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A NEW SPECIES OF *ATELOPUS* (ANURA: BUFONIDAE) FROM THE CORDILLERA ORIENTAL OF CENTRAL PERU

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ABSTRACT: A new species of *Atelopus* is described from three localities near Oxapampa between 1700 and 2200 m elevation in central Peru, representing the first record for the genus in the Department of Pasco. The new species is readily distinguished from all congeners by its small size (maximum SVL 22.1 mm in males), numerous gray coni on dorsal and lateral body surfaces, and a coloration pattern consisting of a cream dorsolateral stripe, narrow dark brown middorsal stripe, arms and legs dorsally dark brown with grayish brown reticulation, and ventral surfaces of hands and feet reddish orange. Females are unknown.

RESUMEN: Describimos una especie nueva de *Atelopus* proveniente de tres localidades en las inmediaciones de Oxapampa entre los 1700 y 2200 m de altitud en el centro del Perú. Esta especie representa el primer registro del género en el Departamento de Pasco. La nueva especie se distingue de sus congéneres por su pequeño tamaño (SVL ≤ 22.1 mm en machos), la presencia de numerosas espínulas color gris en el dorso y superficies laterales del cuerpo y su particular patrón de coloración, el cual consiste de líneas dorsolaterales color crema, una delgada línea mediodorsal color café oscuro, brazos y piernas color café oscuro con una reticulación café grisacea, y superficies ventrales de las manos y pies color naranja rojizo.

Key words: Andes; Anura; *Atelopus* new species

HARLEQUIN frogs of the genus *Atelopus* are distributed from Costa Rica south to Bolivia in the south and east into the Guianas at altitudes between sea level and near to the permanent snow border. About 115 species have been recognized (Coloma et al., 2007). Many of these stream-breeding bufonid frogs are known to have been decimated by drastic population declines that have been linked to climate change and the epizootic fungus *Batrachochytrium dendrobatidis* (e.g., La Marca et al., 2005). Hence, it is not surprising that the majority of the species are listed as critically endangered under the IUCN Red List (Lötters, 2007). Currently, 14 species of *Atelopus* are recognized from Peru, and at least 16 undescribed species are known (Coloma et al., 2007; Lötters, 2007). Six of the latter were illustrated along with a brief summary of key features by Rueda-Almonacid et al. (2005). Clearly, our knowledge of the diversity of Peruvian *Atelopus* is far from being complete. In central Peru (Departments of Ancash, Huánuco, Pasco, and Ucayali), four *Atelopus* species are known (Fig. 1), *A. dimorphus* Lötters, 2003 (Huánuco), *A. peruensis* Gray and Cannatella, 1985 (southernmost Ancash), *A. reticulatus* Lötters, Haas, Schick and Böhme, 2002 (Huánuco), and *A. siranus* Lötters and Henzl, 2000 (Huánuco). During fieldwork in the surroundings of Oxapampa (Department of Pasco) between 1998 and 2004, several new species of anurans were recorded (e.g., Lehr et al., 2004, 2006) including a species of *Atelopus* not allocable to any of the described taxa. Herein, we describe this new species which represents the first record for the genus in the Department of Pasco.

MATERIALS AND METHODS

To facilitate comparisons among species of *Atelopus*, the format of the description follows that of Coloma et al. (2007). Specimens were preserved in 10% formalin, and stored in 70% ethanol. Adult males were determined externally by the presence of nuptial excrescences covering dorsal surface of Finger I. Specimens without nuptial excrescences were dissected and identified by the character of the gonads. Males without nuptial pads are considered

