NUMBER 195 OCTOBER 1, 1928

OCCASIONAL PAPERS OF THE MUSEUM OF ZOOLOGY

UNIVERSITY OF MICHIGAN

ANN ARBOR, MICHIGAN PUBLISHED BY THE UNIVERSITY

A REVISION OF THE GENUS TROPIDOPHIS

BY OLIVE GRIFFITH STULL

The boid genus Trophidophis is a group of eight species. Of these, the species *maculatus* may be divided into three, and the species *pardalis* into five, geographical subspecies. The following arrangement of the forms has been developed in this study.

THE MACULATUS GROUP

Tropidophis maculatus maculatus (Bibron).
Tropidophis maculatus jamaicensis, new subspecies.
Tropidophis maculatus haetianus (Cope).
Tropidophis paucisquamis (Müller).

THE PARDALIS GROUP

Tropidophis taczanowskyi (Steindachner).
Tropidophis pardalis pardalis (Gundlach).
Tropidophis pardalis canus (Cope).
Tropidophis pardalis curtus (Garman).

Tropidophis pardalis androsi, new subspecies.
Tropidophis pardalis bucculentus (Cope).
Tropidophis wrighti, new species.
Tropidophis melanurus (Schlegel).
Tropidophis semicinctus (Grundlach and Peters).

The genus is chiefly West Indian, appearing on the islands of Cuba, Jamaica, Haiti, Navassa, Inagua, Eleuthera, Andros, New Providence, and Great Abaco, but two species are found on the mainland, *taczanowskyi* in Ecuador and Peru, and *paucisquamis* in Brazil. One species has been described from Guatemala, but according to Stejneger (1917, Proc. U. S. Nat. Mus., Vol. 53, p. 281), this locality is erroneous, since this snake is evidently the same as the Cuban *semicinctus,* and since Morelet, the collector, also made collections in Cuba. A specimen of *melanurus* from Mexico (Steindachner, 1907, Wien. Sitz. Ber. Ak. Wiss., Vol. 116, p. 1535), and one of *maculatus* from Charleston, South Carolina (Jan., 1864, Icon. Gen., p. 75), are reported, but these also are doubtless erroneous, and due to artificial transportation. Cuba, the only island where more than one form is found, boasts five species: *maculatus, pardalis, melanurus, semicinctus,* and *wrighti.* This island is the modern center of distribution for the genus. *Tropidophis pardalis pardalis* and *T. pardalis canus* are the only forms which occur on more than one island. The former appears in Cuba and on Great Abaco in the Bahamas, the extremes of the range of the species, with three other forms of *pardalis* geographically intermediate. Doubtless Cuba and the Bahaman islands were formerly connected, and possibly at that time the original *pardalis* form spread throughout that region. If this hypothesis is correct, *pardalis* later differentiated from the original form on New Providence, Andros, Navassa, and Eleuthera and Inagua, after those islands had become isolated, while remaining unmodified, or becoming modified along exactly parallel lines, on Cuba and Great Abaco. It seems more probable, however, that the presence of the Cuban *pardalis* on Great Abaco is the result of accidental introduction. *Tropidophis pardalis canus* occurs on

Eleuthera and Inagua. That the Eleutheran specimens should be like those from Inagua, which is a considerable distance from Eleuthera, and separated from the rest of the Bahamas by a very deep channel, rather than like those of New Providence which is a neighboring island, seems strange, but although these specimens may be considered slightly intermediate between the two, they are obviously *canus* rather than *curtus*. Additional specimens may prove to be more intermediate than those which I examined.

Phylogenetically, the genus is divided into two groups: the *maculatus* group, including the three forms of *maculatus* from Cuba, Jamaica, and Haiti, and *paucisquamis* from Brazil; and the *pardalis* group, including the five forms of *pardalis* from Great Abaco and Cuba, Inagua and Eleuthera, Andros, New Providence, and Navassa, *melanurus, semicinctus,* and *wrighti* from Cuba, and *taczanowskyi* from Ecuador and Peru. In snakes of the *maculatus* type the scales are smooth and the hemipenes are bifurcate and longitudinally laminate. Snakes of the *pardalis* type have scales always more or less keeled, varying from strong keeling even in young specimens, as in *melanurus,* to weak keeling only in the most dorsal rows of full-grown adults, as in *semicinctus.* The hemipenes of this type are quadrifurcate and flounced longitudinally in the secondary forks, and transversely in the primary forks. The flounces are papillose, and develop into large papillae bordering the sulcus spermaticus. The hemipenes of Tropidophis have previously been examined only by Cope, whose figure of the hemipenis of *melanurus* (1898, Pl. 13, fig. 8) is incomplete, because his dissection extended only to the primary fork of the organ. However, he shows the four papillae of the unforked basal region accurately.

My observations of hemipenes have been confined to Tropidophis. In this genus, however, I have considered the most extreme hemipenial differences of less than generic importance, since in the two groups mentioned above, this is the only character in which there is any considerable difference. In fact, *T. maculatus maculatus* and *T. pardalis pardalis* are so

similar externally as to be frequently confused. On the other hand, there is sufficient difference in the hemipenes of such superficially distinct species as *melanurus* and *semicinctus* to make it useful as an additional distinguishing character. It can therefore be used with some confidence, in connection with scale and color differences, to distinguish such subspecies as *pardalis pardalis* and *pardalis curtus,* where the difference is even greater than in some forms more distinct superficially. It is interesting to note that *pardalis androsi* is intermediate between *pardalis pardalis* and *pardalis curtus* in the size and proportions of the hemipenes, as well as geographically.

Since I have been unable to examine specimens of the continental species, *paucisquamis* and *taczanowskyi,* and nothing has been published on the structure of their hemipenes, I have tentatively referred them to the two groups as above, on the basis of other characters. If I have been correct in placing one of these in each group, it would show that both groups arose on the mainland and spread to the West Indies, by way of Central America, before those islands were separated from the mainland. If, on the other hand, as Zenneck's grouping of *taczanowskyi* and *maculatus* together on the basis of coloration would indicate, the two mainland species should prove to belong to the more primitive *maculatus* group, it would seem probable that this type alone originally existed on the mainland and spread to Cuba, where the *pardalis* type arose as an offshoot, becoming the dominant type in Cuba and the Bahamas, and limiting the original *maculatus* type to Jamaica, Haiti, and Western Cuba, where *maculatus* forms are now found. The apparent lack of these snakes in Central America, in spite of the evidence (probably erroneous) of Bocourt and Steindachner, and the separation of the South American species from their West Indian descendants, tends to show the antiquity of the genus.

The *maculatus* group is represented in the West Indies by three forms, *maculatus maculatus, maculatus haetianus,* and *maculatus jamaicensis.* Of these, *maculatus maculatus,* found

in Cuba and the Isla de Pinos, since it is intermediate between *haetianus* and *jamaicensis* in ventral spotting and the number of caudals, is probably nearest the original generalized form, the differences now found arising from isolation. In Cuba it may be confined to the western part of the island, whence all known specimens have come.

The *pardalis* group originated either on the mainland or as a branch of the *maculatus* group on the island of Cuba. Four forms of the *pardalis* type are found in Cuba, *pardalis pardalis,* representing the original type, and *melanurus, semicinctus,* and *wrighti,* the three most specialized species of the genus.

This paper is based on the examination of 177 specimens of this genus, representing eleven of the thirteen known forms. I have been unable to examine specimens of *paucisquamis* or *taczanowskyi.* Wherever possible I have included the scale counts and records of other authors, but in several instances the evidence has seemed erroneous, or been insufficient, notably in the case of Zenneck. He saw only nineteen specimens of the genus, and based his observations entirely on coloration, disregarding the scale counts, as he expressly states, for example, when he divides Boulenger's four Jamaican specimens into two species.

I am greatly indebted to Dr. J. Percy Moore for the use of 4 specimens from the Museum of the University of Pennsylvania; to Dr. G. K. Noble for the loan of material (24 specimens) from the American Museum of Natural History; to Dr. Leonhard Stejneger for the loan of the National Museum specimens (47 in number); to Dr. Thomas Barbour, who suggested the problem, and for the loan of material from the Museum of Comparative Zoology (102 specimens); and to Dr. E. R. Dunn, of Smith College, under whose direction the work was done, for advice and criticism.

Genus Tropidophis Bibron

Tropidophis Bibron, 1840, de la Sagra, Hist. Cuba, p. 207, (type, *Boa melanura* Schlegel).

Leionotus Bibron, 1840, de la Sagra, Hist. Cuba, p. 212, (type, *Leionotus maculatus* Bibron).

Ungalia Gray, 1842, Zool. Misc., p. 46, (type, *Boa melanura* Schlegel).

Notophis Hallowell, 1856, Proc. Acad. Nat. Sci. Phila., p. 156, (type *Notophis bicarinatus* Hallowell).

Range: Cuba, Jamaica, Haiti, Navassa, Inagua, Andros, New Providence, and Great Abaco, in the East Indies; Ecuador, Peru, and Brazil. One species has been described from Guatemala, but it is indistinguishable from the Cuban species, *semicinctus,* and it is probable that the type specimen was actually collected in Cuba and mislabelled.

Diagnosis: Boid snakes with the head distinct from the neck and covered with shields; viz., a pair of internasals, 1 or 2 pairs of prefrontals, 1 frontal, 1 pair of parietals, 1 pair of supraoculars, 1 or 2 pairs of preoculars, 2 or 3 pairs of postoculars, no loreal. The nostril is between the two nasals. The eye has a vertical pupil. The body is cylindrical or compressed, tapering at both ends. The tail is short and prehensile. The anal plate is undivided and the caudals are single. The teeth are larger anteriorly, decreasing in size posteriorly. Premaxillary teeth are lacking. The hemipenes are bifurcate and laminate, or quadrifurcate and flounced.

The most closely related genera are probably Epicrates and Ungaliophis. The latter differs from Tropidophis in the presence of one large azygous prefrontal instead of one or two pairs of prefrontals. Epicrates, the only other boid genus found in the West Indies, differs in the presence of extremely long anterior teeth on both jaws.

KEY TO THE SPECIES AND SUBSPECIES OF THE GENUS TROPIDOPHIS

A. Dorsal scales smooth, hemipenes bifurcate ..... *maculatus* group

B. Scale rows 21 ..... *paucisquamis,* p. 19

BB. Scale rows 25–29.

C. Ventrals 171–182, maxillary teeth 12, belly with immaculate band between 2 rows of ventral spots..... ..... *maculatus jamaicensis,* p. 12

CC. Ventrals 185–200, maxillary teeth 15, belly without immaculate band between rows of ventral spots.

D. Scale rows 25, anterior fourth of belly unspotted, ground color reddish, lighter..... ..... *maculatus maculatus*, p. 8

DD. Scale rows 27–29, belly spotted throughout length, ground color greyish, darker..... ..... *maculatus haetianus*, p. 14

AA. Dorsal scales keeled, at least in the vertebral rows, hemipenes quadrifurcate ..... *pardalis* group

B′. Scale rows 21 ..... *wrighti*, p. 38

BB′. Scale rows 23–29.

C′. Ventrals 141–182.

D′. Caudals 25 ..... *taczanowskyi*, p. 21

DD′. Caudals 27–35.

E′. Ground color white or pale yellow, 6 incomplete rows of brown spots, 4 more or less broken longitudinal dorsal stripes, belly speckled..... *pardalis canus*, p. 28

EE′. Ground color grey or brown.

F′. Tail white or paler than body, 2 rows of large, dark, square spots on belly, dorsal spots in 4–6 rows and always conspicuous..... ..... *pardalis pardalis*, p. 23

FF′. Tail black or darker than body, belly immaculate or with small dark spots, dorsal spots inconspicuous or lacking.

G′. Ventrals 148–155..... ..... *pardalis curtus*, p. 30

GG′. Ventrals 161–169..... ..... *pardalis androsi*, p. 34

CC′. Ventrals 183–224.

DD″. Ventrals 183–187, caudals 27–30..... ..... *pardalis bucculentus*, p. 36

DD″. Ventrals 198–224, caudals 32–41.

E″. Scale rows 25, 2 rows of large, oval, black, dorsal spots on yellow ground, with or without single longitudinal vertebral stripe ..... *semicinctus*, p. 45

EE″. Scale rows 27–29, dorsal spots smaller, in 2–6 rows on grey or brown ground, 4–5 longitudinal dorsal stripes..... ..... *melanurus*, p. 39

Since Cuba is the only locality where more than one species occur, a simpler key for the species of that island may be found useful.

