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Annotated list of amphibian records from the Departamento Pando, Bolivia, with description of some advertisement calls

Jörn Köhler & Stefan Lötters

Abstract. An annotated list of amphibian records from the Departamento Pando, Bolivia, is provided. The list is based on the compilation of literature data as well as on own fieldwork carried out in January 1998 at the town of Cobija and its vicinity. The species *Bufo castaneoticus, Epipedobates hahneli, Leptodactylus didymus* and *Vanzolinius discodactylus* are recorded for the first time from Bolivian territory. The comparatively low number of amphibian species known from the region rather reflects inadequate investigation efforts than actually a low species diversity. In addition, the advertisement calls of five anuran species are described and illustrated.

Key words. Amphibia, Anura, *Bufo castaneoticus, Epipedobates hahneli, Leptodactylus didymus, Vanzolinius discodactylus*, first records, species list, advertisement calls, Amazonia, Pando, Bolivia.

Introduction

Herpetological research activities in Bolivia increased remarkably in recent years. Investigated areas mainly include the northern lowlands of the Departamento Santa Cruz (e. g., De la Riva 1993; Köhler & Böhme 1996), the Yunga region (e. g., De la Riva 1992, 1994; Köhler et al. 1995a) and adjacent Andean dry-valley habitats (e. g., Harvey 1994; Köhler et al. 1995b), and the southern Beni savannahs (Reichle 1997). In contrast, the knowledge of the herpetofauna of Bolivia's northernmost Amazonian regions, namely the Departamento Pando, is still very poor. The only available distribution data referring to amphibian species were published by Heyer (1970; 1994), Fugler (1984), De la Riva (1990) and De la Riva et al. (1996). In addition, Aparicio (1992) listed species found in the Reserva Manuripi-Heath, but several of them with incomplete and some with questionable identifications. Compiling the amount of published data, only 29 amphibian species are known from the Departamento Pando. When comparing with species lists from nearby Amazonian sites in Peru (e. g., Rodríguez & Cadle 1990; Duellman & Thomas 1996), it becomes obvious that such a low number of species presently reported from the Departamento Pando rather reflects inadequate investigation efforts.

In January 1998 we were able to search for amphibians in the town of Cobija, capital of the Departamento Pando, and its vicinity. The objectives of this paper are to (1) provide a preliminary list of amphibian species recorded from the Departamento Pando; (2) comment on certain species found by us and reported in the literature; (3) describe the advertisement calls of five anuran species.

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Material and methods

The study site Cobija is located within the south-western Amazonian basin (at approximately 11°00'S / 68°45'W) exhibiting a semi-humid climate. A dry season is recognisable from May to August. Mean annual precipitation is 1855 mm, with a mean annual temperature of approximately 26.0 °C (mean values from 1986 to 1995, taken at Cobija airport). Between 13 and 19 January 1998 collecting at Cobija and its vicinity was done randomly at sites which were (a) found to be adequate for frogs (e. g., ponds, swamps), (b) more or less easily accessible (e. g., forest trails), and (c) sites where frogs were heard calling. In total, we searched about 12 person days (compare Duellman & Mendelson 1995). Areas studied included the following habitat types: (a) open habitats with cleared vegetation; (b) secondary growth, bush, and scrubby vegetation; (c) forest swamp; (d) disturbed primary forests. Undisturbed primary rainforest was not accessible due to limited sampling time. The elevational range of studied sites varied between 200 and 300 m above sea level.

Measurements of specimens were taken with dial callipers to the nearest of 0.1 millimetre (mm). Snout-vent length is abbreviated SVL. Descriptions of coloration in life were done after colour slides and field notes. Geographic positions were obtained using a Magellan 3000 XL GPS receiver. Air and water temperatures were measured with a Greisinger GTH 215 digital thermometer. Frog calls were recorded using an Aiwa HS-F150 tape recorder, a Sennheiser Me-80 directional microphone, and TDK MA60 cassettes. Recordings were analysed using a Medav Mosip-3000 sound spectrograph and Spektro 4.4 (version 1996) software. Spectrograph settings for frequency and time ranges and resolutions were chosen according to the essential structural parameters to be measured for the calls of each species. Spectrograms and oscillograms of representative calls are provided (FFT width 512). Terminology of call description follows Heyer et al. (1990). Repetition rates were calculated according to method B of Scoville & Gottlieb (1978). Families, genera and species are listed in alphabetical order. Collected specimens are deposited in the Colección Boliviana de Fauna (CBF), La Paz, and the Zoologisches Forschungsinstitut und Museum Alexander Koenig (ZFMK), Bonn. Specimens from the Museu de Zoologia da Universidade de São Paulo (MZUSP) were used for comparisons.

