included in *Dromicus* represent an unquestionably polyphyletic assemblage; to combine *Hypsirhynchus* with *Dromicus* surely contributes no clarification to the confusion in *Dromicus*. Aside even from this contention is the fact that *Hypsirhynchus*, if combined with *Dromicus*, stands out immediately in its general habitus (stocky rather than slim and cursorial), peculiarly viperid-like head, pattern and coloration, and relatively short tail. The hemipenial structures of *Dromicus* (*sensu stricto*, and exclusive of those forms which are to be included in *Leimadophis*) and *Hypsirhynchus* likewise are quite distinct. All things considered, there is surely nothing to be gained by considering *Hypsirhynchus* a member of the genus *Dromicus*. As presently understood, *Hypsirhynchus* is a valid monotypic genus; the species *ferox* is also monotypic, and no one has attempted to assess the variation within it.

My own interest in *Hypsirhynchus* is due to the collection of four specimens on Isla Saona, that Hispaniolan satellite island off the extreme southeastern coast of the República Dominicana. Although *H. ferox* has been previously known to occur on Ile de la Gonâve, it had not before been taken on any other of the Hispaniolan satellites. In fact, published locality records are few indeed. SCHMIDT (1921) reported specimens from Los Quemados and El Cercado de Mao in the northwestern portion of the República Dominicana, and MERTENS (1939) recorded specimens from Monte Cristi in this same general region and from Cap-Haïtien on the northern Haitian littoral. COCHRAN (1941) cited specimens examined or recorded from Jérémie and Côteaux on the Tiburon Peninsula in Haïti, from Momance, Carrefour, Port-au-Prince, Damien, and Manneville in and near the Cul-de-Sac Plain in Haïti, and from St. Michel de

Fig. 150. Map of HISPANIOLA, showing geographic areas and population centers mentioned in text. The densely shaded area in the northwestern República Dominicana is the Valle de Cibao and the lightly shaded area in southern Haïti and the República Dominicana is the Cul-de-Sac - Valle de Neiba Plain which formerly was a strait separating the Hispaniolan north and south islands.



l'Atalaye, Gonaïves, Savanne Papaye, and Cap-Haïtien in northern and central Haïti. Dominican records have been very few and include only (in addition to those of SCHMIDT and MERTENS) that of COCHRAN (1941) from Santo Domingo. The species is obviously widespread but apparently uncommon in most areas.

Examination of specimens of *Hypsirhynchus ferox* collected in Haïti under National Science Foundation grant GB-6944 convinced Dr. ERNEST E. WILLIAMS that the *Hypsirhynchus* from the Tiburon Peninsula in Haïti differed from other Haitian specimens in lacking a loreal – precisely that characteristic which COPE had used to distinguish *H. scalaris* from *H. ferox*. It thus seemed likely that *scalaris* was a recognizable taxon. Specimens collected under National Science Foundation Grant GB-7977 in the República Dominicana in 1968–69 greatly augmented the known locality records and knowledge of the distribution of the species in that country. Although, after study of not only Dr. WILLIAMS' material in the Museum of Comparative Zoology (MCZ) at Harvard University and my own (ALBERT SCHWARTZ Field Series – ASFS), as well as that in the Carnegie Museum (CM), the United States National Museum (USNM) and in the Museum of Zoology at Louisiana State University (LSUMZ), there are still several unresolved problems, it seems an appropriate time to review the variation and distribution of members of this Hispaniolan genus.

I am grateful to Dr. WILLIAMS, NEIL D. RICHMOND, CLARENCE J. MCCOY, Jr., JAMES A. PETERS, and GEORGE R. ZUG for the loans of materials under their respective care. In the field I have had the competent assistance of ROBERT K. BOBLIN, SIXTO J. INCHAÚSTEGUI, RONALD F. KLINIKOWSKI, DAVID C. LEBER, JAMES A. RODGERS, Jr., JAMES B. STRONG, and RICHARD THOMAS – all of whom have been instrumental in collecting specimens of these snakes. C. RHEA WARREN and JACQUES DUROCHER have given me several snakes which they secured in Haïti, on Ile de la Gonâve, and in the República Dominicana. The illustrations are the work of R. MARVIN COOK, to whom I am indebted for his work on my behalf.

Fig. 151. Map of HISPANIOLA, showing locality records for four subspecies of *Hypsirhynchus ferox*, as follow: solid circles, *H. f. ferox*; solid triangles, *H. f. scalaris*; solid hexagons, *H. f. paracrousis*; solid square, *H. f. exedrus*. Open circles represent locality records from the literature (SCHMIDT, 1921; MERTENS, 1939; COCHRAN, 1941) whence no specimens have been examined.

METHODS

Counts of ventralscales were taken as proposed by DOWLING (1950); counts of paired subcaudal scales do not include the terminal spine. Because of the relatively short tail in *Hypsirhynchus ferox*, there is a remarkable number of snakes with complete tails and thus with complete complements of subcaudal scales. Supra- and infralabial scales were noted, and the temporals were counted. Snout-vent length and tail length were measured in millimeters. Total underbody scales (ventrals + subcaudals) were calculated for each specimen, and ventrals minus subcaudals was used as an index figure. The dorsal scale row formula (rows behind the head-rows at midbody-rows before the vent) was taken. All the above are more or less standard counts taken in assessing variation in snakes.

Hypsirhynchus ferox shows remarkable variation in dorsal and ventral pigmentation and pattern; whether this is polychromatism *sensu stricto* is debatable. It is correlated with neither sex nor ontogeny. In an effort to categorize this variation in color and pattern, the following system was employed.

The dorsal pattern of each specimen was categorized as:

- 1) patternless - pale and virtually without pattern with dark dorsal chevrons at most only very faintly indicated.
- 2) pale, almost patternless, but with dorsal chevrons more clearly expressed than in pattern (1).
- 3) darker (brown) with chevrons prominent and with more or less vertical dark lateral bars or markings on the sides.

The throat pattern was categorized as being:

- 0) entirely patternless and concolor with the venter
- 1) vaguely smudged with darker pigment
- 2) marbled with dark pigment
- 3) solid dark brown with included well-defined clear areas which in life vary from cream to white in adults.

Using the dorsal categorizations, there are very few individuals which cannot be placed in one or another category with ease; yet the presence of a few intermediate individuals suggests that these

categories are not sharply delimited from each other. As far as throat color is concerned, the only doubt occurs with snakes assigned to either category 1 or 2. In general, however, the smudged and/or marbled throats are less common features than are either unpatterned or solid dark brown throats.

For convenience of preliminary discussion, the suite of specimens may be divided into four samples: 1) 29 specimens from the Tiburon Peninsula, from Jérémie on the west to Diquini on the east; 2) 14 specimens from Ile de la Gonâve; 3) 91 specimens from Haïti and the República Dominicana, including four specimens from the Península de Barahona in the latter country; 4) four specimens from Isla Saona. Detailed localities are given in the taxonomic accounts beyond, and tabular presentation of the following data is shown in Table 2.

Size. The largest male (snout-vent length 727 mm) is from sample 3, whereas the largest female (773 mm) is from sample 2. Both sexes in samples 1 and 4 are only moderately large (males to 592 mm and 540 mm, females to 582 mm and 586 mm) and are thus much smaller (and consistently so) than are snakes in samples 2 or 3. Considering that both sexes are about equal in snout-vent lengths in sample 1, and despite the apparent discrepancy of sizes of the two sexes in samples 2, 3, and 4 (males to 647 mm, females to 773 mm in sample 2; males to 727 mm, females to 710 mm in sample 3; males to 540 mm, females to 586 mm in sample 4), both sexes seem to reach about the same snout-vent length in *Hypsirhynchus*.

