

The snakes of the genus *Atractus* Wagler (Reptilia: Squamata: Colubridae) from the Manaus region, central Amazonia, Brazil.

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Key words: serpentes; Colubridae; *Atractus*; taxonomy; natural history; central Amazonia.

Taxonomic and natural history data are presented on eight species of *Atractus* from the Manaus region, central Amazonia, Brazil, namely: *A. alphonsehogeii*, *A. latifrons*, *A. major*, *A. poeppigi*, *A. schach*, *A. snethlageae*, *A. torquatus*, and *A. trilineatus*. Four of these species are recorded for the first time for the region, which indicates the scarcity of snake collections in central Amazonia.

Apresentamos dados sobre a taxonomia e a história natural de oito espécies de *Atractus* da região de Manaus, Amazônia central, Brasil: *A. alphonsehogeii*, *A. latifrons*, *A. major*, *A. poeppigi*, *A. schach*, *A. snethlageae*, *A. torquatus* e *A. trilineatus*. Quatro destas espécies são registradas pela primeira vez para a região, o que indica a escassez de coletas de serpentes na Amazônia central.

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Introduction

The Neotropical snake genus *Atractus* Wagler, 1828, comprises nearly 80 species distributed from southern Central America southward through Amazonia to Amazonian Bolivia and southern Brazil. Savage (1960) monographed 16 Ecuadorian species of *Atractus* and emphasized the need of an extensive revision of the genus. Peters & Donoso-Barros (1970) tabulated the diagnostic characters of 72 species of *Atractus*. Hoogmoed (1980) reviewed eight species of *Atractus* from Suriname and Cunha & Nascimento (1983, 1984) reviewed the genus *Atractus* in eastern Amazonia describing three new forms. Additional taxonomic data on *Atractus* from several localities are found in studies of local and regional snake faunas (e.g., Chippaux, 1986; Dixon & Soini, 1986; Duellman, 1978; Gasc & Rodrigues, 1980; Lancini, 1979; Nascimento et al., 1985; Roze, 1966).

When identifying snakes in central Amazonia we found that the snake fauna of this region is very poorly known (see, e. g., Dixon, 1979; Hoogmoed, 1979, 1980). The main accounts on the fauna of this region are those of Hoge & Nina (1969) on some snakes deposited in the collection of the Instituto Nacional de Pesquisas da Amazônia, Manaus (no *Atractus* included), Vanzolini (1985) on *Micrurus averyi*, and Zimmermann & Rodrigues (1990) on the structure of a snake community around Manaus. The latter authors reported five species of *Atractus*, namely *A. latifrons*, *A. major*, *A. snethlageae*, *A. torquatus*, and an unidentified species. Schmidt & Inger (1951)

recorded *A. badius* for Manaus, although this may be a misidentification (see "Discussion" in the present paper).

The purpose of this paper is to diagnose the eight species of *Atractus* of the Manaus region and provide data on their natural history. We analysed specimens deposited in the following collections: Núcleo de Animais Peçonhentos, Instituto de Medicina Tropical de Manaus (IMTM); Instituto Butantan, São Paulo (IB); and Nationaal Natuurhistorisch Museum, Leiden (RMNH). The region considered encompasses localities within a radius of 250 km from Manaus, Amazonas, Brazil, north of the Rio Solimões (fig. 1). This region is covered by lowland forests, including areas seasonally flooded by black and white waters ("igapó" and "várzea", respectively). Detailed descriptions of forests around Manaus are provided by DNPM (1976) and Guillaumet (1987). Total annual rainfall in the region is about 2100 mm; a marked wet season (165-300 mm/month) occurs from November to May, and

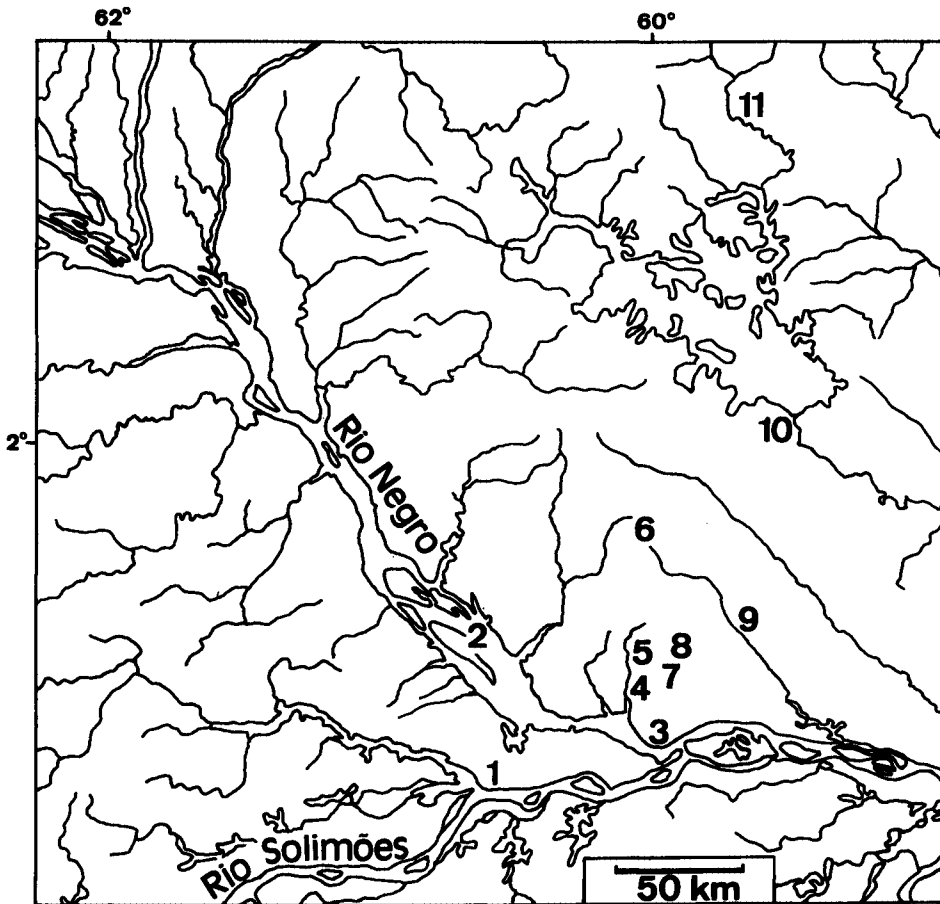


Fig. 1. Map of the Manaus region showing localities where snakes were collected. Manacapuru: urban area (1); Novo Airão: Archipelago of Anavilhanas (2); Manaus: urban area (3), Highway BR-174, Km 18 (4), Km 37 (5), and Km 86 (6), Highway AM-010, Km 25 (7) and Km 35 (8); Rio Preto da Eva: urban area (9); Presidente Figueiredo: Balbina hydroelectric power plant (10) and Pitinga hydroelectric power plant (11).

a drier season (<65 mm/month) from July to September (Leopoldo et al., 1987). Temperature at Manaus ranges from 18 to 37°C throughout the year (DNPM, 1976).

All measurements were made with a flexible ruler and are presented as the total length (TTL); the proportion of tail length in relation to TTL (in percents) is also presented. Numbers in parentheses following taxonomic data indicate number of examined individuals. Since we do not intend to extensively review the taxonomy of the species treated herein (see above), simplified synonymy citations were used. These include only the original descriptions and, when pertinent, the first citation using the names as used here. Extensive synonymy lists for most species treated herein are found in Savage (1960) and Hoogmoed (1980).