Notes on recently collected specimens and description of advertisement calls

In the following we comment on certain species recently collected by us. We describe the advertisement calls of five species for which call data were not available before, at least from Bolivian populations. Numerical parameters of the calls described are summarised in Table 1.

Bufo castaneoticus Caldwell, 1991

Bufo castaneoticus was described from the Rio Xingu, Pará, Brazil (Caldwell 1991). Thus far, this toad has not been reported from other localities, although Hoogmoed (in litt., 24 February 1998) provided information that it is widely distributed in the lower Amazon basin. In external characters the Cobija population (Fig. 1) generally coincides with the data provided by Caldwell (1991) and topotypic material examined by us (MZUSP A67188, A67196). Cobija specimens exhibit the following main characters: small size (SVL of two females 34.3 and 38.5 mm; SVL of four males 35.3–37.7 mm); supratympanic crests not enlarged; neural crests of vertebrae absent; body lacking lateral rows of enlarged tubercles; dorsal skin in males smooth, that of females tubercular. Principal differences to topotypic *B. castaneoticus* refer merely to the bony protrusions at angles of jaws (being slightly larger in the Cobija population), and proportions of tubercles on hands and feet. In all six specimens of the Cobija population the thenar tubercle is about half size of the palmar tubercle (versus one third in topotypic material examined by us and the type series according

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Table 1: Summary of numerical parameters of the advertisement calls of five anuran species recorded at Cobija, Departamento Pando, Bolivia (mean ± SD, range in parentheses).

	Bufo castaneoticus	*Colostethus* sp. A (?)	*Epipedobates hahneli*	*Phyllomedusa palliata*	*Leptodactylus didymus*
air temperature [°C]	26.0	28.0	26.9	25.5	26.5
individuals analysed	1	1	1	1	2
calls analysed	17	10	26	6	23
notes per call	9.1±1.1 (7–12)	2.0±0.0 —	1.0±0.0 —	1.0±0.0 —	1.0±0.0 —
call duration [ms]	204.2±25.6 (180–273)	121.4±3.2 (116–127)	17.2±1.9 (15–19)	26.2±3.1 (23–32)	117.6±10.5 (97–140)
note duration [ms]	10.5±3.8 (5–20)	39.2±4.9 (31–48)	17.2±1.9 (15–19)	26.2±3.1 (23–32)	117.6±10.5 (97–140)
notes/minute	2647.9±86.7 (2500–2775)	441.5±118.6 (214–560)	513.7±17.8 (506–540)	47.9±32.7 (13–98)	133.8±7.2 (122–141)
dominant frequency range [Hz]	900–2600	4000–4900	3700–5600	850–5200	630–1320
dominant frequency [Hz]	1650	4450	4560	1580	780
calls pulsed	+	+	—	+	—

Fig. 1: Male of *Bufo castaneoticus*.

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to Caldwell [1991]) and the inner metatarsal tubercle is approximately two times as large as the outer (versus three times in topotypic material). For these reasons, we conclude that the name *B. castaneoticus* is principally applicable to the Cobija population. However, this allocation is tentative because thus far no other record of *B. castaneoticus* is known from the upper Amazon basin and hence it cannot be excluded that the Cobija population represents an undescribed species. According to Hoogmoed (1990), *B. proboscideus* is a western Amazonian taxon. Caldwell (1991) discussed its relationship to *B. castaneoticus* and noted that *B. proboscideus* is considerably larger.

Four males called at night from a small water-filled hole in the ground (diameter approximately 15 cm) within primary forest. Females were also present in the hole and one amplectant pair was collected. The advertisement call (Fig. 4; mean call duration 204.2 ms) was a group of 7 to 12 notes (mean note duration 10.5 ms), repeated in regular intervals (2647.9 notes/minute). The notes (equals pulse groups sensu Schneider & Sinsch [1991]) were pulsed, mostly consisting of only one pulse at the beginning of the call and having up to four pulses at the end of the call. Call energy was distributed between 900 and 2600 Hz, with a dominant frequency of 1650 Hz. Calls were emitted in call groups consisting of 2 to 5 calls. Compared with calls of Bolivian members of the *Bufo margaritifer* complex published by De la Riva et al. (1996) and Köhler et al. (1997), the call of *B. castaneoticus* differs by having shorter call and note duration, higher note repetition rate within the call (equals pulse groups/minute) and a higher dominant frequency.