KEY TO THE CUBAN SPECIES OF TROPIDOPHIS

A. Scale rows 27–29 ..... *melanurus*[1], p. 39
AA. Scale rows 21–25.
B. Scale rows 21 ..... *wrighti*[2], p. 38
BB. Scale rows 23–25.
C. Two rows large dark spots on yellow ground..... *semicinctus*[3], p. 45
CC. Four to six rows smaller dark spots on grey or brown ground.
D. Scales always smooth, ventrals 185–200, caudals 33–37 ..... *maculatus maculatus*[4], p. 8
DD. Scales slightly keeled, except in young, ventrals 141–178, caudals 27–34..... *pardalis pardalis*[1], p. 23

It is interesting to note that specimens of Tropidophis from eastern Cuba are conspicuously different from those of the rest of Cuba. Thus, *maculatus* is not represented at all in Oriente; most of the eastern specimens of *pardalis* have a conspicuously higher number of ventrals; many of the eastern specimens of *melanurus* are lighter in color, a few lacking spots and stripes entirely; and *semicinctus* is represented by the distinct species, *wrighti*. Such differences doubtless result from the dissimilar physiography of the two parts of the island.

Tropidophis maculatus maculatus (Bibron)

Leionotus maculatus Bibron, 1840, de la Sagra, Hist. Cuba, Rept., p. 212, Pl. 24.

Tropidophis maculatus Dumeril & Bibron, part, 1844, Erp. Gen., Vol. 6, p. 494; Jan., 1864, Icon. Gen., p. 75, Pl. 2, fig. 1; Barbour, 1914, Mem. Mus. Comp. Zool., Vol. XLIV, 2, p. 328; part, Barbour, 1919, Mem. Mus. Comp. Zool., Vol. XLVII, 2, p. 191.

[1] Found throughout Cuba.
[2] Apparently confined to eastern Cuba.
[3] Apparently confined to central Cuba.
[4] Apparently confined to western Cuba.

Ungalia maculata Gray, part, 1849, Cat. Sn. Brit. Mus., p. 104; Gundlach, 1880, Erp. Cuba, p. 69; Boulenger, 1893, Cat. Sn. Brit. Mus., I, p. 112; part, Zenneck, 1898, Zeitschr. Wiss. Zool., Vol. LXIV, pl. 3, 91, 183, and 357; part, Werner, 1921, Arch. Naturg., Vol. 87, Pt. 7, p. 249.

Boa pardalis Gundlach, part, 1840, Arch. Naturg., p. 359.

Chilabothrus inornatus Gray, part, 1849, Cat. Sn. Brit. Mus., p. 103.

Tropidophis distinctus Jan., 1864, Icon. Gen., p. 75, Pl. 1, fig. 2.

Ungalia dipsadina Cope, 1868, Proc. Acad. Nat. Sci. Phila., p. 130.

Type: None mentioned.

Type locality: Cuba.

Range: Western Cuba, and Isla de Pinos.

Diagnosis: This form may be distinguished from *maculatus jamaicensis* by the larger number of ventrals (185–200 instead of 171–182) and the absence of an immaculate band between the rows of ventral spots; from *maculatus haetianus* by the lighter, redder color, the absence of spots on the anterior fourth of the belly, and in most cases by the smaller number of scale rows (25 instead of 27–29). It may be distinguished from the other Cuban species as follows: from *pardalis pardalis* by the larger number of ventrals (185–200 as opposed to 141–178); from *semicinctus* by the coloration, and the smaller number of ventrals (185–200 instead of 205–210); from *melanurus* by the smaller number of scale rows (25 instead of 27–29), and the smooth rather than keeled scales; from *wrighti* by the presence of 6 rows of dorsal and 2 rows of ventral spots, rather than 4 rows of large dorsal spots, with the two lowest intruding on the belly.

Description: The scales are smooth. The squamation is as follows: ventrals 185–200 (average 193.8); caudals 33–37 (average 34.6); supralabials 9–10, 4 and 5 entering the eye; infralabials 10, rarely 11; oculars 1 and 3; temporals 3–3, occasionally 3–4; dorsal scale rows 23–25–17 (except one specimen said by Boulenger to have 27).

The body is cylindrical and stout. The head is slightly distinct from the neck. Horny spurs at the sides of the vent are present in males.

The dentition is as follows: maxillary teeth 15; mandibular teeth 19–20; palatines 7; pterygoids 12–14.

The hemipenes (Pl. I, Fig. 1) fork only once, as does the sulcus, and are longitudinally laminate. The basal portion is smooth, except for a single papilla opposite the forking of the sulcus.

The dorsum is a light chestnut brown, with 6 alternating rows of darker spots with about 40–48 spots to a row. The spots of the vertebral rows cover about 6 scales each, those of the next lowest rows 4 scales, and those of the lowest rows 2 scales each. There is a brown band from the eye to the neck. The belly is pale yellow with the anterior fourth immaculate, and the remainder with rectangular dark spots in 2 rows. The spots are most conspicuous in young specimens. The largest specimen I saw was 13 inches long.

Habits: Barbour (1919, p. 191) says: "The habits of *maculatus* are those of the other species of *Tropidophis.*"

Remarks: Cope (1868, p. 129) confuses the names *pardalis* and *maculatus*, calling *maculatus*, *pardalis*, and vice versa. These errors were accepted to some extent by later authors, but were corrected by Boulenger (1893).

Boulenger (1893) lists one specimen as follows: a) ♂ Sc. 27; V. 183; C. 37—Cuba. If these counts are correct, the specimen has more scale rows and fewer ventrals than any other Cuban specimen, being like *maculatus haetianus* in the former character, but more like *maculatus jamaicensis* in the latter.

Werner (1921) gives no localities with his scale counts, and they are therefore useless in this connection.

Barbour (1914, p. 328) says: "While the specimens of each of these localities (i.e., Haiti, Jamaica, and Cuba) show certain peculiarities in coloration, their squamation does not vary definitely. The series from Jamaica, Haiti, and Cuba seem to belong to the same species."

Although the three forms of *maculatus* from Haiti, Jamaica, and Cuba have generally been considered the same, and in spite of the variations in the Cuban specimen cited by Boulen-

ger, I feel that the differences in squamation, though not entirely constant, when correlated with the decided color distinctions, are sufficient to warrant the separation of these groups into geographical subspecies. I have called these subspecies *maculatus maculatus, maculatus haetianus,* and *maculatus jamaicensis,* for they undoubtedly, as Barbour says, "belong to the same species."

Zenneck (1898, p. 93) describes two color varieties of *maculatus,* but since he gives no localities, it is useless to attempt to correlate them with my geographical subspecies. He points out the similarity of the color designs of *maculatus* and *pardalis* and suggests using the shape of the tail as a distinguishing character, in cases where the patterns are indistinguishable. In *pardalis* the tail, as he says, is hooklike and strongly prehensile in shape, with spots lacking on the posterior part, while in *maculatus* the tail is straight, less prehensile, and spotted to the tip. Zenneck claims to have seen twelve specimens of *maculatus* from Cuba, Haiti, and Jamaica, and probably actually saw fourteen, including two from Jamaica in the British Museum, listed by Boulenger under *maculatus,* but classified by Zenneck as *pardalis.*

I have examined the following specimens of *maculatus maculatus:*

Specimen	Locality	Sex	Scale rows	Ventrals	Caudals	Labials s.	Labials i.	Oculars pre.	Oculars post.	Temporals
M. C. Z.										
12445	Isla de Pinos	♂	23–25–17	190	37	10	11	1	3	3–3
10836	Guane, Cuba	♀	"	188	36	9	10	1	3	"
7930	Havana, Cuba	♀	"	200	33	10	10	1	3	3–4, 3–3
7931	Havana, Cuba	♀	"	200	34	10	10	1	3	3–3
U. S. N. M.										
56328	Havana, Cuba	♀	"	199	35	9	11	1	3	"
A. M. N. H.										
22748	No data	♀	"	185	33	10	11	1	3	3–3, 3–4

Tropidophis maculatus jamaicensis, new subspecies

Leionotus maculatus Gosse, 1851, Nat. Soj. Jamaica, p. 324.

Ungalia maculata, part, Boulenger, 1893, Cat. Sn. Brit. Mus., I, p. 112; part, Zenneck, 1898, Zeitschr. Wiss. Zool., Vol. LXIV, pp. 3, 91, 193, and 357; part, Werner, 1921, Arch. Naturg., Vol. 87, Pt. 7, p. 250.

Tropidophis maculata, part, Barbour, 1910, Bull. M. C. Z., Vol. 52, p. 299; part, Barbour, 1919, Mem. Mus. Comp. Zool., Vol. XLVII, 2, p. 191.

Ungalia pardalis, part, Cope, 1868, Proc. Acad. Nat. Sci. Phila., p. 129.

Type: No. 12090, M. C. Z.

Type locality: Kingston, Jamaica.

Range: Jamaica.

Diagnosis: This form may be distinguished from *maculatus maculatus* and *maculatus haetianus* by the presence of an immaculate band the length of the belly between two rows of ventral spots, by the darker dorsal ground color, by the small number of ventrals (171–182 instead of 185–200), and by the small number of maxillary teeth (12 rather than 15).

Description: The scales are smooth. The squamation is as follows: ventrals 171–182 (average 177.2); caudals 28–37 (average 31.3); supralabials 9–10, 4 and 5 entering the eye; infralabials 9–11; oculars 1–3, occasionally 1–2; temporals 3–3, or 3–4; dorsal scale rows 23–25–17 or 25–27–17.

The body is stout and cylindrical. The head is slightly distinct from the neck. Horny spurs at the sides of the vent are present in males.

The dentition is as follows: maxillary teeth 12; mandibular teeth 16–17; palatines 6; pterygoids 14–15.

The hemipenes are bifurcate and longitudinally laminate.

The dorsum is dark brownish grey with 6–8 alternating rows of darker spots. The spots of the vertebral rows cover 4–6 scales each; those of the lateral rows cover 2–4 scales each, and are inconspicuous or lacking on the anterior half of the body. The belly is white, except for 2 rows of square dark spots which intrude on the lowest scale rows, and never meet in the midline. The head is dark grey dorsally, and the

labials and throat are pale grey. The ventral spots are not confluent on the tail.

Habits: The type was "found tightly coiled up under a flat rock" (Barbour, 1910). Barbour (1919, p. 190) says: "This and others of the genus make no effort to escape, but coil up tightly into a sphere when disturbed."

Remarks: Barbour (1919, p. 191) says: "In Jamaica it is almost extinct owing to the appetite of the introduced mongoose."

This form has never been considered distinct from the Cuban and Haitian forms of *T. maculatus.* However, I feel that the smaller number of ventrals and caudals, and the marking, conspicuously different from either of the other forms, justify its separation as a subspecies. Furthermore, the number of maxillary teeth, 12, is the smallest of the species, and is found elsewhere in the genus only in the very distinct species, *T. wrighti.*

Boulenger (1893) gives scale counts for four specimens of *maculatus* from Jamaica as follows:

1. ♀ Sc. 27, V. 181 C. 28—Jamaica
2. Yg. Sc. 27, V. 174, C. 31— "
3. " Sc. 27, V. 182, C. 37— "
4. ♀ Sc. 25, V. 171, C. 29—Spanish Town, Jamaica

Zenneck includes two of the Jamaican specimens in the British Museum, listed as above by Boulenger, with *maculatus* and two with *pardalis,* on the ground that the latter resemble the Cuban *pardalis* (of which he saw only a single specimen in the British Museum) more closely than the other Jamaican specimens in coloration. He expressly states, however, that he paid no attention to the scale counts, and as I have seen no such resemblance to *pardalis* in any of the specimens I examined, all the specimens in the British Museum undoubtedly are, as the scale counts indicate, *maculatus jamaicensis.*

I have examined the following specimens of this subspecies:

Specimen	Locality	Sex	Scale rows	Ventrals	Caudals	Labials s.	Labials i.	Oculars pre.	Oculars post.	Temporals
M. C. Z.										
12090	Kingston, Jamaica	♀	23–25–17	176	34	9	9	1	3	3–3
7376	"	♀	"	177	31	10	11	1	3	3–4
U. S. N. M.										
42878	Montego Bay, Jamaica	♀	25–27–17	180	32	10	11	1	3	"
42879	Jamaica	♂	23–25–17	180	31	9/10	11/10	1	2	"
42880	"	♀	25–27–17	179	30	9	10	1	2	3–3
A. M. N. H.										
4989	No data	♀	"	179	30	10	11	1	3	"

Tropidophis maculatus haetianus (Cope)

Ungalia haetiana Cope, 1879, Proc. Amer. Philos. Soc., Vol. XVIII, p. 273; Garman, 1887, Proc. Amer. Philos. Soc., Vol. XXIV, p. 279.

Tropidophis maculata haetiana Cochran, 1924, Proc. U. S. Nat. Mus., Vol. 66, Art. 6, p. 12.

Tropidophis conjunctus Fischer, 1880, Jahrb. Hamburg Wiss. Anat., Vol. V, p. 31, Pl. iii, fig. 5; Barbour, 1914, Mem. Mus. Comp. Zool., Vol. XLIV, 2, p. 329; Cochran, 1924, Proc. U. S. Nat. Mus., Vol. 66, Art. 6, p. 12.

