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Mainland Forms of the Snake Genus *Tretanorhinus*¹

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IN attempting to deal with the snake fauna of the Panamá Canal Zone, one is faced with the statement of Barbour and Amaral (1924: 131) that *Tretanorhinus nigroluteus* and *T. moquardi* (both described from the Zone) are synonymous, and with Amaral's later statement (1929: 10-11) that the genus is monotypic. When investigation convinced me that *nigroluteus* and *moquardi* in the Canal Zone differ consistently in range, markings, number of dorsal scales, number of ventral scales, number of caudal scales, number of loreals, and number of prefrontals, I examined as many specimens as possible from the whole range of the genus. This report deals with the mainland forms. The Antillean forms are the subject of a separate report by Mr. G. Congdon Wood (1939: 5-11), but I have examined the material with him, and each of us has had access to the findings of the other.

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For the genus as a whole three groups can be made out. These differ in range, in markings, and in ventral count, as shown below:

| | Atlantic drainage, mainland | Antillean | Pacific drainage, mainland |
|------------------|--------------------------------|-----------|-------------------------------|
| Dorsal markings | Two rows of dots | Crossbars | Three dark stripes |
| Male, ventrals | 133-139 | 152-162 | 166-169 |
| Female, ventrals | 138-151 | 154-168 | 168-177 |

The analysis of North American mainland forms by Bocourt (1891-5) was correct, and it is a pity that, because of lack of attention to his work, it is necessary for me to repeat it.

I have examined forty-eight mainland specimens, from Ecuador to Panamá on the Pacific side, and from Panamá to Guatemala on the Atlantic side, and have used information concerning eleven additional specimens from these areas but have not examined them. I know of no other specimens.

Jan (1863: 76; 1864: 254) has recorded *Tretanorhinus* from Mexico on the basis of specimens in Milan and in Turin. He refers to the Milan specimens in 1863 by the nomen nudum of *adnexus*. The Milan specimens are called *variabilis* in 1865. The Turin specimens are called *variabilis* in both papers. I have not examined these specimens. No Mexican specimens have been seen and no others have been reported.

Jan (1865, *l.c.*: 247; 1868: pl. 1, fig. 1) reported a specimen from Brazil, in the Hamburg Museum, as *Helicops wagleri*. This has not been examined but the figure and description fit specimens from Cuba in every respect.

KEY TO MAINLAND *Tretanorhinus*

- A. Dorsal markings three longitudinal dark stripes; ventrals 166 or more; prefrontals one or three (very rarely two); one loreal; preoculars two (very rarely three); Pacific drainage forms, Panamá to Ecuador (one Canal Zone exception)
- B. 21 dorsal scale rows; three prefrontals; caudals in females 74-81; Colombia and Ecuador *taeniatus*
- BB. 19 dorsal scale rows; one prefrontal (rarely two); caudals in females 69-74; Pacific slope Panamá Canal Zone (one from Atlantic, Canal Zone) *moquardi*
- AA. Dorsal markings two rows of alternating small dots (one Petén specimen with a single row of large dots); ventrals 151 or less; two prefrontals; loreals and preoculars variable; 21 dorsal scale rows; Atlantic drainage
- B. Lowermost two scale rows light; typically with two loreals and two preoculars; Panamá to Honduras *nigroluteus*
- Bb. Lowermost two scale rows dark; typically with one loreal and three preoculars; Petén and Belize *lateralis*

Tretanorhinus taeniatus Boulenger

Tretanorhinus taeniatus Boulenger, Ann. Mag. Nat. Hist., (7), 12, 1903: 350.

TYPE.—Female in Brit. Mus., not examined.

TYPE LOCALITY.—Rio Sapayo, N.W. Ecuador, 450 feet altitude.

RANGE.—Known only from type locality and Buenaventura, Colombia (Mus. Zool., Univ. Mich.)

DIAGNOSIS.—Markings consist of stripes; 21 dorsal scale rows; three prefrontals; ventrals 168-174; caudals 74-81.

DESCRIPTION.—The first statement in the following description refers to the type in each case: scales 21 (21-19); ventrals (♂) 168-175, caudals 81-74; three prefrontals, one loreal, preoculars 2 (2-3); postoculars 2; temporals 1 + 2 or 2 + 3 in both specimens; upper labials 8(8-9), fourth (fourth or fifth) entering eye; nasals in contact behind rostral; 4 or 5 lower labials in contact with anterior chin shields; middorsal dark stripe on vertebral row; lateral dark stripe on row 4 in type, on row 5 in the Buena-ventura specimen. Median prefrontal small but apparently perfectly normal; rows of scales below lateral dark stripe white; three ill-defined dark stripes along belly, a median one and one at end of the ventrals.

REMARKS.—The relationships are with *T. moquardi*. I have seen only the MZUM specimen, a female.

Tretanorhinus moquardi Bocourt

Tretanorhinus moquardi Bocourt, Le Naturaliste, (2), 5, 1891: 122; Bocourt, Miss. Sci. Mex., Zool., 3, Sect. 1, 1893: pl. 52, fig. 5; Bocourt, *l.c.*, 1895: 797.