Bufo species A (*margaritifer* complex)

Toads generally referred to *Bufo margaritifer* (= *B. "typhonius"*) comprise a complex of species (e.g., Hoogmoed 1990). The author recognised seven species (*B. acutirostris, B. ceratophrys, B. dapsilis, B. margaritifera, B. nasicus, B. proboscideus,* and *B. roqueanus*) but emphasized that the complex needs further revision and that several species will have to be described. In addition, Caldwell (1991) named *B. castaneoticus* and La Marca & Mijares-Urrutia (1996) redescribed *B. sternosignatus*. Others (e.g., Reynolds & Foster 1992; Duellman & Mendelson 1995) identified species but desisted from assigning names to them unless the whole *B. margaritifer* complex will be revised. We follow this procedure for a member of the complex collected at Cobija (Fig. 2). Two adult males of this population exhibit the following characters (generally following the standards of Duellman & Mendelson [1995]): (1) SVL 41.7 and 44.5 mm; (2) snout pointed in dorsal view, protruding beyond margin of lip, pointed above, and slightly curved posteroventrally in profile; (3) nostrils protuberant at point anterior to anterior margin of lower jaw; (4) canthal crest not elevated; supraorbital and supratympanic crests continuous; (5) tympanum round, distinct, 58 and 62 % diameter of eye; (6) bony protrusion at angle of jaws small; (7) neural crests of vertebrae barely protruding or absent; (8) parotoid glands triangular or kidney-like, protruding laterally, incorporated into lateral row of tubercles; (9) lateral row of conical tubercles present; (10) skin on dorsum tubercular; (11) skin on dorsal surfaces of limbs spinous; (12) first and second finger equal in length; (13) palmar tubercle large, ovoid, two times size of subtriangular thenar tubercle; (14) inner metatarsal tubercle rounded, four times size of outer rounded

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Fig. 2: Male of *Bufo* sp. A (*margaritifer* complex).

metatarsal tubercle; (15) moderate webbing on foot: I 1—2 II 1—2$^+$ III 2$^-$—3$^1/_2$ IV 3$^1/_2$—1$^+$ V; (16) vocal slits and nuptial excrescences present. In life, all dorsal surfaces had an irregular pattern of light and dark brown with a light brown middorsal line; one individual had few black markings on the dorsum and greyish markings below and behind eye; dorsolateral tubercles were reddish white to reddish brown; posteroventrally and below limbs with numerous greyish-white spots; iris yellow golden with black reticulation.

Previously, members of the *B. margaritifer* complex have been reported from different Bolivian sites, namely from the Departamentos Beni, Cochabamba, La Paz and Santa Cruz (De la Riva 1990; Reynolds & Foster 1992; De la Riva et al. 1996; Köhler et al. 1997). At least three different species of the complex (with exception of *B. castaneoticus*) are distinguishable in Bolivia. Two species inhabit the tropical lowlands and one occurs in perhumid montane rainforests up to 2100 m.

Colostethus trilineatus (Boulenger, 1883)

Morales (1994) referred Bolivian lowland populations of *Colostethus* to *C. trilineatus*. This was followed by De la Riva et al. (1996). We assign the specimens collected in the Cobija region (SVL 16.2 and 17.2 mm) as well as the population reported as *C. marchesianus* by Reichle & Köhler (1996) from Estación Biologica del Beni to *C. trilineatus* only tentatively, because to our opinion taxonomic relationships of *Colostethus* from the Amazon basin have not been sufficiently studied. A single recorded call coincides well with the data provided by De la Riva et al. (1996) for calls of *C. trilineatus* from Cuzco Amazónico, Peru.

Colostethus species A

Among our collection of *Colostethus* a second morphotype (Fig. 3) was recognised. Two specimens (SVL 18.7 and 19.4 mm) are larger than *C. trilineatus* and lack latero-

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Fig. 3: *Colostethus* sp. A from the vicinity of Cobija.

ventral stripes; instead they have white marks. The dorsolateral stripes are broadened behind the head about three times of their posterior width, thus resulting in a scapular hour glass pattern. In life, ventral surfaces were bright yellow. We suggest that these two specimens are most probably not conspecific with *C. trilineatus*. However, information is only insufficient and we therefore desist from assigning a name.