Ventral scales. The total range of ventral scales, regardless of provenance of the specimens, is, in males, from 156 to 177, and in females, from 162 to 182. All samples overlap broadly in extremes, but sample 1 and sample 4 tend toward lower number of ventrals in males, and at least females from sample 1 show the same tendency (sample 4 is represented by only one female). Sample 2 females have higher ventrals (175–182) than do females from sample 3 (166–177) and show very little overlap, but sample 2 males (ventrals 169–170) are completely and broadly bracketed by sample 3 males (ventrals 162–177).

Subcaudal scales. The total range in subcaudal scales is from 73 to 93 in males and from 71 to 89 in females. In both sexes,

the range of sample 3 includes the ranges of the three other samples.

Ventrals + subcaudals. Total underbody scales vary in males from 225 to 267, and in females from 241 to 262. There is considerable overlap, but samples 1 and 4 have lower counts in males, and samples 1 and 3 have lower counts in females.

Ventrals minus subcaudals. Counts vary in males from 66 to 98, and in females from 77 to 109. Males from sample 1 have the lowest counts (although at their upper extreme they overlap those of samples 2 to 4); sample 1 females include the low extreme in this count but otherwise completely overlap the counts in sample 3 females. In fact, the extremes in sample 3 females (80–107) virtually include the ventrals minus subcaudals counts in all other samples.

Dorsal pattern. Sample 1 modally has dorsal pattern 3 (16 of 29 specimens); sample 2 modally has dorsal pattern 1 (11 of 13 specimens); sample 3 modally has dorsal pattern 3 (46 of 90 specimens), and sample 4 modally has dorsal pattern 2 (2 of 4 specimens). There is a very strong tendency for sample 2 snakes to be patternless or have the dorsal chevrons very pale; only one of 13 sample 2 snakes has a dorsal pattern 3. Of the four sample 4 snakes, the mode is pattern 2, but one snake has pattern 1 and the other has pattern 3.

Throat pattern. Sample 1 always has throat pattern 3; this situation is unique, in that elsewhere there is a general positive correlation of intensity of dark throat pattern with intensity of dorsal pattern – i.e., snakes with pallid or virtually patternless dorsa have unmarked or pale throats. Regardless of the condition of the dorsal pattern in sample 1 snakes, the throat pattern is always fully expressed. In samples 3 and 4, throat pattern 3 is the mode and it is one of two bimodes in sample 2. Sample 2 snakes which are modally pattern 1 dorsally (and thus are pale) usually have *some* throat markings (12 of 13 snakes), despite their faded dorsal patterns. The mode of throat pattern 3 in sample 3 snakes is quite strong (59 of 89 snakes), but some sample 3 snakes have throat pattern 0. All four sample 4 snakes have some throat markings (categories 2 or 3).

Loreals. Bilateral absence of the loreal scales occurs in all specimens of sample 1, and in three of the four snakes in sample 4;

the exceptional snake has the loreal absent on one side. Sample 2 snakes modally have the loreal bilaterally present, but three of 14 sample 2 snakes have the loreal absent unilaterally, and the loreals of one snake (ASFS X3376) are present but very tiny. Of the 91 snakes in sample 3, 90 have the loreals bilaterally present, and only one (MCZ 62690) lacks the loreal on one side and has it on the other. Modalities of presence or absence of loreal scales are extremely strong. Samples 1 and 4 lack loreal scales, and samples 2 and 3 have them present, although they may be much reduced in size in sample 2 snakes.

Dorsal scales. The dorsal scales are smooth and have a single apical pit, which, in pallid specimens, is dark and very prominent, even on casual inspection. The usual dorsal scale row formula is 19-19-17, but occasional individuals have behind-the-head counts of 20, 21 or 22, and five specimens have midbody counts of 17 (3 snakes) and 21 (2 snakes). None of these variants is correlated with geography. Snakes from sample 2 are the most aberrant and depart most strongly from the standard 19-19-17 counts; in addition to aberrant head and midbody counts, two sample 2 snakes have 16 dorsal rows before the tail, so that of 13 sample 2 snakes, only four do not have some peculiarity in dorsal scale rows.

Labial scales. There are usually 8/8 supralabials and 10/10 infralabials. Counts of 7/8 and 8/9 supralabials occur very infrequently, and infralabial counts of 9/9, 9/10, 10/11, 10/12, and 11/9 occur randomly and without geographical correlation.

Anal scale. The anal scale is divided in all specimens.

Preocular and postocular scales. The preocular scales are regularly 1/1, and the postocular scales are usually 2/2, although counts of 1/1 and 1/2 postoculars occur. Of nine snakes with postocular counts of 1/1 or 1/2, four are in sample 2, two are in sample 1, and three are in sample 3.

Temporal scales. The usual condition of temporal scales is 1 + 2 bilaterally. One snake from sample 2 has 2 + 2 unilaterally and another from this same sample has 1 + 4 unilaterally and 2 + 3 on the other side. One snake from sample 4 has 1 + 3 unilaterally. In sample 3, two snakes have 1 + 3 unilaterally and one

snake (MCZ 62689) has the first two rows of temporals fused into a single scale on one side.

SYSTEMATIC ACCOUNT

Hypsirhynchus ferox Günther

Hypsirhynchus ferox GÜNTHER, 1858. Cat. colubrine snakes in Brit. Museum, p. 49.

Type locality: "Barbadoes" (= Hispaniola; restricted to "Santo Domingo" by BOULENGER, 1894: 118). Holotype: British Museum (Natural History) 1946.1.4.96.

Description: A moderately large (males to 727 mm, females to 773 mm snout-vent length) colubrid snake with 19 (exceptionally 17 or 21) scale rows at midbody; 156 to 177 ventrals and 73 to 93 paired subcaudals in males, 162 to 182 ventrals and 71 to 89 paired subcaudals in females; dorsal scales smooth and with a single, often very prominent, apical pit; anal divided; head scalation of the normal unspecialized colubrid type, but head prominently triangular and viperid-like and anteorbital portion of head somewhat elongate; loreals 1/1 or 0/0 (occasionally 1/0) modally by populations, 1/1 preoculars, 2/2 (rarely 1/1 or 1/2) postoculars, and usually 1 + 2 temporals; supralabials usually 8/8 and infralabials usually 10/10; dorsal pattern variable, from completely patternless pinkish buff to tan, to heavily patterned dorsally with a median series of arrow-head markings, more or less alternating with some sort of lateral bars or interconnecting reticula; throat varying from patternless to solid brown with included well-defined white to cream spots; venter some shade of tan, usually heavily stippled with dark brown dots; a bold white temporal stripe from the eye across the posterior supralabials onto the anterior quarter of the body where it becomes increasingly obscure; lores and upper head scales variously marbled with pale on a dark brown ground, the most persistent head marking consisting of a median dark stripe from the snout onto the nape, and one or two alternating light-and-dark longitudinal lines or stripes in the supraocular region.

Pupil vertically elliptical.

Hemipenis (based upon USNM 167298) long, extending for a distance of about 13 subcaudals when extruded, strongly bifurcate apically; non-sulcate surface equipped with scattered long spines, those proximal shorter than those distal, and arranged in four longitudinal series, the lateral series delimiting the non-sulcate from the sulcate surface; non-sulcate surface covered with many very small spines and spinules which extend onto the sulcate surface to the sulci; sulcate surface (between sulci) very weakly rugose; sulcus spermaticus divided very near base of organ, the two grooves extending to just below the apices of the two distal forks; apices calyculate, the margins of the calyces studded with prominent papillae; base of hemipenis heavily covered with large stout spines and without a basal lobe.

