

Herpetofauna of the Argentinean Impenetrable Great Chaco

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The Great Chaco is a region of nearly 1,000,000 km² extended through the plains of Northern and central Argentina, Western Paraguay, Southeastern Bolivia, and the extreme Western edge of Mato Grosso do Sul state in Brazil (Pennington *et al.* 2000). Originally dominated by xerophytic semi-deciduous forests, the area has been extensively cleared for timber production and agriculture over the last century; only small patches of native vegetation remain (Zak and Cabido 2002).

The Impenetrable region (Northern region of the Chaco and Santiago del Estero Provinces and Eastern part of Salta Province, Argentina) is one of the biggest remnant patches of native dry forest (Bertonatti and Corcuera 2000). Most of the Impenetrable woodlands are found in the Chaco Province, and are legally protected by two fairly new Provincial Parks (P. P.): The "Fuerte Esperanza" P. P. (283 km²), created in 2001 (SGPC 2001), and the "Loro Hablador" P. P. (175 km²), created in 2004 (SGPC 2004).

Most available data on the herpetofauna of this area come from review works (Gallardo 1979, Cei 1980, 1993, Cabrera 1995, Leynaud and Bucher 1999, Richard 1999, Alvarez *et al.* 2002, Chebez *et al.* 2005). The region has been poorly explored and nearly all field studies were conducted on a few localities (Lavilla and Scrocchi 1991, Lavilla and Rougés 1992, Lavilla *et al.* 1995a,b, Perotti 1997, Leynaud and Bucher 2005). Herein, we present a list of amphibians and reptiles of the Impenetrable Chaco region. This work records new localities for most species and assesses if the Loro Hablador Provincial Parks are protecting a representative portion of herpetofauna richness.

The area surveyed is a flood plain characterized by a continuous dry forest dominated by "quebrachos" (*Aspidosperma quebracho-blanco*, *Schinopsis lorentzii*) and by the absence of permanent wetlands, rivers, and streams (Cabrera 1976). The average annual rainfall is about 600mm; 75% occurs between November and March (for a thorough vegetation characterization, see Morello and Adámoli 1974). We surveyed the area during the spring and summer months between 1999 and 2006 (total 22 months of fieldwork). We visited eight

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localities from Chaco Province: P. P. Loro Hablador (25°48'00" S, 61°70'00" W), Fuerte Esperanza (25°16'00" S, 61°84'00" W), El Torito (25°22'00" S, 62°02'00" W), Luján (25°20'00" S, 62°30'00" W), Chiva Mora (25°10'00" S, 62°50'00" W), Primavera (25°05'00" S, 62°50'00" W), Rio Muerto (25°10'00" S, 62°65'00" W), and Taco Pozo (25°61'00" S, 63°28'00" W) (Figure 1). Most of the work effort was concentrated at P. P. Loro Hablador.

Specimens were identified using available keys; most individuals were identified during the fieldwork (Ceí 1980, 1993, Giraud 2001). Examined material (pictures and specimens) are deposited at Museo de La Plata (MLP), Buenos Aires, Argentina and listed in Appendix I. We constructed a list of cited species for the Impenetrable following Lavilla and Scrocchi (1991), Lavilla and Rougés (1992), Cabrera (1995), Lavilla *et al.* (1995a,b), Perotti (1997), Leynaud and Bucher (1999, 2005), Alvarez *et al.* (2002), Nenda and Scrocchi (2004), Chebez *et al.* (2005), and Kretzschmar (2006).

We found 18 (64%) of the 28 previously reported amphibian species. We also found one species (*Pseudis paradoxa occidentalis*) not cited before for this area (Table 1). We found 37 species (82%) of the 45 cited reptilian species (Table 2).

Some records deserve special comments because of their zoogeographic and/or conservation implications. We found one "endangered" species (*Chelonoidis chilensis*); one "threatened" species (*Boa constrictor occidentalis*) two "vulnerable" species (*Epicrates cenchria alvarezzi* and *Polychrus acutirostris*) and two "insufficiently known" species (*Elachistochleis aff. bicolor* and *Stenocercus doellojuradoi*) (SADS 2005).