At a forest swamp near Cobija we recorded an advertisement call (Fig. 5) which probably corresponds to this species. However, since we did not see the frog individual calling, we do not assign the calls to *Colostethus* sp. A with certainty. The call (mean call duration 121.4 ms) consisted of two pulsed notes (mean note duration 39.2 ms). Interval duration between the two notes varied from 30 to 41 ms (mean 36.7 ± 3.1). Notes were repeated with a rate of 441.5 notes/minute. Call energy was distributed between 4000 and 4900 Hz, with a dominant frequency of 4450 Hz. The second note was always slightly higher in frequency than the first note of the call (ca. 100 Hz difference). Compared with calls of *C. trilineatus* from Cuzco Amazónico, Peru (De la Riva et al. 1996) and from Cobija (own data) our recordings mainly differ by having longer note duration and lower dominant frequency (4450 versus 5400 Hz). However, the general structure of the call is similar in both species.

Epipedobates hahneli (Boulenger, 1883)

Specimens from the vicinity of Cobija coincide well morphologically with the description provided by Haddad & Martins (1994). De la Riva et al. (1996) already mentioned the presence of *E. hahneli* in Bolivia, but this was based on calls only, heard at Nareuda, Departamento Pando. Thus, we provide the first vouchered record of *E. hahneli* for Bolivia.

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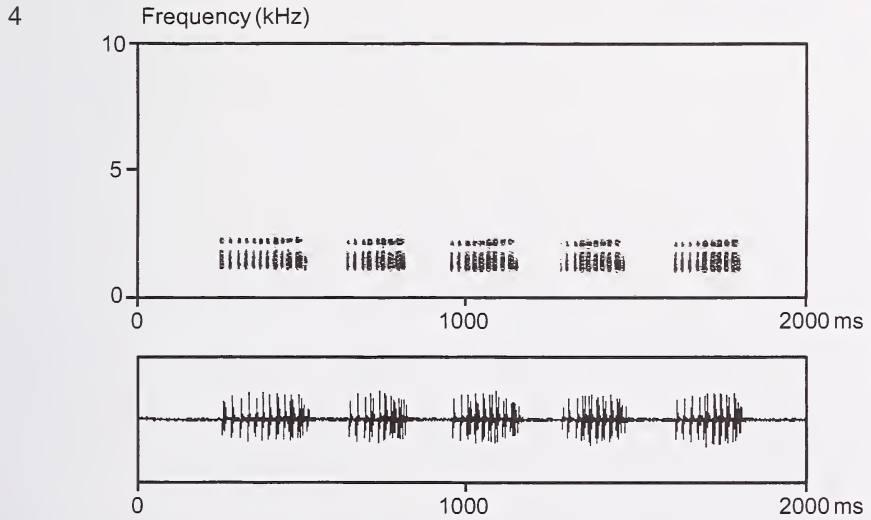
Advertisement calls (Fig. 6) were recorded in the late afternoon of 18 January 1998. Males called from bushes at approximately 0.2—1.5 meters height in disturbed primary forest. The calls consisted of single non-pulsed notes (mean note duration 17.2 ms), repeated in regular intervals (513.7 notes/minute). Call energy was mainly distributed between 3700 and 5600 Hz, with a dominant frequency of 4560 Hz. Calls of *E. hahneli* from Presidente Figueiredo, Amazonas, Brazil (Haddad & Martins 1994) as well as from Cuzco Amazónico, Peru (De la Riva et al. 1996) show lower note repetition rates and higher values in dominant frequency, whereas the note duration is very similar to the calls recorded by us. Haddad & Martins (1994) considered the population from Panguana, Peru, described by Schlüter (1980) to represent *E. hahneli*. The dominant frequency in our recordings is similar to those described by Schlüter (1980), but note duration in specimens from Panguana is much longer, thus resembling calls of *E. pictus* from Mataracú (own data), Prov. Ichilo, Depto. Santa Cruz, Bolivia (a site not far from the type locality of *E. pictus*). However, specimens that are morphologically similar to *E. pictus* sensu Haddad & Martins (1994) were recently recorded from Balta, south-eastern Peru (Duellman & Thomas 1996). Therefore, it is suggested that *E. hahneli* and *E. pictus* broadly occur in sympatry within the upper Amazon Basin of southern Peru and northern Bolivia (see also De la Riva et al. 1996). As Haddad & Martins (1994) and Lötters et al. (1997) already suggested, bioacustic data also support the possibility that more than one species is involved under the name *E. hahneli*.