Key to the species of *Atractus* from the Manaus region, central Amazonia

1. Dorsal scales in 15 rows 2
- Dorsal scales in 17 rows 3
2. Temporal scales 0+1 or 0+2; 1/1 postoculars; 6/6 supralabials; dorsum dark brown with light triangular spots on the flanks, reaching the ventrals; 5-6 maxillary teeth *Atractus poeppigi*
- Temporal scales 1+2; 2/2 postoculars; 8/8 supralabials; dorsum light brown with three longitudinal dark stripes; 11 maxillary teeth *Atractus trilineatus*
3. Dorsum brown with three longitudinal slightly distinct darker stripes and a paravertebral cream stripe on the flanks; dorsal scales with apical pits; scales of the latero-posterior part of the body with tubercles, mainly in the anal region
..... *Atractus alphonsehogei*
- Dorsum lacking longitudinal stripes; dorsal scales without apical pits 4
4. Dorsum with red, black, and white rings; loreal as wide as high
..... *Atractus latifrons*
- Dorsum lacking red, black, and white rings; loreal wider than high 5
5. Dorsum dark brown with light transversal stripes *Atractus snethlageae*
- Dorsum greyish, greenish, reddish or dark brown, either bearing or lacking darker spots 6
6. Ventral scales cream, with brown spots in their center giving rise to a longitudinal midventral stripe, more distinct at the anterior third of the body; dorsum brown to reddish brown with a longitudinal middorsal stripe, sometimes interrupted, and/or short transversal bars *Atractus schach*
- Venter lacking a middorsal dark brown stripe; dorsum either bearing or lacking dark spots 7
7. Six maxillary teeth; dorsum brown to reddish brown with transverse dark brown spots, wider on the middorsal region and bearing internal margins blackish and external margins light brown, or dark brown spots irregularly distributed throughout the dorsum *Atractus major*
- Eight maxillary teeth; dorsum dark, greyish, greenish, or reddish brown, often bearing small dark spots (one scale wide) scattered throughout, sometimes disposed as short transverse or oblique bands *Atractus torquatus*

Species Accounts

***Atractus alphonsehoge* Cunha & Nascimento, 1983**

Atractus alphonsehoge Cunha & Nascimento, 1983: 25. Type locality: Brasil, Pará, Bela Vista, Km 75 PA-242, rodovia Bragança-Viseu.

Material.— Presidente Figueiredo: 1 ♂, IMTM 450.

Diagnosis.— A small *Atractus* (♂ TTL 251 mm) with a slightly pointed head (figs. 2a, 3a) and short tail (♂ 12.2% of TTL). Head width about the same as that of body; eyes small; pupil round; internasals wider than long, shorter than parietals, and longer than supraoculars; loreal wider than high; postoculars 2/2; temporals 1+2; supralabials 7/7, third and fourth entering the orbit; infralabials 7/7, three in contact with the chin shields (fig. 2a). Dorsal scales smooth, except those of the latero-posterior part of the body, especially in the anal region, where they present tubercles (only in males, see "Remarks"), with two apical pits, in 17 rows throughout the body; ventrals 157; anal plate entire; subcaudals 33/33. Six maxillary teeth.

In preservative, dorsum brown with all scales cream bordered with dark brown, some of them with one half cream, the other brown; the juxtaposition of these latter scales gives rise to one middorsal and two dorsolateral slightly distinct longitudinal stripes; paraventrals with lateral borders dark brown and center cream, giving rise to a distinct cream longitudinal stripe (fig. 3a). Tail similar to the body, except for the cream lateral stripe that is less distinct. Head dark brown with indistinct cream blotches and a brown, transverse occipital stripe on the parietals and temporals, becoming cream on the temporals; three first supralabials cream at their base; triangular cream spot at the contact of fifth and sixth supralabials. Underside of head cream with dark brown blotches on symphysal, infralabials, and chin shields. Venter cream with lateral borders of ventrals dark brown, giving rise to a cream midventral stripe.

Habits.— No data available for the specimen examined. According to Cunha & Nascimento (1983) *Atractus alphonsehoge* inhabits the soil of primary and secondary forests and clearings; these authors found an earthworm in the gut of one individual.

Distribution.— Eastern Pará and eastern Amazonas in Brazil (Cunha & Nascimento, 1983, 1984; this study).

Remarks.— The scutellation and colour pattern of the specimen examined are identical to those described by Cunha & Nascimento (1983, 1984), except for the number of subcaudals, slightly higher in our specimen, and ventral colour that they describe as yellow, instead of cream. Cunha & Nascimento (1983, 1984) state that only males have tubercles on the scales of the latero-posterior region of the body.

***Atractus latifrons* (Günther, 1868)**

Geophis latifrons Günther, 1868: 415. Type locality: Peru, Loreto, Pebas.
Atractus latifrons; Hoogmoed, 1979: 275.

Material.— Manaus: 5 ♂, 2 ♀, IMTM 166, 169, 946, 1096, 1249, 943, 1123; 2 ♂, 1 ♀, IB 1723, 1724, 1722; 1 ♂, RMNH 26018. Presidente Figueiredo: 1 ♂, 2 ♀, IMTM 223, 247, 1381; 1 ♂, 1 ♀, IB 51898, 52151; 1 ♂, RMNH 26019.

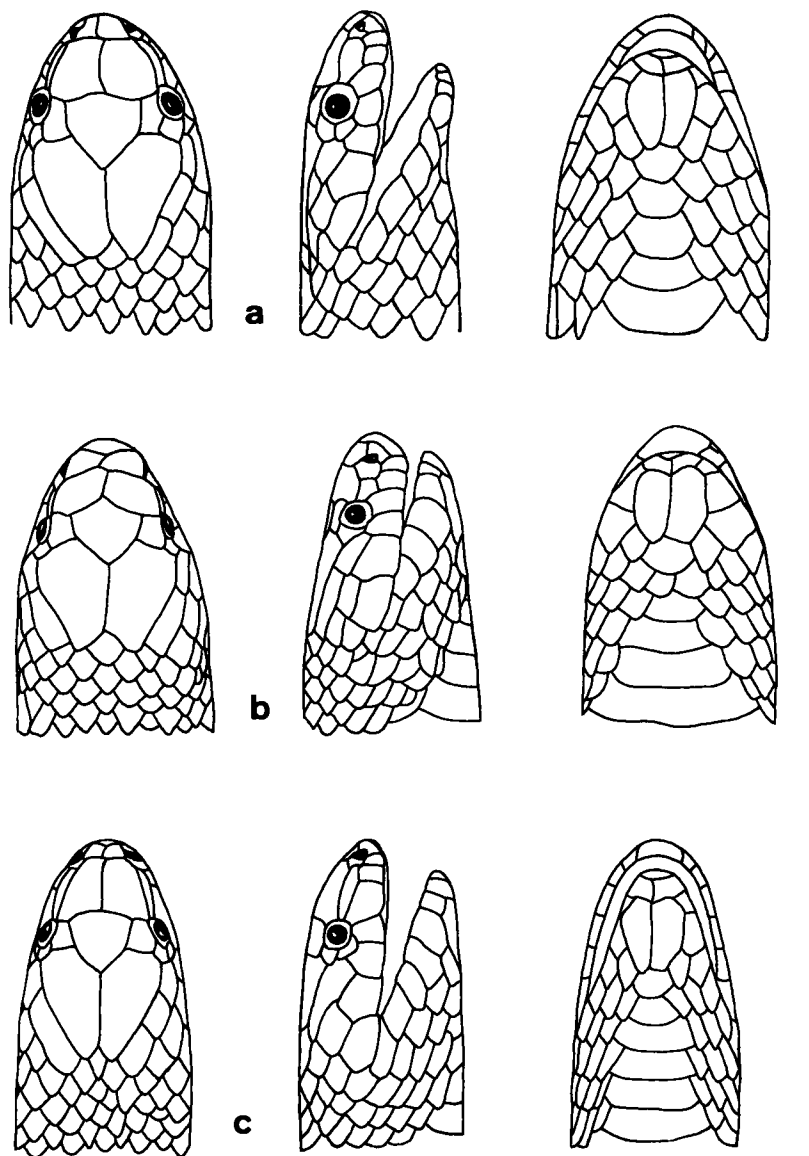


Fig. 2. Dorsal, lateral, and ventral views of the heads of *Atractus* from the Manaus region. (a) *Atractus alphonsehoegi*, ♂ IMTM 0450, total length 222+31 mm; (b) *Atractus latifrons*, ♂ IMTM 0169, total length 423+92 mm; (c) *Atractus major*, ♂ IMTM 0277, total length 499+93 mm. Bars equal 5 mm.