The Chaco Tortoise (*C. chilensis*, Figure 2A) is a small terrestrial tortoise characteristic of the Impenetrable woodlands. Although it is an endangered species, the pet trade seems to be the current major treat (Lavilla *et al.* 2001). Adults showed a high activity during the month



Figure 1 - Region of Impenetrable showing localities explored at this study: P. P. Loro Hablador (1), Fuerte Esperanza (2), El Torito (3), Luján (4), Chiva Mora (5), Primavera (6), Rio Muerto (7), and Taco Pozo (8).

of November and juveniles were only found in January.

The Red Tegu (*Tupinambis rufescens*) is under Appendix II of CITES. Local population of the Dry Chaco Region hunt this lizard as a source of food and to sale its skin to the international trade. Currently, there is a "Red Tegu National Harvesting Program" at the Impenetrable, whose goal is to achieve a sustainable management of the species (Fitzgerald 1994).

Stenocercus doellojuradoi is considered an "insufficiently known" species (Lavilla *et al.* 2000) due to the absence of data about their ecology, population densities and trade. We record this lizard all years in the P. P. Loro Hablador. This Park seems to be a good place to increase the knowledge about the biology of this species.

Two boid species coexist in Impenetrable Chaco area. The Argentine Constrictor Boa (*B. constrictor occidentalis*) is characteristic of dry woodlands in Argentina and Paraguay. Historically this species was captured for its skin and consequently populations have decreased in some areas (Lavilla *et al.* 2000). *B.*

Table 1 - Amphibian species from the Impenetrable region showing localities explored in this study: P. P. Loro Hablador (1), Fuerte Esperanza (2), El Torito (3), Luján (4), Chiva Mora (5), Primavera (6), Río Muerto (7), and Taco Pozo (8).

	Localities								References	
	1	2	3	4	5	6	7	8		
BUFONIDAE										
<i>Chaunus fernandezae</i>										Alvarez <i>et al.</i> 2002
<i>Chaunus granulosis major</i>	X	X	X	X			X	X		
<i>Chaunus schneideri</i>	X	X	X	X			X	X		
CERATOPHRYIDAE										
<i>Ceratophrys cranwelli</i>	X	X	X	X				X		
<i>Lepidobatrachus asper</i>										Alvarez <i>et al.</i> 2002
<i>Lepidobatrachus laevis</i>										Lavilla <i>et al.</i> 1995a, Perotti 1997, Alvarez <i>et al.</i> 2002
<i>Lepidobatrachus llanensis</i>				X				X		
CYCLORAMPHIDAE										
<i>Odontophrynus americanus</i>										Alvarez <i>et al.</i> 2002
<i>Odontophrynus lavillai</i>	X							X		
HYLIDAE										
<i>Phyllomedusa hypochondrialis azurea</i>							X	X		
<i>Phyllomedusa sauvagii</i>	X	X	X	X			X	X		
<i>Pseudis paradoxus occidentalis</i>							X			
<i>Pseudis minutus</i>										Alvarez <i>et al.</i> 2002
<i>Scinax acuminatus</i>										Alvarez <i>et al.</i> 2002
<i>Scinax nasicus</i>	X	X		X			X			
<i>Trachycephalus venulosus</i>	X	X		X						
LEIUPERIDAE										
<i>Physalaemus albonotatus</i>										Alvarez <i>et al.</i> 2002
<i>Physalaemus biligonigerus</i>	X	X	X	X			X			
<i>Physalaemus cuqui</i>	X	X	X	X			X			
<i>Pleurodema tucumanum</i>										Lavilla and Rougés 1992, Perotti 1997, Alvarez <i>et al.</i> 2002
LEPTODACTYLIDAE										
<i>Leptodactylus bufonius</i>	X	X	X	X			X	X		
<i>Leptodactylus chaquensis</i>			X					X		
<i>Leptodactylus elenae</i>										Alvarez <i>et al.</i> 2002
<i>Leptodactylus fuscus</i>	X	X	X	X				X		
<i>Leptodactylus laticeps</i>										Lavilla <i>et al.</i> 1995a, Alvarez <i>et al.</i> 2002
<i>Leptodactylus latinasus</i>	X	X		X			X	X		
<i>Leptodactylus mystacinus</i>	X		X							
MICROHYLIDAE										
<i>Dermatonotus muelleri</i>	X	X		X						
<i>Elachistocleis aff. bicolor</i>							X	X		

Table 2 - Reptilian species of the Impenetrable region showing localities explored in this study: P. P. Loro Hablador (1), Fuerte Esperanza (2), El Torito (3), Luján (4), Chiva Mora (5), Primavera (6), Río Muerto (7), and Taco Pozo (8).