Figs 4—8: Audiospectrograms and oscillograms of characteristic advertisement calls. Fig. 4 *Bufo castaneoticus*; Fig. 5 *Colostethus* sp. A (?); Fig. 6 *Epipedobates hahneli*; Fig. 7 *Phyllomedusa pallic* ; Fig. 8 *Leptodactylus didymus*.

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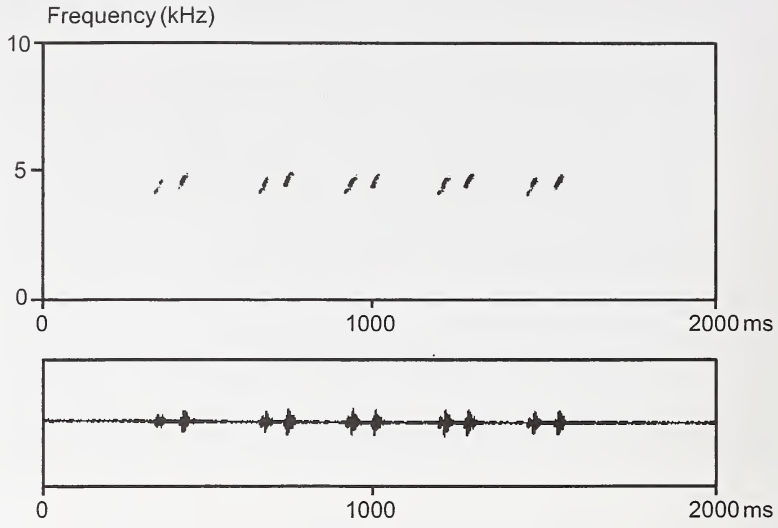

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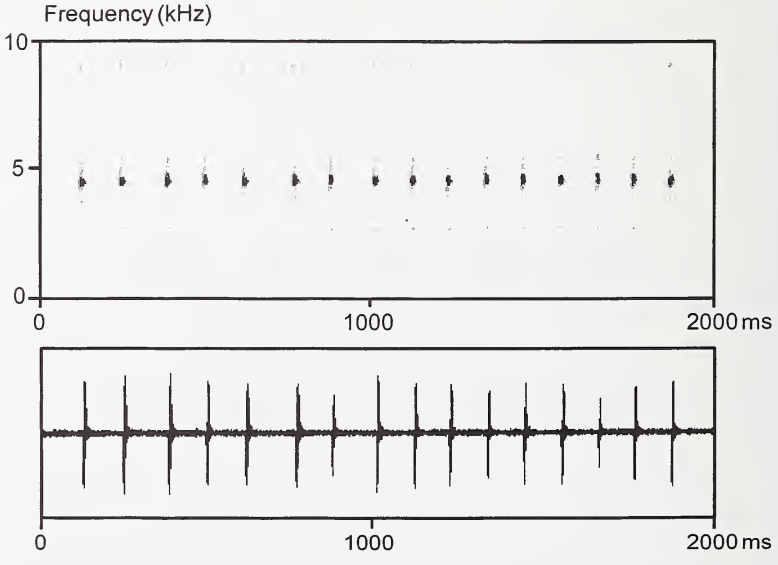

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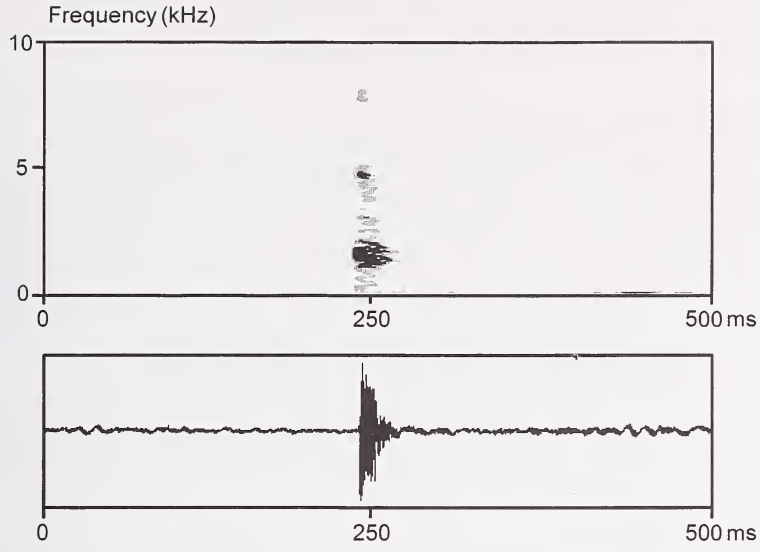