***Hypsirhynchus ferox ferox* Günther**

Type locality: "Barbados" (= Hispaniola); here restricted to the vicinity of Port-au-Prince, Département de l'Ouest, Haïti. **Holotype:** BMNH 1946.1.4.96.

Definition: A large subspecies of *Hypsirhynchus ferox* (males to 727 mm, females to 710 mm snout-vent length), high number of ventrals (162–177) in males and moderate number of ventrals in females (166–177), high number of ventrals + subcaudals in males (244–267) and low number of ventrals + subcaudals in females (241–260), high number of ventrals minus subcaudals in males (77–98) and moderate number of ventrals minus subcaudals in females (80–107), dorsal pattern modally consisting of dark arrow-head markings (Fig. 152), throat modally dark brown with included clear white to cream spots, and loreal scales almost always present bilaterally.

Variation: Variation in all chromatic and scale characteristics has been discussed previously, as sample 3. The mean number of ventral scales in male *ferox* is significantly different from that of *scalaris*, and the mean number of ventrals in females is significantly different from those of both *scalaris* and the Gonâve population (see beyond). For further comparisons, see accounts of the following subspecies.

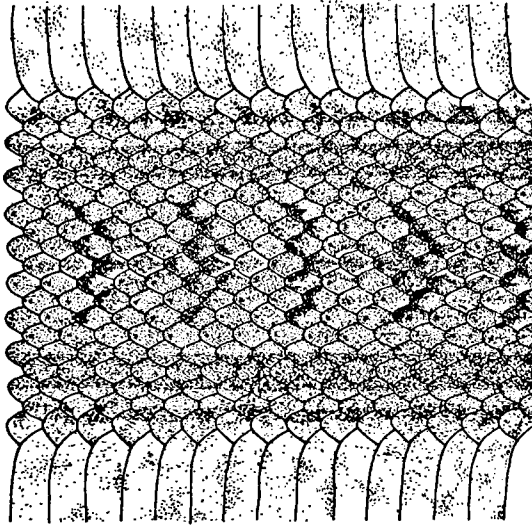


Fig. 152. Pattern of *Hypsirhynchus ferox ferox* (ASFS V17127).

Remarks: Although *Hypsirhynchus ferox ferox* is usually a heavily patterned snake, scattered individuals from various localities are patternless.

To contrast the hues involved in patternless and patterned snakes, the following field notes on two snakes, extreme in pattern, are quoted:

ASFS X9781 – female – 12 mi. SW Enriquillo; dorsal ground color pale sandy with a slight orangish middorsal streak; iris sandy; head dirty grayish tan; labial streak sandy; ventral ground color creamy, throat and chin dark brown.

ASFS X2102 – female – 3.9 mi. NW Ganthier; dorsal ground color tan with a series of dark brown dorsal arrowheads, more or less distinct to tip of tail; median dorsal line buffy orange, fairly bright in comparison to tan dorsal ground color; iris tan; a pale buffy temporal line extending as white on body and becoming obscure after anterior quarter of body; a brownish lateral line above pale line; supra- and infra-labials dark brown, as is chin; venter brown except tip of tail pale yellow; chin and venter with white flecks or blotches.

In the patternless phase, the dorsal ground color was recorded as pale sandy, buffy tan, rich reddish tan, or tan, and the dorsal color of patterned individuals was recorded as tan and rich tan. The pattern is brown, the individual arrowheads delimited anteriorly by cream to buffy lines.

Although *ferox* and *scalaris* approach each other closely (Carrefour

and Diquini; Salamon and Marbial), there is no evidence of intergradation in specimens from these four localities. On the other hand, the few specimens from the Peninsula de Barahona (here regarded as *H. f. ferox*) might be interpreted as intergradient between *scalaris* and *ferox*. These specimens are discussed in detail later.

GÜNTHER (1858) gave no ventral or subcaudal counts for the holotype of *H. f. ferox* in the British Museum; BOULENGER (1894: 118) stated that the specimen was a female with 174 ventral scales and 72 subcaudal scales. Considering probable slight differences between BOULENGER's and my method of counting ventral scales, there is little doubt that the holotype originated on the island of Hispaniola (rather than on either of the satellites whence *H. f. ferox* is presently known), since his counts in both instances fall within the known parameters of female *H. f. ferox*. Ventrals + subcaudals (246) and ventrals minus subcaudals (102) likewise agree with these counts in female *H. f. ferox* and not with those of other subspecies. Finally, in his account of the characteristics of *H. f. ferox*, BOULENGER noted "loreal longer than deep"; the mere presence of a loreal in all five specimens available to BOULENGER (including the holotype) suggests that all specimens came from that population which regularly has large loreals present – namely, *H. f. ferox*. At least two of BOULENGER's specimens with precise locality data (Cap-Haïtien, Gonaïves) came from within the range ascribed herein to the nominate subspecies.

Since it possesses a vertically elliptical pupil, *H. f. ferox* might be presumed to be a crepuscular or nocturnal snake. Our collecting experience indicates the opposite. We have never secured *H. f. ferox* of any subspecies abroad by night. By day, we have secured these snakes under objects on the ground (an old *Agave* stump, a woman's metal laundry tray, in a small log under a fallen branch, under a piece of flat concrete adjacent to the ruins of an abandoned house) and actively crawling (one ascending the trunk of a large tree in an Haitian oasis and another in *Acacia* scrub in the Valle de Neiba). In neither of these latter instances was there evidence that the snakes had been recently routed from some diurnal retreat. Considering the fact that a very great deal of time has been spent in

nocturnal collecting by ourselves in both Haïti and the República Dominicana, I am very reluctant to consider *H. ferox* as a nocturnal snake; all of our evidence pointse to its diurnal activity.

Hypsirhynchus ferox ferox occurs from below sea level (Cul-de-Sac - Valle de Neiba plain) to an elevation of 5600 feet (1697 meters) at Furcy. The snake appears to be most abundant in arid situations in both republics but is apparently no-where extremely common with the possible exception of the Haitian Cul-de-Sac Plain. Its apparent abundance in that region may be due rather to both the accessibility of this desert plain from Port-au-Prince and the fact that the Cul-de-Sac has been visited by most herpetologists who have visited Haïti. A second apparent center of abundance is in the Dominican Valle de Cibao in the Monte Cristi region; this valley is likewise an extremely arid cactus-studded lowland and is comparable ecologically to the Cul-de-Sac Plain. That the subspecies is not restricted to such formidable situations is attested by its occurence at Carrefour and Momance in the mesic lowlands, and at Furcy, Pétionville, and Marbial in the mesic uplands. A dead *H. ferox* was observed at Juanillo, Altagracia Province, República Dominicana, in the easternmost portion of Hispaniola, by James A. RODGERS, Jr., and JAMES B. STRONG in May 1969. The snake was not saved, but the observation indicates that *H. ferox* occurs far to the east of all previously recorded mainland specimens. The habitat at Juanillo is moderately mesic costal forest, the same sort of situation wherein *H. f. ferox* was taken near Pepillo Salcedo and Copey.

