

A new species of *Elachistocleis* (Anura: Microhylidae) from the Andean Yungas of Argentina, with comments on the *Elachistocleis ovalis* – *E. bicolor* controversy

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Abstract. *Elachistocleis skotogaster* spec. nov. is described from the Andean Yungas of Argentina. It is unique in the genus in having belly and legs densely spotted with brown, an uniformly dark brown dorsal mottled with black, absence of a light vertebral strip, a fold behind the mouth but not a postcommisural gland. Its natural history and advertisement call are briefly noted. *Elachistocleis ovalis* and *E. bicolor* are considered different species, and Buenos Aires, Argentina, is established as type locality for the latter one.

Resumen. Se describe *Elachistocleis skotogaster* n. sp. de las Yungas andinas de Argentina. Se diferencia de las restantes especies del género por presentar vientre y región inferior de los miembros posteriores densamente punteada de castaño, la región dorsal castaño oscuro, punteada en negro, sin banda vertebral clara, y el área por detrás de la boca con un pliegue pero sin glándula postcomisural. *Elachistocleis ovalis* y *E. bicolor* son consideradas especies diferentes y se establece Buenos Aires, Argentina, como localidad tipo de esta última.

Introduction

The Neotropical Microhylid genus *Elachistocleis* comprises five species: *Elachistocleis bicolor* (Guerín-Méneville, 1838), *E. erythrogaster* Kwet and Di Bernardo, 1998, *E. ovalis* (Schneider, 1799), *E. piauiensis* Caranaschi and Jim, 1983 and *E. surinamensis* (Daudin, 1802). Two of them, *Elachistocleis ovalis* and *E. bicolor*, are involved in a tremendous confusion since 1841. Later contributions not only did not solve the problem but contributed to increase the controversy (e.g. Duméril and Bibron, 1841; Boulenger, 1882; Mertens, 1929; Parker, 1934).

The discovery of a new population of *Elachistocleis* from the subtropical montane forests of North-Western Argentina, which differs morphologically and acoustically from all other species of the genus, is considered a good opportunity to describe a new species and to discuss the problem of *Elachistocleis ovalis* and *E. bicolor* in an historical context.

Methods

Morphometric information on preserved specimens was taken using digital callipers under a dissecting microscope to the nearest 0.1 mm. All measurements were taken by one of us (EOL) to avoid inter-observer differences (Hayek et al., 2001). The following measurements were taken on each frog: body length (SVL); head length (HL); head width (HW); eye to nostril distance (ENOS); eye diameter (EYE); interocular distance (IOD); internarial distance (IN); forearm length (FL); thigh length (THL); tibia length (TL); hand length (HAND); size of the inner and outer metacarpal tubercles (IMCT, OMCT); foot length (FOOT) and metatarsal tubercle size (MTT).

The advertisement calls from two individuals (5 calls each) were recorded on 27 January 1999 from 22:00 to midnight, using a Marantz PMD 430 tape recorder and a Sennheiser ME-66 microphone. Recording distance was 0.5 to 1.5 m. Meteorological conditions were 24°C air temperature and 96% air relative humidity. The calls were digitised and analysed using a PC with Cool Edit Pro software (Syntrillium Software Co.). Frequency information was obtained through fast Fourier transformation (FFT 256). The terminology used for the description of the calls follows Heyer et al. (1990). Voucher specimens have the numbers FML 07920 and 07927 (Instituto de Herpetología, Fundación Miguel Lillo, Tucumán, Argentina). Osteological information was obtained from one cleared and stained adult female following the technique of Wassersug (1976).

Results

Elachistocleis skotogaster n. sp.

Holotype. Fundación Miguel Lillo (FML) 07927, Los Toldos, Dto. Santa Victoria, Salta, 1100 masl. Adult male, calling when captured; collected on 27 January 1999 by M. Vaira and L. Ferrari.

Paratypes. FML 07920 (♂); 07921 (♂); 07922 (♂); 07923 (♂); 07924 (♂); 07925 (♀) (cleared and stained skeleton); 07926 (♀); 07928 (♀); 07929 (♀); same data as the holotype.

Diagnosis. *Elachistocleis skotogaster* has belly and legs densely spotted in brown; the dorsal region is uniformly dark brown mottled in black, without light vertebral strip, and the area behind the mouth has an evident fold but a postcommisural gland is absent. These set of characters differentiate the new species from *E. bicolor* and *E. ovalis* (with an immaculate, light-yellow belly), from *E. erythrogaster* (with a red-orange belly with dark blotches), from *E. piauiensis* (with a defined postcommisural gland) and from *E. surinamensis* (with an evident light vertebral stripe). Furthermore, *Elachistocleis skotogaster* differs from all known species of the genus by the advertisement call parameters.

