

## THE GENUS *ATRACTUS* (SERPENTES: COLUBRIDAE) IN NORTH-EASTERN ARGENTINA

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We present a revision of *Atractus* in north-eastern Argentina based on the examination of newly collected specimens and most of the material available in Argentinean museums. Four species are reported: *A. snethlageae*, *A. paraguayensis*, *A. reticulatus* and *A. taeniatus*. *Atractus badius* was erroneously cited as occurring in Argentina based on a specimen from Las Palmas, Chaco province which is reassigned to *A. snethlageae*. This record represents a considerable southern extension of the known range of the species. *Atractus paraguayensis* is redescribed based on three new specimens. This species was previously known only from the holotype reported from "Paraguay" without definite locality data. Adult and juvenile colour patterns in life are described. The validity of some diagnostic characters is discussed, and new diagnostic characters are given for *A. reticulatus* and *A. paraguayensis*. All species examined showed noteworthy variation in colour pattern. Sexual dimorphism is reported in all species. The distributional patterns and phytogeographic areas occupied by each species in Argentina are discussed. We also characterize morphological variation for each and provide a key for the Argentinean species.

*Key words:* *Atractus*, snake, classification, distribution, taxonomy

### INTRODUCTION

*Atractus* is a genus of fossorial snakes widely distributed in South America from Panama to northern Argentina. The genus contains approximately 80 species, most having restricted distributions (Savage, 1960; Peters & Orejas Miranda, 1970; Hoogmoed, 1980; Vanzolini, 1986; Scrocchi & Cei, 1991; Fernandes & Puerto, 1993; Fernandes, 1995a,b). The taxonomic status of most species is confused (Fernandes & Puerto, 1993), and museum specimens are rare (Fernandes, 1995a).

Serié (1915) cited one specimen of *Atractus badius* from Las Palmas, Chaco province, the first record of the genus in Argentina. Although a revision of all South American material referred to *A. badius* was suggested by Hoogmoed (1980), this record was repeated in all subsequent checklists of Argentinean snakes (Serié, 1921, 1936; Abalos & Mischis, 1975; Williams & Francini, 1991; Cei, 1993). Recently, *A. taeniatus* (Griffin, 1916) was revalidated by Williams & Gudynas (1991) based on six specimens from Entre Ríos and Misiones provinces in north-eastern Argentina. Alvarez, Rey & Cei (1992) described *Atractus reticulatus scrocchii* from Corrientes province, Argentina and Rio Grande do Sul state, Brazil. Thereafter the taxon was synonymized with *A. reticulatus* by Fernandes (1995b). Also, this author elevated *A. reticulatus paraguayensis* to specific status and distin-

guished it from *A. reticulatus* using coloration pattern and high ventral scale counts. *Atractus paraguayensis* is known only from the holotype, a specimen from "Paraguay" without definite locality data (Fernandes, 1995b).

A recent survey of Argentinean museums and the identification of newly collected material from north-eastern Argentina and southern Paraguay uncovered three new specimens of *Atractus paraguayensis*. Herein, these specimens are described, the identity of Serié's *A. badius* is reconsidered, and new distributional and morphological data for other Argentinean *Atractus* are discussed

### MATERIALS AND METHODS

Most specimens of *Atractus* in Argentinean Museums were examined, and new specimens were collected in north-eastern Argentina and border areas of southern Paraguay (Appendix 1). Standard methods for the study of ophidian taxonomy were used. Terminology for *Atractus* cephalic shields is that of Savage (1960). Ventrals were counted using Dowling's (1951) technique. Terminal spines were not included in subcaudal counts. Morphometric measurements were recorded with a dial caliper to the nearest 0.1 mm for the cephalic distances and with a ruler to the nearest millimeter for body lengths. Total length was measured from the tip of the snout to the tip of the tail, snout-vent length from the tip of the snout to the posterior edge of the anal plate, and head length from the posterior extremity of the jaw to the tip of the snout. The following abbreviations were used: TL/TOL: tail length/total length; HL/TOL: head length/total length; TL/SVL: tail length/snout-vent length (all given as percentages).

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## RESULTS

Four species of *Atractus* inhabit north-eastern Argentina: *A. snethlageae*, *A. paraguayensis*, *A. reticulatus* and *A. taeniatus*. All are small snakes with the following characteristics: head small (3.04-7.17% of total length, Table 1), not distinct from body; body subcylindrical; tail short (8-14% of total length, Table 1); eyes small with round pupils; dorsals smooth, in 15 or 17 rows without reduction; loreal present, entering orbit, loreal at least twice as long as postnasal; preocular absent; nostril bordered by two nasals; temporals generally 1+2; frontal shorter than parietals; rostral much less than half as large as prefrontal; inter-nasal much less than half as large as prefrontal; prefrontal at least one-and-a-half times as broad (measured along the margin of contact with the internasal) as long (measured along the median suture); prefrontals entering orbit; supraoculars small; single pair of chin shields separated from mental; anal plate entire; subcaudals divided; maxillary teeth 6-9, posterior maxillary teeth distinctly reduced.

## SPECIES ACCOUNTS

*ATRACTUS SNETHLAGEAE* CUNHA & NASCIMENTO

1983. *Atractus flammigerus snethlageae* Cunha & Nascimento, Bol. Mus. Par. E. Goeldi (Zool) (123): 19. *Type locality*: Colônia Nova, Gurupi river, road BR-316, 10 km before Gurupi, Pará, Brazil.

1986. *Atractus snethlageae* Vanzolini, Relatório Pesquisa N° 1, CNPq, Assesoria Edit., Brasília, : 23-25.

1990. *Atractus snethlageae* Zimmerman & Rodrigues, Yale Univ. Press, Mew Haven, : 4.

1993. *Atractus snethlageae* da Silva, Herpetol. Nat. Hist., 1: 53.

The specimen cited by Serié (1915) is reassigned to *A. snethlageae* (Cunha & Nascimento, 1983). *Atractus badius* is excluded from Argentina.

*Description*. Known in Argentina only from Serié's specimen (MACN 8764), a female collected in Las Palmas, Chaco province. *Atractus snethlageae* is a small snake (Table 1); temporals 2+1+2; seven supralabials, third and fourth entering eye; eight infralabials, first to fourth in contact with single pair of chinshields; dorsal scales smooth lacking apical pits, in 17-17-17 rows; ventrals 163; subcaudals divided, 23; anal plate entire.