Specimens examined: HAÏTI, DÉPT. DU NORD, Môle St. Nicholas (MCZ 62692); Jean Rabel (MCZ 62693); DÉPT. DE L'ARTIBONITE, St. Michel de l'Atalaye (USNM 74497); DÉPT. DE L'OUEST, 3.9 mi. (6.2 km) NW Ganthier (ASFS X2102); Eaux Gaillées (MCZ 52314, MCZ 51259-60, MCZ 60200-02); "Etang Manneville" (CM 38860-63, CM 38865-67); Gloré (MCZ 60203-04); *between Thomazeau and Gloré (MCZ 60206); Bois Brulée, ca. 3 km W Thomazeau (ASFS V8198); Manneville, (MCZ 8690); Damien, (USNM 75890); Delmas (ASFS V11351, MCZ 62687-90, MCZ 60195-99); Port-au-Prince (MCZ 60182-94, USNM 10162, USNM 10165-66); Port-au-Prince, Furzeau (USNM 118932); Port-au-Prince, Sacred Heart Parish (USNM 118933); *within 2 mi. (3.2 km) Port-au-Prince (ASFS V13560); *Hatte Lathan (USNM 123998); Pétionville (ASFS V11211-12); Furcy (USNM 123802); Carrefour (MCZ 37664-66); Momance (MCZ 8744); Marbial, 21 km NE Jacmel (MCZ 65169).

REPÚBLICA DOMINICANA, MONTE CRISTI PROVINCE, 1 km W Copey (ASFS

V1462-63); 2 km W Copey (ASFS V1628); 7 km SE Pepillo Salcedo (ASFS V17792); 5 km W Guayubín (ASFS V1514, ASFS V1614); SAN JUAN. PROVINCE, Barranca (ASFS V21615, ASFS V21624-25); AZUA PROVINCE, Barreras, 10 km SW Puerto Viejo (ASFS V21209-11, ASFS V21223-25, ASFS V21468-71, ASFS V21977); INDEPENDENCIA PROVINCE, 4 km SE Duvergé (ASFS V17127); Puerto Escondido (ASFS V20599-601, ASFS V20791, ASFS V20875); BARAHONA PROVINCE, 5 km S Cabral (MCZ 57759); PEDERNALES PROVINCE, 12 mi. (19.2 km) SW Enriquillo (ASFS X9781, ASFS X9905); 14 km SW Enriquillo (ASFS V16955).

Localities marked with an * are not mapped.

Hypsirhynchus ferox scalaris Cope

Hypsirhynchus scalaris COPE, 1862. Proc. Acad. Nat. Sci. Phila. p. 72.

Type locality: near Jérémie, Département du Sud, Haïti. Holotype: MCZ 3611.

Distribution: The Tiburon Peninsula in southwestern Haïti, east to Diquini in the north and Salamon near Jacmel in the south.

Definition: A small subspecies of *Hypsirhynchus* (males to 592 mm, females to 582 mm snout-vent length), low number of ventrals in both sexes (156 to 169 in males, 162 to 169 in females), low number of ventrals + subcaudals in both sexes (225 to 254 in males, 242 to 254 in females), low number of ventrals minus subcaudals in both sexes (66 to 83 in males, 77 to 89 in females), dorsal pattern modally consisting of dark arrowhead markings (Fig. 153), often coupled with a lateral dark reticulum composed of dark bars alternating with the dorsal arrowheads and connected by short dark diagonal markings, throat always dark brown with included white to cream spots regardless of expression or intensity of dorsal pattern, and loreal scales always absent bilaterally.

Variation: Variation in all chromatic and scale characteristics has been discussed previously as sample 1. The mean numbers of ventral scales in both male and female *scalaris* differ significantly from the same means in both sexes of *ferox* (male *scalaris* 162.1 ± 1.40 - twice standard error of mean, male *ferox* 169.7 ± 1.08 ; female *scalaris* 166.1 ± 1.49 , female *ferox* 171.6 ± 0.93). Comparison of means of ventrals + subcaudals and ventrals minus subcaudals of both sexes of *scalaris* and *ferox* shows that *scalaris* regularly has the lower means in all cases (ventrals + subcaudals:

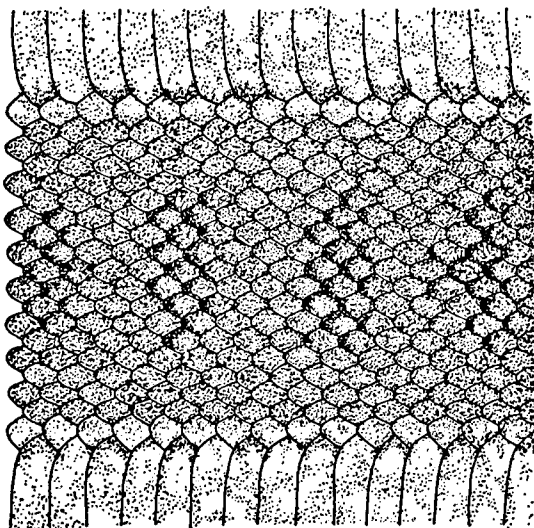


Fig. 153. Pattern of *Hypsirhynchus ferox scalaris* (ASFS V9144).

male *scalaris* 247.0, male *ferox* 254.4; female *scalaris* 248.2, female *ferox* 250.2; ventrals minus subcaudals: male *scalaris* 74.9, male *ferox* 85.3; female *scalaris* 83.0, female *ferox* 93.6); the differences in means are least in counts of ventrals + subcaudals in females of both subspecies. On the other hand, the differences in means of females in ventrals minus subcaudals are the most striking.

Two features of *scalaris* distinguish it immediately from *ferox*: the regular absence of loreal scales bilaterally (only one of 91 *ferox* lacks a loreal unilaterally and all others have the scale present on both sides) and the regular occurrence of a dark throat, regardless of dorsal pattern. Thus, patternless or slightly patterned *scalaris* have dark throats, in contrast to *ferox*, wherein the throat color presence or intensity vary concomitantly with the intensity of expression of the dorsal body pattern.

Judging from examination of preserved specimens and color notes in life from a single *scalaris* (ASFS V9144), I have the impression that *scalaris* is a darker snake than *ferox*. The color description of ASFS V9144, taken by RICHARD THOMAS, states: dorsal ground color dark wood-brown; arrowheads brown to black, con-

nected in a chain-like effect with staggered lateral short bars on sides; hazy dark brown lateral band on lower sides; head brown above in darks and lights, forming an emarginate scrollwork; rostral, upper labials, chin and throat region dark chocolate brown, fading on throat; light spots and flecks on chin white; venter finely stippled with brown but with overall orange wash; spots on venter cream; tail tip mainly black and with small white flecks, yellow below tip. The wood brown color noted here for this *scalaris* has not been recorded for any *ferox*; likewise, as preserved, the specimens of *scalaris* tend very strongly to darker browns; when present, the dorsal arrowheads are prominent due to their increased depth of pigmentation (darker brown to black).

I have examined no Haitian specimens which I interpret as intermediate between *scalaris* and *ferox*. The two subspecies approach each other closely at four Haitian localities (Carrefour and Diquini; Salamon and Marbial) with a distance of 10 kilometers in the former case; Salamon cannot be precisely located but the distance between Marbial and Jacmel is 13 kilometers airline. Apparently in the eastern Massif de la Selle and the associated Morne l'Hôpital, these two taxa interdigitate and details of their distributions in this area remain to be clarified. Specimens which I consider *ferox* from localities immediately adjacent to the presumed range of *scalaris* (Momance, Carrefour, Port-au-Prince, Pétionville, Furcy, Marbial) all have the loreal scales present and no smaller than those from localities far removed from this presumed area of contact between *scalaris* and *ferox*.