Description of the Holotype. Adult male (fig. 1); snout-vent length 28.2 mm; body ovoid; head triangular in dorsal aspect, proportionally short; head length about 17.5% of SVL,

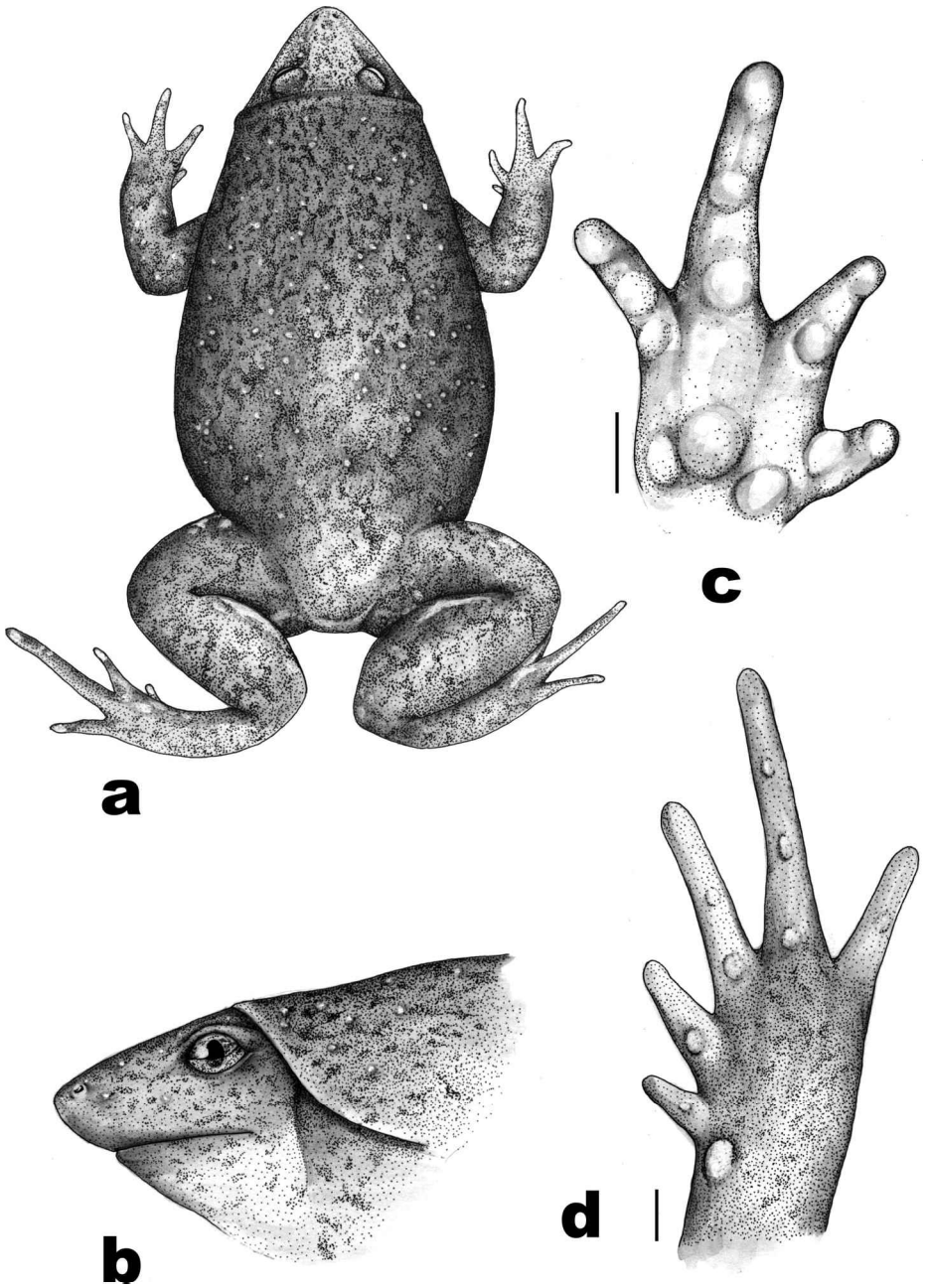


Figure 1. Holotype of *Elachistocleis skotogaster*: a) Dorsal view (SVL 28.2 mm). b) Head in lateral view (head length 4.9 mm). c) Palmar view of the hand (bar = 1 mm). d) Plantar view of the foot (bar = 1 mm).

wider than long (head width/head length 1.6); snout rounded and slightly projected in dorsal view, and rounded in lateral view, protruding in a rostrum comprising about 32.8% of the head length; canthus rostralis undifferentiated, rounded, with loreal region slightly concave and moderately sloping; eyes in dorsolateral position, eye diameter/head length 34%; interorbital region flat; tympanum undifferentiated; nostrils oriented subterminally, not protruding, folded and situated almost at tip of snout; internarial distance about 17% of head width; tongue subcircular; choana subcircular, laterally located, broadly separated; head differentiated from the body by an evident postcephalic skin fold, immediately behind the eyes and extending laterally and posteriorly, to reach the insertion of the forelimb.

Ventrally, an evident, post-gular (thoracic) fold extends at the level of the insertion of hindlimbs. Dorsal and ventral skin smooth, with small light tubercles slightly protruded; at the lateral region a noticeable skin fold extends from the tympanic region to the hindlimbs insertion; cloacal opening as a longitudinal slit, posteriorly directed.

Forelimbs moderate built, without conspicuous details; fingers with rounded tip; relative length of fingers $3 > 4 \cong 2 > 1$; subarticular tubercles simple, rounded to conical; subarticular tubercle formula I(1), II(1), III(2), IV(1); palmar and supernumeraries tubercles absent; fingers without webbing or fringes; prepollex not evident and nuptial pads or cornifications absent; inner metacarpal tubercle oval, smaller than the outer, oval and divided, resembling three palmar tubercles.