Seven maxillary teeth are curved backward, the posterior four are distinctly smaller.

*Coloration*. Parietals scale whitish brown and irregularly speckled with minute brown dots; remaining dorsal and lateral surfaces of head brown; whitish band across occiput from posterior parietal edge to first nuchal scale rows and extending laterally to cover posterior temporals and two last supralabials; single black nuchal band followed by two lateral cream spots with

black margins; dorsum brown with transverse cream colored bands, each edged in black; cream colored bands two to three scales long and beginning on second row of dorsals, continuous or alternating across dorsal midline; 27/28 bands on body, four on tail; first two rows of dorsals, speckled with brown, whitish and black irregular alternating marks (Fig. 1); lower parts of infralabials and antero-lateral part of chinshields with black spots; belly yellowish anteriorly; central black or brown spots forming interrupted mid-ventral stripe extending to ventral 18; posterior to ventral 18, black spots irregularly distributed on belly, not arranged linearly; anal plate and subcaudals brownish with minute brown dots.

*Remarks*. Except for numbers of ventrals and maxillary teeth, the characteristics of the Argentinean specimen fit the diagnosis of *Atractus flammigerus snethlageae* provided by Cunha & Nascimento (1983). However, these differences are slight. Serié's specimen has 7 versus 6 maxillary teeth and 163 versus maximum of 160 ventrals observed in Amazonian specimens (Cunha & Nascimento, 1983, 1993). Other species we examined have 6 to 9 maxillary teeth and we suspect that *A. snethlageae* exhibits a similar range of teeth counts.

*A. flammigerus* is distinguished from *A. snethlageae* by fewer ventrals (145-150 in females of *A. flammigerus* versus 151-163 in females of *A. snethlageae*; 138-149 in males of *A. flammigerus* versus 137-155 in males of *A. snethlageae*), by keeled dorsal scales in the posterior part of the body in *A. flammigerus* versus smooth dorsal scales in *A. snethlageae*, and by the ventral color patterns: two rows of spots forming interrupted ventrolateral stripes in *A. flammigerus*, versus central spots forming a mid-ventral stripe in *A. snethlageae*. Both ventral patterns may be variable (Hoogmoed, 1980; Cunha & Nascimento, 1983), and may be of little diagnostic value. It is easily distinguishable from the other examined species by the coloration patterns and by the 17 dorsal rows (Table 2).

*Distribution*. The species *A. snethlageae* is known from central Amazonia in eastern Pará, Maranhão, Amapá, Manaus and Rondônia (Vanzolini, 1986; Zimmerman & Rodrigues, 1990; Cunha & Nascimento, 1983, 1993; da Silva, 1993). Hoogmoed (1982) considered *A. flammigerus sensu lato* to be a wide-ranging Amazonian species. The Argentinean specimen from Las Palmas, Chaco province, in the alluvial valley of the Paraguay River (Fig. 2), extends the known range of the species by more than 1000 km. Nevertheless, other Amazonian and wide-ranging tropical species have been found in the Paraguay and Paraná rivers valleys, such as *Imantodes cenchoa* (from the same locality, Serié, 1915), *Pseudoeryx plicatilis* (Giraudo, 1999), *Hydrops triangularis* (from a more southerly locality on the bank of the Paraná river, Williams & Couturier,

1984). Some authors have reported Amazonian floral elements from the gallery forests of these rivers valleys (Prado, 1993; Lewis *et al.*, 1994).

*ATRACTUS PARAGUAYENSIS* WERNER

1924. *Atractus paraguayensis* Werner. Sitz. Akad. Wiss. Wien., 133 (1): 40. *Type locality*: Paraguay.

1930. *Atractus reticulatus paraguayensis* Amaral. Mem. Inst. Butantan 4 (1929):27.

1995. *Atractus paraguayensis* Fernandes. Comun. Mus. Cienc. PUCRS, sér. zool., 8:38.

Recently, three new specimens of *A. paraguayensis* were collected and deposited in Argentinean museums (Appendix 1). The species was only known until now from the holotype specimen from "Paraguay", without definite locality.

*Description.* Based on three new specimens and data for the holotype provided by Fernandes (1995b). *Atractus paraguayensis* is a small snake. The percentage TL/TOL and TL/SVL of males are bigger than females (Table 1). Ventrals 157-166 ( $n=3$ ,

mean=162.8, SD=4.03) in females, and 163 in the male; subcaudals divided, 22-24 ( $n=3$ , mean=23, SD=1) in females, 30 in the male, with a tendency to sexual dimorphism in this character. All specimens have 1+2 temporals; seven supralabials, the third and fourth entering the eye; seven infralabials (six on the left side of FML 6238), the first to the fourth in contact with a single pair of chin-shields; dorsal scales smooth, lacking apical pits, and in 15-15-15 rows; one preocular; two postoculars; anal plate entire; and 7 maxillary teeth.

*Coloration.* The general coloration pattern of the three new specimens (one adult and two juveniles) coincides, with Fernandes's (1995b) description, except in some minor details (Fig. 1). The two juveniles have a distinctive white cephalic collar across the parietals and occipital that is faded in adult specimens. Similar collars have been observed in juveniles of other *Atractus* such as *A. reticulatus* and *A. taeniatus* (Fernandes, 1995b; and pers. obs.). The dark nuchal band is unbroken in all new specimens, therefore, the diagnostic character "dark nuchal collar interrupted" proposed by

TABLE 1. Morphometric characteristics of the *Atractus* species examined. The data is presented as mean±SD over range in parentheses and sample size ( $n$ ). New diagnostic characters between *A. paraguayensis* and *A. reticulatus* are emboldened. All measurements in mm. TL/TOL: tail length/total length; HL/TOL: head length/total length; TL/SVL: tail length/snout-vent length.