TYPES.—Originally five. Two are now, Paris 3675 alpha and beta. One is A.N.S. 11656, presented by Bocourt to Cope, bearing the erroneous locality "Belize."

TYPE LOCALITY.—"á Panamá" =Panamá City.

RANGE.—Known only from the Pacific side of the Panamá Canal Zone, with a single exception from Ft. Sherman on the Atlantic Side.

DIAGNOSIS.—Markings consist of stripes; 19 scale rows; one prefrontal (two exceptions with two prefrontals); ventrals in males 166-169; ventrals in females 168-177; caudals in males 78-85; caudals in females 69-74.

DESCRIPTION.—Dorsal scale rows 19-17; a middorsal dark stripe on vertebral row; a lateral dark stripe on fourth row; three lower scale rows light; normally one prefrontal; one loreal; two preoculars; ventrals in males (2) 166-169; ventrals in females (5) 168-177; caudals in males (2) 78-85; caudals in females (3) 69-74.

VARIATION.—I have seen two specimens with two prefrontals. One is MCZ 18812 taken in 1924 at Ft. Sherman on the Atlantic side of the Canal Zone, some ten or twelve years after the Canal was opened. The division between the prefrontals is asymmetrical and may be an injury. This, a female, is in all other respects a *moquardi* with 19-17 dorsals, 172 ventrals, 74 caudals, one loreal, two preoculars, and normal coloration. The second specimen is a head from the Panamá Sabanas, in my possession. This has 19 dorsal scale rows, one loreal, two preoculars, and normal coloration. The division between the prefrontals appears perfectly normal.

REMARKS.—I am inclined to think the Panamá Canal responsible for the appearance of this Pacific form on the Atlantic side.

I have seen three of the five types and nine additional specimens. I know of no others. Localities are: Panamá City (type locality, Paris 2, ANS 1); Bruja Pt. (MCZ 1); Panamá Sabanas (ERD 3); Corozal (USNM 1, FMNH 1); Corozal and Ft. Clayton (MCZ 1); Ft. Sherman (only Atlantic side locality, MCZ 1); "Panamá" (AMNH 1).

Tretanorhinus nigroluteus Cope

It is more convenient to treat this species first as a whole, presenting synonymies under the subspecific headings. I have examined thirty-six specimens and eight have been reported but not examined. Fifteen are from the Atlantic side of the Panamá Canal Zone: Colon (ANS 1, USNM 1); Fort Randolph (MCZ 5, USNM 1); Fort Sherman (MCZ 1); France Field (MCZ 1); Gatun (USNM 1); Fort Davis (MCZ 1); Bas Obispo (MCZ 2); Juan Mina (MCZ 1). The last locality is well up the Chagres near Madden Dam. From the same area I know of, but have not examined, the following: the type of *bifrenatus* from Colon; one from Panamá (Günther, 1872); three from Panamá (Boulenger, 1893). It is strange that no specimens are known from the Atlantic coast between the Canal Zone and the mouth of the San Juan River in Nicaragua.

Eleven are from Nicaragua: San Juan del Norte (USNM 2, MCZ 2); one mile from mouth of Rio San Juan (USNM 1); Bluefields (AMNH 2); Pia Creek (AMNH 1); "Nicaragua" (USNM 2); Corn Islands (MCZ 1). Pia Creek is well up the Prinzapolka River.

Three are from Honduras: Progreso (MCZ 1, MZUM 1); Tuloa Cr. Plantation (MZUM 1).

Two are from British Honduras: Belize (USNM 2). I know of the two types of *lateralis* from Belize.

Five are from the Prov. of Petén, Guatemala: Laguna Yalac, Rio San Pedro (MZUM 1), El Paso de Caballo (MZUM 2, MCZ 1); Arroyo Subin near Trinidad (MZUM 1).

I have not seen the type of *intermedius* Rosén from "Central America."

VARIATION.—The ventrals of males are 133-139; average of nineteen, 135.9. There is no significant geographical variation. The ventrals of females counted by me are 138-148 (Günther, 1872, records 151 from Panamá; Boulenger, 1893, records 149 from Panamá); average of twenty-four, 143.1. Panamanian specimens seem slightly higher.

The caudals of males are 63-80, average of fifteen, 74.8, no geographical variation. The caudals of females are 56-68, average of twenty-two, 61.9, slightly higher in Panamá.

The dorsals are regularly 21-17, reducing by dropping the paravertebrals twice. There are regularly two prefrontals.

The dorsal markings, obscure in adults, are, with the exception of a single specimen, a double dorsal series of alternating dark dots, each occupying approximately a single scale. The exception (MCZ 38583 from El Paso del Caballo, Petén) has oval middorsal spots about three scales long by six wide.

The two lower scale rows are light in color in specimens from Panamá, Nicaragua and Honduras; dark in specimens from Belize and Petén. In the latter there is usually a light line on the third row. In southern specimens the belly is light, with traces of a midventral dark stripe and one on the edges of the ventrals. The belly is quite dark in northern specimens.