Hind limbs short; tibia length about 30% of SVL; heels of adpressed limbs slightly in contact; tibio-tarsal articulation does not reach the forelimbs; toes with rounded tips; relative length of toes $4 > 3 > 5 > 2 > 1$, without webbing or fringes; subarticular tubercles simple, rounded to conical and slightly prominent; subarticular tubercles formula I(1), II(1), III(2), IV(3), V(2); plantar and supernumeraries tubercles absent; inner metatarsal tubercle suboval; outer metatarsal tubercle absent.

Coloration. In life, dorsum dark brown, mottled with black and white spots. Dorsal surfaces of forelimbs with tan mottling. Iris gold, marbled with black and brown. Oval brown blotch at the tympanum region. Yellow spots restricted to the commissural region. Bright orange stripe on hidden surfaces of hind limbs. Irregular bright orange blotch on groin. Venter grey, mottled with dark brown. Throat dark grey, with yellow and black mottling. Chest with some irregular yellowish blotches uniformly distributed. In preservative (70% ethanol), brown changes to grey and orange to whitish; dorsal white spots almost disappear, while the ventral coloration turns into a variegated pattern of grey and cream.

Osteology. Description based on an adult female (FML 07925) (figs. 2-3). Skull depressed, longer than wide. Dermal elements completely ossified; cartilaginous areas restricted to nasal cartilage, otic capsules and suspensorium. Skull without ridges, exostosis or sculpturations. Nasals large, almost in contact and covering completely the sphenetmoid; maxillary process moderate, close to but not in contact with the maxilla. Frontoparietals not fused, almost in contact, slightly superposed to the prootics and the sphenetmoid,

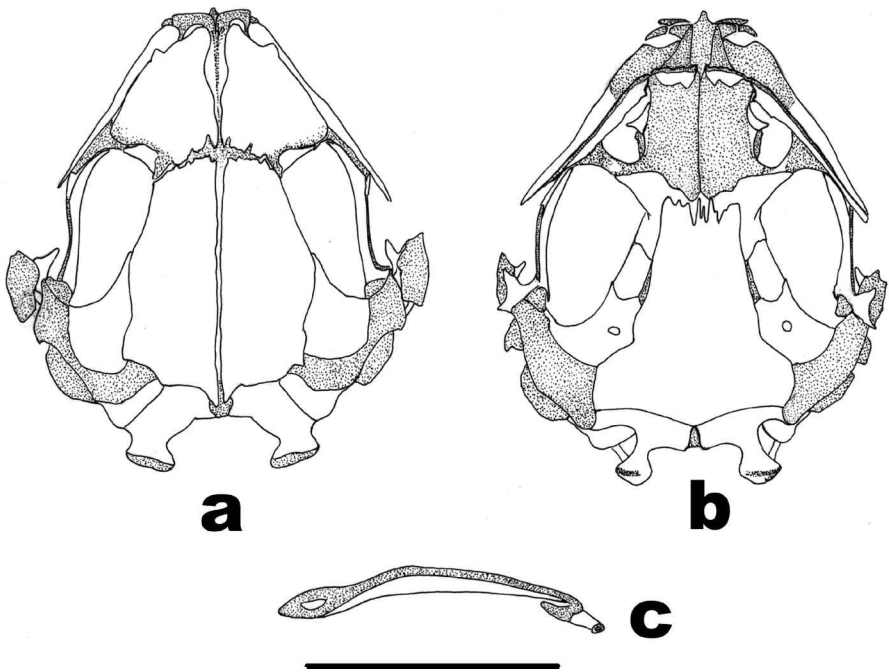


Figure 2. Skull of *Elachistocleis skotogaster*: a) Dorsal view. b) Ventral view. c) Lower jaw in dorsal view (bar = 5 mm).

contacting exoccipitals. Frontoparietal fontanella narrow. Premaxilla and maxilla lacking teeth. Pars palatina of premaxilla well developed, with palatine process slightly evident; alary process nearly vertical, moderately protruded. Maxilla short, truncated posteriorly, separate from quadrato-jugal; pars palatina developed, pars facialis low, without a defined preorbital process, slightly superposed to anterior ramus of pterygoid. Vomer edentate, not contacting the sphenethmoid, reduced to a thin, elongated and sharply pointed triradiate element. Parasphenoid developed; cultriform process proportionally wide, with parallel margins, covering the medial portion of the sphenethmoid; anterior tip wide and indented. Parasphenoid alae wide and short. Anterior ramus of pterygoid reaching anteorbital plate and superposing the maxilla; anterior ramus slightly differentiated and separated from the otic capsule and parasphenoid; posterior ramus fused to the small quadrato-jugal and to the squamosal. Squamosal triradiate; ventral ramus developed, posteriorly oriented and confluent with the pars medialis of the pterygoid; otic and zygomatic ramus vestigial. Occipital condyles broad and pedunculated. Sphenethmoid consisting of two ossified elements separated dorsally and ventrally; maxillary arch at the antorbital plane expanded, functionally replacing the palatines. Palatines absent.

Columella as an ossified shaft; extracolumella cartilaginous, wide and crescent-shaped. Operculum well developed, subelliptical; tympanic annulus present.