	<i>A. snethlageae</i>		<i>A. paraguayensis</i>		<i>A. reticulatus</i>		<i>A. taeniatus</i>	
	Female		Female	Male	Female	Male	Female	Male
TOL (mm)	325 $n=1$		281±103.6 (163-356) $n=3$	149 $n=1$	308.1±106 (111-410) $n=8$	265.7±52 (211-353) $n=1$	309.6±113.3 (149-450) $n=8$	288±65.37 (227-357) $n=3$
TL (mm)	27 $n=1$		24.3±9.29 (14-32) $n=3$	17 $n=1$	30.04±5.87 (12-39) $n=7$	33.16±5.87 (25.6-44) $n=7$	28±9.3 (14-45) $n=10$	34.3±8.02 (26-42) $n=3$
SVL (mm)	298 $n=1$		257±94.43 (149-324) $n=3$	132 $n=1$	282.6±89.9 (99-372) $n=8$	232.6±46.6 (181.5-309) $n=7$	281.6±104.6 (135-415) $n=10$	253.7±57.5 (201-315) $n=3$
HL (mm)	11.8 $n=1$		5.9±1.9 (6.3-8.0) $n=2$	8 $n=1$	10.62±1.68 (7.1-13) $n=8$	10.84±0.69 (10.12-12) $n=6$	13.5±3.8 (8.4-18) $n=7$	11.5 $n=7$
TL/TOL (%)	8.3 $n=1$		<b>8.63±0.34</b> <b>(8.3-9)</b> $n=3$	11.4 $n=1$	<b>9.87±0.62</b> <b>(9.2-10.8)</b> $n=7$	12.55±0.96 (11.4-14) $n=7$	9.2±1.1 (7.8-10.9) $n=10$	11.9±0.5 (11.5-12.5) $n=3$
TL/SVL (%)	9.06 $n=1$		<b>9.4±0.41</b> <b>(9.1-9.9)</b> $n=3$	<b>12.88</b> $n=1$	<b>10.96±0.76</b> <b>(10-12)</b> $n=7$	<b>14.36±1.26</b> <b>(13-16)</b> $n=7$	10.2±1.3 (8.4-2.2) $n=10$	13.5±0.7 (12.9-14.3) $n=3$
HL/TOL (%)	3.9 $n=1$		4.45±1.54 (3.4-5.5) $n=2$	6.06 $n=1$	4.11±1.33 (3.04-7.17) $n=8$	4.9±0.8 (3.88-6.11) $n=6$	4.7±0.7 (3.9-5.7) $n=7$	4.7 $n=1$

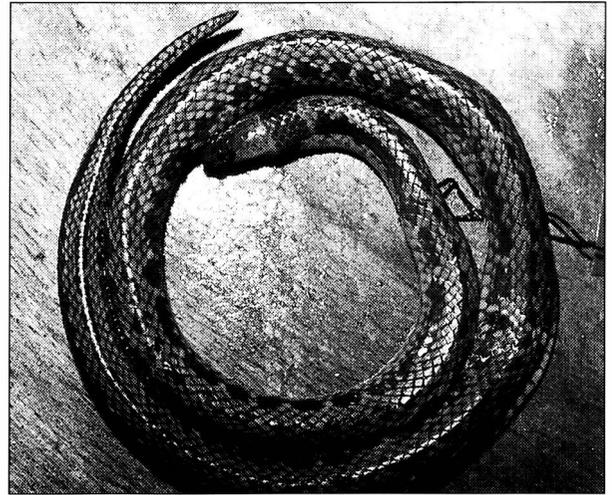


FIG. 1. *Atractus snethlageae* (MACN 8764) (left) and *A. paraguayensis* (FML 6221) (right).

Fernandes (1995b) cannot be used for this species' diagnosis. The dorsum is reddish-brown in live specimens (reddish-pink in *A. reticulatus*, Fernandes, 1995b and pers. obs.). The head is blackish, the parietal-occipital collar whitish-brown and irregularly speckled with brown dots. The collar extends to the three last supralabials, that are whitish. The nasals, preoculars and the first four supralabials are reddish-orange with minute brown dots. The parietal-occipital collar is followed by a dark nuchal band three to five vertebral scales long and extending laterally to the second dorsal row. Dorso-lateral series of dark spots, forming a distinguishable longitudinal stripe, and in the vertebral region, forming a narrow and interrupted stripe that extends to two contiguous paravertebral rows. The lateral and vertebral stripes are more regular and continuous on the tail. The lateral stripes extend from three to five scale rows; below the first two scale rows the background colour is reddish-orange. Dorsal scales are darkly-bordered. The belly is whitish-orange.

*Remarks.* Ventral numbers of female *A. paraguayensis* (157-166, mean=162.8 SD=4.03 n=3) overlapped those of female of *A. reticulatus* (147-164, mean=158.8 SD=6.31 n=6). The only male specimen of *A. paraguayensis* (163) had thirteen more ventrals than the highest number recorded for Argentinean *A. reticulatus* (150). Although useful in distinguishing between males, ventral number may not be a useful diagnostic characteristic of females. On the other hand, ratios of tail length to total length and snout-vent length for *A. paraguayensis* and *A. reticulatus* did not overlap in either sex (Table 1).

New material of both species supports Fernandes' (1995b) assertion that *A. paraguayensis* and *A. reticulatus* are distinct and valid species. Although similar, the two species differ from one another in colour patterns, meristic and morphometric characteristics (Tables 1 and 2). Their known distributions are parapatric; *A. reticulatus* occurs primarily in forested habitats of the "Paranaense" phytogeographic area, *A.*

TABLE 2. Differential characters among examined *Atractus* species.

Characters	<i>A. snethlageae</i>	<i>A. paraguayensis</i>	<i>A. reticulatus</i>	<i>A. taeniatus</i>
No. dorsal scale rows	17	15	15	15
Ventrals range				
Female	151-163	157-166	147-164	150-161
Male	137-155	163	141-150	141-146
Subcaudals range				
Female	22-25	22-24	23-27	23-26
Male	31-35	30	27-29	27-33
Dorsal coloration pattern	Brown with transverse cream bands	Two lateral and a narrow vertebral longitudinal stripe	Reticulate, without longitudinal stripe	Only a broad vertebral longitudinal stripe
Ventral coloration pattern	With dark spots	Immaculate	Immaculate	Immaculate