Ungalia conjuncta Boulenger, 1893, Cat. Sn. Brit. Mus., I, p. 113; Werner, 1921, Arch. Naturg., Vol. 87, Pt. 7, p. 249.

Tropidophis maculata, part, Barbour, 1914, Mem. Mus. Comp. Zool., Vol. XLIV, 2, p. 328; part, Barbour, 1919, Mem. Mus. Comp. Zool., Vol. XLVII, 2, p. 191; Schmidt, 1921, Bull. Am. Mus. Nat. Hist., Vol. XLIV, p. 19.

Ungalia maculata, part, Zenneck, 1898, Zeitschr. Wiss. Zool., Vol. LXIV, pp. 3, 91, 193, & 357; Meerwarth, 1901, Mittheil. Naturhist. Mus. Hamburg, Vol. 18, p. 8; part, Werner, 1921, Arch. Naturg., Vol. 87, Pt. 7, p. 249.

Type: None mentioned.

Type locality: Haiti.

Range: Haiti.

Diagnosis: This form can be distinguished from *maculatus maculatus* by the larger number of scale rows (27–29 instead of 25), the darker, greyer color, and the presence of ventral spots throughout the body length; from *maculatus jamaicen-*

sis by the larger number of ventrals (185–193 instead of 171–182), and the absence of an immaculate band between the rows of ventral spots.

Description: The scales are smooth. The squamation is as follows: ventrals 185–193 (average 186.9); caudals 34–40 (average 36.5), supralabials 10, rarely 9, with 4 and 5 entering the eye; infralabials 11, rarely 12; oculars 1–3, occasionally 1–2; temporals 2–3, or 3–3; dorsal scale rows 25–27–19 or 25–29–19.

The body is cylindrical and stout. The head is slightly distinct from the neck. Males have horny spurs at the sides of the vent.

The dentition is as follows: maxillary teeth 15; mandibular teeth 19–20; palatines 7; pterygoids 13.

The hemipenes and sulci fork only once. The lining of the hemipenes is longitudinally laminate, with the basal portion smooth, except for a papilla opposite the forking of the sulcus.

The dorsum is chestnut brown or grey with 6–8 alternating rows of darker spots. The spots of the vertebral rows cover about 6 scales each, and are often confluent; those of the lateral rows cover 2–4 scales each. The belly is lighter brown or grey, with 2 alternating rows of large square spots, intruding on the first and second scale rows, and generally overlapping at the midline. The head is grey or brown with longitudinal dark bands at the level of the eye and parietal shields. The ventral spots are confluent on the tail.

The largest specimen I examined was 18½ inches long.

Habits: Barbour (1919, p. 191) says: "The habits of *maculatus* are those of the other species of *Tropidophis.*"

Schmidt (1921, p. 19) says: "This specimen was captured in a swamp with one *Hyla pulchrilineata* in its mouth while it was engaged in constricting another one. As numerous mated pairs of *Hyla pulchrilineata* were found at the same time, it is presumable that the snake attacked a pair in embrace."

Remarks: Barbour (1914, p. 328) says: "Cope held that Haitian individuals were distinct from others, and proposed

for them the name of *T. haetiana.* They have not been shown to be really different. Nevertheless, at present only a few specimens have been recorded from the islands where the species occurs, and large series will unfortunately be increasingly difficult to obtain. In Cuba the species is far from common, while on Jamaica and Haiti the mongoose is already omnipresent.

"Mr. Mann's recent collection contains three specimens from Cape Haitien, and one from Diquini, Haiti. In only one is the interparietal present as Cope supposed is always the case with Haitian examples. In three examples the scale rows number 27 and in one 25, in none 29. This is the number also declared a character of *T. haetiana.* Nevertheless, much more material is needed to show that the place modes do not differ with series from the several islands. I may be quite wrong and inconsistent in not allowing *T. haetiana* to stand separately, but there is not much proof of its distinctness."

In 1919 (p. 191) his opinion remains unchanged. To quote: "In Haiti it is also rare and there is some doubt as to the validity of the form *haetiana* of Cope based on Haitian specimens. Its peculiar character was supposed to be due to the presence of an interparietal, and 29 scale rows. But all Haitian specimens do not have an interparietal and although we have not observed the scale ever in specimens from elsewhere, the validity of *haetiana* must therefore remain in doubt until a large series from both Cuba and Haiti can be secured."

Cochran (1924, p. 12) says: "One young specimen (U. S. N. M. No. 64910) was taken at Paradis, near Barabona, in 1922. This snake has 27 scale rows around the body. There is a very tiny scale between the parietal shields."

Of *Tropidophis conjunctus* Fischer, which is obviously the same snake, Miss Cochran says (1924, p. 12): "One specimen, (U. S. N. M. No. 55046), taken near Cape Samana on August 30, 1916. This snake has 27 scales around the body, 186 ventrals, an undivided anal, and 35 caudals. It differs from the figure of the type specimen in having 2 pairs of

prefontals, the second pair the smaller, instead of only one pair. In the type specimen, fusion has probably taken place, and the occurrence of 2 pairs of prefrontals is apparently the normal condition. In No. 55046 the frontal is relatively shorter than in the figured specimen, but the difference is not great enough to warrant specific distinction.''

I have based my separation of the Haitian form from the Cuban and Jamaican forms on the number of scale rows and color characteristics in the former case, and on the number of ventrals and color characteristics in the latter case. Boulenger lists one specimen from Cuba with 27 scale rows, and one specimen from San Domingo with 25 scale rows (Sc. 25, V. 189, C. 38), and Werner (1921, p. 249) under *U. conjuncta* gives one specimen as follows: Sq. 25, V. 188, Sc. 40. No mention is made of the coloration of any of these specimens. It is possible that they may be mislabeled or the scale counts inaccurate, but more probable that they represent the intermediates inevitable between forms so close phylogenetically and geographically as the Haitian and Cuban *maculatus*. I have found that the presence or absence of one or more interparietals is a character varying greatly within even such well-defined species as *semicinctus,* and therefore of no value taxonomically. Although I have been unable to examine a large series from Haiti, I have found every specimen easily distinguished from Cuban and Jamaican specimens of the same species merely on sight, and I feel that the characters in which they differ from the other geographical forms of *maculatus* are sufficiently constant to warrant the separation of this form as a subspecies.

Meerwarth lists 3 specimens from Haiti in the Hamburg Museum, with the following scale counts.

	Scale rows	Ventrals	Caudals	Supralabials
No. 2311	27	190	?	9–10
" 1360	27	191	35	10
" 34	27	193	35	10

I have examined the following specimens of this form:

Specimen	Locality	Sex	Scale rows	Ventrals	Caudals	Labials s.	Labials i.	Oculars pre.	Oculars post.	Temporals
M. C. Z.										
6116	Haiti	♀	25–27–19	190	36	9	11	1	3	3–3
8746	Diquini, Haiti	♀	"	189	37	10	11	1	2	"
8740	Cape Haitien, Haiti	♀	"	189	36	10	11	1	3	2–3
8739a	"	♀	"	186	26	10	11/12	1	2	3–3, 4–3
8739	"	♂	"	185	38	10	11	1	3/2	2–3, 3–3
8741	"	♂	"	187	39	10/9	11	1	2	"
6294	"	♀	"	189	38	10	11	1	3	3–3, 2–3
U. S. N. M.										
66716	Quarabo, Haiti	♀	25–27–19	187	37	10	11	1	3	3–4, 3–3
35979	St. Francisco Mts., Haiti	♀	"	186	35	9	10	1	3	3–3, 3–4
35980	"	♀	"	190	37	10	11	1	3	3–3
64910	Paradis, Haiti	♀	"	187	34	10	11	2	3	"
14838	Haiti	♀	"	192	36	10	11	1	3	"
14838a	"	♂	"	185	38	10	11	1	3	3–3, 3–4
10275	Puerto Plata, Haiti	♂	"	185 tail injured		10	12	1	3	"
55046	Cape Samana, Haiti	♀	"	185	35	10	11	1	3	"
A. M. N. H.										
6013	Sanchez, Haiti	♂	"	185	38	10	12	1	3	"
*	La Bracita, Haiti	♀	"	189	37	10	12	1	3	3–3, 3–4
*	"	♂	"	186	37	10	11	1	3	3–3
*	"	♂	"	185	38	10	11	1	3	3–3
*	"	♀	"	188 tail injured		10	11	1	3	3–3
*	"	♀	"	185	37	10	11	1	3	2–3
*	"	♀	"	185	35	10	11	1	3	2–3
*	"	♂	25–29–19	185	34	10	11	1	3	3–4, 2–3

* Not numbered.

Tropidophis paucisquamis (Müller)

Ungalia sp., Müller, 1878, Verhandl. Naturf. Ges. Basel, Vol. VI, p. 652; 1885, Verhandl. Naturf. Ges. Basel, Vol. VII, p. 142.

Ungalia paucisquamis, Müller in Schenkel, 1901, Verhandl. Naturf. Ges. Basel, Vol. XIII, p. 154; Werner, 1921, Arch. Naturg., Vol. 87, Pt. 7, p. 250.

Ungalia braziliensis, Andersson, 1901, Bih. Svenska Vet. Ak. Handl., Vol. XXVII, iv, 5, p. 4, Pl. 1, fig. 1; Werner, 1921, Arch. Naturg., Vol. 87, Pt. 7, p. 250.

Type: None mentioned.

Type locality: "The continent of tropical America."

Range: Known only from "Brazil."

Diagnosis: This species is probably the most primitive of the *maculatus* group, judging from the small number of scale rows (21 instead of 25–29). This form may be distinguished from other species of the genus except *wrighti* by this character, and by the large number of maxillary teeth (19 as opposed to 12 in *wrighti* and *jamaicensis,* and 15 in all other forms). It may be distinguished from *wrighti* by the smaller number of ventrals (178 rather than 195) and the presence of 6 rows of dorsal and 2 rows of ventral spots, rather than 4 rows of large dorsal spots, of which the two lowest intrude on the belly.

Description: Since I have seen no specimens of this form, I quote Schenkel (1901, p. 154) in translation:

"F. Müller gives (Kat. d. Herp. Samml., VI, p. 652) a short description of an *Ungalia.* In a comment in his handwriting this is mentioned under the above name (i.e., *U. paucisquamis*). In Nachtrag I (Verh. VII, p. 142) the continent of tropical America is given as its probable home.

"The species resembles *U. conjuncta,* but is distinguished by the small number of scale rows (21 series), and by the possession of two pairs of subequal prefrontals, of which the first is in contact with the second and third supralabials on each side. Belly with wide, irregular, black crossbands, which, wider posteriorly, and alternating in a double row of spots, are confluent. Back and sides with three rows of

darker spots on each side, of which the lowest are greatest lying partly between (a), and partly over (b) the ventral spots; those of the middle row perpendicularly over (a), those of the upper series over (b); the pattern is so regular only in certain areas.''

Andersson, in his description of *U. braziliensis* (1901, p. 4), which is obviously the same species, says:

''Maxillary teeth 19, mandibular teeth about equal in number; in both jaws all solid, closely set, and decreasing in size from large anterior ones. Head depressed, small, but at base distinctly broader than the narrow neck. Eye small, one half the length of the distance to the tip of the snout; pupil vertical. Rostral broader than deep, not visible from above, with the upper margin bordered by a little pentagonal shield placed between the rostral, nasals, and internasals. Two internasals, considerably broader than long. Two pairs of prefrontals; anterior pair much larger than posterior, and in contact with the third upper labial; both pairs considerably broader than long. Nostril oblong, pierced in the anterior part of a rather elongate semidivided nasal. No loreal. A single great preocular with the upper margin broadly in contact with the posterior prefrontal, and separated from the nasal by the anterior prefrontal. Frontal pentagonal, much broader than the supraocular, one and one-third as long as broad, and as long as its distance from the tip of the snout. Parietals small, much smaller than the frontal, 2 postoculars; temporals 2–3; upper labials 9 or 10, 4–6 or 4–7 entering the eye; 9 lower labials. Chin with a long groove, bordered on both sides with 4 small, irregular scales; of these the 2 anterior are in contact with the anterior lower labials, and the 2 posterior are separated from the labials by scales. Body short and compressed, with the posterior part much higher than the anterior. Scales in 21 rows, smooth, the vertebral row enlarged. Ventral shields 178, anal entire. Tail short, prehensile and pointed; subcaudals 37, all single.

''Color above, brown with indistinct, round, dark spots in 6 rows; head lighter than body, with a dark streak from the

eye to the angle of the mouth; small, dark spots on the frontal shield, and dark angle-shaped marking on the occiput. Lower parts yellowish and black; the black arranged in 2 rows of great, square spots which on the posterior part of the trunk, alternating, form a broad zigzag line; on the anterior part, as also on the tail, confluent into broad, oblique crossbands, which on the tail and throat are narrower, but on the other parts are as broad as or broader than the light interspaces between.

"This species agrees rather well in color with other species of *Ungalia,* hitherto described, from which it is distinctly separated by the broad vertebral row of scales and small number of scale rows.