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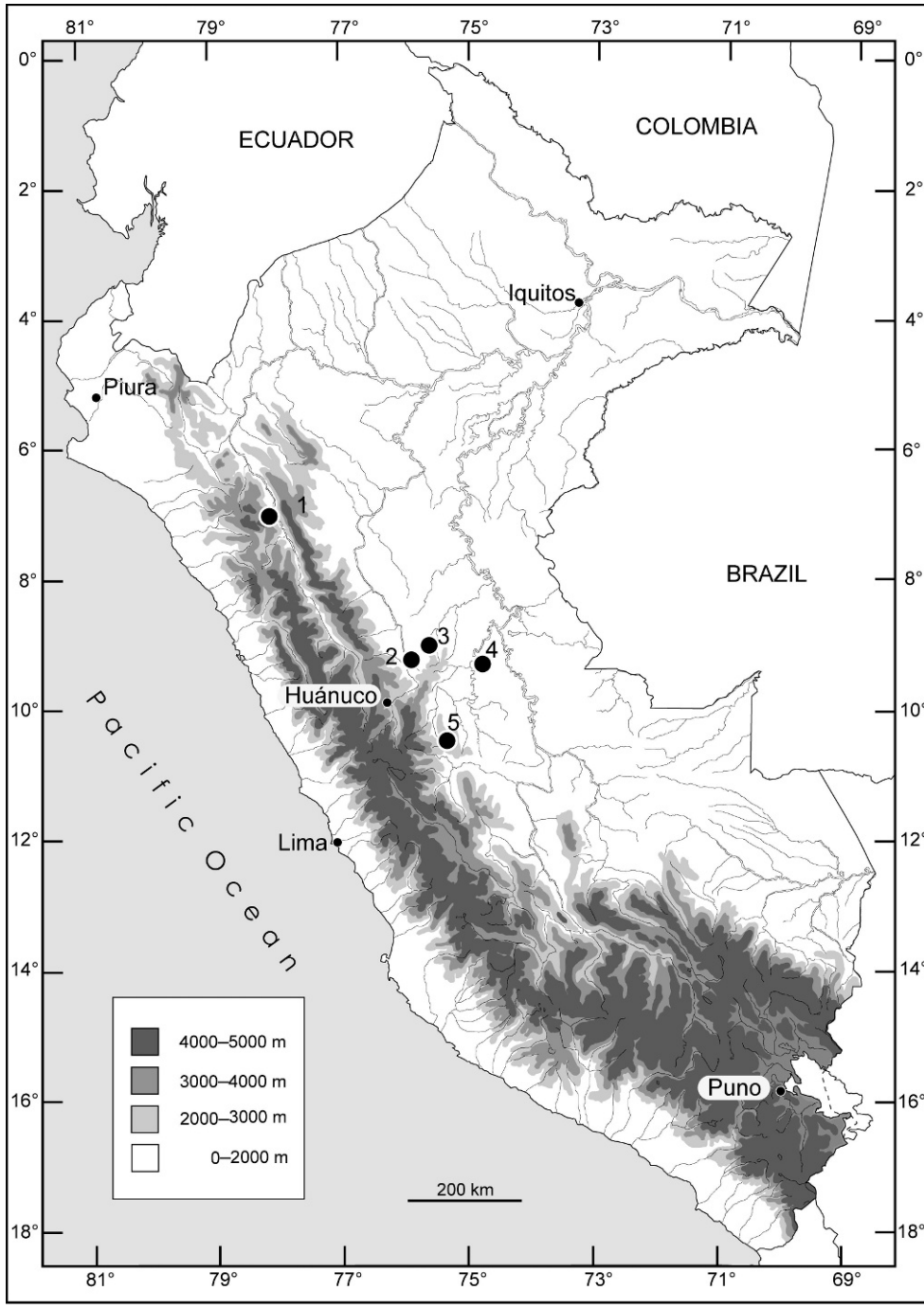

FIG. 1.—Map illustrating the type localities of *Atelopus* known from central Peru: *A. peruensis* (1), *A. dimorphus* (2), *A. reticulatus* (3), *A. siranus* (4), and *A. oxapampae* (5). Distribution (not shown here) of *A. peruensis* reaches from the type locality northwards to the Department of Piura and southwards to the Department of northern Ancash.

FIG. 2.—Lateral (A), dorsal (B) and ventral (C) views of preserved male holotype of *Atelopus oxapampae* (MUSM 19875, SVL 19.1 mm). Photos by E. Lehr.

subadults. We follow the definition of conditions of the tympanum by Lynch and Duellman (1997). The otic region was dissected in two specimens (MUSM 19875, 19948) to evaluate the condition of the tympanic annulus. We use the term spiculae to refer to pustular warts, and coni to refer to spiculae with pointed projections. Definition of measurements follow Gray and Cannatella (1985) and Coloma et al. (2000); they were taken on preserved adults with digital calipers to the nearest 0.1 mm: SVL (snout-vent length), TIBL (tibia length), FOOT (foot length), HLSQ (head length from the squamosal), IOD (interorbital distance), HDWD (head width), EYDM (eye diameter), EYNO (eye to nostril distance), ITNA (internarial distance), RDUL (length of flexed forearm), HAND (hand length), THBL (thumb length), and SW (sacrum width). We indicate webbing formulae in the manner described by Savage and Heyer (1969, 1997) and Myers and Duellman (1982). Coloration in life descriptions are based on photos taken by M. Lundberg. Comparative data were adopted from Lötters and De la Riva (1998), Lötters and Henzl (2000), Lötters et al. (2002*a*,*b*), Rueda-Almonacid et al. (2005), and material examined as listed in Appendix I. Museum acronyms are: AMNH = American Museum of Natural History, new York; BM = British Museum (Natural History); London; CBF = Colección Boliviana de Fauna, La Paz; CRS = private collection of Rainer Schulte, Tarapoto; KU = Natural History Museum, University of Kansas, Lawrence; MNHNP = Muséum national d'Histoire Naturelle, Paris; MUSM = Museo de Historia Natural Universidad Nacional Mayor de San Marcos, Lima; MTD = Museum für Tierkunde Dresden; NHMW = Naturhistorisches Museum Wien; ZFMK = Zoologisches Forschungsmuseum Alexander Koenig, Bonn

Atelopus **oxapampae** *sp. nov.*
Figs. 2–4

Holotype.—MUSM 19875 (ML 626) (Figs. 2, 3A), an adult male from km 34 at 1770 m elevation on Oxapampa–Yaupi road, Distrito de Chontabamba, Provincia de Pasco, Departamento de Pasco, Peru (10° 44′ 44.4″ S, 75° 30′ 02.2″ W), collected by M. Lundberg on 29 November 2003.