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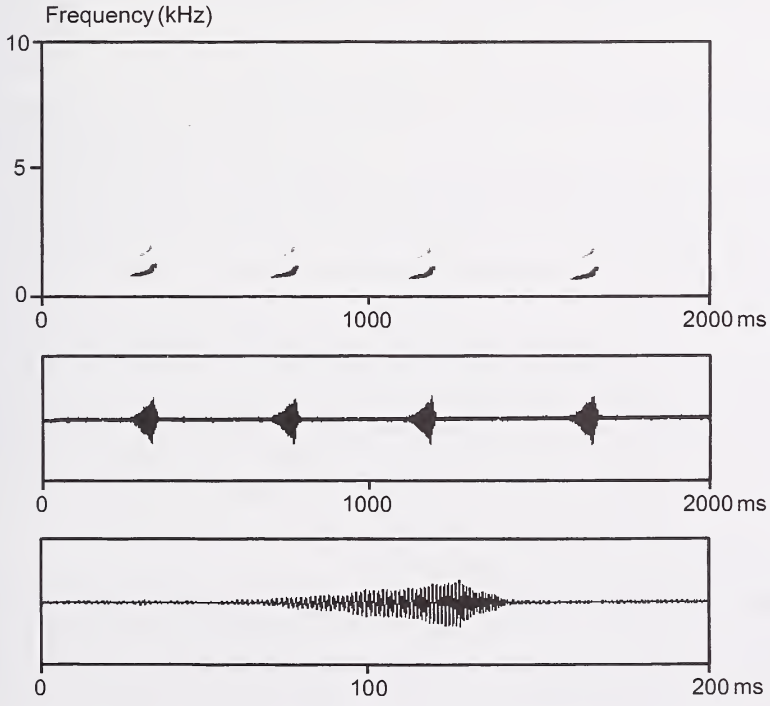

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Hyla species A
This small species of *Hyla* seems to be related to *H. leali* but is distinguished by morphological characters and advertisement call. The taxonomic status of this population will be the subject of a forthcoming paper.

Phyllomedusa palliata Peters, 1872
Our specimens represent the second record of *P. palliata* from Bolivian territory (compare Reichle & Köhler 1996). The advertisement call (Fig. 7) was recorded on 19 January 1998. Several males called from grassy vegetation around a pond in open habitat. Advertisement calls consisted of single notes (mean note duration 26.2 ms) and were emitted isolated or in call groups containing two calls. Within these call groups notes were repeated with a mean interval of 583 ms. Call energy was mainly distributed between 850 and 5200 Hz, with a dominant frequency of 1700 Hz. Notes are indistinctly pulsed. Duellman & Pyles (1983) provided data of calls of *P. palliata* from Santa Cecilia, Ecuador. In comparison to calls of the Bolivian population, they are similar in note duration, note repetition rate and frequency. However, Duellman & Pyles (1983) obviously did not observe two-note call groups as described above.

Phyllomedusa species A
This unnamed species is a member of the *P. tarsius* group probably being described by D. C. Cannatella and R. I. Crombie (see Duellman & Salas 1991). It is also known from southern Peru and western Brazil. Its advertisement call was recently described by De la Riva et al. (1995). The record of *Phyllomedusa boliviana* from the Reserva Manuripi-Heath (Aparicio 1992) most probably corresponds to this species.

Leptodactylus didymus Heyer, García-Lopez & Cardoso, 1996
This recently described species was commonly heard in the town of Cobija. Males called from under logs and in grassy open vegetation. *Leptodactylus didymus* is morphologically indistinguishable from *L. mystaceus*, a species also occurring in Bolivia. The two species differ only by their advertisement calls (Heyer et al. 1996). Our advertisement call recordings from Cobija have the following parameters: calls consisted of single notes (mean note duration 117.6 ms), repeated with a rate of 122–141 notes/minute; frequency modulated from 630 to 1320 Hz, with a dominant frequency of 780 Hz; harmonic structures present; calls without terminal drop in frequency; calls not distinctly pulsed. These parameters coincide well with calls of *L. didymus* from Xapuri, Acre, Brazil, and with those from Tambopata, Madre de Dios, Peru (type locality of *L. didymus*) described by Heyer et al. (1996). Especially, the non-pulsed structure of the call (Fig. 8) is characteristic in all three populations. Our specimens represent the first record of *L. didymus* for Bolivia.