"The specimen belongs to the collection of Dr. Touzet; the labels are marked 'Brasilia.' Therefore the new *Ungalia* differs even in geographical distribution from other *Ungalia* species, the patria of which is the West Indies, the Central America, and the West South America.

"Single specimen a female;
total length 325 mm,
tail 42 mm,
length of head 8 mm,
greatest breadth of head 6.8 mm.
longitudinal diameter of eye 2 mm,
distance from eye to snout 3.6 mm.

Remarks: Werner (1898, p. 250) gives the following scale counts for *U. paucisquamis*—Sq. 21, V. 178, Sc. 40; and for *U. braziliensis*—(from Andersson) Sq. 21, V. 178, Sc. 37.

Tropidophis taczanowskyi (Steindachner)

Ungalia taczanowskyi Steindachner, 1880, Sitz. Ak. Wein, Vol. LXXX, Pl. —; Boulenger, 1893, Cat. Sn. Brit. Mus., I, p. 111; Zenneck, 1898, Zeitschr. Wiss. Zool., Vol. LXIV, pp. 86 & 193; Werner, 1921, Arch. Naturg., Vol. 87, Pt. 7, p. 249.

Type: None mentioned.
Type locality: Tambillo, Peru.
Range: Ecuador and Peru.

Diagnosis: The most closely related species is probably *T. pardalis*. *T. taczanowskyi* may be distinguished from that species by the small number of caudals (25 as opposed to 27–35 in *pardalis*).

Description: Since I have seen no specimen of this form, I quote from Steindachner's original description, which may be translated as follows:

"Characters: Body strongly compressed, head slender, triangular; body scales in 23 longitudinal rows, strongly keeled with the exception of smooth scales in three or four lower rows, and increasing in size toward the vertebral row; 150–160 ventrals, anal entire; 25 subcaudals, of which occasionally a few seem to be divided; supralabials 8–9, the eye lying over the fourth and fifth; 2 postorbitals, 1 preorbital; infralabials 10–11; parietals of considerable size, each divided (crosswise) into two halves, but more or less entire.

"Sides of the body brownish violet, sometimes with a few short yellowish longitudinal streaks; as in *melanura*, with more longitudinal rows (3 on each side) of indefinite round spots, which are in some cases specked or edged with yellow on the borders; sometimes a blackish longitudinal band behind the eye and one behind each parietal; sides of belly watery blue-grey, with very indistinct, darker, cloudy spots toward the vent, or bordered with larger, bluish-black spots; the majority of the crossbars are confluent, and are present on the underside of the tail also."

Habits: I quote Steindachner in translation: "The larger of the two examples described here contained five fine, completely formed embryos of about three inches in length, on which the keels of the upper dorsal scales, as well as the dark body spots (in three rows on each side) and the ventral spots are already apparent, but the upper head shields do not yet appear sharply separated from one another. Therefore, *U. taczanowskyi* is included among viviparous snakes."

Remarks: I have included this species in the *pardalis* group, because of the strong keeling of the scales, and the coloration and pattern, similar to *melanurus*. In the number

of ventrals, caudals, and dorsal scale rows, this species resembles *pardalis* more than *maculatus*.

Boulenger (1893, p. 111) gives the following description: "Head slightly distinct from neck. Rostral a little broader than deep, just visible from above; frontal longer than broad, longer than its distance from the end of the snout or than the parietals; 1 or 2 pre- and 2 postoculars; 8 or 9 upper labials, fourth and fifth entering the eye. Scales keeled, three outer rows smooth, in 23 rows. Ventrals 149–160; anal entire; subcaudals 25. Brown above, with darker longitudinal streaks or series of spots; a series of large black spots and yellowish dots on each side; sides of belly black; ventrals black and yellow. Total length 345 mm; tail 40 mm. Ecuador and Peru. (a) V. 149: C. 25—Guayaquil."

The scale counts given by Werner (1921, p. 249) are of the same specimen, and identical with those of Boulenger.

Zenneck (1898, p. 193) groups *maculatus* and *taczanowskyi* together in respect to coloration, and suggests that the color pattern of *maculatus* is derived from that of *taczanowskyi*. This would seem to indicate that *taczanowskyi* might belong in the *maculatus* group, but since he considers *maculatus* and *pardalis* also similar in coloration, as far as color is concerned *taczanowskyi* might equally well belong in the *pardalis* group, where I have tentatively placed it on the basis of the keeled scales and other characters. I believe that this question of the phylogenetic position of *taczanowskyi* (and similarly of *paucisquamis*) could be settled by dissection of the hemipenes, which are distinctly different in the two groups, but unfortunately no specimens are available in this country.

Tropidophis pardalis pardalis (Gundlach)

Boa pardalis, part, Gundlach, 1840, Arch. Naturg., p. 359.

Ungalia pardalis Boulenger, 1893, Cat. Sn. Brit. Mus., I, p. 113; Zenneck, 1898, Zeitschr. Wiss. Zool., Vol. LXIV, pp. 3, 91, 190, & 357; part, Werner, 1921, Arch. Naturg., Vol. 87, Pt. 7, p. 249.

Tropidophis pardalis, part, Stejneger, 1905, in Shattuck's Bahama Is., p. 336; Stejneger, 1917, Proc. U. S. Nat. Mus., Vol. 53, p. 280; part, Barbour, 1919, Mem. Mus. Comp. Zool., Vol. XLVII, 2, p. 189.

Tropidophis maculatus, part, Duméril & Bibron, 1844, Erp. Gen., Vol. VI, p. 494.

Ungalia maculata, part, Gray, 1849, Cat. Sn. Brit. Mus., p. 104; part, Cope, 1868, Proc. Acad. Nat. Sci. Phila., p. 129.

Type: None mentioned.

Type locality: Cuba.

Range: Cuba and Great Abaco Islands.

Diagnosis: This subspecies may be distinguished from *pardalis androsi* and *pardalis curtus* by the pale instead of black tail, and from those forms and *pardalis canus* and *pardalis bucculentus* by the presence of large, square ventral spots instead of small ventral spots or none, and by the presence of 22–23 mandibular teeth instead of 15–20. It may be distinguished from other Cuban species by the smaller number of ventrals (141–178 instead of 185–224); from *maculatus* also by the presence of keeled scales; from *melanurus semicinctus* and *wrighti* by the differences in coloration and markings.

Description: The scales are keeled, at least in the most dorsal rows. The squamation is as follows; ventrals 141–178 (average 151); caudals 27–34 (average 29.5); supralabials 9–10, with 4, 5, and 6 entering the eye, rarely 3, 4, and 5, or 4 and 5; infralabials 10, sometimes 11, rarely 9; oculars 1–2, rarely 1–3; temporals 2–3, 3–3, or 3–4, rarely 2–2 or 3–2; scale rows 23–25–17, or 23–23–17.

The body is short and stout, and strongly compressed, with the head rather distinct from the neck. Horny spurs at the sides of the vent are present in males.

The hemipenes (Pl. I, Fig. 2) and the sulcus fork twice. The unforked portion occupies about one-sixth of the total length of the organ, the primary forks about one-third and the secondary forks about one-half. The secondary forks are lined with papillose longitudinal flounces which become transverse in the primary forks, and develop into papillae at the base of the primary forks and bordering the sulcus in the primary and secondary forks. The basal portion is weakly

laminate with a single large papilla opposite the forking of the sulcus. The organ extends almost to the tip of the tail.

The dentition is as follows: maxillary teeth 15; mandibular teeth 22–23; palatines 7–8; pterygoids 12 in Cuban specimens, 15 in Great Abacan specimens.

The dorsum is grey or brown with 4–6 rows of well-defined dorsal spots. The spots of the vertebral rows measure 4 scales transversely by 4 or 5 scales longitudinally; the spots of the next lateral rows 4 scales transversely by 3 scales longitudinally; and those of the lowest rows, when present, 2 or 3 scales transversely and longitudinally. The top of the head is brown or grey. The throat, labials, ventral scutes, and lowest scale rows are white or pale yellowish grey. The rows of large, dark brown, square spots are present ventrally, often confluent, and intruding on the two lowest scale rows. Each of these is usually 3 scutes long. The end of the tail is white or paler than the body.

The largest specimen which I examined measured 11¼ inches in length.

Variations: Specimens M. C. Z. 9884, and U. S. N. M. 27455 and 12361 show the highest number of ventrals in the species, respectively, 164, 178, and 158. These, and a specimen from Neuvitas, A. M. N. H. 2496, with 153 ventrals, are the only specimens I have seen from eastern Cuba. Specimen M. C. Z. 9884 had also a conspicuous light patch on the head from just behind the parietals to the neck, and an immaculate band between the ventral spots. The light patch on the head may be common in young specimens since a similar patch is found in specimens M. C. Z. 18119, from Soledad, and M. C. Z. 10838, from San Antonio de los Banos, the only other young specimens of this form that I have examined. The specimens from Oriente may possibly represent an eastern variety in Cuba, but as I have examined only these four specimens, I refer them to this subspecies, to which they are most closely related, if not actually belonging here.

Habits: Barbour (1919, p. 190) says: "Its habits differ in no wise from those of its ally, *T. maculatus.*"

Dr. E. R. Dunn reports having collected one specimen under a pile of debris on the ground at Soledad, and another at Hoyo Colorado, under a plank at the edge of a coffee drying platform.

Remarks: Barbour (1917, p. 328) says: "A specimen, No. 6114 M. C. Z., from Cuba is labelled in Garman's hand as *Ungalia curta* and probably served him as the type of that species. He gave Cuba as the locality, and this is the only Cuban specimen having such a label. The species is a synonym of the above" (i.e. *pardalis*). I have seen this specimen, for which there is no definite history in the catalogue of the museum. Since it is obviously the same form as all the specimens from New Providence which I have examined, and is unlike the Cuban *pardalis,* it is probable that the locality given by Garman is erroneous, and that the specimen actually came from New Providence.

The forms of *pardalis* from Cuba and Great Abaco, Andros, and New Providence have hitherto not been separated, but on the basis of conspicuous and constant differences in coloration, squamation, and hemipenes, I have divided them into the following subspecies: *p. pardalis* from Cuba and Great Abaco; *p. androsi* from Andros Island, and *p. curtus* from New Providence. I have included *canus* from Inagua and Eleuthera islands, and *bucculentus* from Navassa, in this species because of their great similarity to the other Bahaman forms. The hemipenes of the Cuban and Great Abacan specimens of *p. pardalis* are indistinguishable, while those of *androsi, curtus, canus,* and *bucculentus* are conspicuously different.

Cope (1868) mixes *pardalis* and *maculatus,* calling each by the name properly ascribed to the other, and causing some confusion in later authors. Boulenger (1893), however, corrects the error.

Boulenger (1893) lists only one Cuban specimen of *pardalis,* as follows: (a) ♀ Sc. 23; V. 155; C. 30– Cuba.

Werner (1921) makes no locality distinctions in giving the scale counts of this species, and they are therefore useless in this connection.

Zenneck (1898) considers *pardalis* close to both *maculatus* and *melanurus* in coloration. The color-design of *pardalis* is, in his opinion, actually derived from that of *melanurus*. I believe, however, that the reverse is true, since the high scale counts and arboreal habits of *melanurus* indicate that it is a much more modified species than *pardalis*. The similarity in coloration of *maculatus* and *pardalis* is so great that many of the specimens of these two species which I examined were mislabelled. In cases where coloration cannot be used as a distinguishing character, Zenneck suggests the use of the shape and coloring of the tail, since the tail of *pardalis* is curved for clasping, and spotted only on the anterior half, while that of *maculatus* is straight and spotted throughout. I have used the keeling of the scales, and the number of ventrals to distinguish these species.