Diagnosis.— A large *Atractus* (maximum TTL ♂ 561 mm, ♀ 618 mm) with a slightly pointed head (fig. 2b) and short tail (♂ 12.6-17.9% and ♀ 8.8-15.1% of TTL). Head width nearly the same as that of body; eyes small; pupil round; internasals wider than long, smaller than the prefrontals; frontal wider than long, longer than the supraoculars; loreal as wide as high; postoculars 1/1; temporals 1+2; supralabials 6/6, third and fourth entering the orbit; infralabials 7/7, the first three (2) or four (15)

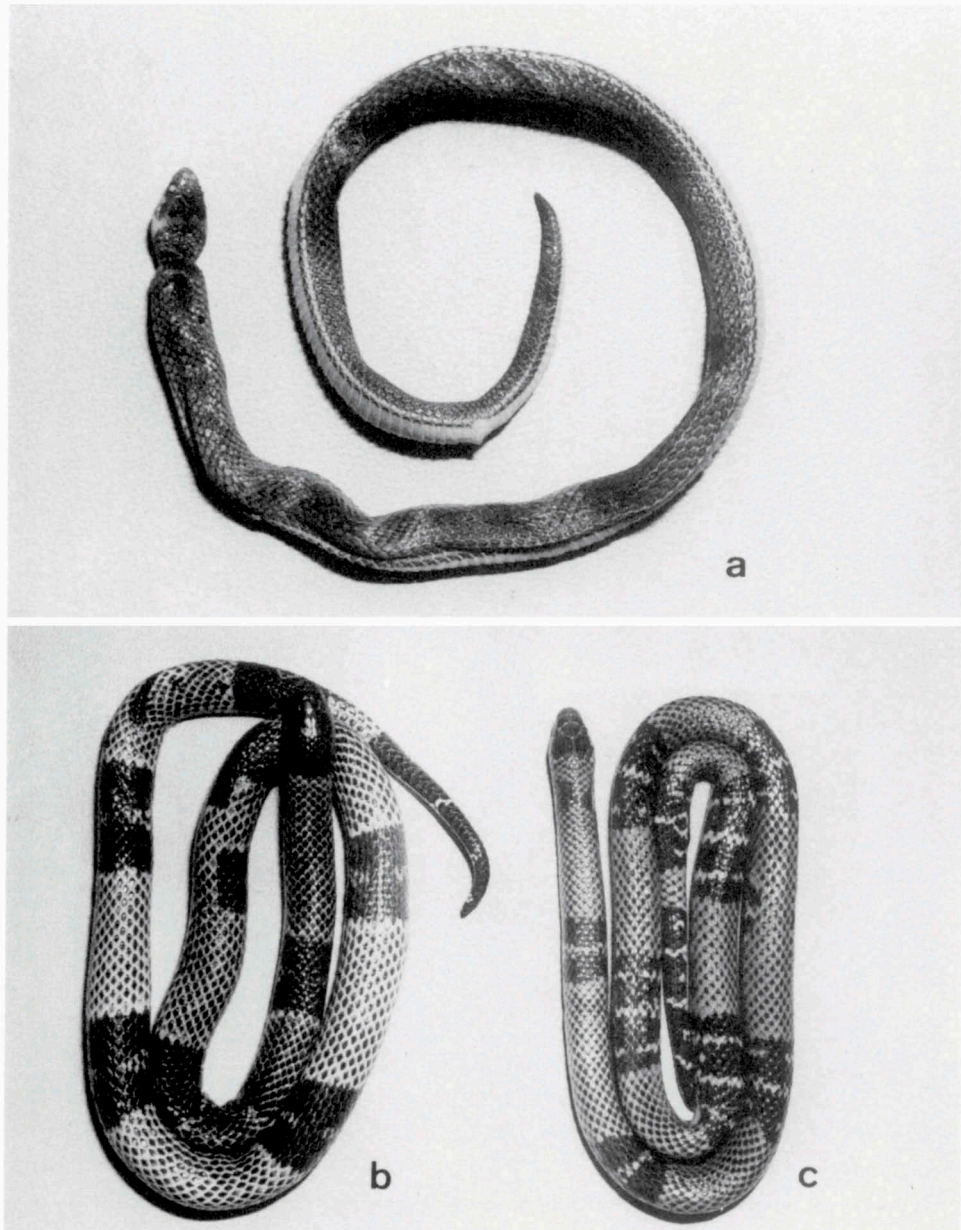


Fig. 3. Preserved specimens of *Atractus* from the Manaus region. (a) *Atractus alphonsehogei*, ♂ IMTM 450, total length 222+31 mm. (b), (c) *Atractus latifrons*, IMTM 1341, total length 487+66 mm, and ♀ IMTM 1381, total length 469+58 mm.

in contact with the chin shields (fig. 2b). Dorsal scales smooth, without apical pits, in 17-17-17 (13), 17-17-16 (3) or 17-17-15 (1) rows; ventrals 144 to 172; anal plate entire; subcaudals 28/28 to 54/54. Five (10) or six (7) maxillary teeth.

In live specimens, body deep red (yellowish cream in ethanol) with no to ten

black rings bearing no to three narrow white bands (figs. 3b, c, 4a). All dorsal scales, except the paracentrals in most specimens, are blackish; in less melanistic specimens only the apices of the scales are blackish. Tail similar to the body, with two to four black rings, frequently close together, or even fused. Head black (attaining third to seventh transversal row of dorsal scales) with a transverse white occipital stripe (red in some specimens) passing through the posterior end of the parietals (not evident in melanistic specimens) and widening at the sides of the head, encompassing the temporals and last supralabials (this stripe may be fused to the first black ring in some specimens); a small white spot (red in two specimens) on the posterior nasals, the prefrontals and the first two supralabials. Underside of head white (red in two specimens), except the chin shields, the first infralabials, and first ventrals, that are black. Venter red, either plain or with black spots scattered throughout.

Habits.— Two specimens were found active in the leaf litter of primary forest, one in the morning and the other late at night (ca. 2200h). Two specimens were collected in pitfall traps in a riverine forest; the remaining specimens are from localities in forested areas, but with no field data. Literature data (Cunha & Nascimento, 1983; Dixon & Soini, 1986) indicate that *A. latifrons* inhabits the soil of forests and clearings. One adult was found while ingesting a giant earthworm on the ground, at ca. 1000h after a light rain. Five individuals had earthworm chaetae, acari and remains of insects in their hindguts. One female (TTL 553 mm) collected in July had three oviducal eggs (51 × 10 mm, 48 × 8 mm, and 49 × 10 mm); another female (TTL 527 mm) collected in September had three enlarged ovarian eggs (15-18 mm); juveniles (TTL ca. 210-240 mm) were found in March, June, August, and October. These data indicate that reproduction may occur throughout the year. *Atractus latifrons* from the Manaus region coils the tail and makes erratic movements such as those observed in sympatric species of *Micrurus*, although its colour pattern does not closely resemble any specific pattern of sympatric *Micrurus* and probably represents a case of abstract mimicry (Pough, 1989). However, in some populations, *A. latifrons* closely resembles sympatric *Micrurus*: two individuals from Tefé (IB 15057, 15079), Amazonas (ca. 600 km west of Manaus), have colour patterns very similar to the probably sympatric *Micrurus langsdorffi* (see distribution and colour photo of this latter species in Campbell & Lamar, 1989) and all known individuals from Porto Velho, Rondônia, have a black and white pattern nearly identical to that of the syntopic *M. albicinctus* (see Cunha & Nascimento, 1991; pers. obs.).