	Localities								References	
	1	2	3	4	5	6	7	8		
CHELIDAE										
<i>Acanthochelys pallidipectoris</i>										Lavilla et al. 1995a
CHELONIDAE										
<i>Chelonoidis chilensis</i>	X	X	X			X				
KINOSTERNIDAE										
<i>Kinosternon scorpioides</i>										Lavilla et al. 1995a
AMPHISBAENIDAE										
<i>Amphisbaena bolivica</i>	X	X								
<i>Amphisbaena darwini</i>										Lavilla et al 1995b, Alvarez et al. 2002, Leynaud and Bucher 2005
<i>Anops kingi</i>	X									
<i>Leposternon microcephalum</i>										Alvarez et al. 2002
GEKKONIDAE										
<i>Homonota fasciata</i>	X									
<i>Phyllopezus pollicaris przewalskyi</i>	X	X								
GYMNOPHTHALMIDAE										
<i>Cercosaura schreibersii</i>										Alvarez et al. 2002
<i>Vanzosaura rubricauda</i>	X									
LIOLAEMIDAE										
<i>Liolaemus chacoensis</i>	X									
POLYCHROTIDAE										
<i>Polychrus acutirostris</i>	X									
<i>Urostrophus gallardoii</i>										Lavilla et al. 1995b, Alvarez et al. 2002, Leynaud and Bucher 2005
TEIIDAE										
<i>Ameiva ameiva</i>	X	X								
<i>Cnemidophorus ocellifer</i>	X									
<i>Teiús teyú</i>	X	X	X	X	X	X	X	X		
<i>Tupinambis rufescens</i>	X	X	X		X	X	X	X		
TROPIDURIDAE										
<i>Stenocercus doellojuradoi</i>	X									
<i>Tropidurus etheridgei</i>	X									
<i>Tropidurus spinulosus</i>	X	X	X		X	X	X	X		
SCINCIDAE										
<i>Mabuya frenata</i>	X							X		
BOIDAE										
<i>Boa constrictor occidentalis</i>	X		X			X	X			
<i>Epicrates cenchria alvarezii</i>	X				X					

Table 2 - Continued.

	Localities								References	
	1	2	3	4	5	6	7	8		
COLUBRIDAE										
<i>Boiruna maculata</i>	X	X							X	
<i>Chironius quadricarinatus maculoventris</i>									X	
<i>Leptodeira annulata pulchriceps</i>	X									
<i>Liophis guentheri</i>										Lavilla <i>et al.</i> 1995b, Alvarez <i>et al.</i> 2002, Chebez <i>et al.</i> 2005
<i>Liophis poecilogyrus caesius</i>	X									
<i>Liophis sagittifer modestus</i>	X									
<i>Lystrophis pulcher</i>	X	X	X		X					
<i>Oxyrhopus rhombifer</i>	X									
<i>Phalotris punctatus</i>										Alvarez <i>et al.</i> 2002, Leynaud and Bucher 2005
<i>Philodryas baroni</i>	X								X	
<i>Philodryas mattogrossensis</i>	X					X				
<i>Philodryas olfersii latirostris</i>	X								X	
<i>Philodryas psammophidea</i>	X									
<i>Phimophis vittatus</i>	X									
<i>Sibynomorphus lavillai</i>	X									
<i>Waglerophis merremii</i>	X								X	
ELAPIDAE										
<i>Micrurus pyrrhocryptus</i>	X	X							X	
LEPTOTYPHLOPIDAE										
<i>Leptotyphlops albipunctus</i>	X									
<i>Leptotyphlops unguirostris</i>	X									
<i>Typhlops brongersmianus</i>										Alvarez <i>et al.</i> 2002
VIPERIDAE										
<i>Bothrops neuwiedii diporus</i>	X	X	X						X	
<i>Crotalus durissus terrificus</i>	X									

constrictor occidentalis in particular is considered a threatened and protected species (Appendix I of CITES). The Argentine Rainbow Boa (*E. cenchria alvarezii*) occurs in the Northwestern region of Argentina, including Chaco and Yungas woodlands. Historically this species was also hunted for the skin trade and, as other boids, it is listed in Appendix II of CITES; however, we did not find evidence of current hunting by local population. We found

B. constrictor occidentalis both on the ground and on trees, whereas *E. cenchria alvarezii* was only observed inside tree cavities. Both species seem to be very common at the Impenetrable Chaco Region.