I have examined the following specimens:

Specimen	Locality	Sex	Scale rows	Ventrals	Caudals	Labials s.	Labials i.	Oculars pre.	Oculars post.	Temporals
M. C. Z.										
9884	Guantanamo, Cuba	♀	23–25–17	164	30	9	10/11	1	3	3–3
13276	Hatonuevo, Cuba	♀	"	152	28	10	11	1	3	3–2, 3–3
19871	Hoyo Colorado, Cuba	♂	23–23–17	157	34	"	"	1	2	3–3
10838	San Antonio de los Baños, Cuba	♀	"	145	29	"	"	1	2	3–4, 2–3
10839	Cuba	♂	23–25–17	143	28	"	11	1	2	3–3
10840	"	♂	"	141	27	9/10	10	1	2	"
10837	Soledad, Cuba	♀	23–23–17	152	28	9	9/10	1	2	2–2
19872	Cuba	♀	"	154	32	"	"	2	2	3–3
13277	"	♂	"	150	27	10	11	1	2	"
13278	"	♂	"	153	31	9	9	1	2	3–3, 3–4
13279	"	♂	"	152	31	10	11	1	3	3–3

Specimen	Locality	Sex	Scale rows	Ventrals	Caudals	Labials s.	Labials i.	Oculars pre.	Oculars post.	Temporals
13280	Cuba	♀	"	150	28	"	10/11	1	3	3–4
12140	"	♀	"	156	30	"	"	1	2	3–3
7929	"	♀	23–25–17	154	33	9/10	10/11	1	3	3–4, 3–3
18881	Limones, Cuba	♂	23–23–17	157	33	10	10	1	2/3	2–3
18117	Soledad, Cuba	♀	"	155	28	"	"	1	2	3–3
18118	Cuba	♂	"	146	31	"	"	1	2	"
18119	"	♀	"	155	32	"	"	1	2	"
10952	Gt. Abaco	♂	"	146	27	10	10/9	1	2	3–4, 3–3
10953	"	♀	"	153	28	9	9	1	2/3	3–3
10954	"	♀	"	149	31	10	10/11	1	3	"
10955	"	♀	"	147	28	10	11	1	3	2–3, 3–3
A. M. N. H.										
2496	Neuvitas, Cuba	♀	23–25–17	153	31	"	11	1	3	3–4
U. S. N. M.										
58715	Havana, Cuba	♂	23–23–17	148	27	9	10	1	2	2–3
58716	Cuba	♂	"	147	"	9/10	11	1	2	3–3
58717	"	♂	"	145	"	10/9	"	1	2	2–3
27455	E. Cuba	♂	23–25–17	178	32	10	11	1	3	3–4, 3–3
12361	"	♂	"	158	30	"	"	1	3	3–3
12418	Cuba	♂	23–23–17	148	28	11	12	1	2	3–4
26360	Matanzas, Cuba	♀	23–23–17	147	28	10	11	1	2	3–3
27392	El Guama, Cuba	♂	"	143	29	9	10	1	2	"
27849	San Diego, de los Baños, Cuba	♀	"	144	injured	10	11	1	2	"

Tropidophis pardalis canus (Cope)

Ungalia cana Cope, 1868, Proc. Acad. Nat. Sci. Phila., p. 129, and 1894, Proc. Acad. Nat. Sci. Phila., p. 236; Boulenger, 1893, Cat. Sn. Brit. Mus., I, p. 113; Zenneck, 1898, Zeitschr. Wiss. Zool., Vol. LXIV, p. 96; Werner, 1921, Arch. Naturg., Vol. 87, pt. 7, p. 250.

Tropidophis cana, Stejneger, 1905, in Shattuck's Bahama Is., p. 337; Barbour, 1914, Mem. Mus. Comp. Zool., Vol. xliv, 2, p. 329.

Ungalia maculata, Cope, 1894, Proc. Acad. Nat. Sci. Phila., p. 432.

Type: None mentioned.

Type locality: Inagua Island.

Range: Inagua and Eleuthera Islands.

Diagnosis: This subspecies may be distinguished from other forms of *pardalis* by its coloration (white or greyish yellow, as opposed to grey or brown); from *pardalis bucculentus* by the smaller number of ventrals (152–174 instead of 183–187); from *pardalis androsi* and *pardalis curtus* by the pale rather than black tail; from *pardalis pardalis* by the absence of large well-defined spots on both belly and dorsum. It differs from *melanurus* in the smaller number of ventrals (152–174 instead of 198–224), the smaller number of scale rows (23 instead of 27–29), and the smaller size.

Description: The scales are weakly keeled, except on the most lateral rows. The squamation is as follows; ventrals 152–174 (average 164.7); caudals 30–33 (average 31.6); supralabials 10, occasionally 9, 4 and 5 entering the eye; infralabials 11, occasionally 12; oculars 1–3; temporals 3–3, or 3–4; dorsal scale rows 21–23–19 or 21–23–17.

The body is short, compressed, and neither very stout nor very slender. The head is distinct from the neck. Horny spurs at the sides of the vent are present in males.

The dentition is as follows: maxillary teeth 15; mandibular teeth 17; palatines 7; pterygoids 12.

The hemipenes fork twice (Pl. I, Fig. 3), and are divided into the following regions; unforked portion, one-sixth total length, primary forks one-half total length, secondary forks one-third total length. The sulcus also forks twice. The secondary forks are lined with longitudinal flounces, which develop into transverse flounces in the apical two-thirds of the primary forks, and into large papillae in the basal one-third, and bordering the sulcus in the primary and secondary forks. The basal unforked portion is smooth except for a large papilla opposite the sulcus.

The ground color is white or pale greyish yellow. Two vertebral rows of brown spots, each covering 4–6 scales, and often confluent, are present. Smaller dark spots, each cover-

ing 1–2 scales, form 2 more or less broken lateral rows on each side. Longitudinal stripes are present on the 5th and 9th scale rows of each side. Usually large immaculate areas, lacking spots and stripes and having no place in the pattern, are found at irregular intervals on the body. The belly is specked with black. There is a brown band from the eye to the side of the neck.

The largest specimen I examined measured 13½ inches in length.

Habits: Cope says (1894, p. 432): "They are found during the day coiled up under stones in the dryest, hottest places, with such incompatible company as centipedes, scorpions and tarantulas, for they are mild-tempered little snakes."

Remarks: Werner (1921, p. 250) lists a specimen from Inagua Island as follows: Sq. 23, V. 168, Sc. ?.

I examined the following specimens:

Specimen	Locality	Sex	Scale rows	Ventrals	Caudals	Labials s.	Labials i.	Oculars pre.	Oculars post.	Temporals
M. C. Z.										
12307	Inagua, Bahamas	♀	21–23–19	174	32	10	11	1	3	3–4
12308	"	♀	"	"	31	9	12/11	1	3	3–3
12309	"	♀	21–23–17	"	33	10	11	1	3	3–4
12310	"	♂	"	170	30	"	"	1	3	3–3
12311	"	♀	"	153	32	"	"	1	3	3–4
12312	"	♀	21–23–19	152	33	"	"	1	3	3–4
12313	"	♀	"	173	31	"	"	1	3	3–3
12313	"	♀	"	173	31	"	"	1	3	3–3
U. of P.										
989	"	♂	"	169	31	"	"	1	3	3–3
337	Eleuthera, Bahamas	♀	21–23–17	158	30	"	12	1	3	3–4
291	"	♀	"	"	32	"	11	1	3	3–4, 2–4
292	"	♂	"	157	33	"	"	1	3	3–3

Tropidophis pardalis curtus (Garman)

Ungalia curta Garman, 1887, Proc. Amer. Philos. Soc., Vol. XXIV, p 279.

Ungalia maculata, part, Cope, 1868, Proc. Acad. Nat. Sci. Phila., p. 129.

Ungalia pardalis, Barbour, 1904, Bull. Mus. Comp. Zool., Vol. XLVI, 3, p. 59; Barbour, 1906, Amer. Nat., Vol. XL, 471, p. 230; part, Werner, 1921, Arch. Naturg., Vol. 87, Pt. 7, p. 249.

Tropidophis pardalis, part, Stejneger, 1905, in Shattuck's Bahama Is., p. 336; part, Barbour, 1914, Mem. Mus. Comp. Zool., Vol. XLIV, 2, p. 328.

Type: No. 6114, M. C. Z.

Type locality: Cuba (probably erroneous).

Range: New Providence Island, Bahamas, and possibly Cuba.

Diagnosis: This form may be distinguished from *pardalis androsi* by the smaller number of ventrals (148–155 instead of 161–169), by the darker color and the presence of more distinct spots and longitudinal stripes in most specimens, and by the lower number of mandibular teeth (15 instead of 20); from *pardalis pardalis* by the presence of black rather than pale tail, by the smaller and less conspicuous ventral and dorsal spots, and by the smaller number of mandibular teeth (15 rather than 22–23); from *pardalis canus* by the black rather than pale tail, darker ground color, and less distinct dorsal spots; and from *pardalis bucculentus* by the smaller number of ventrals (148–155 instead of 183–187) and the black rather than pale tail.

Description: The scales are keeled, at least in the most dorsal rows. The squamation is as follows; ventrals 148–155 (average 151.5); caudals 28–35 (average 31.3); supralabials 10, rarely 9, with 4 and 5, or 4, 5, and 6 entering the eye; infralabials 11–12, sometimes 10 or 13; oculars 1 and 2, or 1 and 3; temporals 3–3, or 3–4, rarely 2–3, or 2–4; dorsal scale rows 23–25–19 or 23–23–17.

The body is short and stout, and strongly compressed. The head is distinct from the neck, and the tail short and pointed. Horny spurs at the sides of the vent are present in males.

The dentition is as follows: maxillary teeth 15; mandibular teeth 15; palatines 6; pterygoids 12–13.

The hemipenes and the sulcus spermaticus fork twice (Pl. I, Fig. 4). The unforked basal portion and the primary forks each occupy more than one-third the total length of the organ; the secondary forks less than one-third. Longitudinal flounces are present in the secondary forks, becoming transverse in the primary forks, and developing into papillae at the base of the primary forks and bordering the sulcus in the primary forks. The basal portion is almost smooth, except for two large papillae bordering the sulcus just anterior to the first forking. A large papilla is present opposite the first forking of the sulcus, and another between the forks of the sulcus.

The ground color of the dorsum is grey or dark brown with 6 rows of more or less conspicuous darker spots and traces of longitudinal stripes on the sixth and ninth scale rows. The spots of the vertebral rows are often partly outlined with yellow, each covering about 6 scales and often confluent; the spots of the lateral rows are often almost lacking, but when present, each spot covers about 3 scales. The throat and labials are paler than the dorsum. The ventral scutes and the lowest scale rows of each side are white or pale greyish yellow, with 2 rows of ventral spots, each usually 1 scute, and never more than 2 scutes in width, never confluent, and rarely intruding on the scale rows. The distal half of the tail is black or conspicuously darker than the rest of the body.

The largest specimen of this form which I examined measured 12¼ inches long.

Variations: Two specimens Nos. 7090c and 6969c M. C. Z. had the distal half of the tail white, but agreed with the other specimens from New Providence in every other character, and having the smaller dorsal and ventral spots, and the longitudinal stripes, could scarcely be confused with *pardalis pardalis.*

Habits: Barbour (1906, p. 231) says: "The natives call these thunder-snakes, because they say that they frequently crawl about after severe rainstorms. This species is most frequently taken among the heaps of broken rock which are

piled about the trunks of orange trees; or under stone walls. I have never seen one above ground.''

Remarks: I have seen the type specimen, No. 6114, in the Museum of Comparative Zoology at Cambridge, and in the catalogue find the specimen to be without definite history, and therefore probably not from Cuba, as originally assumed, but from New Providence Island in the Bahamas.

I have examined the following specimens:

Specimen	Locality	Sex	Scale rows	Ventrals	Caudals	Labials s.	Labials i.	Oculars pre.	Oculars post.	Temporals
M. C. Z.										
6114	?	♀	23–25–19	153	28	10	10	1	3	3–4
6241	New Providence	♂	23–23–17	149	31	10	11/10	1	2	3–3, 2–3
6241a	"	♂	"	149	32	10	11	1	2	3–3
6491	"	♀	23–25–19	155	33	10	11	1	3	3–3
7090c	Nassau, New Providence	♂	23–23–17	152	30	10	10/11	1	2	3–4
7090b	"	♀	23–25–19	154	32	10	10/11	1	3	3–3
7090a	"	♂	23–23–17	149	32	10	11	1	3/2	2–3, 3–4
8734	"	♀	23–25–19	153	30	10	13	1	3	3–4
8735	"	♀	23–23–17	151	29	10	11	1	2	3–4
8736	"	♀	23–25–19	151	28	10	12	1	3	2–3, 3–4
8737	"	♀	23–23–17	152	32	10	11/12	1	2	3–3
8738	"	♀	23–25–19	154	31	9	11	1	3	3–3, 3–4
7089	New Providence	♀	23–25–19	155	33	10	12	1	3	3–3, 3–4
6780	"	♀	23–23–17	152	31	10	12	1	3/2	3–4, 2–3
6781a	"	♂	23–23–17	151	33	10	11/12	1	3	3–3, 4–4
6781b	"	♂	23–25–19	148	33	10	11	1	2	3–3
6969a	"	♂	23–23–17	152	35	10	10/9	1	3	3–3, 3–4
6969b	"	♂	23–25–19	151	31	9	11	1	2	2–4, 2–3
6969c	"	♀	23–23–17	154	32	10	10	1	3	2–3, 3–3
6969d	"	♂	23–23–17	150	32	10	10	1	2	2–3, 3–3
U. S. N. M.										
36594	"	♀	23–23–17	151	28	10	12	1	3	2–3, 2–3
36595	"	♀	23–23–17	150	30	10	11	1	2	3–3, 2–3
A. M. N. H.										
7713	"	♀	23–25–19	155	32	10	11	1	3	3–4, 2–3
2617	Nassau, New Providence	♀	23–25–19	152	31	10	12	1	2	3–4, 3–3

Tropidophis pardalis androsi, new subspecies

Tropidophis pardalis, part, Stejneger, 1905, in Shattuck's Bahama Is., p. 336; part, Barbour, 1914, Mem. Mus. Comp. Zool., Vol. 44, 2, p. 328; part, Barbour, 1919, Mem. Mus. Comp. Zool., Vol. XLVII, 2, p. 189.