Since the Tiburon Peninsula and the Peninsula de Barahona compose the ancient south island (*sensu* WILLIAMS, 1961) of Hispaniola, it might be assumed that these two areas might be inhabited by snakes of a taxon (*scalaris*) endemic to the south island. But *ferox* occurs on both slopes of the interior montane masses in southeastern Haiti, thereby apparently severing *scalaris* from any direct contact with populations on the Peninsula de Barahona. There are three snakes (ASFS X9781, ASFS X9905, ASFS V16955) from well south on the Peninsula de Barahona; all are patternless or weakly patterned and all have loreal scales bilaterally; one has the throat marbled and the other two have the throat brown, but

not so dark as is customary in *ferox*. One of these is a male (ASFS V16955) with 162 ventrals, the low extreme for male *ferox*, and the two females have counts of 166, the low extreme for female *ferox*. These three snakes might be interpreted as being intergrades between *ferox* and *scalaris* on the basis of ventral scales and some pattern features but the apparent separation of the Barahona populations of *H. ferox*, by penetration of *H. f. ferox* between these snakes and *H. f. scalaris* to the west, confuses the interpretation. It is possible that, in southeastern Haïti, *H. f. ferox* extends south into the Massif de la Selle by some circuitous route (hardly directly across the very high uplands of that range) and occurs at Marbial, and that more western *scalaris* occurs along this southern Haitian coast near Jacmel and eastward, with the Peninsula de Barahona populations showing extreme intergradation between *ferox* and *scalaris* (but tending strongly toward *ferox*). There are too few specimens available from this whole region to be certain. Another possibility is that *ferox* and *scalaris* should be regarded as two species (and lack of intergradation in specimens from immediately adjacent areas of contact bears out this suggestion), and that the Peninsula de Barahona snakes represent an endemic subspecies (of *H. ferox*) on that peninsula. Only much additional material from southern Haïti and southwestern República Dominicana can clarify the picture.

Hypsirhynchus ferox scalaris occurs from coastal regions (Jérémie) at sealevel to elevations of at least 1000 feet (305 meters); so many of the recent localities for *scalaris* are unlocatable that the upper altitudinal extreme of its distribution is uncertain. Since the distal Tiburon Peninsula is mesic, presumably *H. f. scalaris* is a snake of humid situations; its apparently darker dorsal color suggests such an ecological association.

Specimens examined: HAÏTI, DÉPT. DU SUD, near Jérémie (MCZ 3611; holotype); Jérémie (ASFS V9144); *Ambas Laye, nr. Jérémie (MCZ 70121–22); Place Nègre, nr. Jérémie (MCZ 70124–25, MCZ 64792–94); *Riverdi, nr. Jérémie (MCZ 70126); *Latinzi, nr. Jérémie (MCZ 70123); Marfrance (MCZ 74544); *Perine, nr. Jérémie (MCZ 70120, MCZ 64795); *Paroty, nr. Jérémie (MCZ 64791); Mayette, nr. Jérémie (MCZ 64782); Carrefour Sanon, nr. Jérémie (MCZ 64787–90); *Laye, nr. Jérémie (MCZ 64783–86); *La Source, nr. Jérémie (MCZ 64796); Camp Perrin

(MCZ 38280); Côteaux (USNM 80928); DÉPT. DE L'OUEST, Salamon, nr. Jacmel (MCZ 65158); Diquini (USNM 118944).

Localities marked with an * are not mapped.

***Hypsirhynchus ferox paracrousis*, new subspecies**

Holotype: CM 52284, a subadult female, from Etroits, ILE DE LA GONÂVE, HAÏTI, taken 17 July 1962 by Elie Cyphale. Original number X2433.

Paratypes: ASFS X3375-76, ASFS X3857, USNM 167299, LSUMZ 18007, same locality as holotype, July 1962, E. Cyphale; ASFS V11350, vicinity of Etroits ILE DE LA GONÂVE, Haïti, June 1967, native for J. Durocher; ASFS V11467-68 vicinity of Etroits, Ile de la Gonâve, hatched from eggs laid 16 May 1967 on 7 August 1967; MCZ 80833-34, Pointe à Raquette, Ile de la Gonâve, summer 1964, G. Whiteman; MCZ 93166, Boucan Patate, Ile de la Gonâve, December 1965, G. Whiteman; MCZ 80835-36, Ti Palmiste, 6 km from (= N) Pointe à Raquette, Ile de la Gonâve, summer 1964, G. Whiteman.

Definition: A large subspecies of *Hypsirhynchus ferox* (males to 647 mm, females to 773 mm snout-vent length), moderate number of ventrals in males (169-170), high number of ventrals in females (175-182), high number of ventrals + subcaudals in both sexes (251-258 in males, 248-262 in females), high number of ventrals minus subcaudals in males (82-89), very high number of ventrals minus subcaudals in females (96-109), dorsum pale pinkish buff to tan, modally without head or body pattern and modally with dark throat but throat pigmentation in adults never so strongly or solidly brown as in mainland subspecies, and loreal scales modally present bilaterally, but often tiny or even unilaterally absent.

Description of holotype: A subadult female, snout-vent length 570 mm, tail 160 mm; ventrals 179, subcaudals in 80 pairs, ventrals + subcaudals 259, ventrals minus subcaudals 99; anal divided; supralabials 8/8, infralabials 10/10; loreals 1/1; preoculars 1/1, postoculars 2/2, temporals 2 + 2/1 + 2; scale rows 19-19-17.

Dorsum and head pale tan in life with a faint buffy orange middorsal wash the length of the body; completely patternless dorsally and without head markings whatsoever; venter pale pinkish buff, throat concolor with venter. Dorsal pattern code 1, throat pattern code 0.

Variation: Four male *Hypsirhynchus ferox paracrousis* have

169 or 170 ventrals (mean 169.8), and ten females have 175 to 182 ventrals (177.8); subcaudals in four males vary between 81 and 88 (85.0) and in eight females between 71 and 81 (76.8). Ventrals + subcaudals are 251 to 258 (254.8) in males and 248 to 262 (255.3) in females; ventrals minus subcaudals are 82 to 89 (84.8) in males, 96–109 (101.8) in females. Supralabials are usually 8/8 (12 snakes), but 8/9 and 9/9 each occurs in one snake. Infralabials vary between 9/9 (3 snakes) and 10/10 (9), with counts of 9/10 and 10/11 in each of two snakes. The loreals are usually bilaterally present, but may be very tiny (as in ASFS X3376, for example) or somewhat smaller than in *H. f. ferox*; three specimens lack loreals unilaterally. Preoculars are uniformly 1/1, and postoculars are either 1/1 (4 snakes) or 2/2 (10 snakes). Temporals are most often 1 + 2 bilaterally, but the holotype has 2 + 2 unilaterally, another snake has 1 + 1 unilaterally, and a third snake has an aberrant formula of 1 + 4/2 + 3. Scales rows at midbody are usually 19, but two have midbody counts of 17 and one has a count of 21; anterior scale row counts are 19, 20, or 21, with 19 the strong mode, and posterior counts are most often 17, with two snakes having counts of 16 and one 19 in this position.

Of the fourteen *H. f. paracrousis*, 11 have the dorsal pattern code 1 (unpatterned or almost patternless with dorsal chevrons only very faintly indicated). Two additional snakes have dorsal chevrons present but are otherwise unmarked and are in category 2. Only one juvenile snake (snout-vent length 170 mm) has the dorsal pattern fully expressed and as dark as mainland *H. f. ferox*. As far as dorsal pattern is concerned, *H. f. paracrousis* most often is patternless or virtually so. The throats are modally patterned or smudged (five snakes in each category) with brown and with some cream blotches, but even in the most heavily pigmented condition (code 3), the brown ground color is less deep and less uniform than it is in *H. f. ferox* or *H. f. scalaris*. Two snakes (including the holotype) have the throat concolor with the venter and without pattern, and two snakes have the throat marbled. Although the bimodality of a patterned throat seems to indicate that a dark throat is the most common condition in *paracrousis*, the tendency is strongly toward weakly patterned or unpatterned throats. The dorsal head

pattern likewise is suppressed to a large extent, and many snakes, both adults and juveniles, lack or have only very weakly expressed the typical scroll-like head markings of *H. ferox*. The heavily patterned juvenile noted above has the head pattern fully expressed. With suppression of the throat and head pattern, the lateral pale and dark neck stripes have likewise disappeared. The net result of these pigmental modifications is a uniformly pale snake with little or no dorsal, cephalic, or throat markings.