Of fourteen Panamanian specimens twenty-seven sides have two loreals; a single side has one. Ten Nicaraguan specimens show fifteen cases of two loreals, five of one loreal. All specimens from Honduras, Petén and Belize have a single loreal.

There are three instances of three preoculars against twenty-five of two preoculars in Panamá. Specimens from Nicaragua, Honduras, and Petén have regularly two preoculars. Specimens from Belize have three preoculars.

Thus in color and in head scutellation the population of Panamá is quite different from that of Belize. In color the Nicaraguan and Honduran specimens, while nearer the Panamá type, show a tendency for row one to be darker and for row three to be lighter, thus approaching the Petén-Belize type. The loreal change takes place between Nicaragua and Honduras. The preocular alteration seems practically confined to Belize. I have divided the races, for the purpose of allocating specimens, by color.

Tretanorhinus nigroluteus nigroluteus Cope

Tretanorhinus nigroluteus Cope, Proc. Acad. Nat. Sci. Phila., 1861: 298; Günther, Ann. Mag. Nat. Hist., (4), 9, 1872: 27; Bocourt, Le Naturaliste, (2), 5, 1891: 122; Boulenger, Cat. Snakes Brit. Mus., 1, 1893: 283; Bocourt, Miss. Sci. Mex., Zool., 3, Sect. 1, 1893: pl. 54, fig. 1; *l.c.*, 1895: 798.

Helicops agassizii Jan, Arch. Zool. Anat. Phys., 3, 1865: 248 (San Juan del Norte, Nicaragua, MCZ 826, type); Icon. Oïd., 28, 1868: pl. 2, fig. 1.

Helicops bifrenatus Bocourt, Bull. Soc. Philom., (7), 8, 1884: 134 (Colon, Panamá, type in Paris).

Tretanorhinus intermedius Rosén, Ann. Mag. Nat. Hist. (7), 15, 1905: 171 (Central America, type in Lund).

TYPE.—USNM 5568, collected by Dr. Caldwell.

TYPE LOCALITY.—Aspinwall, Panamá. Erroneously given as Greytown, Nicaragua, in the original description.

RANGE.—Atlantic drainage of Panamá Canal Zone; Atlantic drainage of Nicaragua and Honduras.

Tretanorhinus nigroluteus lateralis Bocourt

Tretanorhinus lateralis Bocourt, Le Naturaliste, (2), 5, 1891: 122; Bocourt, Miss. Sci. Mex., Zool., Sect. 3, 1893: pl. 52, fig. 4; Bocourt, *l.c.*, 1895: 800.

Tretanorhinus nigroluteus Stuart, COPEIA, 1937: 69 (Petén).

TYPES.—Originally two in Paris. Not examined.

TYPE LOCALITY.—Belize.

RANGE.—Known only from Belize and Petén.

HABITS OF MAINLAND *Tretanorhinus*

These snakes are practically unknown ecologically. Hubbs says of *lateralis* in Petén (Stuart, 1937): "purely aquatic ophidian dives to the bottom when surprised and there seeks protection in the crevices of rocks, etc., from which no amount of confusion can disturb it. One of the specimens was caught in a gill net from which it had stolen a *Cichlasoma octofasciata* (Regan)."

Barbour and Amaral (1924), writing of *nigroluteus* and *moquardi* in the Canal Zone as of one species, say: "one of the very few that frequent salt water. It is found about mangrove swamps, if not exclusively, at least frequently, having much the habits of *Natrix compressicauda*."

I have had considerable experience with the form of the genus that occurs at Soledad, near Cienfuegos, Cuba. This is found abundantly in the water of small streams at night. Since a great deal of time spent around small

streams at night in the Canal Zone and elsewhere in Panamá has never once brought a specimen of *Tretanorhinus* under my observation, I infer that the mainland forms differ ecologically from their Cuban congeners.

GENERIC CHARACTERS AND RELATIONSHIPS

Dorsal scales keeled, striate, pitless, reducing by dropping the paravertebrals, 21-17; subcaudals double; anal double; head scales normal with at times two loreals and at times one or three prefrontals; internasals small; pupil circular to slightly oval; maxillary teeth about 27, subequal; hemipenis single or slightly bilobed; calyculate area capitate; sulcus forks within the calyculate area; four basal hooks; between hooks and calyculate area about four cross rows (about ten longitudinal rows) of rather uniform smaller spines; posterior hypapophyses present, low.

The hemipenis is most like that of some of the forms of the *Rhadinaca-Coniophanes-Trimetopon* series. The dentition, the dorsal scales, and the hypapophyses are similar to those of *Ninia* (*Tretanorhinus* has more maxillary teeth). These similarities may be an indication of relationships. There is also a resemblance in hemipenis and hypapophyses to *Amastridium*, but *Amastridium* has only two basal hooks on the hemipenis, and is very different in dentition. In dentition and in hemipenis there is close similarity with the endemic central upland genus *Hydromorphus*.

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