Ungalia pardalis, part, Werner, 1921, Arch. Naturg., Vol. 87, Pt. 7, p. 249.

Type: No. 49471 U. S. N. M.

Type locality: Andros Island, Bahamas.

Range: Andros Island.

Diagnosis: This form may be distinguished from *pardalis pardalis, pardalis canus,* and *pardalis bucculentus* by the presence of a black rather than pale tail; from *p. canus* by the less conspicuous dorsal and ventral spots; from *p. pardalis* and *p. curtus* by the larger number of ventrals (161–169 instead of 141–158[5]), and the absence or inconspicuousness of the dorsal and ventral spots; from *p. bucculentus* by the smaller number of ventrals (161–169 instead of 183–187).

Description: The scales are keeled, at least in the most dorsal rows. The squamation is as follows: ventrals 161–169 (average 162.8); caudals 30–34 (average 31.7); supralabials 10, 4 and 5, or 4, 5, and 6 entering the eye; infralabials 11–12; oculars 1 and 3, or 1 and 2; temporals 2 and 3, or 3 and 4; dorsal scale rows 23–25–19.

The body is short and stout, and strongly compressed. The tail is short and pointed; the head distinct from the neck. Horny spurs at the sides of the vent are present in males.

The dentition is as follows: maxillary teeth 15; mandibular teeth 20; palatines 6–7; pterygoids 12.

The hemipenes and sulci fork twice (Pl. II, Fig. 5). The lining of the hemipenes is flounced longitudinally in the secondary forks and transversely in the primary forks, the flounces developing into papillae bordering the sulcus. The basal portion is smooth. The basal portion, primary and secondary forks each occupy one-third the total length of the organ.

[5] Except specimens of *p. pardalis* from Oriente, Cuba.

The dorsum is grey and usually unspotted, but may have inconspicuous spots in 4 rows. The belly is white or paler grey with small flecks of black in 2 rows, or immaculate. The distal end of the tail is black.

The largest specimen of this form which I examined was 13¼ inches long.

Variations: No. 49474, U. S. N. M., labelled "*canus*," probably belongs to this group, although the tail is pale, and the dorsal spots are distinct. This specimen, however, is very young, and I have noticed that embryos and young of *melanurus*, and young of *maculatus maculatus* and *pardalis curtus* are also much more conspicuously spotted than adults of the same species. Furthermore, the specimens of *pardalis curtus* with white rather than black tails were both young specimens.

Habits: Nothing is definitely known of the habits of this group, but they are probably terrestrial and burrowing like the other forms of *pardalis*.

Remarks: Although this form from Andros Island has never been considered distinct from the *pardalis* of other islands, I have given it the position of a geographical subspecies, since it differs from each of them in coloration and markings, or in coloration and scalation.

I have examined the following specimens of this form:

Specimen	Locality	Sex	Scale rows	Ventrals	Caudals	Labials s.	Labials i.	Oculars pre.	Oculars post.	Temporals
U. S. N. M.										
49471	Andros Island	♂	23–25–19	161	34	10	12	1	3	3–4
49472	"	♂	"	161	30	10	12	1	2	2–3
64156	"	♀	"	161	31	10	11	1	3	3–4
49474	"	♂	"	162	31	10	11/12	1	3	2–3, 3–4
A. M. N. H.										
2925	"	♀	"	169	31	10	12	1	3	3–4
2926	"	♂	"	163	30	10	11	1	3	3–4
2927	"	♂	"	163	34	10	12	1	2	3–4

Tropidophis pardalis bucculentus (Cope)

Ungalia bucculenta Cope, 1868, Proc. Acad. Nat. Sci. Phila., p. 129.
Tropidophis bucculenta, Stejneger, 1917, Proc. U. S. Nat. Mus., Vol. 53, p. 279.

Type: No. 12377, U. S. N. M.

Type locality: Navassa Island.

Diagnosis: This form may be distinguished from all other subspecies of *pardalis* by the larger number of ventrals (183–187 instead of 141–178); from *p. androsi* and *p. curtus* also by the pale rather than black tail; from *p. pardalis* also by the inconspicuousness of the dorsal and ventral spots; from *melanurus* by the smaller number of ventrals (183–187 instead of 198–224) and of caudals (28–30 instead of 32–41), and by differences in dentition.

Description: The scales are keeled, at least in the most dorsal rows. The squamation is as follows; ventrals 183–187 (average 185); caudals 28–30 (average 29); supralabials 10, 4 and 5 entering the eye; infralabials 11–12; oculars 1–3; temporals 3–4, 4–4, or 4–3; dorsal scale rows 23–25–19 or 25–27–19.

The body is stout and compressed, the head distinct from the neck, and the tail short. Horny spurs at the sides of the vent are present in males.

The dentition is as follows: maxillary teeth 12; mandibular teeth 15; palatines 4–5; pterygoids 10–11.

The hemipenes and sulci fork twice (Pl. II, Fig. 6), the basal unforked region, the primary forks and the secondary forks each occupying about one-third of the entire organ. The lining is flounced longitudinally in the secondary forks and transversely in the primary forks, the flouncing developing into papillae bordering the sulcus in the primary forks and in the region of the primary forking. The basal portion is smooth except for slight longitudinal folds bordering the sulcus and converging in a single papilla on either side of the sulcus, just anterior to the first forking.

The ground color of the dorsum is a pale ashy brown. Six alternating rows of brown spots are present, the two most

dorsal distinct and confluent, with each spot covering 4 or 5 scales, and the more lateral rows indistinct and broken, each spot covering 1 or 2 scales. Indistinct brownish longitudinal stripes may be present, 2 on each side between the scale rows. The belly is pale yellow, unspotted except for several small inconspicuous spots just anterior to the vent. The underside of the tail has brownish spots alternating in two rows. The tip of the tail is paler than or as pale as the body.

The largest specimen of this form which I examined measured 25 inches long.

Habits: Nothing has been recorded of the habits of this form.

Remarks: Stejneger (1917) says: "I am inclined to regard *Tropidophis bucculenta* (Cope) from Navassa Island as belonging near *T. melanura,* rather than to *T. maculata* though forming a separate species. I have examined the type material (No. 12377, U. S. N. M.) and find the scale formulas of the three specimens to be as follows:

Scale rows	Ventrals	Caudals	Supralabials
27	186	27	10
25	180	30	10
25	183	29	10

"I would call attention to the number of caudals which is less than in any specimen of *T. melanura* or *maculata* which I have examined. The brownish stripes seen in *T. melanura* are plainly visible in all three specimens."

After examination of these same specimens, I have included *bucculentus* as a subspecies of *pardalis.* The brownish stripes mentioned by Stejneger are no more distinct in these specimens than in those of *p. canus* and *p. curtus,* and in coloration and markings they are very similar to those subspecies, the tail being pale as in *canus* rather than black as in *curtus.* In the number of caudals, also, *bucculentus* resembles the other forms of *pardalis* more than it resembles *melanurus.* The scale formulas do not entirely agree with

Stejneger's, but I counted those which differ several times as a check.

The specimens seen were as follows:

Specimen	Locality	Sex	Scale rows	Ventrals	Caudals	Labials s.	Labials i.	Oculars pre.	Oculars post.	Temporals
U. S. N. M.										
12377a	Navassa	♂	23–25–29	183	29	10	11	1	3	3–4
12377b	"	♂	"	185	30	10	11	1	3	4–4
12377c	"	♀	25–27–29	187	28	10	12	1	3	4–3, 3–4

Tropidophis wrighti, new species

Type: No. 12420, U. S. N. M.

Type locality: East Cuba.

Range: East Cuba.

Diagnosis: This species may be distinguished from all species of the genus excepting *paucisquamis* by the small number of scale rows, 21; from *paucisquamis* by the presence of 12 rather than 19 maxillary teeth, and 195 rather than 178 ventrals; from all other species also by the presence of 4 rows of large, dark spots on a yellow ground.

Description: The scales are weakly keeled on the most dorsal rows. The squamation is as follows: ventrals 195; caudals 35; supralabials 10, with 4, 5, and 6 entering the eye; infralabials 10; oculars 1–3; temporals 3–4; dorsal scale rows 21–21–17.

The body is slender and compressed laterally, with the head rather distinct from the neck. Horny spurs at the sides of the vent are present in males.

The dentition is as follows: maxillary teeth 12; mandibular teeth 16; palatines 5; pterygoids 12.

The hemipenes (Pl. II, Fig. 7) are quadrifurcate, and divide into the following regions: unforked portion one-third total length; primary forks one-third total length; secondary forks one-third total length. The secondary forks are lined with longitudinal flounces, which develop into transverse flounces in the primary forks, and into large papillae border-

ing the sulcus in the primary and secondary forks. The basal unforked portion has slight longitudinal folds, and a large papilla opposite the first forking of the sulcus.

The ground color is greyish yellow. Four rows of alternating dark brown spots are present, each spot covering about 5 scales longitudinally by 5 scales transversely, and with the lower rows intruding on the belly, and confluent just anterior to the vent and on the ventral side of the tail. The dorsum of the head is brown.

The single specimen, a male, was 14¼ inches long.

Habits: Nothing is known of the habits of this species.

Remarks: I have examined only the type specimen.

Tropidophis melanurus (Schlegel)

Boa melanura Schlegel, 1837, Ess. Phys. Serp., II, p. 399, and 1844, Abbild., Pl XXVI.

Tropidophis melanurus, Bibron, 1840, in Sagra, Hist. Cuba, Rept., p. 208, Pl. XXIII; Dumeril & Bibron, 1844, Erp. Gen., Vol. VI, p. 491; Jan, 1864, Icon. Gen., p. 75, Pl. 1, fig. 1; Barbour, 1914, Mem. Mus. Comp. Zool., Vol. XLIV, 2, p. 327; Stejneger, 1917, Proc. U. S. Nat. Mus., Vol. 53, p. 279; Barbour, 1919, Mem. Mus. Comp. Zool., Vol. XLVII, 2, p. 188.

Ungalia melanura, Gray, 1842, Zool. Misc., p. 46; Gray, 1849, Cat. Sn. Brit. Mus., p. 104; Cope, 1868, Proc. U. S. Acad. Nat. Sci. Phila., p. 129; Gundlach, 1880, Erp. Cuba, p. 61; Boulenger, 1893, Cat. Sn. Brit. Mus., I, p. 111; Gundlach, 1898, Report U. S. Nat. Mus. Pl. 13, fig. 8; Zenneck, 1898, Zeitschr. Wiss. Zool., Vol. LXIV, pp. 89 & 190; Meerwarth, 1901, Mittheil. Naturhist. Mus. Hamburg, Vol. 18, p. 8; Werner, 1921, Arch. Naturg., Vol. 87, Pt. 7, p. 249.

Notophis bicarinatus Hallowell, 1856, Proc. Acad. Nat. Sci. Phila., p. 156.

Type: None mentioned.

Type locality: Cuba.

Range: Cuba. (One specimen was reported from Orizaba, Mexico, by Steindachner, in 1907 [Wien. Sitz. Ber. Ak. Wiss., Vol. 116, p. 1535]. It is almost certain, however, that the specimen which he saw was artificially transported to Mexico, perhaps in a banana bunch, as *melanurus* have fre-

quently been known to hide in such places. A similar case is found in the specimen described from Charleston by Jan (1864) as *T. distinctus.*)

Diagnosis: This species may easily be distinguished from other Cuban forms by its greater size, greater number of scale rows (27 as opposed to 21–25), and markings, which differ from those of other Cuban species in the presence of 4 or 5 longitudinal stripes, and the variability of the dorsal spots.

Description: The scales are strongly keeled. The squamation is as follows: ventrals 198–224 (average 206); caudals 32–41 (average 34.7); supralabials 10, 4 and 5 entering the eye; infralabials 11–13; oculars 1 and 3; temporals 3–3, or 3–4, rarely 2–3, 2–2, 3–2, 2–4 or 4–4; dorsal scale rows 25–27–19 or 27–29–19.

The body is compressed laterally, the head triangular and distinct from the neck, and the tail cylindrical. The body tapers toward head and tail. Horny spurs at the sides of the vent are present in males.

The dentition is as follows: maxillary teeth 15; mandibular teeth 17–18; palatines 6; pterygoids 12–13.

The hemipenes (Pl. III, Fig. 9) are distinctly forked, and each fork redivides. The sulcus forks with the primary forking of the organ, but extends into only one of the secondary forks of each half. The primary fork appears at about one-third the distance from the base to the apex, and the secondary at about two-thirds the distance from the primary forking to the apex. Longitudinal flounces in the secondary forks develop into transverse flounces in the primary forks. The edges of these flounces are strongly papillate, and develop into large papillae bordering the sulcus, and in the region of the first forking. The unforked region is smooth except for 4 large papillae, of which those lying nearest the sulcus are the largest. Cope's figure of this organ in *melanurus* (Report U. S. Nat. Mus., 1898, pl. I, fig. 3) shows the four papillae accurately, but does not include any of the organ posterior to the first forking.