Paratypes.—Five adult males: MTD 45912 (same data as holotype), 46308 (from the type locality, collected on 7 February 2004 by M. Lundberg); MUSM 19948 (1 December 1998), MTD 45990 (27 November 1998) collected at San Alberto (10° 32′ 53″ S, 75°

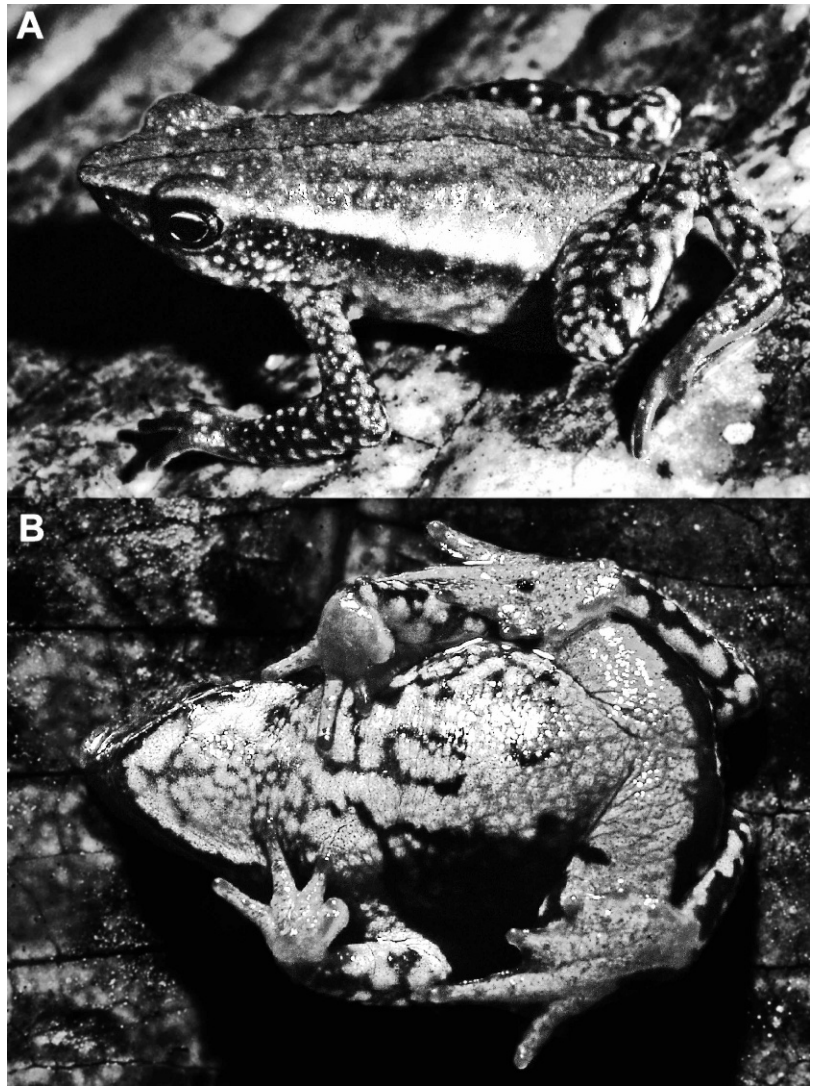

FIG. 3.—Dorsal view (A) of holotype and ventral view (B) of paratype (MTD 45912) of *Atelopus oxapampae* in life. Photos by M. Lundberg.

22′ 17″ W, 2200 m), Distrito de Oxapampa, Provincia de Oxapampa, Departamento de Pasco by C. Aguilar; MUSM 19995 from Yanachaga-Chemillén National Park, unknown date in the late 1990s by J. Icochea.