Vanzolinius discodactylus (Boulenger, 1883)
Two males (SVL 25.0 and 28.4 mm) were obtained at night in swampy areas of disturbed primary forest. Using Heyer's (1997) standards the specimens can be described as follows: dorsal snout pattern, A; dorsal pattern, C; throat and chest pattern, A and D; belly pattern, C; posterior thigh pattern, B; digit tip dorsal outline,

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A (not expanded). The obtained specimens represent the southernmost record for the species as well as the first record for Bolivia.

Comments on previous records

Our compilation of own data and literature records resulted in a preliminary list of amphibian species known from the Departamento Pando, Bolivia (Table 2). However, some of the former records from that region deserve remarks.

Those of *Bufo paracnemis* and *Hyla nana* reported by Fugler (1984) from 25 km south of Cobija are questionable and possibly the result of misidentifications. These species are otherwise known to inhabit semi-deciduous forests and dry areas from eastern Bolivia south-east to Argentina, Paraguay, south-eastern Brazil, and Uruguay (Frost 1985). For that reason they do not appear in our account. The record of *Leptodactylus ocellatus* from the Reserva Manuripi-Heath (Aparicio 1992) most likely corresponds to one of the similar species *L. macrosternum* or *L. chaquensis*. *Leptodactylus ocellatus* seems to be restricted to eastern South America, mainly the Río Paraná river system (e.g., Gallardo 1964; Cei 1962). Therefore, we tentatively include *Leptodactylus* sp. A in our list. Aparicio (1992) based the record of *Epipedobates trivittatus* on call recordings only. The presence of this species in the region is very probable since it is known to inhabit a wider range within the Amazon basin (e.g., Silverstone 1976). Nevertheless, as long as no voucher specimens become available we regard the presence of species in Bolivia as tentative. The record of *Hyla rossalleni* for the Departamento Pando (De la Riva 1990) was based on misidentified specimens (see De la Riva & Duellman 1997) and therefore it is excluded from the list. We also do not include four species of the genus *Leptodactylus* and four species of *Eleutherodactylus* listed without specific identifications by Aparicio (1992). However, we are well aware that *E. fenestratus* is not the only species of the genus occurring in northern Bolivia.

De la Riva (1990) mentioned a record of *Bolitoglossa altamazonica* from the Departamento Pando referring to Wake et al. (1982). This citation is in error. Wake et al. (1982) merely refer to Bolivian material from the Departamento Cochabamba. Nevertheless, *B. altamazonica* or a related unnamed species can be expected to occur within the Departamento Pando due to the distribution records known from these salamanders (Wake et al. 1982).

Thus far known, no gymnophione species has been reported from the Departamento Pando, although the presence of this order is expectable since several species are known to occur within the Amazon basin.

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Table 2: Preliminary list of amphibian taxa known to occur in the Departamento Pando, Bolivia.