The dorsal ground color varies from putty to reddish or ashy grey, with darker vertebral spots in 2 rows of about 45 spots each, and each spot covering 4–6 scales. Smaller spots of dark brown are scattered on the sides and belly, often forming 2 additional rows on each side, and 2 rows on the belly, but sometimes wholly lacking. Four more or less conspicuous longitudinal dark streaks, usually on the 4th and 9th scale rows of each side, are present, and often a similar streak appears on the vertebral row. The largest specimen I examined was 34 inches long. (Werner, 1921, p. 249, mentions a specimen 90 cm. long.)

Variations: Two large males collected at Guantanamo, by T. Barbour, Nos. 8609 and 8610 M. C. Z., were uniformly reddish yellow dorsally and lighter ventrally, entirely lacking spots or stripes. Possibly these are albinistic. No. 8609, however, had the tip of the tail black.

Habits: Bibron's remarks on the feeding habits of the species may be translated as follows: "This snake seems most particularly to feed on Anuran Batrachians of the family Hylaeformes, species which, like this one, habitually dwell in trees, for not only have we found the remains of these animals in the stomach of two of our specimens of *T. melanurus,* but we possess a third which still holds in its throat a marbled *Trachycephalus,* which it had just seized at the moment of its capture."

E. R. Dunn reports finding specimens of this species under the following conditions: One climbing about waist high among vines on the trunk of a tree at night; one coiled under a rock near a brook; one in a bromeliad 30 feet high in a tree; two on the ground in the early morning, not yet retired to their daily retreat; one in a fallen bromeliad.

Thomas Barbour found a specimen eating a lizard, and (1919, p. 189) mentions birds as part of the diet of this snake. I found a small bird in the stomach of No. 8606 M. C. Z.

In the oviduct of M. C. Z. No. 8605 I found ten well-developed embryos, with the scales keeled, and the markings

darker and more conspicuous than in adult specimens. This snake is therefore plainly viviparous.

Remarks: Barbour (1919, p. 189) says: "This is the largest member of the genus and we have specimens nearly a meter in length."

Boulenger (1893, p. 112) gives the following scale counts:

(a) Sc. 27; V. 211; C. 33–Cuba.

(b) Hgr. Sc. 29; V. 224; C. 35–locality?

Meerwarth (1901, p. 8) gives the following scale counts: No. 1727 (Hamburg Museum), Sq. 27; V. 205; Sc. 35; Supralab. 10.

Werner gives the following scale counts of the species based on Boulenger and the collection in the Vienna Museum: Sq. 27–29; V. 201–224; Sc. 32–41. All of these fall within the ranges I have given.

Zenneck (1898, p. 89) describes two color varieties of *melanurus* which he calls *melanura* A and B, the main differences being the presence of 2 vertebral stripes in A, and 1 in B, and the lighter spots and general body color of B. Although he makes no mention of locality, it is possible that these varieties may be geographical, A representing western and B eastern Cuba, for I have noticed that the eastern specimens tend to be lighter in color than the western, though with no distinctive differences. Furthermore, under B he mentions a specimen uniformly yellow, undoubtedly similar to specimens No. 8609, and No. 8610 M. C. Z. described above. He groups *melanurus* and *pardalis* together (p. 190) as having very similar color designs, and derives *pardalis,* including *melanura* B, from *melanura* A. *Pardalis,* however, is probably the more primitive species, and has given rise to *melanurus* rather than the reverse, since the high scale counts, and the arboreal habits of *melanurus* indicate that it is, with the possible exception of *semicinctus,* the most modified species of the genus.

I have examined the following specimens of this species:

Specimen	Locality	Sex	Scale rows	Ventrals	Caudals	Labials s.	Labials i.	Oculars pre.	Oculars post.	Temporals
M. C. Z.										
186	Cuba	♀	25–27–19	215	41	10	12	1	3	3–3, 2–3
10835	Guane, Cuba	♂	"	214	37	10	13	1	3	3–4
10901	Cienaga de Zapata, Cuba	♂	"	198	33	10	13	1	3	3–3, 3–4
10902	"	♂	"	204	35	10	13	1	3	3–4
13281	Cardenas, Cuba	♀	"	?	34	10	11	1	3	3–4
21841	Mina Carlota, Cuba	♂	27–29–19	200	36	10	?	1	3	3–4
7945a	Soledad, Cuba	♂	25–27–19	199	34	10	12	1	3	3–3, 3–4
7945b	"	♀	"	207	33	10	12	1	3	3–3, 3–4
7945c	"	♀	27–29–19	206	33	10	12	1	3	3–4
7945d	"	♀	"	212	35	10	11	1	3	3–4
18120	"	♂	"	205	35	10	13	1	3	3–4
18121	"	♂	"	198	35	10	13	1	3	3–3, 3–4
19873	"	♂	25–27–19	207	38	10	12	1	3	3–4, 3–3
21828	"	?	27–29–19	?	?	10	13	1	3	3–3
21829	"	♀	"	201	35	10	11	1	3	4–4
21830	"	♂	25–27–19	198	34	10	11	1	3	3–4
21831	"	♀	"	210	34	10	13	1	3	3–4
21832	"	♂	"	208	37	10	13	1	3	3–4, 2–4
18880	"	♂	"	208	35	10	13	1	3	3–3
22286	"	♀	27–29–19	199	36	10	12	1	3	3–4
22287	"	yg.	25–27–19	211	36	10	11	1	3	3–3
22288	"	♂	27–29–19	203	37	10	12	1	3	2–3, 3–4
11894	Cananova, Cuba	♂	25–27–19	201	34	10	12	1	3	3–4
11895	"	♂	27–29–19	203	37	10	12	1	3	3–3
8965	Gusia, Cuba	♀	"	214	?	10	13	1	3	3–4
11209	Baracoa, Cuba	♂	25–27–19	198	?	10	12	1	3	3–4
8604	Guantanamo, Cuba	♂	27–29–19	204	37	10	12	1	3	3–3
8605	"	♀	25–27–19	213	36	10	12	1	3	2–3
8606	"	♂	"	205	35	10	12	1	3	2–3
8607	"	♀	27–29–19	207	35	10	12	1	3	3–4, 2–3
8608	"	♂	"	198	39	10	11/12	1	3	3–4, 3–3
8609	"	♂	26–27–19	199	37	10	12	1	3	3–3, 2–4
8610	"	♂	"	203	38	10	12	1	3	2–4, 2–3

Specimen	Locality	Sex	Scale rows	Ventrals	Caudals	Labials s.	Labials i.	Oculars pre.	Oculars post.	Temporals
U. S. N. M.										
12416	Cuba	♀	"	206	34	10	11	1	3	3–3
12416a	"	♂	"	198	37	10	11	1	3	3–4
27391	El Guamá, Pinar del Rio, Cuba	♀	27–29–19	212	35	10	12	1	3	3–3, 2–3
29779	"	♀	"	211	40	10	13	1	3	3–4
36803	Cuba	♀	"	213	36	10	11	1	3	3–4
51853	Cape San Antonio, Cuba	♀	25–27–19	204	36	10	11	1	3	3–3, 2–3
56240	Guantanamo, Cuba	♂	27–29–19	205	37	10	12	1	3	2–3
56242	Prov. Santiago, Cuba	♂	"	200	36	10	12	1	3	3–3
56241	Cienfuegos, Cuba	♀	25–27–19	207	32	10	12	1	3	3–3, 3–4
56244	Santa Clara, Cuba	♀	"	212	34	10	12	1	3	3–3
56245	"	♂	"	202	?	10	12	1	3	3–2, 2–2
56243	Santiago de las Vegas, Cuba	♂	"	211	35	10	10/12	1	3	3–3
51861	Vinales, Cuba	♂	"	208	34	10	11/12	1	3	3–3, 3–4
A. M. N. H.										
2948	Baracoa, Cuba	♀	"	204	37	10	12	1	3	3–3
7384	Cueva de la Macha, Cuba	♂	"	205	38	10	12	1	3	3–3
7385	"	♀	27–29–19	208	36	10	12	1	3	3–3
6501	Rio Analla, Cuba	♂	"	199	36	10	12	1	3	3–4
7403	Banos de Ciego, Montero, Cuba	♀	25–27–19	212	33	10	12	1	3	3–3, 3–4
2953	Santiago de Cuba	♀	27–29–19	215	36	10	12	1	3	3–4

Tropidophis semicinctus (Gundlach and Peters)

Ungalia maculata, var. *semicincta* Gundlach and Peters, 1864, Mon. Berl. Ak., p. 388.

Ungalia semicincta, Gundlach, 1868, Repert. fis. Cuba, ii, p. 115; Cope, 1868, Proc. Acad. Nat. Sci. Phila., p. 230; Gundlach, 1880, Erp. Cuba, p. 70; Boulenger, 1893, Cat. Sn. Brit. Mus., I, p. 113; Zenneck, 1898, Zeitschr. Wiss. Zool., Vol. LXIV, pp. 87, 194; Schmidt, 1921, Bull. Am. Mus. Nat. Hist., Vol. XLIV, p. 558; Werner, 1921, Arch. Naturg., Vol. 87, Pt. 7, p. 249.

Tropidophis semicincta, Barbour, 1914, Mem. Mus. Comp. Zool., Vol. XLIV, 2, p. 329; Stejneger, 1917, Proc. U. S. Nat. Mus., Vol. 53, p. 281; Barbour, 1919, Mem. Mus. Comp. Zool., Vol. XLVII, 2, p. 191.

Tropidophis semicinctus, Darlington, 1927, Bull. Antivenin Inst., Vol. I, No. 2, Article 17.

Tropidophis moreletii, Bocourt, 1885, Bull. Soc. Philom., Vol. IX, p. 113.

Ungalia moreletii, Bocourt, 1888, Miss. Sci. Mexique, Rept., Pl. xlii, fig. 5; Boulenger, 1893, Cat. Sn. Brit. Mus., I, p. 111; Zenneck, 1898, Zeitschr. Wiss. Zool., Vol. LXIV, pp. 87, 194; Günther, 1902, Biol. Cent. Amer., Rept. & Amphib., p. 181; Werner, 1921, Arch. Naturg., Vol. 87, Pt. 7, p. 249.

Type: None mentioned.

Type locality: Cuba.

Range: Cuba and Isla de Pinos (Guatemala is given also by Bocourt, but this locality is probably erroneous.)

Diagnosis: This species may be distinguished from any other species of the genus by its coloration (2 dorsal rows of large black oval spots on a yellow ground). It is also the most slender species of the genus, and the only one in which males lack horny spurs at the sides of the vent.

Description: The scales are slightly keeled in the most dorsal scale rows, and have been described as tectiform. The squamation is as follows: ventrals 205–210 (average 208.4); caudals 36–39 (average 37); supralabials 10, occasionally 9, 4 and 5 entering the eye; infralabials 11–12, rarely 10; oculars 1 and 3; temporals 3–3 or 3–4; dorsal scale rows 23–25–17.

The body is slender and compressed, with the head rather distinct from the neck. The tail is narrow and pointed. Males lack horny spurs at the sides of the vent.

The dentition is as follows: maxillary teeth 15; mandibular teeth 22; palatines 6; pterygoids 10–11.

The hemipenes (Pl. III, Fig. 8) fork twice, the first fork appearing at about one-fifth the distance from the base to the apex, and the secondary fork at about one-half the remaining distance from the first forking to the apex. The sulcus spermaticus also forks twice, extending into both of the secondary forks of the organ. The secondary forks are lined with longitudinal, papillose flounces, which develop into transverse flounces in the primary forks, and into large papillae at the base of the primary forks, and bordering the sulcus in primary and secondary forks. The unforked region is almost smooth, except for a single large papilla lying opposite the first forking of the sulcus.

The dorsum is yellow, with a pattern of large, oval, black spots in 2 longitudinal rows, which tend to fuse on neck and tail. These spots each cover about 11 scales transversely and 6 scales longitudinally, and there are about 25 spots to a row on the body, and 7 to a row on the tail. The dorsal side of the head is chestnut brown. An orange or brownish vertebral stripe, 5 or 6 scales wide, is often present. The belly is immaculate. The largest specimen I saw was 16½ inches long.

Variations: In one specimen, No. 13282, M. C. Z., from Cardenas, Cuba, the dorsal spots intruded upon the abdomen just anterior to the vent.

Habits: Barbour (1919, p. 192) says; "We know really nothing of its habits beyond the fact that it is perfectly inoffensive, simply rolling up into a ball with its head tucked away inside and remaining motionless until disturbed. It is like its close relatives, nocturnal."