Distribution.— Amapá, Pará, Amazonas, Acre, Rondônia, and Mato Grosso in Brazil; eastern Peru and Colombia; Venezuela, French Guiana, and Suriname (Chippaux, 1986; Cunha & Nascimento, 1983; Dixon & Soini, 1986; Gasc & Rodrigues, 1980; Hoogmoed, 1980; Nascimento et al., 1985; Peters & Donoso-Barros, 1970; Vanzolini, 1986; Zimmermann & Rodrigues, 1990; pers. obs.).

Remarks.— Colour pattern and scutellation of the specimens examined are nearly identical to those recorded in the literature (Chippaux, 1986; Cunha & Nascimento, 1983; Dixon & Soini, 1986; Gasc & Rodrigues, 1980; Hoogmoed, 1980; Nascimento et al., 1985). The specimens examined showed a great variation in colour pattern (figs. 3b, c, 4a), including a ringless pattern of the body (fig. 4a) not cited by the authors mentioned above; furthermore, the specimens from Iquitos, Peru (Dixon & Soini, 1986), have yellow, instead of white, bands in the black rings.



Fig. 4. Live specimens of *Atractus* from the Manaus region. (a) *Atractus latifrons*, ♂ IMTM 1249, total length 180+31 mm. (b), (c) *Atractus major*, ♂ IMTM 1353, total length 507+72 mm, and ♀ IMTM 1374, total length 609+71 mm. (d) *Atractus schach*, ♂ IMTM 1378, total length 386+46 mm. (e) *Atractus snethlageae*, ♂ IMTM 1237, total length 323+44 mm. (f) *Atractus torquatus*, ♂ IMTM 1529, total length 470+88 mm.

Atractus major Boulenger, 1894

Atractus major Boulenger, 1894: 307. Type locality: Ecuador, Pastaza, Canelos.

Material.— Manaus: 1 ♀, IMTM 339. Presidente Figueiredo: 10 ♂, 1 ♀, IMTM 1353, 1375, 1399, 1413, 1425, 1506, 1519, 1522, 1532, 1618, 1374. Rio Preto da Eva: 1 ♂, IMTM 277.

Diagnosis.— A large *Atractus* (maximum TTL ♂ 595 mm, ♀ 680 mm) with a slightly pointed head (fig. 2c) and short tail (♂ 12.3-17.4%, ♀ 10.4-13.5% of TTL). Head wider to slightly narrower than the neck; small eyes, round to semi-elliptical pupils; internasals one third as long as the prefrontals; frontal as long as wide or slightly longer than

wide, twice as long as the supraoculars; loreal wider than high; postoculars 2/2; temporals 1+2; supralabials 7/7 (9), 7/8 (2) or 8/8 (2), third and fourth (11) or fourth and fifth (2) entering the orbit; infralabials 7/7, three in contact with the chin shields (fig. 2c). Dorsal scales smooth, without apical pits, in 17-17-17 (12) or 17-17-16 (1) rows; ventrals 152 to 173; anal plate entire; subcaudals 37/37 to 44/44. Six maxillary teeth.

The colour pattern of *Atractus major* from the Manaus region is highly variable. Most specimens have the dorsum brown to reddish brown with transverse dark brown spots, wider on the middorsal region, with internal margins blackish and external margins light brown; flanks with small dark brown spots between the larger ones (fig. 4b, c); dark brown, interrupted stripe at the contact of paraventrals and ventrals, less distinct on the anterior third of the body. Head brown with lighter laterals. Underside of head cream with diminutive brown markings. Venter cream with small dark brown spots, becoming more abundant toward the anal region. Underside of tail cream with small black spots scattered throughout. Colours in the preserved specimens are quite similar to those in the live ones. One adult and most juveniles have a series of horseshoe-shaped marks (openings directed downward) on each side of the middle part of the dorsum and a cream band on the occipital region (only the juveniles; fig. 5a, b). In one adult the dorsal and lateral dark brown spots are smaller and somewhat irregularly distributed; behind the head, some dorsal spots are fused giving rise to a middorsal stripe; the stripe at the contact of the paraventrals and ventrals is less distinct; the venter is less pigmented.

Habits.— One adult was found amidst leaf litter at 2030h, and one juvenile was found by day in a clearing. Ten individuals were caught in pitfall traps, in primary forest. Duellman (1978) found *A. major* to be "... active by day on the ground or in leaf litter ..." mainly in forests and Dixon & Soini (1986) found this species in cultivated fields. Two specimens from Manaus had earthworms and another had acari and remains of insects in their hindguts. One female (TTL 627 mm) collected in October had six oviducal eggs (length 15-21 mm, diameter 4-6 mm). Juveniles were found in September, October, and November.

Distribution.— Amazonas in Brazil; Ecuador and Colombia on the Amazonian slopes of the Andes, and Venezuela (Peters & Donoso-Barros, 1970; Zimmermann & Rodrigues, 1990).

Remarks.— The first colour pattern described above (adults) is similar to pattern A of Savage (1960), except for the secondary blotches that are rarely fused with the primary ones in some individuals; the second adult pattern is similar to pattern B of Savage (1960) and also to that of the specimen of *A. torquatus* shown in Plate 6e in Hoogmoed (1980), except for the region just behind the head. Zimmermann & Rodrigues (1990) suggest that "... there appear to be two species under *Atractus major* that cannot be distinguished using the literature ...", without further comments on this situation. In spite of the variations in colour pattern described above, our sample seems to be composed of only one species.

Atractus poeppigi (Jan, 1862)

Rhabdosoma poeppigi Jan, 1862: 11. Type locality: Brazil.

Atractus poeppigi; Dixon, Thomas & Greene, 1976: 223.

Material.— Manaus, 3 ♂, IMTM 1039, 1707, 1708. Presidente Figueiredo: 1 ♂, IB 52240.