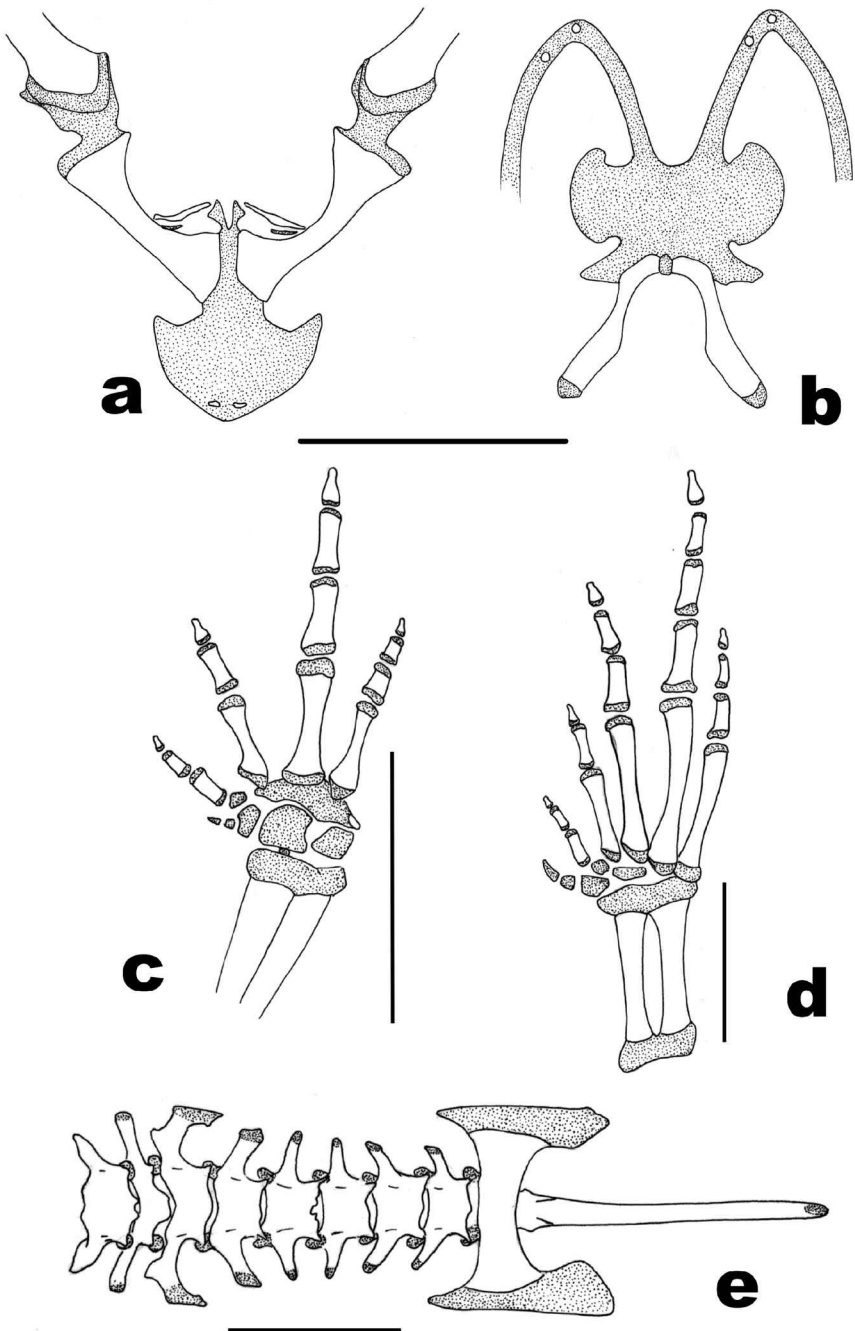


Figure 3. Skeleton of *Elachistocleis skotogaster*: a) Pectoral girdle. b) Hyoid. c) Hand. d) Foot. e) Vertebral column (bars = 5 mm).

Mentomeckelians unfused to each other but synchondrotically related to the dentary, projected backwards in a lateral, cartilaginous, epiphyses, as long as the ossified portion.

Hyoid with cartilaginous hyal plate, hyoglossal sinus concave and moderately deep; alary processes with broad base; posterolateral processes developed, directed backwards and outwards; hyals without anterior processes; tyrohyals ossified, longer than the hyoid plate, with cartilaginous distal tip.

Coracoids normally developed and ossified; clavicles as short and thin shafts, one-half the length of the coracoids; a thin cartilaginous band in the area of contact between them. Omosternum absent; procoracoids separated and divergent at the union with the clavicles. Scapula short and strong, with double proximal tip; suprascapula completely cartilaginous with a well defined anterior process. Cleithrum ossified, with bifurcated proximal and sharp distal tips. Sternum cartilaginous, strongly broader backwards; distal portion semicircular.

Vertebral column with eight presacral vertebrae; first and second slightly imbricated. Transversal processes short; diapophysis of vertebrae 2, 7 and 8 forward oriented; diapophysis of vertebrae 3, 4 and 5 backward projected. The process of vertebrae 3 with a well defined, forward oriented, apophysis. Sacral diapophysis with expanded cartilaginous epiphysis. Ilium laying on the cartilaginous projections. Sacrum and urostyle with bicondilar articulation.