A series of four topotypes (ASFS X3375-76, LSUMZ 18007, USNM 167299) was noted in life as having the dorsa pale pinkish buff to tan. Of these four snakes, one was patternless, one had faint dusky blotches indicative of the dorsal chevrons, a third had darker dorsal chevron remnants, and the fourth had dark dorsal arrowhead markings; all had a middorsal orange blush. The ventral ground color was pale pinkish tan stippled with brown dots. The iris in the holotype was golden above and below, and dark tan anteriorly and posteriorly. In the series of four topotypes, the iris was recorded as tan to brown, the top of the iris paler than the bottom, and with a golden pupillary ring.

Comparisons: *Hypsirhynchus ferox paracrousis* is easily differentiated from *H. f. scalaris*, if by no means other than the heavy and dark dorsal pattern and regularly dark throats of the latter subspecies. *H. f. scalaris* always lacks loreal scales bilaterally, whereas *paracrousis* most often has them, although it shows a tendency toward reduction of the size of the loreal or even its unilateral (and presumably also bilateral) loss. Both *paracrousis* and *scalaris* modally have the throat patterned, but as pointed out above, the depth and extent of pigmentation in *paracrousis* does not equal that in *scalaris*. As far as scales are concerned, *paracrousis* females are completely separable from *scalaris* females on the basis of ventral scales (high of 169 in *scalaris*, low of 175 in *paracrousis*), and *paracrousis* males stand at the upper extreme of ventral counts in male *scalaris* (169-170 versus 156-169). Ventrals minus subcaudals show the same situation, with almost complete separation in males (66-83 in *scalaris*, 82-89 in *paracrousis*) and complete dichotomy in this index figure in females (77-89 in *scalaris*, 96-109

in *paracrousis*). Of these two subspecies, *paracrousis* reaches a much larger size in both sexes, females exceeding *scalaris* by 200 mm.

Differentiation of *paracrousis* from nominate *ferox* is somewhat more difficult. Both subspecies modally have the throats dark brown, but there is a strong tendency in *paracrousis*, even with relatively heavily pigmented throats, to have the throat pigmentation much less deep than in heavily pigmented *ferox*. Dorsally, *ferox* is modally patterned (46 of 90 snakes), whereas *paracrousis* is modally unpatterned dorsally (10 of 13 snakes). Although my color notes do not give complete confirmation, I have the impression that patternless *paracrousis* are regularly paler and more faded than are patternless *ferox*, with hues in the former tending towards pinks and pinkish tans, and hues in the latter tending toward reddish tans and deeper shades. No single count or combination of counts will distinguish *paracrousis* from *ferox*; also, considering the small number of male *paracrousis*, comparisons of that sex with the large number of male *ferox* is not feasible. However, means of number of ventrals in female *paracrousis* (177.8 ± 1.75) and female *ferox* ($171.6 \pm .93$) are significantly different, and in both ventrals + subcaudals and ventrals minus subcaudals, the means for female *paracrousis* are higher than those of female *ferox*, in the latter case strikingly so (101.8 versus 93.6).

From both *scalaris* and *ferox*, *paracrousis* differs in having a high incidence of 1 postocular scale (four of fourteen snakes have this condition bilaterally). In all specimens of *ferox* and *scalaris* combined, only five snakes (three *ferox*, two *scalaris*) have 1 postocular unilaterally, and none has 1 postocular bilaterally, the condition in *paracrousis*.

Remarks: There are few habitat data on specimens of *Hypsi-rhynchus ferox paracrousis*. The holotype was collected in coastal cactus scrub during the day. Since the immediate area about Etroits is extremely arid, *H. f. paracrousis* resembles *H. f. ferox* in being an inhabitant of xeric lowland situations. However, Boucan Patate and Ti Palmiste are inland at elevations of about 240 meters and 280 meters, respectively.

Two eggs were laid by an *H. f. paracrousis* in a collecting sack on 3 August 1926; the eggs were creamy in color, very flexible, and granular in texture, the granules arranged in cotyledons; the eggs measured 30.6 mm × 17.2 mm and 25.9 mm × 17.0 mm. The paratypes include two juveniles, hatched on 7 August 1967 from eggs deposited on 16 May 1967 – an incubation period of 83 days.

The name *paracrousis* is from the Greek for "striking a false note", in allusion to the differences between the Gonave subspecies and nominate *ferox*.

***Hypsirhynchus ferox exedrus*, new subspecies**

Holotype: USNM 167298, a (subadult?) male, from the environs of Mano Juan, ISLA SAONA, REPÚBLICA DOMINICANA, one of two collected 29 December 1968 by native collectors. Original number ASFS V16193.

Paratypes: MCZ 92100, same data as holotype; ASFS V16202, ASFS V16250, environs of Mano Juan, ISLA SAONA, República Dominicana, 30 December 1968, native collector.

Definition: An apparently small subspecies of *Hypsirhynchus ferox* (males to 540 mm, snout-vent length, single female with snout-vent length of 586 mm), low number of ventrals in both sexes (159–163 in males, 168 in female), low number of ventrals + subcaudals in both sexes (239–244 in males, 243 in female), moderate number of ventrals minus subcaudals in both sexes (79–80 in males, 93 in female), dorsum rich pinkish tan and with pattern present but obsolescent (Fig. 154) and with head pattern fragmented and obscure, throat dark brown with isolated cream spots, temporal and anterior white longitudinal line present and prominent, and loreal scales modally absent.

Description of holotype: A (subadult?) male, snout-vent length 460 mm, tail 146 mm; ventrals 162, subcaudals in 82 pairs; ventrals + subcaudals 244, ventrals minus subcaudals 80; anal divided; supralabials 8/8, infralabials 10/10; loreals 1/0; preoculars 1/1, postoculars 2/2, temporals 1 + 2/1 + 2; scale rows 20–19–17.

Dorsum rich pinkish tan in life, without an orange middorsal wash; venter pink; top of head concolor with dorsum and without definite scroll-like figures, but these are represented by dark (black) fragments on the internasals, prefrontals, and supraoculars, and by a median brownish line on the parietals; dorsal body pattern consisting of a series of about 45 diffuse, somewhat angulate brownish blotches which represent the more orthodox dark brown

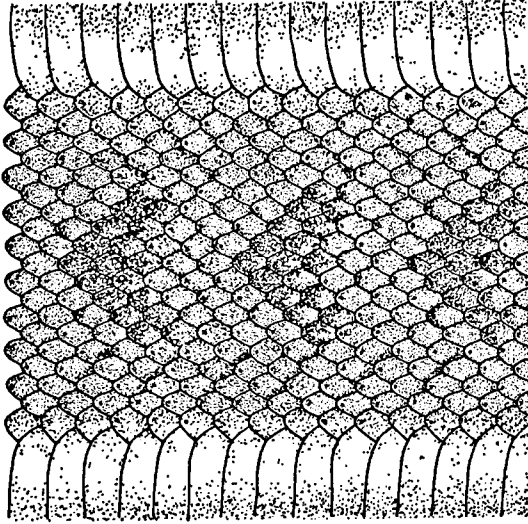


Fig. 154. Pattern of *Hypsirhynchus ferox exedrus* (USNM 167298).

dorsal arrowheads, two to three scales in length and about five or six scales in width, becoming lighter posteriorly and continuing onto the tail as a somewhat diffuse dark dorsal area or stripe; throat mottled very dark brown and bright rich orange-pink, with three large cream areas on the second pair of chin shields and on the throat scales themselves; venter heavily stippled with dark brown medially, clearer laterally, thereby giving a wide midventral darkly stippled stripe with the lateral quarters of the ventrals much less densely stippled; underside of tail rich orange-pink, grading to bright yellow distally, and with scattered dark brown stippling, dense on the proximal two thirds and immaculate for the posterior third. – Left hemipenis extruded. – Dorsal pattern code 2, throat pattern code 2.

