

# First confirmed records of the endangered Andean pitviper *Bothrops lojanus* Parker, 1930 (Viperidae: Crotalinae) from Peru

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The genus *Bothrops* Wagler, 1824 has a widespread distribution in the Americas, from Mexico to southern Argentina (Campbell and Lamar, 2004). Whereas some species are widely distributed and have been observed and studied repeatedly, other species are poorly known and considered rare because they are infrequently found and/or inhabit relatively restricted areas. That is the case with the Lojan lancehead, *Bothrops lojanus* Parker, 1930, an Andean pitviper known from the provinces of Azuay, Loja, and Zamora-Chinchipe (type locality: “vicinity of the city of Loja”) in southwestern Ecuador.

*Bothrops lojanus* is a terrestrial snake that is known to inhabit montane dry forests in the arid temperate zone of Ecuador, at elevations of 1600–2600 m (Almendáriz, 1991; Campbell and Lamar, 2004; Valencia et al., 2016). The species is categorised as Endangered according to the IUCN Red List of Threatened Species (www.iucnredlist.org) because the estimated extent of its area of occurrence is only approximately 2000 km<sup>2</sup>, and the area is threatened by urban and agricultural expansion. In addition, the population may be at risk due to indiscriminate killing (Cisneros-Heredia, 2010).

The presence of *B. lojanus* in Peru had previously been suggested by Campbell and Lamar (2004), who

mentioned that “this species or a near relative is also found in northern Peru (O. Pesantes, pers. comm.)”. During a recent examination of museum specimens of viperid snakes, we discovered two specimens of *Bothrops* collected in the northwestern part of Peru and identified them as *B. lojanus*. These specimens are the first to confirm the presence of the species in Peru, extending its known distribution south of the type locality by 307 km (Fig. 1).

The specimens (MUSM 13997 and 13998; Fig. 2) are both male and are housed in the herpetological collection of the Museo de Historia Natural de la Universidad Mayor de San Marcos, Lima, Peru (MUSM). They were

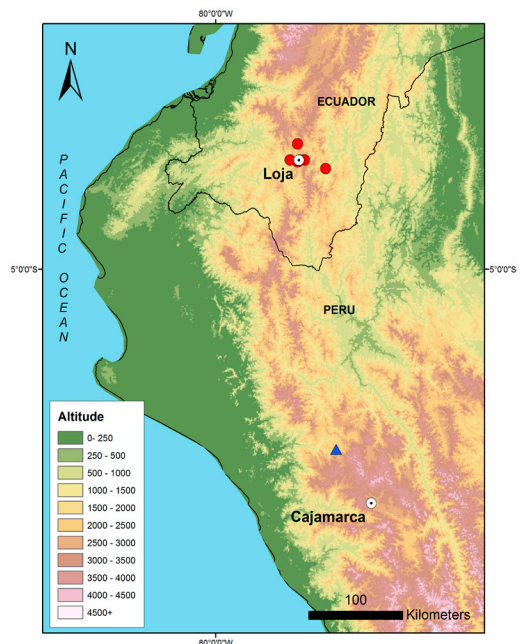


Figure 1. Collecting localities for *Bothrops lojanus* in Ecuador (red circles) and Peru (blue triangle).

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**Figure 2.** Specimens of *Bothrops lojanus* from the locality of Yauyucan, Santa Cruz Province, Cajamarca Department, Perú. (A) Dorsal and (C) ventral body views of MUSM 13997. (B) Dorsal body view and (D) left lateral head view of MUSM 13998.

collected at Yauyucan, Santa Cruz Province, Cajamarca Department, Perú ( $6.6775^{\circ}$  S,  $78.8200^{\circ}$  W, elev. 2500–2600 m; Fig. 1). No further data about the site and date of collection are available. We were also informed that the specimens were initially assessed by the late Omar Pesantes, who catalogued them as members of a putative new species but never published a description. We studied the external morphology of the specimens, following the characters used by Carrasco *et al.* (2012), and compared it to the description of the holotype by Parker (1930) and the description by Campbell and Lamar (2004). We also compared the morphology of the specimens from Cajamarca with that of 16 specimens of *B. lojanus* from Ecuador and of geographically close species of bothropoid snakes (*Bothrocophias microphthalmus*, *Bothrops pictus*, *B. barnetti*, *B. pulchra*). Comparative material (Appendix) is housed in the collections of the

Fundación Herpetológica Gustavo Orcés and Escuela Politécnica Nacional, Quito, Ecuador (FHGO), MUSM, and Centro de Ornitología y Biodiversidad, Lima, Perú (CORBIDI).

The characters of the Peruvian specimens correspond to those of *B. lojanus* (Table 1). They present the typical dorsal colour pattern, including a dark zigzag stripe that tends to become fragmented posteriorly into a series of blotches, and a series of small lateral dark blotches oriented parallel with the middorsal stripe (Fig. 1; see also Plate 596 in Campbell and Lamar, 2004). The values for most characters of lepidosis fall within the known ranges for the species. The specimens of Peru also present an elongated loreal scale, a rare condition among bothropoids reported for *B. lojanus*, and few other Andean species (Harvey *et al.*, 2005; Carrasco *et al.*, 2010).

**Table 1.** Comparison of diagnostic characters of *Bothrops lojanus*, taken from the descriptions of the holotype (Parker, 1939), Campbell and Lamar (2004), the two MUSM specimens from Peru we report on here, and additional specimens from Ecuador we ourselves examined. Abbreviations include SVL (snout–vent length), MSR (middorsal scale rows), and SupL (supralabials). A hyphen (–) indicates missing information.