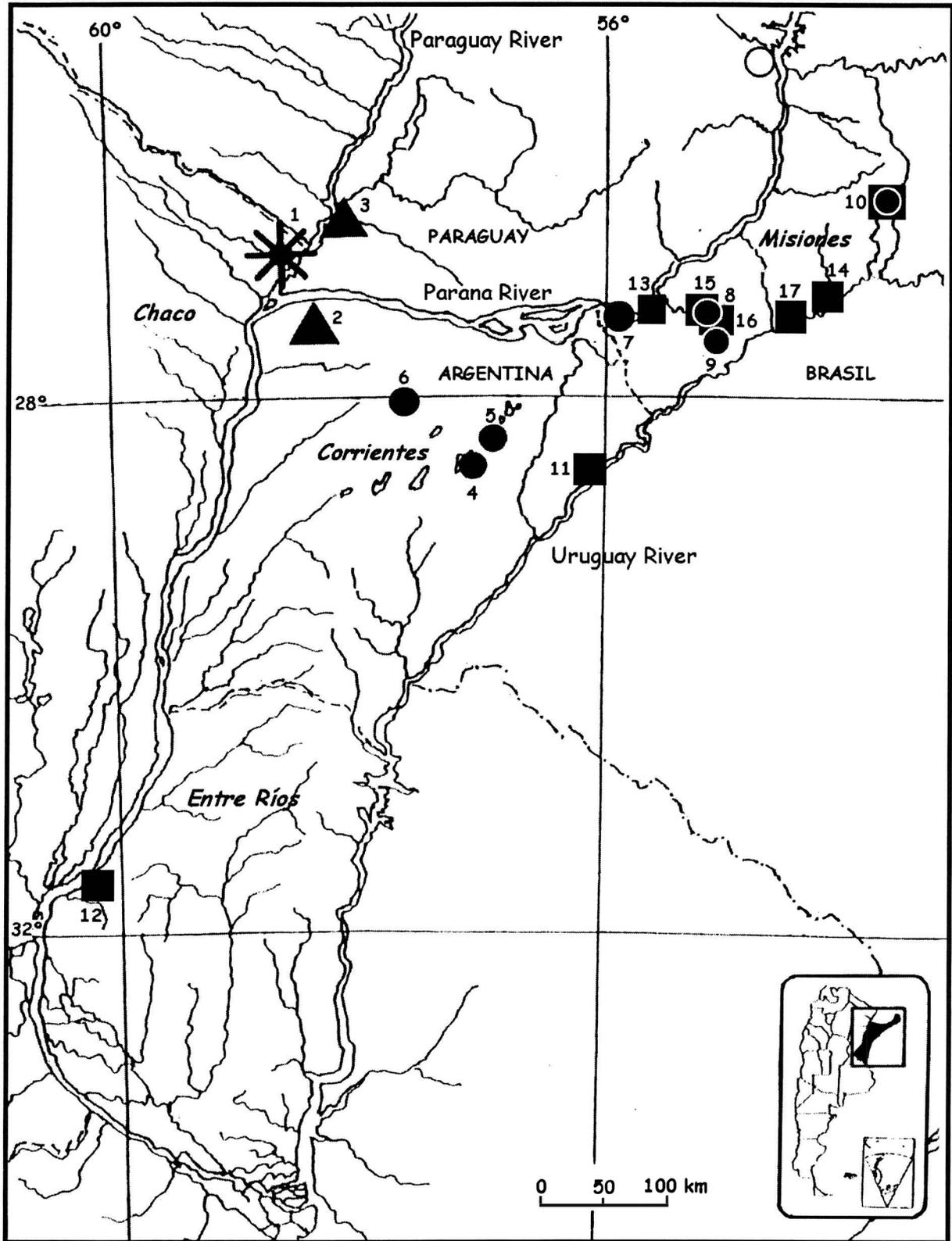


FIG. 2. Distribution of *Atractus* species in north-eastern Argentina and southern Paraguay: *A. snethlageae* (asterisks), *A. reticulatus* (circles), *A. paraguayensis* (triangles) and *A. taeniatus* (squares). Numbers reference localities listed in Appendix 1. Open circles are literature records (Alvarez *et al.*, 1992) for specimens not examined by us.

*paraguayensis* in open formations of the "Chaco" phytogeographic area.

The new specimens have two postoculars, and confirm Fernandes' (1995b) suggestion concerning the invalidity of the diagnosis character "One postocular" used for Amaral (1929) and Peters & Orejas Miranda (1970).

*Distribution.* The first two precise localities for *A. paraguayensis* are Pilar, Ñeembucú department, southern Paraguay, and Palmar Grande, Corrientes Province, north-eastern Argentina (Fig. 2). The two localities are in the transitional communities between Chacoan and Paranaense regions characterized by a complex mosaic of wetlands, grassland, palms, gallery rainforest and *Schinopsis balansae* forest (Prado, 1993; Carnevali, 1994).

#### *TRACTUS RETICULATUS* (BOULENGER)

1885. *Geophis reticulatus* Boulenger, Ann. Mag. Nat. Hist., 5 (16): 87. *Type locality:* San Lorenzo, Rio Grande do Sul, Brasil.

1992. *Atractus reticulatus scrocchii* Alvarez, Rey & Cei. Boll. Mus. reg. Sci. nat. Torino, 10 (2): 251. *Type locality:* San Miguel, Corrientes, Argentina.

*Description.* Based on 11 Argentinean and 4 Brazilian specimens (Appendix 1). *Atractus reticulatus* is a small snake. The females reach a greater total length. The males' TL/TOL and TL/SVL range and mean are larger than those of the females (Table 1). Argentinean populations have 147-164 ( $n=6$ , mean=158.8, SD=6.31) ventrals in females, and 141-150 ( $n=5$ , mean=144.4, SD=3.78) in males. The females' range and mean are larger than those of Brazilian populations (149-163, mean=156.98, Fernandes, 1995b); 23-27 paired subcaudals in females ( $n=4$ , mean=24.5, SD=1.91) and 27-29 in males ( $n=5$ , mean=27.6, SD=0.89). All specimens have 1+2 temporals; seven supralabials (six on

the right side for FML 6240), third and fourth entering the eye ( $n=15$ ); seven infralabials (eight on the left side for FML 1814-3), first to fourth in contact with a single pair of chin-shields ( $n=15$ ); dorsal scales smooth lacking apical pits, in 15-15-15 rows, one preocular and two postocular scales; anal plate entire; and 6-9 maxillary teeth.