The Llanos Frog (*Lepidobatrachus llanensis*) is uncommon throughout its range and the populations are decreasing (IUCN 2006). The species range includes dry scrubland and semi-arid areas in Northern Argentina and



Figure 2 - (A) The Chaco Tortoise (*Chelonoidis chilensis*); (B) the Cei's Escuerzo (*Odontophrynus lavillai*).


Western Paraguay. During the breeding season it appears to be a common species in ponds; we found adults in amplexus, tadpoles, and juveniles.

Cei's Escuerzo (*Odontophrynus lavillai*, Figura 2B) is endemic to Argentina, known only from the Provinces of Santiago del Estero, Salta, Chaco, and Jujuy. We recorded two new localities for this fossorial species. In both places, the species was found in artificial ponds.

This is the first herpetofaunal survey of the P. P. "Loro Hablador" (Chaco Province). The 50 species here recorded from this park represent respectively 52 and 77 % of amphibian and reptilian species known from the Impenetrable region, therefore we think that this Park is protecting a significant number of total herpetofaunal species of the Impenetrable, including populations of vulnerable and threatened reptilian species. The knowledge of species distribution is crucial in understanding their natural history and in giving direction to future research and conservation efforts.

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Appendix I - Material Examined

Material examined is presented with collection number and locality. All specimens are deposited at Museo de La Plata (MLP). MLP codes: cf (photographic collection); A (amphibians); and R, S and JW (reptiles). For more information about the MLP herpetological codes, see Ferraro and Williams (2006).

AMPHIBIANS

Chaunus granulatus major MLP. (cf) 0001 (Loro Hablador Provincial Park); *Chaunus schneideri* MLP. (cf) 0005 (Loro Hablador Provincial Park); *Trachycephalus venulosus* MLP. A 1534 (Fuerte Esperanza), (cf) 0002 (Fuerte Esperanza); *Phyllomedusa hypochondrialis azurea* MLP. A 1544 (Taco Pozo), (cf). 0003 (Taco Pozo); *Phyllomedusa sauvagii* MLP. A 1537 (Taco Pozo), (cf) 0004 (Taco Pozo); *Scinax nasicus* MLP. (cf) 0006 (Taco Pozo); *Ceratophrys cranwelli* MLP-A-1525 (Taco Pozo), (cf) 0007 (Taco Pozo); *Lepidobatrachus llanensis* MLP. A 1523 (Taco Pozo), A-1528 (Taco Pozo); *Leptodactylus bufonius* MLP. (cf) 0009 (Loro Hablador Provincial Park); *Leptodactylus chaquensis* MLP. A 1526 (Taco Pozo), (cf) 0010 (Taco Pozo); *Leptodactylus fuscus* MLP. A 1531 (Taco Pozo), A 3454 (Fuerte Esperanza), (cf) 0011 (Fuerte Esperanza); *Leptodactylus latinus* MLP. A 3460 (Fuerte Esperanza); *Leptodactylus mystacinus* MLP. A 3453 (Fuerte Esperanza), (cf) 0013 (Fuerte Esperanza); *Odontophrynus lavillai* MLP. (cf) 0012 (Loro Hablador Provincial Park); *Physalaemus cuqui* MLP. A 3455 (Puesto Primavera); *Physalaemus biligonigerus* MLP. A 3456 (Fuerte Esperanza), A 3457 (Fuerte Esperanza), A 3458 (Fuerte Esperanza), A 3459 (Fuerte Esperanza); *Dermatonotus muelleri* MLP. (cf) 0014 (Loro Hablador Provincial Park); *Elachistocleis* aff. *bicolor* MLP. (cf)-0003 (Taco Pozo); *Pseudis paradoxus occidentalis* MLP. (cf) 0008 (Río Muerto).