Diagnosis.—(1) A small species of *Atelopus* (SVL in adult males 19.2–22.1 mm, $n = 3$, females are unknown); (2) body slim (SW/SVL 0.25, $n = 3$), long limbs (TIBL/SVL 0.41–0.45, $n = 3$); (3) apparent phalangeal formula of hand by external examination 1–2–3–3, basal finger webbing absent; (4) webbing formula of toes: **I**(0)—(0)**II**(0)—(0)**III**(0)—(2–3)**IV**(2–3)—1**V**; (5) snout acuminate, distinctly protruding beyond lower jaw; (6) tympanic membrane and tympanic annulus absent; (7) dorsal and lateral surfaces (except for anterior surfaces of thighs) bearing numerous gray coni; venter lacking coni except for ventrolateral surfaces of upper arms, chest, and posterior margin of throat; (8) males with minute keratinized spines on dorsal and

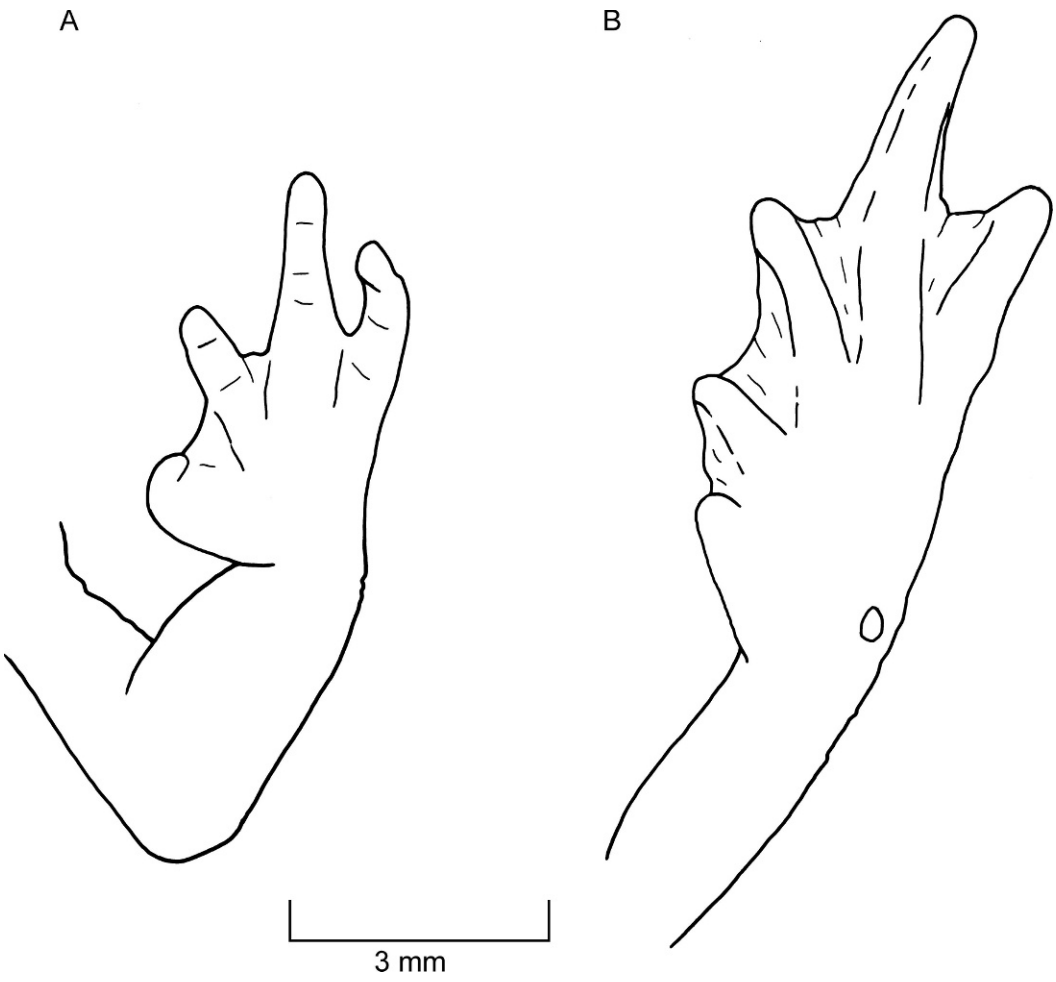

FIG. 4.—Ventral views of hand (A) and foot (B) of holotype *Atelopus oxapampae*. Drawings by E. Lehr.

TABLE 1.—Measurements (in mm) of adult (MUSM 19995, MTD 45912) and subadult (MUSM 19948, MTD 45990, 46308) male paratypes of *Atelopus oxapampae*.

Character	MUSM 19995	MTD 45912	MUSM 19948	MTD 45990	MTD 46308
SVL	22.1	19.3	18.5	17.6	16.4
TIBL	9.1	8.6	7.2	8.1	7.1
FOOT	8.8	7.3	6.3	6.6	5.9
HLSQ	8.6	7.4	6.2	7.1	6.3
IOD	2.6	2.3	2.1	2.3	2.2
HDWD	6.6	5.5	5.4	5.6	5.0
EYDM	2.1	1.9	1.9	1.9	1.7
EYNO	2.1	1.8	1.7	1.7	1.6
ITNA	2.5	1.9	2.1	1.9	1.9
RDUL	6.0	5.0	4.4	5.0	4.5
HAND	5.6	4.8	3.8	4.3	3.8
THBL	2.8	2.1	1.8	1.9	1.8
SW	5.5	4.8	4.1	4.4	4.4