*Coloration.* Based on 11 Argentinean specimens. The typical coloration pattern of Argentinean populations (Fig. 3) is head dark brown on rostral, internasals, prefrontals and frontals. Generally with parietal-occipital collar whitish-brown irregularly speckled with brown dots, extending to the last three supralabials, that are whitish. Nasals, preoculars and the first four supralabials more narrow with minute brown dots. The parietal-occipital collar is followed by the dark nuchal band, and together they extend to three vertebral scales (generally narrower than in *A. paraguayensis*). Dorsum reddish-pink in live specimens and greyish in preserved specimens, with a regular reticulate dark brown pattern formed by the dark edges of dorsal scales. This pattern is less evident on the first two rows and is darker close to the vertebral scales, occasionally forming a very fine vertebral stripe (FML 2690). The belly and the first dorsal scale row are creamish. A distinctive white nuchal collar is found in juveniles. The extent of the parietal occipital collar is variable, from the anterior parietal to the first two or three dorsal scales, and is not present in FML 2666. Some Brazilian populations showed differences in coloration patterns that were commented on by Fernandes (1995b). Colour pattern in *A. reticulatus* apparently lacks taxonomic significance because of its clinal variation (Fernandes, 1995b).

One specimen, CUNAM 121, was leucistic. Dorsally and ventrally, this specimen was uniformly whitish pink (creamish white in preservative, Fig. 3), and it

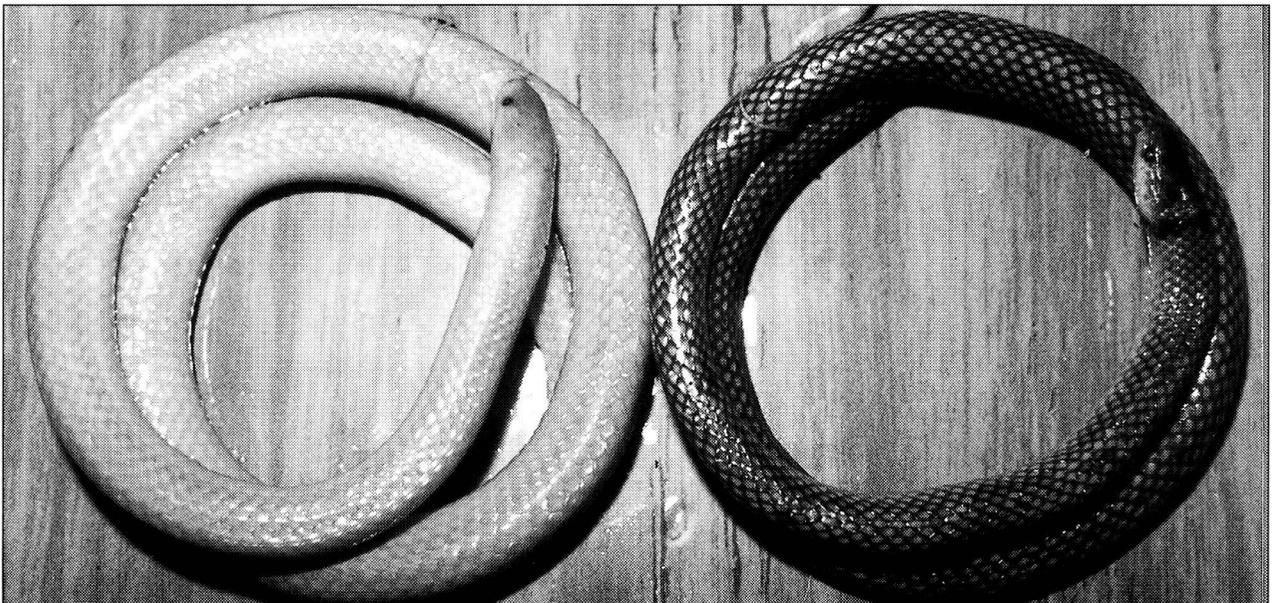


FIG. 3. A leucistic specimen of *Atractus reticulatus* (CUNAM 121) (left) compared to a specimen with the typical Argentinean pattern (CUNAM 140) (right).

lacked the dark cephalic, nuchal, and reticulate patterns of normal individuals.

*Distribution:* the distribution of *Atractus reticulatus* extends from the city of São Paulo, São Paulo south to São Lourenço, Rio Grande do Sul, Brazil and west to San Miguel, Corrientes, Argentina (Fernandes, 1995 *b*). This species has also been reported from Puerto Bertoni, Alto Paraná, Paraguay (Bertoni, 1939; Alvarez *et al.*, 1992). In Argentina, *A. reticulatus* was reported from north-eastern Corrientes and Misiones (Fig. 2, Appendix 1) in the Paranaense phytogeographic area. The species occurs in subtropical rainforest, Araucaria forest and savannas, as well as in transitional and semi-urban habitats.

*Remarks:* According to Fernandes (1995*b*) and in contrast to Alvarez *et al.* (1992), the Argentinean populations do not show substantive differences in coloration with respect to the holotype as described and illustrated by Boulenger (1885, 1894). *A. reticulatus* showed sexual dimorphism in number of ventrals and subcaudals, and in the ratio of tail length to total length (Figs. 4 and 5, Tables 1 and 2). Alvarez *et al.* (1992) concluded that Argentinean and Brazilian specimens they examined were not sexually dimorphic; however, the paratype UNNEC 257 was wrongly sexed as female.

*ATRACTUS TAENIATUS* GRIFFIN

1916. Griffin. Mem. Carnegie Mus., 7 (3): 173-174. *Type locality:* Santa Cruz, Bolivia.

*Description.* Based on 11 Argentinean specimens, and data for the holotype and other Bolivian specimens provided by Griffin (1916), McCoy (1971) and Williams & Gudynas (1991). The longest species of *Atractus* in Argentina. Females reach a greater total

length than males (Table 1). The males have a relatively longer tail than females with respect to the total length. Sexual dimorphism is evident in ventral and subcaudal counts: 150-161 ( $n=10$ , mean=153.5, SD=3.37) ventrals in females, 141-146 in males ( $n=3$ , mean=144.3, SD=2.89); 23-26 paired subcaudals ( $n=10$ , mean=24.2, SD=0.9) in females, 27-33 in males ( $n=3$ , mean=30, SD=3). All specimens have 1+2 temporals; seven supralabials, the third and the fourth entering the eye ( $n=10$ ); seven infralabials, the first to the fourth in contact with a single pair of chin-shields ( $n=10$ ); dorsal scales smooth, lacking apical pits, and in 15-15-15 rows; one preocular; two postoculars ( $n=10$ ); anal plate entire; 8 maxillary teeth.