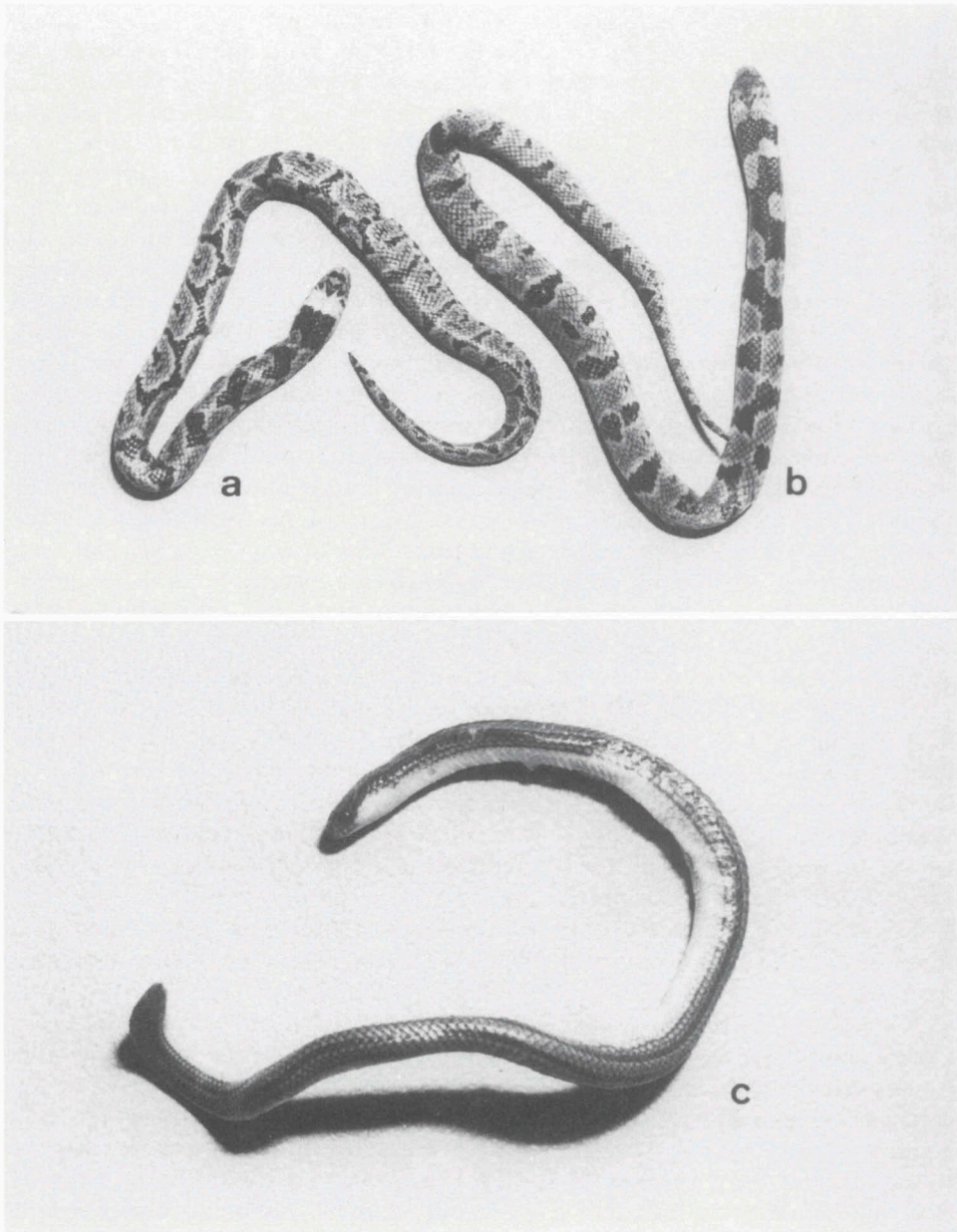


Fig. 5. Preserved specimens of *Atractus* from the Manaus region. (a), (b) *Atractus major*, ♂ IMTM 1375, total length 183+27 mm, and ♂ IMTM 1532, total length 207+32 mm. (c) *Atractus trilineatus*, ♂ IMTM 1328, total length 110+6 mm.

Diagnosis.— A large-sized *Atractus* (maximum TTL ♂ 503 mm) with a slightly pointed head (fig. 6a) and short tail (♂ 9.5-11.9% of TTL). Head width nearly the same as that of body; eyes small; pupils round; internasals wider than long, shorter than the prefrontals; frontal slightly wider than long, twice as long as the length of

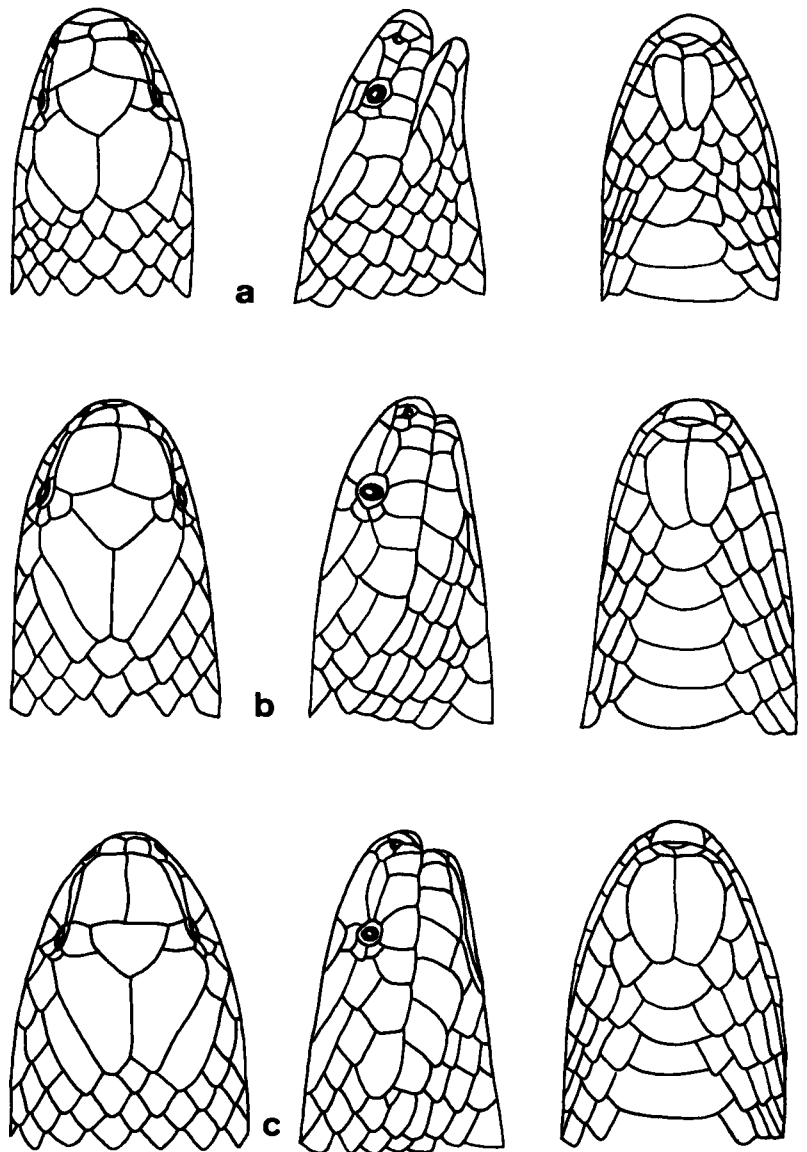


Fig. 6. Dorsal, lateral, and ventral views of the heads of *Atractus* from the Manaus region. (a) *Atractus poeppigi*, IMTM 1039, total length 435+59 mm; (b) *Atractus schach*, IMTM 0914, total length 316+45 mm; (c) *Atractus snethlageae*, IMTM 0380, total length 412+39 mm. Bars equal 5 mm.

the supraoculars; loreal slightly higher than wide; postoculars 1/1; temporals 0+1 (3) or 0+2 (1); supralabials 6/6, third and fourth entering the orbit; infralabials 7/7, four in contact with the chin shields (fig. 6a). Dorsal scales smooth, without apical pits, in 15 rows throughout the body; ventrals 139 to 148; anal plate entire; subcaudals 25/25 to 29/29. Five (3) or six (1) maxillary teeth.

In ethanol, the dorsum is deep dark brown with light triangular spots on the

flanks, generally indistinct, reaching the ventrals (fig. 7a). Tail similar to the body. Head dark brown with the supralabials and temporals cream. Underside of head reddish cream with small black spots on the two first infralabials. Venter reddish cream on the anterior part, becoming dirty cream toward the anal region, with sparse black spots that may encompass entirely, or only half of, some ventrals (fig. 7b); underside of tail reddish cream. A freshly killed specimen of *A. poeppigi* from the Rio Urucu (ca. 600 km west of Manaus) had a bright red and black venter as described by Dixon & Soini (1986).