Character	Holotype ♂	C & L (2004)	MUSM 13997 ♂	MUSM 13998 ♂	Ecuador ♀ n = 5	Ecuador ♂ n = 11
SVL (mm)	418	400–500	509	570	393–526	348–527
Canthals	–	–	1	1	1	1
Intercanths	–	–	5	6	2–4	2–4
Intersupraoculars	3	3–5	7	9	5–7	3–5
SupL	7	7–8	7	7	7–8	7
Infralabials	8	8–10	9	9	9–10	8–10
Prefoveals	–	–	2	2	1–3	1–3
Subfoveals	–	–	0	0	0	0
Postfoveals	–	–	0	0	1–2	1–2
Interrictals	–	–	27	30	22–25	18–25
Interoculabials	1	–	1	1	1–2	1–2
Gulars	–	–	5	5	2–5	1–4
MSR	23	21–23	23	23	21–25	21–25
Ventrals	154	144–154	149	151	150–155	142–154
Subcaudals	41	38–46	43	37	35–42	37–46
Loreal	–	elongated	elongated	elongated	elongated	elongated
Prelacunal	–	usually fused with 2 <sup>nd</sup> SupL	discrete, in contact with 2 <sup>nd</sup> SupL	partially fused with 2 <sup>nd</sup> SupL	fused with 2 <sup>nd</sup> SupL	fused with 2 <sup>nd</sup> SupL
Subcaudals	divided	–	divided	divided	divided	divided

The comparative study of the Ecuadorian and Peruvian specimens revealed some differences in head scales (Table 1). Peruvian specimens present higher numbers of intercanthals, intersupraoculars, interrictals, and gulars than Ecuadorian ones, and one of them possesses a discrete prelacunal scale, a condition absent in the rest of the specimens examined (in which the prelacunal is either partially or totally fused with the second supralabial). Parker (1930) did not allude to this condition in the holotype, but Campbell and Lamar (2004) mentioned that *B. lojanus* usually has the prelacunal fused with the second supralabial.

We believe the variation mentioned above may have led Pesantes to consider the Peruvian specimens as a different species, but we believe that, in the absence of additional information, these differences do not warrant the recognition of a new taxon. The prelacunal condition is a character of diagnostic value within *Bothrops* (e.g., Burger, 1971; Werman, 1992; Salomão et al., 1997; Gutberlet and Harvey, 2004) and alternative conditions for this character are synapomorphic for well-supported groups. However, polymorphism in the prelacunal

condition is present in other Peruvian bothropoids (e.g., *B. barnetti*; Carrasco, unpubl. data). The higher number of some head scales in the Peruvian specimens than in the Ecuadorian ones may follow a geographic pattern, as was observed in *B. asper* where the number of interrictals increases with latitude (Saldarriaga-Cordoba et al., 2009). Passos et al. (2010, 2013) reported variation in ventrals and subcaudals in dipsadid snakes of the genus *Atractus* in its distributional extremes between Ecuador and Peru.

The presence of *B. lojanus* in Yauyucan extends the known distribution of the species 307 km south of the type locality (Fig. 1). The locality of Yauyucan is located approximately 80 km south of the deep valleys of the Huancabamba Depression. The depression interrupts the northern and central Andes and is widely recognized as a major biogeographic discontinuity for Andean organisms (Vuilleumier, 1969; Simpson, 1975; Duellman, 1979; Cadle, 1991; Weigend, 2002; Koch et al., 2013). This interesting geographical pattern raises the question of whether *B. lojanus* has disjunct populations in Ecuador and Peru, or if there exists a



continuous distribution and the gap between Loja and Yauyucan is a sampling artifact. Therefore, additional fieldwork and the study of additional specimens of the Peruvian population of *B. lojanus* are necessary to answer questions about distribution and its taxonomic status.

In Ecuador, the localities where *B. lojanus* has been reported have been greatly altered by agricultural and livestock activities. Additionally, local residents capture and sacrifice individuals to remove body fat for the ill-advised treatment of muscular and respiratory diseases (Valencia, 2010). Even though Yauyucan also shows some environmental degradation, confirmation of *B. lojanus* for the country represents a hope for the conservation of this endangered snake.

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**Appendix. Comparative material.**

*Bothrops lojanus*.—ECUADOR, Loja: Loja, FHGO 883, 3758–59, 3762–3766; km 5, Loja–Zamora road, FHGO 840, 855; km 42, Loja–Saraguro road, FHGO 479; km 2, Zamora–Yanacocha road, FHGO 817; La Tenería, FHGO 830; Zamora Huayco, FHGO 5527; Taquil, Cerro Villonaco, FHGO 3756–57.

*Bothrops barnetti*.—PERÚ, Lambayeque: Olmos, MUSM 23684–85, CORBIDI 1460, 10385–87, 14137; Illimo, CORBIDI 5618, 14136.

*Bothrops pictus*.—PERÚ, La Libertad: Humedal El Tubo, CORBIDI 10378. Ancash: Coleap, MUSM 2265. Recuay, MUSM 25397; Quebrada Culebras, CORBIDI 425, 2072; Chaucayan, CORBIDI 10376. Lima: Mala, CORBIDI 10384; Tornamesa, CORBIDI 2066.

*Bothrops pulchra*.—PERÚ, Amazonas: Bagua Grande, MUSM 2902; Santa Rosa de la Yunga, CORBIDI 15353.

*Bothrocophias microphthalmus*. PERÚ, Amazonas: Bagua Grande, MUSM 2716; Camñopite, CORBIDI 2059. Huánuco: Sira, MUSM 8605. San Martín: Moyobamba, CORBIDI 1242. Cajamarca: N Santa Rosa, Cordillera del Cóndor, CORBIDI 1461–63.