*Coloration.* Based on 11 Argentinean specimens. The head is blackish with parietal occipital collar whitish-brown irregularly speckled with brown dots. There is a distinctive white collar (parietal occipital) in juveniles that is faded in adults. A dark nuchal band extends over two vertebral scales dorsally, and laterally extends to the corner of the mouth. A dark vertebral stripe extends to two contiguous paravertebral rows. This is regular or irregular, and has dark lateral projections in some specimens (Fig. 4). Laterally, there are very variable irregular dark spots on the dorsal scales. The first scale rows have the same colour as the belly, i.e. whitish-cream. In life the general coloration is reddish-pink and similar to *A. reticulatus*. The tail has the same pattern as the body.

*Distribution.* From south-eastern Bolivia in Santa Cruz (Griffin, 1916) and Buena Vista (McCoy, 1971), Santa Cruz department, eastward to several localities in Paraná state, Brazil (Moura Leite, Morato & Bérnils, 1996) and north-eastern Argentina - Misiones, Corrientes and Entre Ríos provinces (Williams & Gudynas, 1991; Cei, 1993; Rey & Lions, 1997; pers.

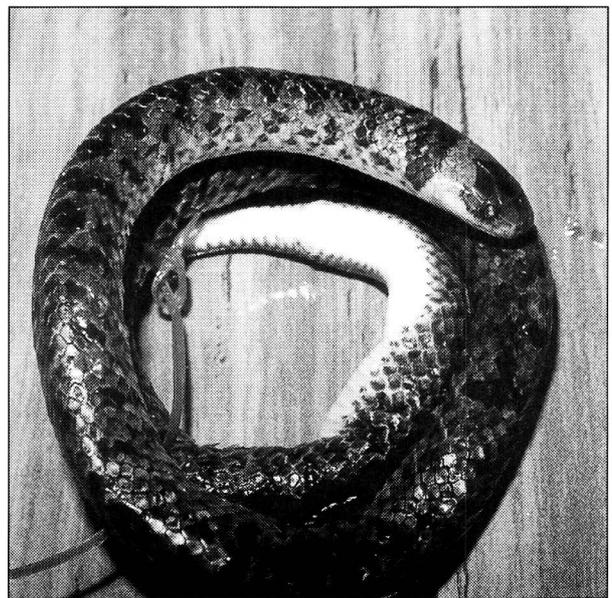
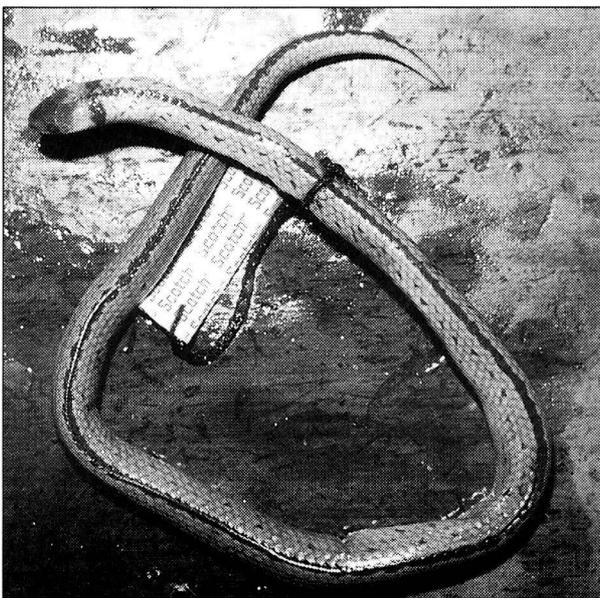


FIG. 4. A specimen of *A. taeniatus* with a regular vertebral stripe (FML 6220) (left) and a specimen with an irregular vertebral stripe (CUNAM 420) (right).

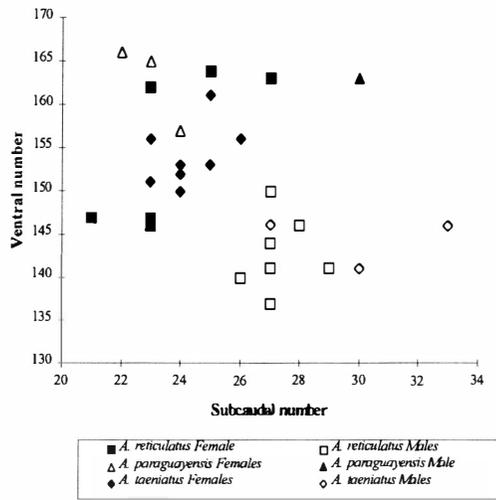


FIG. 5. Scatter plot of ventral and subcaudal number for males and females of *Atractus paraguayensis*, *A. reticulatus* and *A. taeniatus*.

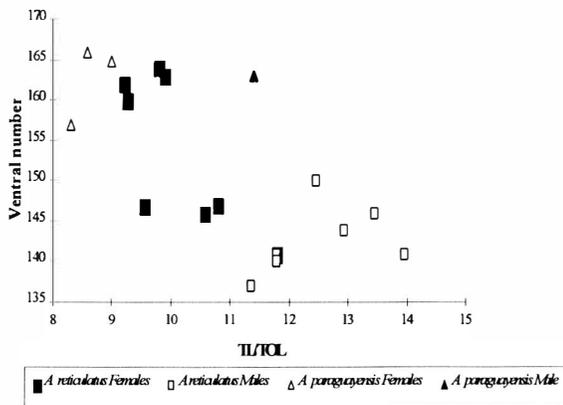


FIG. 6. Scatter plot of ventral number and tail length/total length (TL/TOL) for males and females of *A. paraguayensis* and *A. reticulatus*.

obs; Fig. 2). In Argentina the species was recorded from the Paranaense subtropical rainforest and Araucaria forest in Corrientes and Misiones provinces, and in gallery rainforest in Entre Ríos province. The geographic distribution of *A. taeniatus* coincides with the “Misiones” nucleus proposed by Prado & Gibbs (1993).

*A. taeniatus* is sympatric with *A. reticulatus* in Argentina, and the two species have been collected in the same locality.

Da Silva (1993) mentioned two specimens from Rondonia, Brazil as *Atractus* cf. *taeniatus*, but we could not examine them to compare with Argentinean populations.

**Remarks.** Lema (1994) pointed out that the juvenile mentioned by Williams & Gudynas (1991) is a new species, and that *A. taeniatus* therefore contains at least two new species, although no supporting data are presented in this regard. The Argentinean populations showed a remarkable polymorphism in the dorsal col-

oration, this should be considered in future revisions of these complex taxa.