Habits.— One individual had insect remains in the hindgut. No field data available for the specimens examined. At the Rio Urucu, ca. 600 km west of Manaus, we found two dead individuals in the soil of recently cleared primary forests; one of these individuals had an earthworm in its stomach. Dixon et al. (1976) mentioned specimens found in "... rotting logs, stumps, and associated litter ..." and Dixon & Soini (1986) found this snake at forest edges. The dorsal, and especially the contrasting ventral, colour patterns of *A. poeppigi* and also of *Liophis breviceps* from Manaus resemble that of the sympatric ringless *Micrurus collaris* (except for the nuchal stripe that is incomplete in the two colubrids), which may indicate an instance of mimicry among these species. A similar resemblance occurs among *Atractus occipitoalbus*, *Ninia hudsoni* and the ringless *Micrurus narducci* at Santa Cecilia, Ecuador (see figs. 140, 156, and 162 in Duellman, 1978). For additional, putative instances of mimicry in *Atractus* see colour plates in Campbell & Lamar (1989).

Distribution.— Amazonas in Brazil; eastern Peru; Colombia (Dixon et al., 1976; this study).

Remarks.— Colour pattern and scutellation of the specimens examined are nearly identical to those presented by Dixon & Soini (1986) for a male specimen from Iquitos, Peru.

Atractus schach (F. Boie, 1827)

Brachyorrhos schach F. Boie, 1827: 540. Type locality: unknown. (Hoogmoed, 1980, designated a specimen from French Guiana as the lectotype of *Brachyorrhos schach*)

Atractus schach; Hoogmoed, 1980: 31.

Material.— Manaus: 1 ♂, 1 ♀, IMTM 914, 1061. Presidente Figueiredo: 4 ♂, 1 ♀, IMTM 1354, 1378, 1501, 1563, 1678.

Diagnosis.— A medium-sized *Atractus* (maximum TTL ♂ 361, ♀ 418 mm) with slightly pointed head (fig. 6b) and short tail (♂ 12.5-13.6%, ♀ 7.9% and 8.8% of TTL). Head width nearly the same as that of body; small eyes; semi-elliptical pupils; internasals wider than long, nearly one third as long as the prefrontals; frontal as wide as long, nearly twice as long as the supraoculars; loreal wider than high; postoculars 2/2; temporals 1+2; supralabials 7/7 (4) or 8/8 (3), third and fourth (4) or fourth and fifth (3) entering the orbit; infralabials 7/7 (2) or 8/8 (5), the first four in contact with the chin shields (fig. 6b). Dorsal scales smooth, without apical pits, in 17/17/17 (5), 17/17/16 (1) or 15/17/17 (1) rows; ventrals 158 to 177; anal plate entire; subcaudals 23/23 to 38/38. Six (3) or seven (4) maxillary teeth.

In live specimens, dorsum brown to reddish brown with a dark brown middorsal

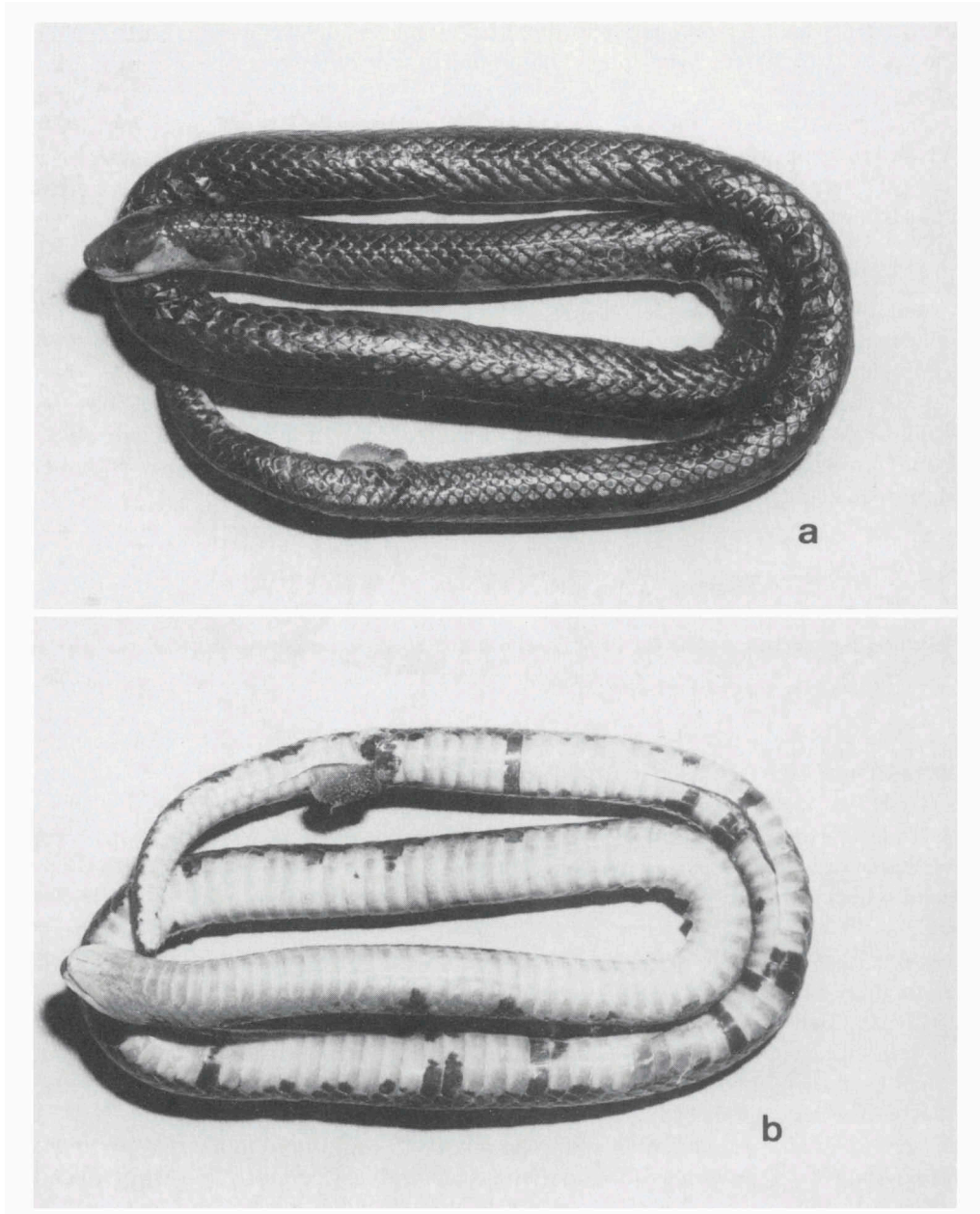


Fig. 7. Preserved specimens of *Atractus* from the Manaus region. (a), (b) *Atractus poeppigi*, ♂ IMTM 1039, total length 435+59 mm., dorsal (a) and ventral (b) views.

stripe, sometimes interrupted, and/or short transversal bars; paraventral region lighter with dark brown spots with the center cream (fig. 4d). Tail similar to the body. Head dark brown with a wide dark brown occipital stripe preceded by a cream stripe on the temporals and last supralabials. Underside of head cream with dark brown spots on the symphysal, infralabials, and chin shields. Venter cream with dark

brown spots giving rise to a longitudinal stripe; underside of tail more melanic than the venter. In preserved specimens the ground colour of the dorsum is light to dark brown.