E. R. Dunn reports finding one specimen coiled under a box.

Darlington (1927) has noted the phenomenon of autohemorrhage in *semicinctus* as follows: "The majority of specimens taken were observed to bleed from the mouth; no specimen examined for the phenomenon failed to bleed; in no other of the two dozen or so snakes of other species handled in Cuba

during the same period was bleeding noted. In two specimens which were handled gently no blood was produced at first, but bleeding from the mouth commenced as soon as the *posterior* parts of the body were treated roughly. Under one stone two *T. semicinctus* were found coiled with a large *Arrhyton,* and were probably exposed to the same pressure when the stone was turned. Both *semicinctus* bled, the *Arrhyton* did not.

"When taken, the snake coils into a ball with its head in the middle, and offers no physical resistance. A very offensive anal secretion is produced, however, and immediately thereafter autohemorrhage begins. The blood is allowed to flow slowly from the mouth with no sign of being ejected under pressure, and is usually sufficient to form about four large drops. During the bleeding the eyes turn from a dark, inconspicuous shade to a color most aptly described as "ruby-red." The blood itself is very nearly odorless, certainly far less offensive to human nostrils than the anal secretion. Unfortunately it did not occur to the writer to taste it for possible defensive flavors."

I have noted the same phenomenon in a specimen of *T. melanurus* kept alive in the laboratory, when it was subjected to anaesthesia. Blood flowed from both mouth and eyes at that time, but on returning to consciousness, the snake appeared no worse for the experience.

Remarks: This snake is probably the most highly modified of the genus, as it averages the highest number of ventrals and caudals, lacks horny spurs at the sides of the vent in males, and differs greatly in coloration and markings from all other forms. It most closely resembles *wrighti,* which is probably the eastern representative of the form in Cuba, although a distinct species.

Semicinctus is similar in appearance to *Sibynomorphus,* an arboreal, nocturnal, and snail-eating snake.

Stejneger (1917, p. 281) says; "The type of *T. moreletii* is said to have been collected by A. Morelet at Vera Paz, Guatemala, but there is no other record from the mainland

that I am aware of. However, some mistake may have crept in, for Morelet, as we know, collected also in Cuba. In part confirmation of my doubt as to the correctness of the locality, I may mention that in A. Duméril's "Catalogue Méthodique de la Collection des Reptiles du Muséum d'Histoire Naturelle de Paris" (1851, p. 216), there is listed a *T. maculatus* collected by Morelet in Cuba, and I suspect that this may be the same specimen which afterwards served as the type of *T. moreletii.*"

Zenneck (1898, p. 88) points out the identical nature of the coloration and markings of *semicinctus* and *moreletii,* remarking that the only difference is in the number of scale rows, which is given by Boulenger, Werner, and earlier authors as 21–23 for *semicinctus* and 25 for *moreletii.* The scale counts given by Werner are based directly on Boulenger, and Boulenger saw no examples of either form. All the specimens of *semicinctus* which I examined, including all those cited by American authors, I found to have 25 scale rows, and I think there can be little doubt that the species are synonymous, or that the normal number of scale rows around the middle of the body is 25. It is possible that specimens cited by earlier authors as showing 21 scale rows may have been examples of the quite different species *wrighti,* which has 21 scale rows, and 4 rows of large dark spots instead of the two rows of *semicinctus.* Such a specimen, No. 12420, U. S. N. M., which I used as the type of *wrighti,* was labelled "*semicinctus*" in the collection in the U. S. National Museum.

I have examined the following specimens of this species:

Specimen	Locality	Sex	Scale rows	Ventrals	Caudals	Labials s.	Labials i.	Oculars pre.	Oculars post.	Temporals
M. C. Z.										
13282	Cardenas, Cuba	♀	23–25–17	208	36	10	11	1	3	3–3
10822	Soledad, Cuba	♂	"	205	38	9	12	1	3	3–4
21840	"	♂	"	210	36	10	11	1	3	3–4

Specimen	Locality	Sex	Scale ows	Ventrals	Caudals	Labials s.	Labials i.	Oculars pre.	Oculars post.	Temporals
18122	"	♂	"	205	37	10	11	1	3	3–3, 3–4
18123	"	♂	"	210	37	10	12	1	3	3–4
22290	"	?	"	209	36	10	10	1	3	3–3
22289	"	?	"	206	36	10	11	1	3	3–4, 3–3
U. S. N. M.										
56346	Cienfuegos, Cuba	♂	"	210	39	9	10	1	3	3–3
56347	"	♂	"	209	36	10	11	1	3	3–3
26361	Matanzas, Cuba	♀	"	209	?	10	11	1	3	3–3
A. M. N. H.										
7386	Santa Clara, Cuba	♂	"	210	39	9	10	1	3	3–3

EXPLANATION OF FIGURES

b—basal unforked region.
f—forking.
l. fl.—longtitudinal flounces.
m—muscle.
p—papilla.
p. f.—primary fork.
s. f.—secondary fork.
s. s.—sulcus spermaticus.
t. fl.—transverse flounces.

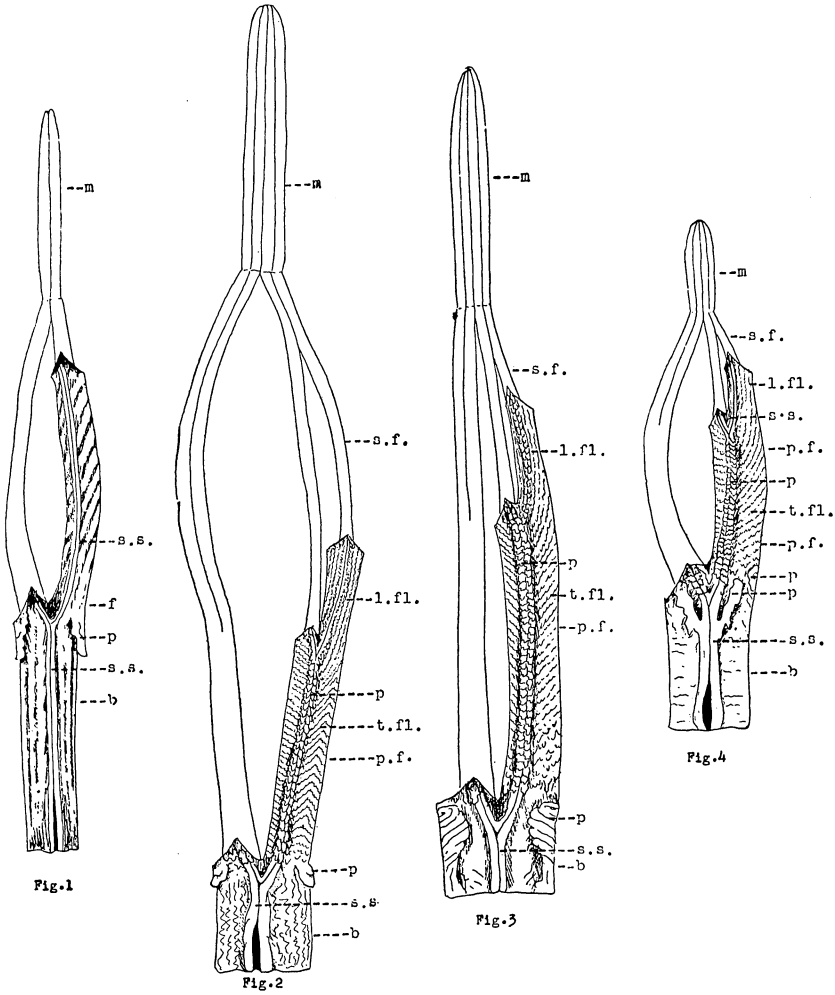

FIG. 1. Hemipenis of *Tropidophis maculatus maculatus*, × 3.5.
FIG. 2. Hemipenis of *T. pardalis pardalis*, × 3.5.
FIG. 3. Hemipenis of *T. pardalis canus*, × 3.5.
FIG. 4. Hemipenis of *T. pardalis curtus*, × 3.5.

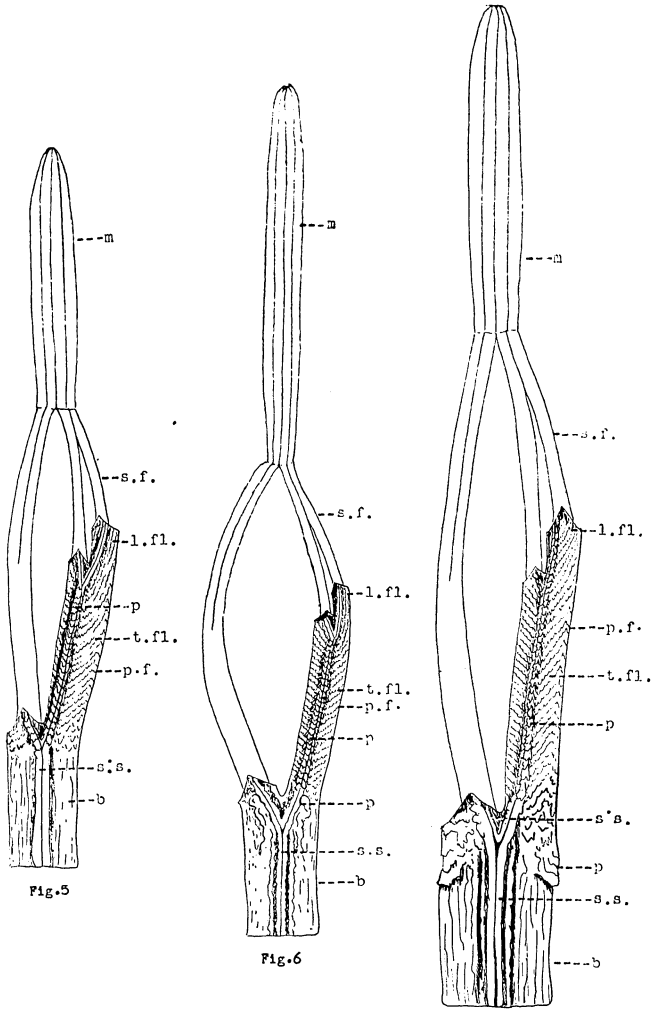

FIG. 5. Hemipenis of *Tropidophis pardalis androsi*, × 3.5.
FIG. 6. Hemipenis of *T. pardalis bucculentus*, × 3.5.
FIG. 7. Hemipenis of *T. wrighti*, × 3.5.

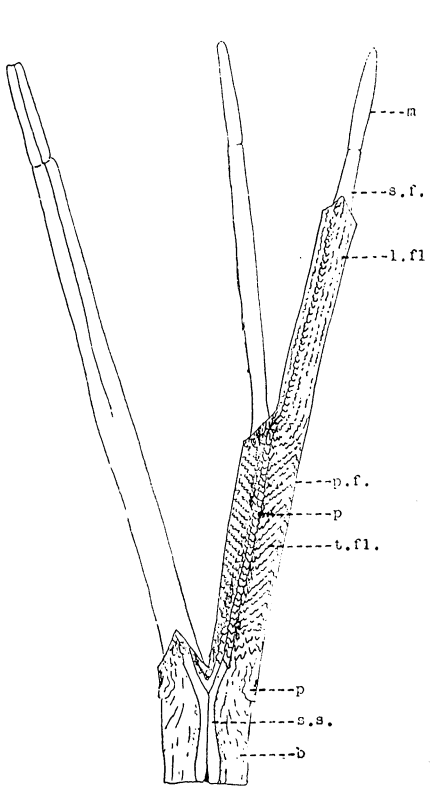

Fig.8

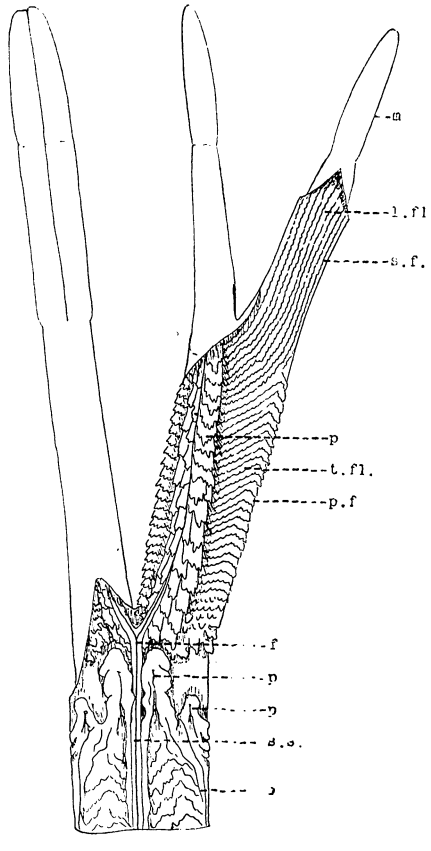

Fig.9

FIG. 8. Hemipenis of *Tropidophis semicinctus*, × 3.5.
FIG. 9. Hemipenis of *T. melanurus*, × 3.5.