Humerus with laminar humeral ridge developed; radio-ulna without particular traits. Carpus type C of Fabrezi (1992) formed by radiale, ulnare, distal carpal 5-4-3, distal carpal 2, and element Y; prepollex with proximal and distal elements differentiated. Hind limbs without particular traits; tip of the long bones and tarsus are cartilaginous; tarsus formed by distal tarsal 3-2, distal tarsal 1; prehallux with an ovoid proximal element and a sharp and small distal element. Phalangeal formula 2-2-3-4-3; terminal phalanges of hand and feet simple and slightly expanded and curved.

Variation of the paratypes. Most noticeable variations with the holotype refer to body measurements (table 1). Morphological variations are:

- a - Loreal region varies from flat to concave-flat.
- b - Interorbital region varies from flat to slightly convex.
- c - Tympanic area varies from flat to slightly concave.
- d - Post-cephalic fold shows several degrees of thickening.
- e - Post-gular fold shows different degree of development, from absent (FML 07922) to extremely developed (FML 07929).
- f - Cloaca in FML 07920 and 07923 as a subcircular opening instead of as longitudinal slit.
- g - Lateral fold of the body not evident in individuals FML 07922; 07926 and 07928.
- h - Margins of the fingers can show diverse degrees of thickness.
- i - Besides body size measurements (table 1), there are no evidences of sexual dimorphism.

Table 1. Measurements (in mm) of the Holotype and Paratypes of *Elachistocleis skotogaster*. See abbreviations in Methods.

	FML 07927 ♂ (holotype)	FML 07920 ♂	FML 07921 ♂	FML 07922 ♂	FML 07923 ♂	FML 07924 ♂	FML 07926 ♀	FML 07928 ♀	FML 07929 ♀
SVL	28.2	27.5	28.6	28.5	28.0	27.9	30.9	34.4	30.3
HL	4.9	4.5	4.4	4.9	4.6	4.2	5.0	5.1	4.3
HW	7.9	6.3	6.4	7.0	6.4	6.2	7.4	8.8	7.2
IN	1.4	1.4	1.6	1.6	1.6	1.5	1.6	2.2	1.8
IOD	4.0	4.2	3.5	4.1	4.1	3.7	4.0	4.3	4.3
EYE	1.7	1.9	1.6	1.9	2.0	1.7	2.2	2.3	1.9
ENOS	2.9	2.5	2.5	3.1	2.9	2.9	3.0	3.7	2.9
FL	4.9	4.6	4.9	4.7	4.6	4.7	5.9	6.0	5.4
THL	9.3	9.7	9.1	9.2	9.7	9.3	10.7	11.5	10.0
TL	8.5	9.1	8.8	8.8	8.7	8.8	10.4	11.7	9.8
HAND	5.7	5.8	5.2	5.9	5.2	5.5	6.7	7.0	5.8
FOOT	11.0	10.3	10.6	10.2	9.9	10.6	11.9	13.4	10.5
IMCT	0.9	0.9	0.8	0.8	0.7	0.7	0.9	1.0	0.8
OMCT	1.1	1.0	1.0	0.9	0.8	0.9	0.9	1.1	0.9
TMT	1.1	1.1	1.0	1.2	0.9	0.9	0.9	1.3	0.9

Etymology. *Skotios*, Gr. Dark, obscure + *gaster*, Gr. stomach, belly.

Call description. The advertisement call of *Elachistocleis skotogaster* n. sp. ($n = 10$ calls from two individuals) consists of a sustained trill formed by a long and loud note of 3310 to 4816 milliseconds of duration (mean 3744 milliseconds), dominant frequency peak between 3458 to 3671 Hz (mean 3546 Hz), and a wide frequency band of 2988 to 4028 Hz (fig. 4). The call is multipulsed (547 to 784 pulses per call) with a rate of 158 to 167 pulses per second (mean 163,3 pulses/sec.). It is characterised by modulate frequency rise at the first segment, corresponding to the 24 to 65 initial pulses (mean 48 pulses) and a initial frequency oscillating between 2426 to 2886 Hz (mean 2654 Hz).

Natural history. The type locality is located in a typical subtropical humid montane forest area (ecoregion of Andean Yungas). The individuals were collected at night in a temporary pond of approximately 3.0×1.5 meters and 40 cm of maximum depth water. The entire area was extremely disturbed by antropic impact and frequently visited by domestic stock. The pond was surrounded by small bushes and presented rooted vegetation at the bottom. Males were calling inside the pond, clasped to the vegetation and with only their heads above the water surface. Amplexant pairs were found floating exposed at the water surface. Egg masses were deposited in a single layer completely exposed at the pond water surface. The eggs were black and the capsule has lenticular aspect. A captured pair laid 1072 eggs with a mean diameter of $2.63 \text{ mm} \pm 0.14 \text{ mm}$.

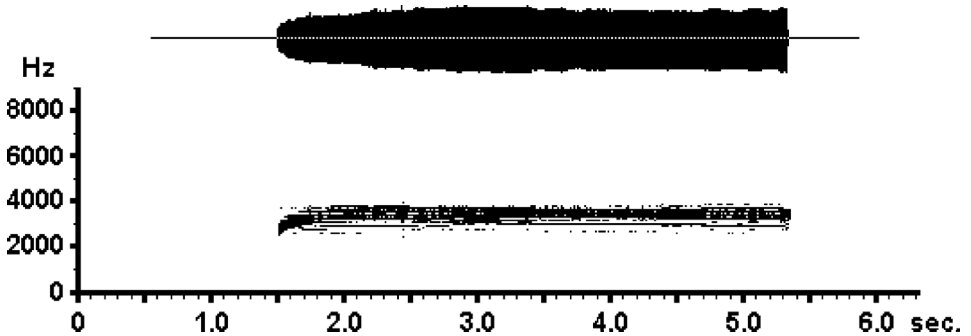


Figure 4. Oscillogram and ausiospectrogram of the advertisement call of *Elachistocleis skotogaster*.