Habits.— One specimen was found at 2000h active in the leaf litter in a primary forest. Four specimens were caught in pitfall traps in primary forest. One specimen had earthworm chaetae and remains of insects in the hindgut. One female collected in October had five oviducal eggs (length 8-11 mm, diameter 4-5 mm); the only juvenile was found in June. Literature data (Cunha & Nascimento, 1983; Hoogmoed, 1980) indicate that *A. schach* inhabits the soil of forests and degraded forested areas, where it feeds on insects.

Distribution.— Eastern Pará and Amazonas in Brazil; Guianas (Chippaux, 1986; Cunha & Nascimento, 1983, 1984; Hoogmoed, 1980; this study).

Remarks.— The scutellation and colour pattern of the specimens examined are similar to those found in the literature (Chippaux, 1986; Cunha & Nascimento, 1983, 1984; Hoogmoed, 1980), except for the higher number of ventrals and lower number of infralabials in our specimens.

Atractus snethlageae Cunha & Nascimento, 1983

Atractus flammigerus snethlageae Cunha & Nascimento, 1983: 19. Type locality: Brazil, Pará, Colonia Nova, on Highway BR-316, 10 km before the Rio Gurupi.
Atractus snethlageae; Vanzolini, 1986: 25.

Material.— Manaus: 2 ♂, 1 ♀, IMTM 1031, 1237, 1121. Presidente Figueiredo: 5 ♂, 2 ♀, IMTM 1356, 1467, 1541, 1614, 1615, 380, 1355; 1 ♂, 1 ♀, RMNH 26021, 26020.

Diagnosis.— A medium-sized *Atractus* (maximum TTL ♂ 446 mm, ♀ 465 mm) with a slightly pointed head (fig. 6c) and short tail (♂ 9.6-13.9 mm, ♀ 5.9-8.6 mm). Head width nearly the same as that of body; small eyes; round pupils; internasals as wide as long, one third as long as the prefrontals; frontal wider than long, nearly twice as long as the supraoculars; loreal wider than high, narrowing toward the eye; postoculars 1/1 (1) 2/2 (11); temporals 1+2 (11) or 1+1+2 (1); supralabials 6/6 (1), 7/7 (9) or 8/8 (2), third and fourth (10) or fourth and fifth (2) entering the orbit; infralabials 8/8, four in contact with the chin shields (fig. 6c). Dorsal scales smooth, without apical pits, in 17-17-17 (8), 17-17-16 (1), 17/17/15 (3) rows; ventrals 159-185; anal plate entire; subcaudals 24/24 to 37/37. Seven maxillary teeth.

In life, dorsum dark brown with several cream (light orange in one specimen) transversal spots or stripes (one or two scales wide), frequently interrupted and never attaining the paraventrals; the dorsal colour becomes black at the contact with the cream spots or stripes (fig. 4e). Tail similar to the body. Head dark brown with cream to light brown occipital stripe passing through the parietals, temporals, and last supralabials; first supralabials with scattered cream spots. Underside of head cream with symphysal, infralabials, and chin shields bearing dark brown spots. Venter cream with dark brown spots at the midventral area (mainly on the anterior third of the body) or scattered throughout, becoming more melanic toward the tail; subcaudals with dark brown spots, except on the lateral margins.

Habits.— One specimen was found in a clearing at midnight. The only juvenile

was found in November. Eight specimens were caught in pitfall traps in primary forest. Hindgut of two individuals with earthworm chaetae and that of another with insect remains. Cunha & Nascimento (1983) found *A. snethlageae* in primary and secondary forests.

Distribution.— Eastern Pará, eastern Amazonas, and Rondônia in Brazil (Cunha & Nascimento, 1983; Vanzolini, 1986; Zimmermann and Rodrigues, 1990).

Remarks.— The scutellation and colour pattern of the specimens examined are nearly identical to those presented by Cunha & Nascimento (1983), except for the number of ventrals that is higher in our specimens. Cunha & Nascimento (1983) described this snake as a subspecies of *A. flammigerus*. However, this latter species has keeled scales on anal and caudal regions and less and wider light spots on the dorsum (Hoogmoed, 1980). Considering these differences, we agree with the name used by Vanzolini (1986).

Atractus torquatus (Duméril, Bibron & Duméril, 1854)

Rhabdosoma torquatum Duméril, Bibron and Duméril, 1854: 101. Type locality: Bolivia, Santa Cruz, Santa Cruz de la Sierra.

Atractus torquatus; Boulenger, 1894: 309.

Material.— Manaus: 7 ♂, 3 ♀, IMTM 191, 338, 877, 1073, 1201, 1212, 1223, 947, 1097, 1098. Manacapuru: 1 ♀, IMTM 0133. Presidente Figueiredo: 8 ♂, 5 ♀, IMTM 1402, 1529, 1533, 1539, 1571, 1575, 1578, 1617, 1357, 1358, 1458, 1403, 1404.

Diagnosis.— A large-sized *Atractus* (maximum TTL ♂ 633 mm, ♀ 754 mm) with a narrow, pointed head (fig. 8a) and short tail (♂ 14.4-16.4%, ♀ 8.0-13.8% of TTL). Head width about the same as that of body; small eyes; round pupils; internasals as wide as long, smaller than the prefrontals; frontal longer than wide, shorter than the parietals and larger than the supraoculars; loreal wider than high; postoculars 1/1 (21), 1/2 (2) or 2/2 (1); temporals 1+2; supralabials 8/8, fourth and fifth entering the orbit; infralabials 7/7 (3) or 8/8 (21), four in contact with the chin shields (fig. 8a). Dorsal scales smooth, without apical pits, in 17/17/17 (22) or 17/17/16 (2) rows; ventrals 155-169; anal plate entire; subcaudals 28/28 to 52/52. Eight maxillary teeth.

In life, body greyish, greenish, reddish (fig. 4f) or dark brown, plain (4) or bearing dark brown to black spots (20) (one scale wide) scattered throughout the dorsum and flanks, sometimes disposed as short transversal or oblique bands. Tail similar to the body. Head slightly darker than body, with a nuchal stripe, sometimes little distinct, beginning at two or three scales behind the parietals; supralabials, and sometimes the loreals, cream. Underside of head cream to yellowish cream, with symphyasal, first infralabials and anterior end of chin shields blackish. Venter cream to yellowish cream, sometimes with small dark spots on the ventrals; underside of tail with blackish spots, the tail end sometimes becoming completely brown. In six individuals the paraventrals are reddish.

Habits.— At the Manaus region, *A. torquatus* was found in primary forests and clearings near forests, both by day and at night. Two juveniles were found near a forest stream, one crawling on the ground and another under a fallen log, at 1900h and 2030h, respectively. Another juvenile was found inside a decomposing log in a clear-