The new data for ventral scale counts obtained by us (Table 2), are not consistent with the statement of Williams & Gudynas (1991) on the lack of sexual dimorphism in this character.

DISCUSSION

All species showed noteworthy intraspecific variation in coloration pattern, although each could also be diagnosed by characteristics of coloration and lepidosis (Figs. 1, 3 and 4, Tables 1 and 2).

*Atractus paraguayensis*, *A. reticulatus* and *A. taeniatus* showed sexual dimorphism in the number of ventrals and subcaudals, and in the ratio of tail length to both total length and snout-vent length (Fig. 5-6), too reported in the two first characters for *A. snethlageae* (Cunha and Nascimento, 1993).

*Atractus paraguayensis* has a parapatric distribution with respect to *A. reticulatus* and *A. taeniatus*, inhabiting more xeric western regions (transitional formations between Chacoan and Paranaense phytogeographic regions (Prado, 1994; Carnevali, 1994) (Fig. 2). *A. snethlageae* is known from only one record in gallery rainforest in the alluvial valley of the Paraguay river (Fig. 2), where other Amazonian and wide-ranging tropical species such as *Imantodes cenchoa*, *Pseudoeryx plicatilis* and *Hydrops triangularis* have been found. The distributional pattern of *A. reticulatus* coincides with the “Misiones” nucleus proposed by Prado & Gibbs (1993) for dry, seasonal South American forest.

The new specimens of *A. paraguayensis* confirm the specific status proposed by Fernandes (1995b).

KEY FOR THE SPECIES OF *ATRACTUS* FROM ARGENTINA

- 1. 15 dorsal scales rows; venter immaculate ..... 2
- 17 dorsal scales rows; venter with dark spots..... 4
- 2. Dorsal pattern with dark longitudinal stripes, regular or irregular, and sometimes with lateral projections.....3
- Reticulate dorsal pattern, without dark longitudinal stripes .....*A. reticulatus*
- 3. Dorsal pattern with two longitudinal lateral stripes, and a narrow, interrupted vertebral stripe ..... *A. paraguayensis*
- Dorsal pattern with a single, continuous broad vertebral longitudinal stripe, sometimes with lateral projections.....*A. taeniatus*
- 4. Dorsal pattern brown with transverse cream colored bands, each edged in black; venter yellowish, anteriorly with central black spots forming an interrupted mid-ventral stripe, and posteriorly with black spots irregularly distributed.....*A. snethlageae*
- Dorsal pattern creamish or reddish with symmetrical black blotches, alternating or fused into bands on the vertebral line; venter with regular transverse bars of black and cream.....*A. canedii*

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REFERENCES

- Abalos, J. W. & Mischis, C. C. (1975). Elenco sistemático de los ofidios argentinos. *Bol. Acad. Nac. Cien. Córdoba* **51**, 55-76.
- Alvarez, B. B., Rey, L. & Cei, J. M. (1992). A new subspecies of the *reticulatus* group, genus *Atractus*, from southeastern South America (Serpientes, Colubridae). *Boll. Mus. Reg. Sci. Nat. Torino* **10**, 249-256.
- Amaral, A. (1929). Estudos sobre Ophidios Neotrópicos XVII. Valor sistemático de varias formas de Ophidios Neotrópicos. *Mem. Inst. Butantan* **4**, 1-68.
- Bertoni, A. (1939). Catálogo sistemático de los vertebrados del Paraguay. *Rev. Soc. Cient. Paraguay* **4**, 40-49.
- Boulenger, G. A. (1885). Second list of Reptiles and Batrachians from the Province of Rio Grande do Sul, Brasil, sent to the Natural History Museum by Dr. H. Von Ihering. *Ann. Mag. Nat. Hist.* **16**, 85-88.
- Boulenger, G. A. (1894). Catalogue of the Snakes of the British Museum. Vol. II. London: Trustees of the British Museum.
- Carnevali, R. (1994). Fitogeografía de la Provincia de Corrientes. Corrientes: Gobierno de la Provincia de Corrientes e INTA.
- Cei, J. M. (1993). Reptiles del noroeste, nordeste y este de la Argentina. Herpetofauna de las Selvas subtropicales, Puna y Pampas. *Mus. Reg. Sc. Nat. Torino, Monogr.* **14**, 1-949.
- Cunha, O. R. da & do Nascimento, F. P. (1983). Ofidios da Amazonia. XX. As espécies de *Atractus* Wagler, 1828, na Amazonia oriental y Maranhão. *Bol. Mus. Paraense Emilio Goeldi, n. sér., Zool.* **123**, 1-38.
- Cunha, O. R. & do Nascimento, F. P. (1993). Ofidios da Amazônia. As cobras da região leste do Pará. *Bol. Mus. Paraense Emilio Goeldi, n. sér., Zool.* **9**, 1-191.
- Da Silva, N. J. Jr. (1993). The snakes from Samuel Hydroelectric Power Plant and vicinity, Rondônia, Brazil. *Herpetological Natural History* **1**, 37-86.
- Dowling, H. G. (1951). A proposed standard system of counting ventrals in snakes. *Br. J. Herpetol.* **1**, 97-99.
- Fernandes, R. A (1995a). New Species of snake in the genus *Atractus* (Colubridae, Xenodontinae) from northeastern Brazil. *J. Herpetol.* **29**, 416-419.
- Fernandes, R. (1995b). Variation and taxonomy of the *Atractus reticulatus* Complex (Serpentes: Colubridae). *Comun. Mus. Cienc. PUCRS, sér. zool.* **8**, 37-53
- Fernandes, R. & Puerto, G. (1993). A New species of *Atractus* from Brazil and the status of *A. guentheri* (Serpentes: Colubridae). *Mem. Inst. Butantan* **55**, 7-14.
- Giraud, A. R. (1999). New records of snakes from Argentina. *Herpetol. Review* **30**, 179-181.
- Griffin, L. E. (1916). A catalog of the Ophidia from South America at present (June, 1916) contained in the Carnegie Museum with description of some new species. *Mem. Carnegie Mus.* **7**, 163-228.
- Hoogmoed, M. S. (1980). Revision of the genus *Atractus* in Surinam, with the resurrection of two species (Colubridae, Reptilia). Notes on the herpetofauna of Surinam VII. *Zool. Verhandl., Leiden* **175**, 4-47, 3 pl.
- Hoogmoed, M. S. (1982). The Snake of the Guianan Region. *Mem. Inst. Butantan* **46**, 219-254.
- Lema, T. (1994). Lista comentada dos répteis ocorrentes no Rio Grande do Sul, Brasil. *Comun. Mus. Cienc. Tecnol. PUCRS. Sér. Zool.* **7**, 41-150.
- Lewis, J. P., Pire, E. F. & Vesprini, J. L. (1994). The mixed dense forest of the Southern Chaco. Contribution to the study of flora and vegetation of the Chaco. VIII. *Candollea* **49**, 159-168.
- McCoy, C. J. (1971). Comments on Bolivian *Atractus* (Serpentes, Colubridae). *Herpetologica* **27**, 314-316.
- Moura Leite, J. C., Morato, S. A. A. & Bernils, R. S. (1996). New records of reptiles from the State of Paraná, Brazil. *Herpetological Review* **27**, 216-217.
- Peters, J. R. & Orejas Miranda, B. (1970). Catalogue of the neotropical squamata: Part I. Snakes. *U. S. nat. Mus. Bull.* **297**, 1-347.
- Prado, D. E. (1993). What is the Gran Chaco Vegetatio in South America? II. A redefinition. Contribution of the study of the flora and vegetation of the Chaco. *Candollea* **48**, 615-629.
- Prado, D. E. & Gibbs, P. E. (1993). Patterns of species distributions in the dry seasonal forest of South America. *Ann. Missouri Bot. Gard.* **80**, 902-927.
- Rey, L. & Lions, M. L. (1997). Geographic distribution, Serpentes: *Atractus taeniatus*. *Herpetol. Review* **28**, 51.
- Savage, J. M. (1960). A revisión of the Ecuadorian snakes of the colubrid genus *Atractus*. *Misc. Publ. Mus. Zool. Univ. Michigan* **112**, 1-86.
- Scrocchi G. J. & Cei, J. M. (1991). A new species of the genus *Atractus* from the northwestern Argentina (Serpentes, Colubridae). *Boll. Mus. Reg. Sci. Nat. Torino* **9**, 205-208.
- Serié, P. (1915). Suplemento a la fauna herpetológica argentina. *An. Mus. Hist. Nat. Bs. Aires* **27**, 93-109.
- Serié, P. (1921). Catálogo de los ofidios argentinos. *An. Soc. Cientif. Arg.* **92**, 145-175.
- Serié, P. (1936). Nueva enumeración sistemática de los ofidios argentinos. *Inst. Mus. Univ. Nac. La Plata. Obra cincuentenario*, 33-68
- Vanzolini, P. E. (1986). Levantamento herpetológico da área do estado de Rondônia sobre a influencia da Rodovia BR. 364. Relatorio de Pesquisa I. Brasília: CNPq, Assessoria Editorial. Brasília, Brazil.