Discussion

The ventral pattern in Elachistocleis

As pointed out by Nelson (in Frost, 1985 and on-line version), the nomenclature of *Elachistocleis* is extremely complex, part of the confusion being due to the variation and distribution of the ventral color morphs. Ventral coloration was considered by Parker (1927) as the only tool to discriminate among taxa, and actually all species reported in the genus are primarily discriminated by ventral coloration. Four of them have only one pattern, while the remaining two are deemed to have two.

Elachistocleis surinamensis was originally characterized as having a brown belly, mottled with gray, by Daudin (1802), which was supported by Kenny (1969 Trinidad), Carcerelli (1992), and Rivero et al. (1986). *Elachistocleis bicolor* was always characterized as having an immaculate belly (greenish yellow, yellow or white) by diverse authors, that include, chronologically, Valenciennes (1838), Miranda-Ribeiro (1920; 1926), Parker (1927) Mertens (1929), Müller and Hellmich (1936), Dunn (1949), Martínez Achenbach (1965), Cei (1980), Gudynas (1983), De la Riva et al. (1996, 2000) and Köhler (2000). *Elachistocleis erythrogaster* was characterized as having a peculiarly colored belly, red-orange, with black and blue blotches, according to Kwet and Di Bernardo (1998), and *Elachistocleis skotogaster* is described here as having a grey, mottled with dark brown, venter.

The two species reported as having variable ventral coloration are *Elachistocleis ovalis* and *E. piauiensis*. *Elachistocleis piauiensis* was characterized as having a spotted, marbled venter by Caramaschi and Jim (1983), although Carcerelli (1992) considered them as having both, immaculate and spotted ventral pattern.

Elachistocleis ovalis needs a lengthy discussion. Schneider (1799) characterized *Rana ovalis* as having an yellow venter, in which he was followed by Shaw (1802) and Daudin (1802). When Duméril and Bibron (1841) included *Bufo surinamensis* and *Oxyrhynchus bicolor* in the synonymy, two ventral color patterns, immaculate and spotted, were reported for the species. Duméril and Bibron's (1841) statement was followed by

Steindachner (1864), Mertens (1929), Parker (1934), Cochran (1955) and Rivero (1961). Others considered that *Elachistocleis ovalis* has only spotted or marbled venter (e.g. Boulenger, 1882; Miranda Ribeiro, 1920, 1926; Nieden, 1926; Parker, 1927; Mertens, 1930; Crawford, 1931; Myers, 1942; Dunn, 1949; Stebbins and Hendrickson, 1959; Kenny, 1969; Bogart and Nelson, 1976; Hoogmoed and Gorzula, 1979; Gudynas, 1983; De la Riva, 1993; De la Riva et al., 1996, 2000, and Köhler, 2000). Finally, diverse authors considered that *Elachistocleis ovalis* has an yellow venter. Some of them used the name *Elachistocleis ovalis* (or its synonyms or chresonyms) for the southern populations (considered here as *Elachistocleis bicolor*), including Budgett (1899) and Peracca (1904) for Paraguay, Hensel (1867) for Rio Grande [do Sul], Brazil, and Vellard (1948) for the chacoan areas of Argentina. In a meeting abstract, and based on the presence of an yellow, immaculate ventral coloration, Carcerelli (1992) considered that *Elachistocleis bicolor* is a junior synonym of *E. ovalis*, an idea followed by Klappenbach and Langone (1992), Langone (1995) and Kwet and Di Bernardo (1998). Finally, Duellman and Trueb (1986: 550, Fig. 19-61 D) presented a picture of a frog with immaculated belly from Tachira, Venezuela, under the name *Elachistocleis ovale*.

Almost all published information indicates (explicitly or by implication) that each local population has only one pattern of ventral coloration (immaculate or spotted). Some Bolivian populations seems to be the exceptions. Rivero (1961) quoted that six of eight individuals in a series from Buena Vista fall into the description of *Elachistocleis bicolor*, while two show a spotted ventral pattern. De la Riva et al. (1996) and Reichle (1997) found individuals with both patterns of ventral coloration living in sympatry in southeastern Bolivia, and the latter authors, plus Köhler (1995), Reichle and Köhler (1998), Köhler and Lötters (1999), De la Riva et al. (2000) and Köhler (2000) considered those forms with spotted venter as *Elachistocleis ovalis*, while those with immaculate venter were considered as *E. bicolor*.

An operational identification of Elachistocleis species

Of the six species of *Elachistocleis* considered here, three (*E. erythrogaster*, *E. piauiensis*, and *E. skotogaster*) are well defined, and have associated name-bearing types and type localities; consequently, they are not included in the following definitions. The remaining three need some clarification.