lateral surfaces of thumb; (9) vertebral neural processes not visible externally; (10) in life, dorsum grayish brown with narrow dark brown middorsal stripe, arms and legs dark brown with grayish brown reticulation, cream dorsolateral stripe distinctly bordered ventrolaterally by a dark brown band (in preservative, dorsum pale grayish brown with gray coni, arms and legs brown with pale gray reticulation, dorsolateral stripe pale gray bordered ventrolaterally by a brown band); (11) throat pale gray with dark gray reticulations, chest and anterior half of belly pale gray with bold black reticulation and greenish yellow tint, thighs, ventral surfaces of feet and hand reddish orange (in preservative ventral surfaces pale grayish cream with grayish-brown reticulations on throat, chest, and belly).

Atelopus oxapampae is readily distinguished from all its congeners by the combination of small size, numerous gray coni covering dorsal and lateral body surfaces, and a life coloration consisting of a narrow dark brown middorsal stripe, cream dorsolateral stripe, arms and legs dark brown with grayish brown reticulation, and ventral surfaces of hands and feet reddish orange. Nine other described Peruvian *Atelopus* have part of the venter as well as ventral surfaces of hands and feet reddish or pinkish, which are *A. andinus* Rivero, 1968, *A. dimorphus*, *A. erythropus* Boulenger, 1903, *A. pulcher* (Boulenger, 1882), *A. reticulatus*, *A. siranus*, *A. seminiferus* Cope, 1874, *A. spumarius* Cope, 1874 (actually a species complex; Lötters et al., 2002*b*), *A. tricolor* Boulenger, 1902, as well as two undescribed taxa, i.e., *Atelopus* sp. 10, *Atelopus* sp. 11 as listed by Rueda-Almonacid et al. (2005). In four of these, males are distinctly larger than in *A. oxapampae* (SVL 19.1–22.1 mm): *A. andinus* (SVL 26.4–27.5 mm), *A. pulcher* (SVL 25.2–29.3 mm), *A. seminiferus* (SVL 33.8–35.2 mm), and *A.* sp. 10 (SVL between 40 and 50 mm, according to Rueda-Almonacid et al., 2005). Furthermore, *A. andinus* and *A. pulcher* have a dark brown or black dorsum with irregular green or greenish-yellow dorsal and dorsolateral markings (single cream dorsolateral stripe on each side clearly defined and ventrolaterally bordered by dark brown in *A. oxapampae*). Also *A. pulcher* is dorsally and laterally largely smooth (*A. oxapampae* dorsally and laterally with numerous coni), and *A. andinus* has a shorter thumb than *A. oxapampae* (THBL 1.5–1.9 mm versus > 1.8 mm in the new species, THBL/HAND 23.8–31.6 versus > 0.44 in the new species; Tables 1–2; Lötters and De la Riva, 1998). *Atelopus seminiferus* lacks dorsal and dorsolateral stripes and has a black dorsum with minute yellow spots (dorsum grayish brown with narrow dark brown middorsal stripe in *A. oxapampae*) and lacks coni (present in the new species), and *A.* sp. 10 has a broad cream dorsolateral stripe (narrow in *A. oxapampae*), and smooth skin (skin dorsally and laterally with numerous coni in *A. oxapampae*).

TABLE 2.—Ranges (in mm) followed by mean and standard deviation and proportions of adult type specimens of *Atelopus oxapampae*.

Characters	Males (n = 3)
SVL	19.1–22.1 (20.2 ± 1.7)
TIBL	8.5–9.1 (8.7 ± 0.3)
FOOT	6.9–8.8 (7.7 ± 1.0)
HLSQ	7.0–8.6 (7.7 ± 0.8)
IOD	2.2–2.6 (2.4 ± 0.2)
HDWD	5.5–6.6 (5.9 ± 0.6)
EYDM	1.9–2.2 (2.1 ± 0.2)
EYNO	1.8–2.1 (1.9 ± 0.2)
ITNA	1.9–2.5 (2.1 ± 0.3)
RDUL	5.0–6.0 (5.4 ± 0.6)
HAND	4.8–5.6 (5.1 ± 0.5)
THBL	2.1–2.8 (2.4 ± 0.4)
SW	4.8–5.5 (5.0 ± 0.4)
SW/SVL	0.25
HDWD/SVL	0.28–0.30
HDWD/HLSQ	0.74–0.81
HLSQ/SVL	0.37–0.39
TIBL/SVL	0.41–0.45
FOOT/TIBL	0.81–0.97
RDUL/SVL	0.26–0.27
THBL/HAND	0.44–0.50