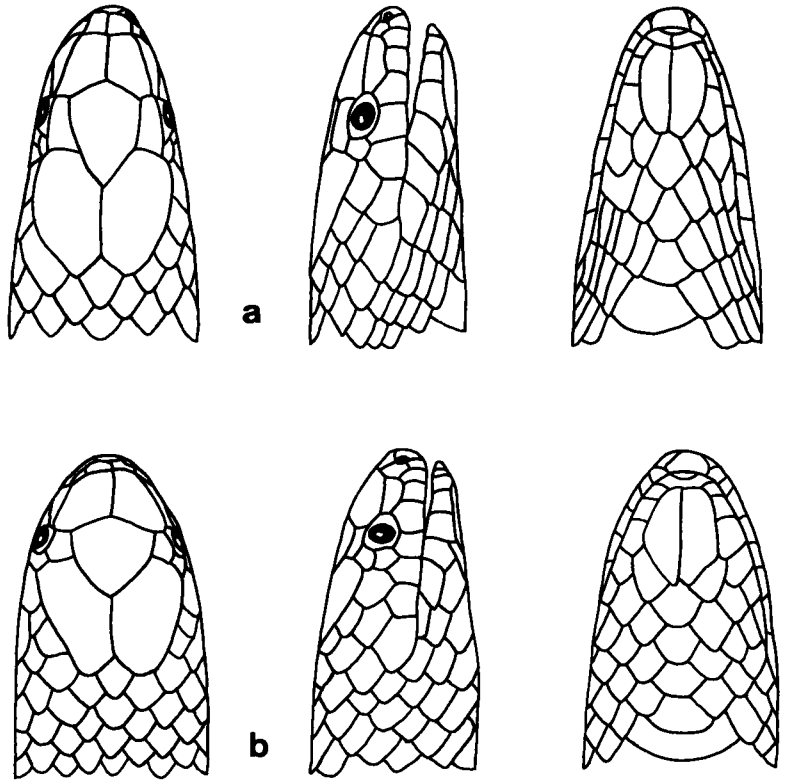


Fig. 8. Dorsal, lateral, and ventral views of the heads of *Atractus* from the Manaus region. (a) *Atractus torquatus*, IMTM 0133, total length 265+40 mm; (b) *Atractus trilineatus*, IMTM 1328, total length 110+6 mm. Bars equal 5 mm.

ing, at 1600h. Five adults were found active: one was crawling on the ground in a clearing at 0800h; two were crawling amidst leaf litter in a primary forest at 1630h and 2015h; another was on a scrub, 60 cm above the ground in a riverine forest at 2200h; and another was climbing on a fallen palm leaf at 2225h. Eleven individuals were collected in pitfall traps in primary forest. Dixon and Soini (1986) found this species in "... cultivated fields, orchards, overgrown abandoned fields and in secondary forests ...". Ten individuals had earthworm chaetae, acari, and insect remains in their hindgut (identifiable insects were beetles and flies). Two females (TTL 754 and 654 mm) collected in October had seven and eight oviducal eggs, respectively (length 11-19 mm, diameter 8-11 mm in both individuals); juveniles (TTL ca. 170-260 mm) were found in January, February, August, and November. These data indicate that reproduction may occur throughout the year.

Distribution.— Eastern Amazonas in Brazil; Guianas, Colombia, Peru, and Bolivia (Dixon and Soini, 1986; Hoogmoed, 1980; Peters and Donoso-Barros, 1970; Zimmermann and Rodrigues, 1990).

Remarks.— Scutellation and colour pattern of the specimens examined are similar to those found in the literature (Chippaux, 1986; Cunha & Nascimento, 1983, 1984; Hoogmoed, 1980) except for the number of ventrals that is higher in our material.

***Atractus trilineatus* Wagler, 1828**

Atractus trilineatus Wagler, 1828: 742. Type locality: unknown.

Material.— Novo Airão: 1 ♂, IMTM 1328.

Diagnosis.— A small *Atractus* (♂ TTL 116 mm) with a slightly pointed head (fig. 8b) and extremely short tail (♂ 5.4% of TTL). Width of head about the same as that of body; small eyes; semi-elliptical pupils; internasals as long as one third the prefrontals; frontal as wide as long, as long as twice the supraoculars; loreal wider than high; postoculars 2/2; temporals 1+2; supralabials 8/8, fourth and fifth entering the orbit; infralabials 7/7, four in contact with the chin shields (fig. 8b). Dorsal scales smooth, without apical pits, in 15 rows throughout the body; ventrals 153; anal plate entire; subcaudals 13/13. Eleven maxillary teeth.

In preservative, dorsum light brown with a middorsal and two dorsolateral dark brown stripes (one scale wide) and two lateral cream stripes (half scale wide) at the third and fourth dorsal scale rows; paraventrals and lower two thirds of the second dorsal scale row cream; upper surface of tail similar to the body (fig. 5c). Head dark brown with light brown spots on the internasals, anterior third of prefrontals, supraoculars, frontals and parietals; first five supralabials dark brown with cream spots, sixth lighter, and last two and inferior half of temporals cream. Underside of head cream with dark brown spots on the symphysal, first five infralabials, and chin shields. Venter cream, except the last ventrals and anal that have light brown spots. Underside of tail cream with light brown spots on the contact of the subcaudals.

Habits.— The specimen examined was collected in a flooded area of the archipelago of Anavilhanas, an area of "igapó" (black water flooded forest).

Distribution.— Northern Roraima and eastern Amazonas in Brazil; Trinidad, eastern Venezuela, and western Guyana (Cunha & Nascimento, 1980; Hoogmoed, 1980; this study).

Remarks.— Scutellation and colour pattern of the specimen examined are similar to those found in the literature (Cunha & Nascimento, 1980; Lancini, 1979; Lancini & Kornacker, 1989; Roze, 1966). However, according to Lancini & Kornacker (1989) this species has 7-8 maxillary teeth. Cunha & Nascimento (1980) mention a TTL 276 mm in a female, and Lancini & Kornacker (1989) state "... ca. 35 cm ...". Hoogmoed (1982) commented on the nomenclatural problems relating to the name *Atractus trilineatus*.

Discussion

Of the eight species studied here, *Atractus alphonsehogei*, *A. poeppigi*, *A. schach*, and *A. trilineatus* are recorded for the first time for central Amazonia. Schmidt & Inger (1951) cited a specimen of *A. badius* from Manaus, although, as suggested by Cunha & Nascimento (1983), this may be a misidentification; in fact the name *A. badius* has long been used for more than one species until the recent revision of this taxon by Hoogmoed (1980).

The scarcity of snake collections in central Amazonia is easily recognized as a large hiatus in this region when the known distribution of Amazonian snakes is

mapped (see, e. g., fig. 9.9 in Dixon, 1979). In fact, the distribution of four of the eight *Atractus* here dealt with is greatly enlarged by the new locality records presented here. This also suggests that several species of *Atractus* have areas of distribution larger than previously thought (Hoogmoed, 1980). The high diversity of habitats in central Amazonia, due mainly to the confluence of the two major Amazonian river systems ("white waters" of the Rio Solimões and "black waters" of the Rio Negro), is probably responsible for the very high richness of snakes in this region (at least 85 snake species are known to occur around Manaus; pers. obs.). Thus, it will not be a surprise to find additional species of *Atractus* in this still poorly known region.

Atractus torquatus seems to be the most common species in the Manaus region, followed by *A. latifrons*. Although primarily fossorial, many *Atractus* are found active on the ground surface in forests, indicating also terrestrial habits.

Duellman (1978) found *Atractus elaps*, *A. major*, and *A. occipitoalbus* only by day in Ecuador. However, most species of *Atractus* in the Manaus region, including *A. major*, seem to have no defined activity period: none of the most common species was found exclusively either by day or at night (four by day and nine at night, considering all these species). A similar pattern was observed for other sympatric, primarily fossorial snakes, such as some *Micrurus* (pers. obs.). In temperate regions, snake daily activity patterns are strongly influenced by temperature (Gibbons & Semlitsch, 1987); however, temperature varies relatively little in Amazonian lowland forests (ca. 18-30°C) and, consequently, the activity of snakes in this region may be influenced by other factors, perhaps mainly by daily light patterns and their implications (e. g., higher vulnerability to predation during diurnal activity). Supporting this suggestion, the activity of nocturnal snakes at Santa Cecilia, Ecuador, seems to be considerably reduced during clear nights (three quarters to full moon; Duellman, 1978) and this seems to be true also in the Manaus region (Martins, unpubl. data); an evident reduction in activity during clear nights was observed in an African water snake (see Madsen & Osterkamp, 1982). However, for fossorial snakes which live in a habitat where no light is available, activity may be influenced by other factors (e. g., hunger), instead of daily light patterns.

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