- Williams, J. D. & Couturier, G. (1984). Primera cita del género *Hydrops* Wagler, 1830 para la Republica Argentina (Serpentes: Colubridae). *Hist. Nat.* **4**, 61-66.
- Williams, J. D. & Francini, F. (1991). A checklist of the Argentine snakes. *Boll. Mus. Reg. Sci. nat. Torino* **9**, 55-90.
- Williams, J. D. & Gudynas, E. (1991). Revalidation and redescription of *Atractus taeniatus* Griffin, 1916 (Serpentes: Colubridae). *CIPFE CED Orione. Cont. Biol.* **15**, 1-8.
- Zimmerman, B. L. & Rodrigues, M. T. (1990). Frogs, snakes, and lizards of the INPA-WWF reserves near Manaus, Brazil. In *Four Neotropical Rainforests*, 426-454. Gentry A. H. (Ed.). New Haven: Yale Univ. Press.

#### APPENDIX 1

*Specimens examined* (Numbers before localities are references for Fig. 2): Museum abbreviations are: CENAI: Centro Nacional de Investigaciones Iológicas collection, now in the MACN, Buenos Aires; CUNAM: Universidad Nacional de Misiones, Posadas, Misiones. FML: Fundación Miguel Lillo, Tucumán; MACN: Museo Argentino de Ciencias Naturales "Bernardino Rivadavia", Buenos Aires; MLP: Museo de La Plata, La Plata, Buenos Aires; and UNNEC: Universidad Nacional del Nordeste, Corrientes.

*Atractus snethlageae*. ARGENTINA: Chaco province: Bermejo Department: 1. Las Palmas MACN 8764.

*Atractus paraguayensis*. ARGENTINA: Corrientes province: San Luis del Palmar department: 2. Campo Grande UNNEC 82; PARAGUAY: Ñeembucú Department: 3. Pilar FML 6221 and 6238.

*Atractus reticulatus*. ARGENTINA: Corrientes province: General San Martín Department: 4. Colonia Carlos Pelegrini MACN 24452; 5. Ea. San Solano near from Carlos Pelegrini UNNEC 517; San Miguel Department: 6. San Miguel UNNEC 256 and 257 (the holotype and paratype from *A. reticulatus* respectively); Misiones Province: Capital department: 7. San Isidro quarter Posadas city FML 6240; 7. Posadas city CUNAM 121, 140 and 284; Candelaria department: 8. Ea. Santa Cecilia, 3 km eastern of Bompland city FML 6222; Leandro N. Alem Department: 9. Leandro N. Alem city CENAI 1556; San Pedro department: 10. 30 km to eastern of Cruce Caballero FML 2690; BRAZIL: Paraná state: Curitiba FML 6239, 1814-1, 1814-2 and 1814-3.

*Atractus taeniatus*. ARGENTINA: Corrientes province: Santo Tomé department: 11. Santo Tomé city, UNNEC 4979; Entre Rios province: Paraná department: 12. Urquiza MLP 637; Misiones province: Candelaria department: 13. San Juan stream, near from national route 12, specimen maintained in live; San Pedro department: 10. km to eastern of Cruce Caballero FML 6220; Guaraní department: 14. El Soberbio CUNAM 420; Oberá department: 15. General Alvear CUNAM 419; 16. Oberá city CENAI 2921, CENAI 3110 and 3111; San Javier department: 17. Puerto Londera MACN 9489 and 9490.

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