Seven species share with *A. oxapampae* (SVL 19.1–22.1 mm) small male size: *A. dimorphus* (SVL 21.6–24.9 mm), *A. erythropus* (SVL 20.4 mm in the only known specimen, the male holotype), *A. reticulatus* (SVL 24.7 mm in the only known male), *A. siranus* (SVL 22.5 and 23.5 mm in the only known male specimens), *A. spumarius* sensu stricto, the smallest form within *A. spumarius* sensu lato (SVL 19.3 mm in a male examined by Asquith and Altig, 1987), *A. tricolor* (SVL 20.4–27.0 mm), and *A.* sp. 11 (SVL below

30 mm, according to Rueda-Almonacid et al., 2005). Three of these (*A. dimorphus*, *A. erythropus*, and *A. siranus*) lack a dorsolateral line and coni (both present in *A. oxapampae*). Furthermore, the dorsal snout shape in *A. erythropus* is 'blunt' (see photograph of holotype in Lötters, 2003:174) in contrast to the acuminate snout shape in *A. oxapampae*. While *A. dimorphus* and *A. erythropus* are uniformly colored on dorsal sides (in preservative, olive and brown, respectively versus pale grayish brown with gray markings in the new species), *A. siranus* is similar to *A. oxapampae* by having light dorsal pattern; however, the patterns of the two are different, i.e., dorsal spots in *A. siranus* versus dorsolateral stripes in *A. oxapampae*. *Atelopus spumarius* sensu lato has dorsum dark brown or black (dorsum grayish brown in *A. oxapampae*) with green or yellow dorsal markings and dorsolateral line often interrupted by annuli (dorsolateral line without interruptions in *A. oxapampae*), and largely smooth skin (skin with numerous coni, spinous in *A. oxapampae*). Both *Atelopus reticulatus* and *A. oxapampae* have a pale dorsolateral line (yellowish green in *A. reticulatus* versus cream in *A. oxapampae*), which is bordered ventrolaterally by a broad dark brown band in *A. oxapampae* and a dark brown reticulated line in *A. reticulatus*. *Atelopus reticulatus* has greenish or yellowish reticulation on the dorsum (dorsum grayish brown with narrow dark brown middorsal stripe), skin without coni (present in *A. oxapampae*). *Atelopus* sp. 11 and *A. oxapampae* share a pale dorsolateral stripe, but *A.* sp. 11 has dorsum uniformly dark brown (grayish brown with narrow dark brown middorsal stripe in *A. oxapampae*), and dorsal skin in males slightly granular (with numerous coni in *A. oxapampae*). *Atelopus tricolor* has a broad, yellowish mustard colored dorsolateral line accompanied by irregular dorsal markings (dorsolateral line narrow and cream colored and dorsal markings absent in *A. oxapampae*). This species also differs genetically from *A. oxapampae* (see below).

Atelopus pulcher and *A. spumarius* sensu lato possess tympanic membranes, and tympanic annuli which are absent in the new species described here.

The only other described species of *Atelopus* from central Peru is *A. peruensis*, which is larger (male SVL > 32 mm), has a more robust, toad-like body, and in life is dorsally green and black without stripes (Gray and Cannatella, 1985).

Description of holotype.—Body slim (SW/SVL = 0.25), head longer than wide (HLSQ/HDWD = 1.23), HLSQ more than one third SVL (HLSQ/SVL = 0.37), HDWD less than one third SVL (HDWD/SVL = 0.30); snout acuminate in dorsal view, with tip of snout distinctly protuberant to anterior margin of jaw; nostrils slightly protuberant anteriorly, directed laterally, barely visible from above, situated posterior to level of apex of lower jaw; canthus rostralis distinct and covered with coni, convex from tip of snout to nostril, nearly straight from nostril to eye, swollen posteriorly; loreal region slightly concave; lips not flared; interorbital and occipital regions flat, rostral area concave, all bearing coni; eyelid flared bearing coni; postorbital crests slightly raised, narrow; tympanic membrane and tympanic annulus absent; tympanic area covered with coni; choanae small, rounded, widely separated, concealed by palatal shelf of maxillae; tongue about 2.5× as long as wide, its posterior half not attached to mouth's floor; ostia pharyngea and vocal slits absent.

Forearm relatively short (RDUL/SVL = 0.27), 1.5× as thick proximally as distally; nuptial pad on dorsal and outer surfaces of thumb consisting of minute keratinized spines, without magnification barely distinguishable from black pigmentation of hand; palmar, supernumerary palmar, thenar and subarticular tubercles indistinct; digital tips with round pads; thumb short (THBL/HAND = 0.48), apparently having one phalange; basal webbing on fingers absent, fingers lacking lateral fringes; relative length of fingers II < III < V < IV (Fig. 3A).