Elachistocleis ovalis. Ventral color pattern is not the only problem for *Elachistocleis ovalis*. No type locality was given neither by Schneider (1799) nor by his earlier followers (Shaw, 1802, Daudin, 1802, Merrem, 1820), while Fitzinger (1826) considered that *Engystoma ovale* distribution is “. . . Ex Asia, India. . .” (sic). This statement was overlooked by Duméril and Bibron (1841), who were the first to establish South America as the range for the species, a concept followed, without discussion, by all subsequent authors.

Due to the lack of an identifiable name-bearing type for *Elachistocleis ovalis* it is necessary to rely on Schneider's (1799) description (Appendix I), and it would be advisable

to consider as such those frogs that fit with the characters that describe the genus *Elachistocleis*, have an immaculate, yellow, ventral coloration, and inhabit the northern portion of the generic range. Frogs with this set of character states constitute, without doubts, a complex of species, but the decision is presented as an operative framework for a necessary revision. Regarding distribution, if Fitzinger's (1826) statement is in errore and *Elachistocleis ovalis* is a neotropical taxon, the decision is based on the exclusion of those frogs considered under the name *Elachistocleis bicolor*.

Elachistocleis surinamensis. The name *Elachistocleis surinamensis* is not related to a name-bearing type, although Daudin (1802) based the description on an individual given to him by M. de Bèze, collected in "Surinam" (a broad geographical concept during the XVIII-XIX centuries). In consequence, it is necessary to rely on Daudin's (1802) description (Appendix I), and consider as such those frogs that fit with the characters that describe the genus *Elachistocleis*, have a spotted ventral coloration, and inhabit the northern portion of the generic range. As for the previous species, frogs with this set of character states constitute, without doubts, a complex of species, but the decision is presented as an operative framework for a necessary revision. Regarding distribution, it is based on Daudin (1802), Kenny (1969), Carcerelli (1992) and Rivero et al. (1986).

Elachistocleis bicolor. Is the species that, filling the characters that describe the genus *Elachistocleis*, has an immaculate venter and occupies the southern portion of the generic range (Argentina, Bolivia, Paraguay, Uruguay and southern Brazil). Although neither the name-bearing type, nor the type locality were reported for this species (Guerín de Méneville, 1838; Valenciennes, 1838), indirect evidences indicate that it is probably based on at least two individuals from Buenos Aires, Argentina, sent by D'Orbigny to Paris Museum during his trip to southern South America (held between 1826 and 1833), as quoted by Duméril and Bibron (1841). The temporal frame is adequate and Duméril and Bibron's (1841) statement that the characterization of the frogs with immaculate ventral pattern was based on an individual similar to the one in the figure of Guerín de Méneville (1838) supports this idea (in a footnote, Duméril and Bibron used a peculiar form of French that could be translated as "an individual that seems to be" or as "an individual similar to" the one used for Guerín illustration). This hypothesis is coincident with that of Dunn (1949), who considered Buenos Aires as type locality for *Elachistocleis bicolor*. Again, frogs with this set of character states constitute, without doubts, a complex of species, but the decision is presented as an operative framework for a necessary revision. Regarding distribution, the decision follows Cei (1980) and De la Riva et al. (2000).

Elachistocleis skotogaster and the species with spotted venter

According to the previous discussion, three species of the genus *Elachistocleis* have spotted venter, including the one described here, *Elachistocleis skotogaster*, plus *E. surinamensis* and *E. piauiensis*. Differences among them were given in the diagnosis.

Table 2. Advertisement call parameters in *Elachistocleis*.

Species	Authors	Duration (ms)	Dominant frequency (Hz)	Frequency band (Hz)	Pulse rate (pulse/sec)	Call rate (call/min)
<i>Elachistocleis skotogaster</i>	This work	3744.6 (3310-4816)	peak: 3546.6 range: 3458-3671	2998-4028	163.3 (158.1-166.7)	1-2
Los Toldos (Argentina)	Haddad et al. (1988)	3000 ?	peak: ? range: 2700-3600	?	“multipulsed uniform”	?
<i>Elachistocleis ovalis</i>	De la Riva et al. (1996)	1966.9 (1357-2576.1)	peak: 3779.9 range: 3715.5-3844.4	4000-5500	“unpulsed”	5.1 (4.1-6.1)
Poços de Caldas (Brazil)	Kwet and Di Bernardo (1998)	2740 (1500-4600)	peak: 4740 range: ?	3700-5500	120-180	?
<i>Elachistocleis ovalis</i> ^a	Köhler (2000)	2618 (2044-3037)	peak: 3630 range: ?	2800-4300	245 >	3.7
Río Seco (Bolivia)	De la Riva et al. (1996); Köhler (2000).	1778.4 (1546.2-1949.1)	peak: 5741.3 range: 5714-5755	5000-6100	“unpulsed”	5.1 (4.2-6.1)
<i>Elachistocleis bicolor</i>	Reichle (1996)	5300 (4370-6350)	peak: 5140 range: 5080-5280	?	99.7	?
<i>Elachistocleis bicolor</i>	Kwet and Di Bernardo (1998)	4100 (3900-4200)	peak: 3800 range: ?	3100-4500	110-125	1-3
E.B. Beni (Bolivia)	Nelson (1973)	2000-4600 (range)	peaks range: 2100-4800	?	“unpulsed”	?
<i>Elachistocleis erythrogaster</i>						
S.F. de Paula (Brazil)						
<i>Elachistocleis</i> sp. ^b						

^aData from Kwet and Di Bernardo (1998) resume calls recorded at five localities of Rio Grande do Sul, Brazil.