REPTILES

Chelonoidis chilensis MLP.(cf) 0019 (Loro Hablador Provincial Park); *Polychrus acutirostris* MLP.S 2223 (Loro Hablador Provincial Park); *Liolaemus chacoensis* MLP.R 5183 (Loro Hablador Provincial Park), (cf) 0022 (Loro Hablador Provincial Park); *Tropidurus etheridgei* MLP.S 2549 (Loro Hablador Provincial Park), ; *Tropidurus spinulosus*; MLP.R 5094 (Loro Hablador Provincial Park), S 2221 (Loro Hablador Provincial Park), S 2222 (Loro Hablador Provincial Park); (cf) 0024 (Loro Hablador Provincial Park); *Stenocercus doellojuradoi* MLP.R 5185 (Loro Hablador Provincial Park); *Ameiva ameiva* MLP.R 5206 (Loro Hablador Provincial Park); *Cnemidophorus ocellifer* MLP R 5190 (Loro Hablador Provincial Park); *Teius teyou* MLP.S 2547 (Loro Hablador Provincial Park), S 2550 (Loro Hablador Provincial Park), S 2224 (Loro Hablador Provincial Park), R 5154 (Loro Hablador Provincial Park), R 5155 (Loro Hablador Provincial Park), R 5205 (Loro Hablador Provincial Park), (cf) 0025 (Loro Hablador Provincial Park); *Tupinambis rufescens* MLP.(cf) 0026 (Loro Hablador Provincial Park), *Vanzosaura rubricauda* MLP.S 2548 (Loro Hablador Provincial Park), R 5180 (Loro Hablador Provincial Park); *Mabuya frenata* MLP.R 5204 (Loro Hablador Provincial Park), (cf) 0027 (Loro Hablador Provincial Park); *Homonota fasciata* MLP.R 5184 (Loro Hablador Provincial Park), (cf) 0028 (Loro Hablador Provincial Park); *Phyllopezus pollicaris przewalskyi* MLP.R 5093 (Loro Hablador Provincial Park), R 5181 (Loro Hablador Provincial Park), R 5182 (Loro Hablador Provincial Park), R 5186 (Loro Hablador Provincial Park); *Amphisbaena bolivica* MLP.R 5156 (Loro Hablador Provincial Park); *Anops kingi* MLP.S 2225 (Fuerte esperanza); *Leptotyphlops unguirostris* MLP.R 5188 (Loro Hablador Provincial Park);

Leptotyphlops albipunctus MLP.R 5187 (Loro Hablador Provincial Park); *Boa constrictor occidentalis* MLP.(cf) 0030 (Loro Hablador Provincial Park); *Epicrates cenchria alvarezi* MLP.R 5153 (Loro Hablador Provincial Park), (cf) 0031 (Loro Hablador Provincial Park); *Boiruna maculata* MLP.R 5203 (Loro Hablador Provincial Park), (cf) 0032 (Loro Hablador Provincial Park); *Chironius quadricarinatus maculoventris* MLP.(cf) 0033 (Loro Hablador Provincial Park); *Leptodeira annulata pulchriceps* MLP.JW 1913 (Loro Hablador Provincial Park); *Liophis poecilogyrus caesius* MLP.R 5177 (Loro Hablador Provincial Park); *Liophis sagittifer modestus* MLP.(cf) 0045 (Loro Hablador Provincial Park); *Lystrophis pulcher* MLP.R 5095 (Loro Hablador Provincial Park), (cf) 0034 (Loro Hablador Provincial Park); *Oxyrhopus rhombifer* MLP. JW 2001 (Loro Hablador Provincial Park); *Philodryas baroni* MLP.R 5152 (Loro Hablador Provincial Park), R 5175 (Loro Hablador Provincial Park), JW 1948 (Loro Hablador Provincial Park), (cf) 0035 (Loro Hablador Provincial Park); *Philodryas mattogrossensis* MLP.R 5189 (Loro Hablador Provincial Park), (cf) 0036 (Loro Hablador Provincial Park); *Philodryas olfersii latirostris* MLP.JW 1912 (Loro Hablador Provincial Park); *Philodryas psammophidea* MLP.R 5176 (Loro Hablador Provincial Park); *Phimophis vittatus* MLP.JW 2000 (Loro Hablador Provincial Park), (cf) 0038 (Loro Hablador Provincial Park); *Sibynomorphus lavillai* MLP.(cf) 0046 (Loro Hablador Provincial Park); *Waglerophis merremii* MLP. JW 2002 (Loro Hablador Provincial Park), (cf) 0039 (Loro Hablador Provincial Park); *Micrurus pyrrhocryptus* MLP. JW 1914 (Loro Hablador Provincial Park), (cf) 0040 (Loro Hablador Provincial Park); *Bothrops neuwiedii diporus* MLP. R 5151 (Loro Hablador Provincial Park), (cf) 0041 (Loro Hablador Provincial Park); *Crotalus durissus terrificus* MLP. (cf) 0042 (Loro Hablador Provincial Park).