Tibia long (TIBL/SVL = 0.45); fold on distal half of inner edge of tarsus absent; inner metatarsal tubercle indistinct; outer metatarsal tubercle conical, low raised; supernumerary plantar and subarticular tubercles indistinct; digital pads distinct; webbing formula of toes **I**(0)—(0)**II**(0)—(0)**III**(0)—(2)**IV**(2)—(1)**V**; relative length of toes I < II < III = V < IV (Fig. 3B). Vertebral neural processes

not visible externally; dorsal and lateral surfaces (except for anterior surfaces of thighs) bearing numerous gray coni, largest on extremities; skin of throat, chest, and belly smooth; venter lacking coni except for ventrolateral surfaces on upper arms, chest and posterior margin of throat; cloacal opening slightly above midlevel of thighs, directed laterally; skin lateral to cloacal bearing coni.

Measurements of holotype (in mm).—SVL: 19.1; TIBL: 8.5; FOOT: 6.9; HLSQ: 7.0; IOD: 2.2; HDWD: 5.7; EYDM: 2.2; EYNO: 1.9; ITNA: 2.0; RDUL: 5.1; HAND: 4.8; THBL: 2.3; SW: 4.8.

Coloration of holotype in preservative.—Dorsum pale grayish brown with gray coni, dorsolateral stripe pale gray bordered ventrolaterally by a brown band; posterior surfaces of thighs cream with a horizontal dark brown, irregularly shaped stripe; ventral surfaces pale grayish cream with grayish-brown reticulations on throat, chest, and belly.

Coloration of holotype in life.—Dorsum grayish brown with narrow dark brown middorsal stripe, arms and legs dark brown and grayish brown reticulated; cream dorsolateral stripe distinctly bordered ventrolaterally by a dark brown band; throat pale gray with dark gray reticulations, chest and anterior half of belly pale gray with bold black reticulations and greenish yellow tint, thighs, ventral surfaces of feet and hand reddish orange; pupil surrounded by golden ringlet.

Variation.—Coloration in life is only known for one paratype (MTD 45912, Fig. 3B), which differs from the holotype in having less amount of red coloration on ventral surfaces. In preservative, one specimen (MTD 46308) has ventral surfaces of hands, feet, thighs, posterior part of belly, chest, and outer margin of throat faded to pink. All specimens have (in preservative) a narrow dark brown middorsal stripe and a pale gray dorsolateral stripe bordered ventrolaterally by a dark brown band. The largest male (MUSM 19995) has the most protruding snout and the most coni on the dorsal and lateral surfaces, which are largest on the arms. Three males (MUSM 19875, 19995, MTD 45912) have nuptial pads on dorsal and lateral surfaces of the thumb, the other individuals lack nuptial pads which either indicates seasonal variation or more likely that ontogenetic development of this character is reached at a larger body size (SVL 19.1 mm for smallest male bearing nuptial pads). For measurements of the type series of *A. oxapampae* see Table 1; for ranges and proportions see Table 2.

Due to the absence of females among the type series we lack information about sexual dimorphism (e.g., size or coloration in females). In *Atelopus*, females are usually larger than males and have ventral surfaces covered with more red than males, if red coloration occurs.

Etymology.—The specific name *oxapampae* refers to the city Oxapampa in the surroundings of which the new species was found.

Distribution and ecology.—*Atelopus oxapampae* is known from three localities in the department of Pasco at elevations between 1770 and 2200 m a.s.l., all within a distance of 26 kilometers. The type locality (Fig. 5) is a narrow creek that crosses the road between Oxapampa and Yaupi at km 34. The creek is approximately half a meter wide and runs along the steep hillside, eventually it ends up in Río Paucartambo. Typical dense cloud forest vegetation covers the creek and direct sunlight rarely reaches the ground. The holotype and one paratype (MTD 45912) were found on leaves at 10–30 cm above the ground and less than half a meter distance from the creek. A third specimen (MTD 46308) was found on the road side slope about one meter above the road level and approximately one meter from the creek. All three specimens were found at night between 2000 and 2100 h. The vegetation of the road side is cut down on a regular basis as part of the road maintenance. Syntopic species at the type locality include *Pristimantis flavobracatus*, *P. rhabdocnemus*, and *Hyalinobatrachium bergeri*.

San Alberto is located close to the Yanachaga-Chemillén National Park. The vegetation at San Alberto consists of secondary forest and open areas used as grass land. All specimens were found in secondary forest next to a creek: One specimen (MUSM 19948) was found between 2200 and 2400 h on a leaf 1 m above ground, the other specimen (MTD 45990) was found on a leaf about 1.5 m above ground. Syntopic species at

FIG. 5.—Type locality of *Atelopus oxapampae*. See text for description. Photo taken by M. Lundberg on 1 June 2003.

San Alberto include *Pristimantis bromeliaceus*, *P. sagittulus*, *Hypsiboas* sp., and *Scinax oreites*. Females and the tadpole of *A. oxapampae* are unknown.