Taxon	References
Bufonidae	
Bufo marinus	Aparicio (1992), CBF 3303, ZFMK 66774
Bufo castaneoticus	CBF 3327-28, ZFMK 67125-128
Bufo sp. A. (*margaritifer* complex)	Aparicio (1992), ZFMK 66821-822
Dendrobatidae	
Colostethus trilineatus	De la Riva et al. (1996), ZFMK 66791-792
Colostethus sp. A	ZFMK 66793-794
Epipedobates hahneli	De la Riva et al. (1996), ZFMK 66809-810
Epipedobates trivittatus[1]	Aparicio (1992)
Hylidae	
Hyla acreana	CBF 3315-3316, ZFMK 66805-808
Hyla calcarata	Aparicio (1992)
Hyla fasciata	Fugler (1984), CBF 3317, ZFMK 67143-144
Hyla granosa	De la Riva (1990), CBF 3314, ZFMK 66820
Hyla lanciformis	Fugler (1984), CBF 3304-06, ZFMK 66776-777
Hyla leucophyllata	Fugler (1984), ZFMK 66789
Hyla marmorata	CBF 1271-80
Hyla minuta	Fugler (1984), ZFMK 66790
Hyla parviceps	ZFMK 67149-152
Hyla punctata	Fugler (1984), ZFMK 66813
Hyla riveroi	ZFMK 67145-148
Hyla sp. A	CBF 3323-26, ZFMK 67119-124
Osteocephalus leprieurii	Aparicio (1992)
Phrynohyas venulosa	Aparicio (1992), CBF 3307, ZFMK 66775
Phyllomedusa palliata	CBF 3320, ZFMK 66778-780
Phyllomedusa sp. A	ZFMK 66781
Scinax chiquitanus	CBF 3308-09, ZFMK 66800-804
Scinax garbei	CBF 3318, ZFMK 66812
Scinax ruber	Fugler (1984), CBF 3310-11, ZFMK 66817-819
Sphaenorhynchus lacteus	Fugler (1984), ZFMK 66811
Leptodactylidae	
Adenomera andreae	ZFMK 66814
Adenomera hylaedactyla	Aparicio (1992), ZFMK 66783-784
Leptodactylus bolivianus	De la Riva (1990), Aparicio (1992)
Leptodactylus didymus	CBF 3313, ZFMK 66782
Leptodactylus elenae	Aparicio (1992)
Leptodactylus leptodactyloides	Heyer (1994)
Leptodactylus pentadactylus	Aparicio (1992), CBF
Leptodactylus petersii	Heyer (1994)
Leptodactylus podicipinus	Heyer (1994)
Leptodactylus rhodomystax	Aparicio (1992)
Leptodactylus sp. A[2]	Aparicio (1992)
Eleutherodactylus fenestratus	ZFMK 66795-799
Vanzolinius discodactylus	ZFMK 66815-816
Microhylidae	
Elachistocleis bicolor[3]	ZFMK 66785-786
Hamptophryne boliviana	CBF 3319, ZFMK 66787-788

[1] record based on call recordings only, no voucher specimen available.
[2] reported as *L. ocellatus* by Aparicio (1992), supposed to represent *L. macrosternum* or *L. chaquensis*.
[3] there is much taxonomic confusion concerning the two species names *bicolor* and *ovalis* within the genus *Elachistocleis* (see Frost 1985). Like De la Riva et al. (1996) and Reichle & Köhler (1998) formerly did for Bolivian populations, we assign our specimens with uniformly yellow venter to *E. bicolor*.

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Remarks

Our compilation resulted in a list of only 42 anuran species known from the Departamento Pando, Bolivia. Compared with species lists of sites within the Amazon basin of southern Peru this number is rather low. For example, 72 anuran species are known from Cocha Cashu (Rodríguez & Cadle 1990; Rodríguez 1992), 63 species from Cuzco Amazónico (Duellman & Salas 1991), and 55 species from Balta (Duellman & Thomas 1996). All these represent single but well investigated sites of limited expanse. There is no doubt that actually more amphibian species inhabit the vast area of the Bolivian Departamento Pando. Hence, we suggest that the present state of knowledge is the result of insufficient investigation efforts only. Even our short term random sampling at Cobija was too limited, and for instance did not cover undisturbed primary forest as an important habitat type, to receive at least a contiguous inventory of the area. Many species known from adjacent regions are expectable to occur in the northernmost part of Bolivia and will surely be discovered if further investigations will take place. Well managed research programs are recommended to seize and protect the amphibian species diversity of Bolivia's Amazonian environments.

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Zusammenfassung

Es wird eine kommentierte Liste von Amphibiennachweisen aus dem Departamento Pando, Bolivien, präsentiert. Die Liste basiert auf der Auswertung von Literaturdaten sowie eigenen Feldarbeiten, die im Januar 1998 in der Umgebung der Stadt Cobija durchgeführt wurden. Die Arten *Bufo castaneoticus, Epipedobates hahneli, Leptodactylus didymus* und *Vanzolinius discodactylus* werden erstmalig für Bolivien nachgewiesen. Die vergleichsweise geringe Zahl nachgewiesener Amphibienarten in der Region spiegelt eher die unzureichende Erforschung als eine tatsächlich vorhandene geringe Artenvielfalt wider. Zusätzlich werden von fünf Froscharten Anzeigerufe beschrieben und abgebildet, die zuvor, zumindest von bolivianischen Populationen, unbekannt waren.

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Jörn Köhler, Stefan Lötters, Sektion Herpetologie, Zoologisches Forschungsinstitut und Museum Alexander Koenig, Adenauerallee 160, D-53113 Bonn, Germany [e-mail: uzsl3b@uni-bonn.de].

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