Variation: The three males have from 159 to 163 ventrals, and two males with complete tails have 80 and 82 subcaudals. The single female has 168 ventrals and 75 subcaudals. Ventrals + subcaudals in males are 239 and 244, and are 243 in the female; ventrals minus subcaudals in males are 79 and 80, and are 93 in the female.

The loreals are bilaterally absent in three specimens and are unilaterally absent in the holotype. Preoculars are always 1/1 and postoculars are 2/2; temporals are bilaterally 1 + 2, except that the female has 1 + 3 unilaterally. Midbody scales are regularly 19 and posterior scales are regularly 17; anterior scale rows are 19 in two snakes and 20 in two snakes.

The dorsal body pattern was coded as 1 in one snake, 2 in two snakes, and 3 in one snake. Even in the snake which is coded as having the body pattern present and bold, the arrowheads are still diffuse and much less distinct than in the majority of well patterned specimens of the other subspecies. The dorsal coloration of two males (holotype and MCZ 92100) was recorded as pinkish tan, with the venters pink to buffy; the remaining two specimens did not differ markedly from this description. The tails are regularly rich orange-pink, grading to bright yellow distally. The throats were coded as 2 (mottled) in two cases and as 3 in two cases. Some sort of dark throat pigmentation is the rule in *exedrus*, and even the palest and most patternless snake (ASFS V16250) has a mottled throat. The throat mottling is composed of dark brown, orange-pink, and cream – the latter color restricted to blotches or spots which are surrounded by dark pigment. Dorsally, the head never shows the clear scroll-like markings as do *scalaris* and *ferox*, but there are more or less diffuse but dark brown to black areas or spots which indicate the basic position of the portions of the cephalic head pattern, even though the pattern itself has been for the most part lost.

Comparisons: *Hypsirhynchus ferox exedrus* is easily differentiated from both the nominate subspecies and *paracrousis* in that it lacks loreal scales whereas these subspecies usually have them present. It will be recalled that in *ferox*, only one of 91 specimens lacked a loreal unilaterally, whereas of the four *exedrus*, three lack the scale bilaterally and the other specimen lacks it unilaterally. The situation in *paracrousis* is less clear, since that subspecies tends toward reduction of size of the loreal and its unilateral (and presumably bilateral) loss. Both *exedrus* and *scalaris* lack the loreal bilaterally, and thus resemble each other in this feature. Likewise,

exedrus and *scalaris* have low scale counts; in both sexes, the limited data on ventrals in *exedrus* fall within the parameters of these counts in *scalaris*. In subcaudals, *exedrus* lies at the lower extreme (males) or below (females) the number of subcaudals in *scalaris*. The two taxa are easily differentiated on the basis of much darker ground color and heavy and often reticulate pattern in *scalaris*. At least females of the two subspecies can be differentiated on the higher ventrals minus subcaudals counts, which vary between 77 and 89 in *scalaris*; this count is 93 in the single *exedrus*.

There is no overlap between ventral counts in both sexes of *paracrousis* and *exedrus*, and ventrals + subcaudals and ventrals minus subcaudals show the same complete dichotomy; admittedly the number of *exedrus* is small. In comparison with *ferox*, the ventral counts of *exedrus* males lie at the low extreme in *ferox*, but the single female *exedrus* is included within the parameters of number of ventrals in female *ferox*. In male *exedrus*, ventrals + subcaudals lie just below male *ferox*.

It is difficult to assess the differences between the various subspecies of *H. ferox* as far as pattern and color are concerned. Certainly *scalaris* stands alone in having a dark brown dorsum with a chainlike pattern and, regardless of the condition of the dorsum – i.e., patterned or unpatterned – the regular presence of a solid dark brown throat. *H. f. paracrousis* tends toward extremely pallid and patternless individuals, and although the modal throat condition in that subspecies is dark, the dark brown pigment does not reach the intensity of the solid dark browns in *scalaris* and *ferox*. In *paracrousis*, the dorsal head scroll pattern is, in keeping with the general paleness and patternless condition, much reduced or absent, but it is not replaced by dark brown to black pigment aligned along the regions of the old pattern; in *exedrus*, this latter is indeed the case – the basic pattern is obsolescent but it has been replaced to some extent by irregular dark brown or black markings which generally follow the outlines set down by the original pattern. In *ferox*, on the other hand, patterned snakes regularly have the head pattern well delineated and distinct. Thus *exedrus* differs from patterned *H. f. ferox* in having the head pattern obsolete but replaced by irregular darker cephalic markings.

Remarks: Although *Hypsirhynchus ferox exedruss* is represented by but four specimens, these as a group differ from (presumably) adjacent *H. f. ferox* in several ways. I was impressed with the vivid colors of the *exedruss* in life. There are no mainland specimens of *ferox* from areas adjacent to Isla Saona; the closest mainland locality whence I have examined *H. f. ferox* is Barreras in Azua Province, 235 kilometers airline to the west. COCHRAN (1941) reported a specimen from Santo Domingo. RODGERS and STRONG examined a badly damaged and long dead specimen of *H. ferox* at Juanillo in extreme eastern Altagracia Province, so the species seems to occur in favorable situations east of Barreras in the southern República Dominicana.

The name *exedruss* is from the Greek for "away from home" in allusion to the occurrence of the taxon on Isla Saona.

The avifauna (see SCHWARTZ, 1970) and herpetofauna of Isla Saona are of extreme interest. Little collecting had been done on this island prior to our 1968 visits; our collections showed clearly that the fauna of both these classes was far richer than had been previously known. The amount of endemism is great. Among birds only the Lizard Cuckoo (*Saurothera longirostris* Hermann) has an endemic subspecies (*saonae* Bond). Almost surely the local Greater Antillean Bullfinch (*Loxigilla violacea* Linnaeus) is also a distinct form restricted to Saona, but the specimens available are still too few to be certain. All other avian species on Saona occur on the adjacent mainland and have not differentiated racially on the island.

As far as the herpetofauna is concerned, even though the entire suite of specimens collected on Saona still remains to be studied in detail, certain overall generalizations can even now be made. *Hyla dominicensis* Tschudi occurs on the island and appears to be identical with its mainland relatives. Among the lizards, *Diploglossus costatus* Cope, *Sphaerodactylus savagei* Shreve, *Anolis distichus* Cope, *Anolis cybotes* Cope, *Anolis chlorocyanus* Duméril & Bibron, *Ameiva taeniura* Cope, *Ameiva chrysolaeama* Cope, and *Leiocephalus lunatus* Cochran are abundant; the *S. savagei* and *A. chlorocyanus* populations are identical with those on the mainland, but all other lizards show strong endemism. Subspecies of *A. distichus*, *L. lunatus*, *A. taeniura*, and *A. chrysolaeama* have already been named, and even casual inspection of specimens of *A. cybotes* and *D. costatus* suggests that these two populations likewise should be differentiated nomenclatorially from their mainland relatives.