Phylogeny.—Little is known about phylogenetic relationships of species of *Atelopus*. Using a ca. 590 base-pair fragment of the mitochondrial 16S rRNA gene, S. Lötters and collaborators are currently studying systematics of Amazonian *Atelopus*. Among the species which are morphologically similar to *A. oxapampae* (see above) only *A. pulcher*, *A. seminiferus*, *A. spumarius* sensu lato and *A. tricolor* could be included in a preliminary analysis. In addition, an apparently undescribed, *pulcher*-like species (neither *Atelopus* sp. 10 nor sp. 11 of Rueda-Almonacid et al., 2005, mentioned above) from the Department of Cuzco, Peru, was included. Results indicate that *A. oxapampae* (MTD 45912; GenBank accession number EU672979; http://www.ncbi.nlm.nih.gov) is nested within a clade of species from southern Peru and adjacent Bolivia, i.e., *A. tricolor* (EU672978) and the apparently undescribed species from the Department of Cuzco (EU672980). Uncorrected pairwise sequence divergence is 6.3% and 9.2%, respectively, while the other species mentioned show larger distances.

Remarks

The Yanachaga-Chemillén National Park is located in eastern central Peru, covering 122,000 ha between 300 and 3644 m elevation. Several species of amphibians have been described from this national park recently, including five species of *Phrynopus* (Chaparro et al., 2008; Duellman and Hedges, 2008; Hedges, 1990), nine *Pristimantis* (Boano et al., 2008; Duellman and Hedges, 2005, 2007; Lehr et al., 2004), one *Gastrotheca* (Duellman et al., 2006), one species of microhylid (Lehr and Trueb, 2007), and one *Rhinella* (Lehr et al., 2007), all of which are endemic to the Cordillera Yanachaga. Whereas the surroundings of the park are intensively used as plantations (e.g., coffee) or for cattle breeding, the national park consists of primary cloud forests with little to no anthropogenic influence. Based on the distribution of the new species and its occurrence in a protected area of 122,000 ha, the likely Red List status of *Atelopus oxapampae* is "critically endangered". According to Lötters (2007), there are nine other Peruvian *Atelopus* under this Red List status. With *A. oxapampae*, these are one third of all known *Atelopus* species from this country. Some of these occur in protected areas, as the new species described herein, which apparently does not prevent these animals from high extinction risk. Along with findings by La Marca et al. (2005), who pointed out that in recent years 22 species of *Atelopus* from protected areas over the genus' entire distribution range have disappeared, in situ conservation action is apparently not sufficient to protect diversity loss in *Atelopus*. These amphibians are in need of complex survival programs including *ex situ* conservation measures, as anchored in the IUCN Amphibian Conservation Action Plan (see Lötters, 2007).

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Appendix I

Comparative Specimens Examined

Atelopus andinus: PERU: San Martín: upper Río Biabo valley, AMNH A42657 (paratype), A43200 (holotype); Loreto: Río Pisqui, AMNH A43545 (paratype); border area of San Martín-Loreto: Río Cachiyacu (Tocachi), AMNH A42914, A43296–927 (paratypes). *Atelopus dimorphus:* PERU: Huánuco: Cordillera Azul, KU 209387–393 (holo- and paratypes). *Atelopus erythropus:* PERU: Puno: Santo Domingo, Cordillera Carabaya, BM 1947.2.14.65 (holotype). *Atelopus pulcher:* PERU: San Martín: vicinity of Tarapoto, KU 211676–683, 212530, ZFMK 48573, 50680–685, 76243–244; Chyavetas (= Departamento de Loreto: Chayahuitas), BM 1947.2.14.80–82 (lecto- and paralectotype). *Atelopus reticulatus:* PERU: Ucayali: Cordillera Azul, circa 3 km by road after Divisoria on the Tingo María-Pucallpa road, ZFMK 76246–247 (para- and holotype). *Atelopus seminiferus:* PERU: San Martín: Alto Mayo, CRS A4, A5. *Atelopus siranus:* PERU: Huánuco: Serranía de Sira, NHMW 33906:1 (paratype), NHMW 33906:2 (holotype). *Atelopus spumarius* sensu stricto: PERU: Loreto: Colonia, Río Ampiyacu, MNHNP 1979/8382 (neotype); 3 km north-east of Pebas, AMNH A 103–31–35. *Atelopus tricolor:* PERU: Cuzco: Marcapata valley, BM 1947.2.14.57–59 (paralectotypes), ZFMK 28103 (lectotype); 4 km south-west of Santa Isabel, Río Cosñipata, KU 162988; Puno: vicinity of Juliaca, AMNH 6097 (holotype of *A. rugulosus*); BOLIVIA: La Paz: 17 km from Carrasco, Serranía de Bellavista, CBF 285–288; Río Ñeques, circa km 10 on Charazani-Apolo road, Yungas de La Paz, CBF 2502; Pilon-Lajas, CBF 2487; Cochabamba: Río Ronco, Chapare, CBF 892; "old" road from Villa Tunari to Cochabamba, Chapare, ZFMK 69919–920.