^bData from Nelson (1973) resume calls recorded at 12 localities of Panama (4), Venezuela (3), Guyana (1), Surinam (1), Colombia (1) and Brazil (1).

Aside from these, some of the Bolivian populations with spotted venter, referred to *Elachistocleis ovalis* (see picture of p. 160 in De la Riva et al., 2000, and plate VII-h in Köhler, 2000), are strikingly similar to *Elachistocleis skotogaster*, but available information indicates that the physical parameters of their advertisement call show some differences, as discussed below.

The current synonymy of *Elachistocleis ovalis* includes two taxa, *Microps unicolor*, from an undetermined locality (Wagler, 1828), and *Engystoma ovale concolor*, from Ypiranga [Ipiranga, Sao Paulo, Brazil] (Miranda Ribeiro, 1920), that have the ventral coloration similar to the dorsal one, being dark brown the first and light brown the second. Furthermore, the same characteristics were considered in the diagnosis of *Elachistocleis* sp. 3 from Venezuela, by Carcerelli (1992). This set of species, of immaculate, dark, and apparently homogeneous coloration needs special attention.

The advertisement call of Elachistocleis skotogaster

Available information on advertisement calls of the genus *Elachistocleis* (synthesized in table 2) refers to diverse populations of *E. ovalis* (De la Riva et al., 1996; Haddad et al., 1998; Köhler, 2000), *E. bicolor* (De la Riva et al., 1996, Reichle, 1996), *E. erythrogaster* (Kwet and Di Bernardo, 1998) and several populations from northern range of the genus identified as *Elachistocleis* spp. (Nelson, 1973).

As described above, *Elachistocleis skotogaster* has multipulsed call with frequency peak between 3458 to 3671 Hz and a maximum frequency band of 4028 Hz. These set of character states differentiate the new species from *E. bicolor* and *E. ovalis* (De la Riva et al., 1996) and *Elachistocleis* spp. (Nelson, 1973), described as having non pulsed call; from *E. ovalis* (Kwet and Di Bernardo, 1998; Reichle, 1996), and from *E. bicolor* (Köhler, 2000), described as having higher frequency band. Finally, it differs from *E. erythrogaster* by the presence of a lower pulse rate.

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Appendix I

Transcription of the original description of Rana ovalis by Schneider (1799).

Caput breve, rostratum, cum corpore globoso confusum, oculi parvi.

Exemplum Musei Ducalis Brunovicensis caput a pedibus anterioribus usque sensim sine ullo colli vel tympani discrimine in acumen excurrans, oculi parvi, color corporis superni dilute fuscus, inferne flavidus, pedes posteriores breves, digitis liberis, callo ad basin digiti intimi posito, denique rostrum ultra maxillam inferiorem eminens distinguit. Exempla duo alia plane similia exstant in Museo Barbyensi magis tamen maculosa; alterum etiam versus colorem caeruleum magis inclinabat quam fuscum.

Gronovius Musei II n°67 ranam rostro vix prominente acuminato cum naribus utrinque in lateribus rostri, ut in bufone nasuto, descripsit et in Zoophilacii n°65 cum Sebana pictura II tab. 37 f. 3 comparavit. Sed ea pictura os rotundatum habet, et ranam fistit gibbosam.

Est etiam alia rana in Gronovii Zoophyl. n°63 descripta capite trigono, antrorsum in apicem acutum contracto, dorsi lineis tribus utrinque longitudinalibus parallelis, dorsum medium et caput usque ad anum dividit linea albicans, ceterum esculentae pedibus similis.

Referee huc licebit, donec commodior et suus illi locus reperitur, notitiam ranae a Linnaeo Amoenit. I p. 285 (p. 566 edit. Lugdun.) positam, quam deinde ipse auctor loco plane alieno in Systemate veluti varietatem ranae arboreae subiunxit. Caput est parvum, parum acuminatum, laeve; oculi parvi; corpus subrotundum utrinque laeve, fuscum: palmarum digito tertio longissimo, primo minimo, omnibus obtusis: ad carpos subtus tubercula aliquot, ut et ad singula digitorum genicula (articulos) tuberculum: plantarum digiti fissi, obtusi, quartus longissimus, primus brevissimus, geniculis (articulis) singulorum subtus protuberantibus, minus tamen quam palmarum.

Transcription of the original description of Bufo surinamensis by Daudin (1802).

Bufo corpore fusco laevi, subtus griseo punctato, lineâ albâ in clunibus.

CARACT. PHYS. Longueur d'un pouce. Yeux très petits et non saillants. Tête petite, triangulaire et confondue avec le corps; nez saillant et mince à son bout; bouche peu fendue. Corps un peu ovale, très lisse, brun avec quelques petits points gris en dessus, plus roussâtre et pointillé de gris en dessous: une ligne d'un blanc jaunâtre derrière chaque cuisse, avec deux petites taches de même couleur aux jarrets. Pieds antérieurs courts, ayant quatre doigts séparés; les postérieurs allongés, avec cinq doigts séparés, et munis d'une petite callosité sous les articulations des phalanges.

CARACT. HAB. Cet petit Crapaud paroît très voisin du Crapaud ovale: il m'a été donné par M. de Bèze, qui l'a trouvé à Surinam.

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