Saona snakes include *Typhlops pusilla* Barbour, *Uromacer catesbyi* Schlegel, *Uromacer oxyrhynchus* Duméril & Bibron, *Dromicus parvifrons* Cope, and *Hypsirhynchus ferox*. Of these, only *T. pusilla* and *U. oxyrhynchus* have apparently not differentiated on Saona. Thus, of the total Saona herpetofauna of 13 species, only three seem not to have differentiated from the mainland Hispaniolan stocks from which they were derived.

DISCUSSION

Hypsirhynchus ferox has been shown to be composed of four subspecies, of which two occur on Hispaniola itself and two on Hispaniolan satellite islands. As pointed out previously, the Hispaniolan south island, separated from the Hispaniolan north island by the lowland Cul-de-Sac – Valle de Neiba plain, has been a strong center of specific and subspecific endemism. When these two islands were rejoined during the Pleistocene, a general intermingling of their respective faunas occurred; additionally, some members of each fauna have penetrated into one or the other island – usually to only a limited extent. Many genera have cognate species or subspecies whose present distributions conform fairly precisely to the configurations of the pre-Pleistocene north and south islands, with areas of species overlap or subspecific intergradation in the area of the Cul-de-Sac – Valle de Neiba plain. Other species – and to this group belongs *H. ferox* – do not show this pattern quite so neatly. Although *H. f. scalaris* is obviously a south island taxon, its eastern limit falls at about the longitude of Port-au-Prince; certainly *scalaris* itself does not appear to extend so far east as the Peninsula de Barahona, where, were *scalaris* the endemic species of the entire south island, it might reasonably be expected. Conversely, *H. f. ferox* seems logically to be the north island taxon, and it might reasonably be expected to occur only north of the Cul-de-Sac – Valle de Neiba. However, *ferox* has penetrated into the south island not only along its old north shore (as at Momance and Carrefour) but also as far south across the high Massif de la Selle at Marbial. Presumably this latter area has been colonized by passage, not across the uplands of the Massif de la Selle, but rather through the Vallée de Trouin, which extends from Carrefour southeastward to the Jacmel region. The occurrence of *scalaris* near Jacmel (at Salamon) and the absence of intergradation between these two subspecies in this region suggests that there may be ecological differences between *ferox* and *scalaris* (ecological differences which are reflections of the regions and areas in which each has evolved), and that generally *ferox* is a snake of lowland xeric regions and

scalaris of more mesic lowlands (or even moderately high mesic uplands). The present distributions of both *scalaris* and *ferox* in areas away from this zone of contact south of Port-au-Prince and the ecological preferences of both taxa elsewhere tend to confirm this postulate.

That *scalaris* and *ferox* are distinct from each other is obvious: the absence of a loreal in the former and its regular presence in the latter suggest the degree of difference which has been achieved by *scalaris* from *ferox*. Presumably *scalaris* is an old derivative of *ferox* which evolved in the mesic western portion of the south island (that portion which is presently the Haitian Tiburon Peninsula). *H. f. ferox*, on the other hand, is the basic stock which has long occupied the north island; this subspecies presently occupies the entire area north of the Cul-de-Sac – Valle de Neiba plain.

The fact that the Peninsula de Barahona appears to be inhabited by snakes which are in some ways extreme intergrades between *ferox* and *scalaris* (i.e., they show the *ferox* condition of presence of a loreal, but the *scalaris* conditions of low scale counts and retention of a dark throat – albeit in one case marbled and in the other two cases not so solidly dark as in *ferox* – regardless of the presence or intensity of the dorsal pattern) suggests that *ferox* has invaded the south island in the Peninsula de Barahona and that *scalaris* intergrades with it in this region but apparently not in the Momance-Diquini and Salamon-Marbial regions farther to the west. Such a situation is most peculiar, and its interpretation is greatly hampered by lack of material from extensive areas between Marbial-Salamon in the west and Enriquillo in the east – a distance of some 150 kilometers airline. Were it not for the presumed intergrades at Enriquillo, it might be preferable to consider *scalaris* a species separate from *ferox*; such a course must await further material.

If *scalaris* and *ferox* were considered distinct species, the absence of a loreal in the former would surely constitute a major external character in their recognition, as it does now on the subspecific level. However, the problem is made more complex by the regular absence of this scale in *exedrus* (which is surely a direct *ferox* derivative), and its reduction and occasional absence in *paracrousis*. Basically, all populations of *H. ferox* other than *H. f. ferox* show at

least a tendency toward loreal reduction leading to absence (uni- or bilaterally) in *exedrus* and *scalaris*. Thus, species definition on the basis of absent loreals is not consistent with the geographical distribution of this character in the snakes themselves.

It is possible to consider *paracrousis* a subspecies which has arisen (with reduced or absent loreals) from the repeatedly chance colonizations of Gonâve by *scalaris* from the south and *ferox* from the east. This seems hardly likely, however, since *paracrousis* resembles *ferox* in most details of color and pattern, and the Gonâve subspecies seems to have been derived directly from *ferox*. Since reduction and absence of loreals is characteristic of all three subspecies satellite to *H. f. ferox*, there is no compelling necessity to suggest that *paracrousis* is a result of random colonizations of Gonâve by both *scalaris* and *ferox*.

Twenty four species of amphibians and reptiles have been reported from Ile de la Gonâve. These can be divided into three groups: 1) those which arrived on Gonâve from the south (= the Tiburon Peninsula); 2) those which arrived on Gonâve from the east (= the historical north island); and 3) those whose mainland distributions are so widespread that it is presently impossible to determine the origin of their Gonâve populations. To the first group belong five species (*Gonatodes albogularis* Duméril & Bibron, *Sphaerodactylus cinereus* Wagler, *Anolis singularis* Williams, *Typhlops capitulata* Richmond, and *Uromacer frenatus* Günther). To the second group belong eleven species (*Anolis brevirostris* Bocourt, *Anolis chlorocyanus* Duméril & Bibron, *Anolis olssoni* Schmidt, *Leiocephalus vinculum* Cochran, *Ameiva chrysoleama* Cope, *Ameiva taeniura* Cope, *Amphisbaena gonavensis* Gans & Alexander, *Typhlops pusilla* Barbour, *Epicrates fordi* Günther, *Hypsirhynchus ferox*, and *Uromacer catesbyi* Schlegel). Eight species are widely distributed on the Hispaniolan main island and occur on Gonâve; these include *Hyla dominicensis* Tschudi, *Aristelliger cochranae* Grant, *Anolis cybotes* Cope, *Diploglossus sepsoides* Gray, *Epicrates angulifer* Bibron, *Tropidophis haetianus* Cope, *Dromicus parvifrons* Cope, and *Ialtris dorsalis* Günther. The southern element on Ile de la Gonâve is far

less (five species) than the eastern (eleven species), and *H. f. paracrousis* conforms to this general pattern.

In summary, *Hypsirhynchus ferox* is an Hispaniola endemic colubrid genus which is presently regarded as monotypic. The history of the species is two-fold: early invasion of the old south island and development there of *scalaris*; later invasion by *ferox*, when the strait between the north and south islands was closed, and contact between *ferox* and *scalaris* south of the Cul-de-Sac Plain (where intergradation remains unknown) and south of the Valle de Neiba on the Península de Barahona (where intergradation is suggested). Additionally, *H. ferox* reached Gonâve and Saona, and in each case differentiated there. Of the four subspecies, *scalaris* is the best differentiated both scutellogically and chromatically. This is not surprising, since of the three derived subspecies, *scalaris* has presumably been the longest isolated.

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