

# A new *Leptodactylodon* species from Gabon (Amphibia: Anura: Astylosternidae)

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## Abstract

We describe a new *Leptodactylodon* species from Gabon. The new species is a member of the *Leptodactylodon ovatus* species group. It is characterized by its small size, its white venter, granular dorsal skin, the presence of distinct gular folds on the throat and three metacarpal spines in reproductive males and the shape of toe and finger tips. *Leptodactylodon stevarti* nov. sp. represents the second species and the second and third known specimens of the genus for Gabon. So far the new species is only known from the Crystal Mountains.

Key words: Amphibia: Anura: Astylosternidae: *Leptodactylodon stevarti* nov. sp.; Crystal Mountains; Gabon.

## 1 Introduction

The genus *Leptodactylodon* ANDERSSON, 1903 comprises small to medium sized frogs of very compact body shape from western Central Africa. So far 13-14 species are recognized, almost all of which have very limited ranges (AMIET 1980, FRÉTEY & BLANC 2000, FROST 2002). In 1980 AMIET published an excellent revision of the genus. Since then only two new species were added (OHLER 1999, AMIET & DOWSETT-LEMAIRE 2000). Based on AMIET's (1980) paper, OHLER (1999) provided an updated key.

The preferred habitat of the genus seems to be forest in higher altitudes close to streams and creeks. Tadpoles of the genus are unique for African anurans by having a funnel mouth (AMIET 1970). Otherwise they show typical adaptations of torrenticol tadpoles, e. g. an oval body shape with a very long and muscular tail. Most species are known from the mountainous areas of western Cameroon. Two species stretch into eastern Nigeria (SCHIÖTZ 1963, AMIET 1980), only three are known to occur in southwestern Cameroon, Equatorial Guinea, and Gabon (AMIET 1980, DE LA RIVA 1994, FRÉTEY & BLANC 2000, FROST 2002). One of these, *L. blanci* OHLER, 1999, comprises the first and so far only known specimen of the genus for Gabon. During a recent herpetological survey of the Monts de Cristal, the junior author caught two additional *Leptodactylodon* specimens that represent an undescribed species.

## 2 Material and Methods

Morphological data – Frogs were preserved in 4 % formaldehyde. Later they were transferred into 75 % ethanol. Measurements were taken with a dial caliper ( $\pm 0.1$  mm) or a measuring ocular in a dissecting microscope ( $\pm 0.1$  mm, Zeiss Stemi SV 6). Specimens were dissected to determine sex and reproductive status. All measurements are given in mm and have been taken by one person (M-OR). Drawings were done with the aid of a camera lucida.

Museum acronyms: IRSNB = Institut Royal des Sciences naturelles de Belgique, Brussels; SMNS = Staatliches Museum für Naturkunde, Stuttgart.

## 3 Species description

*Leptodactylodon stevarti* nov. sp.

**Holotype:** IRSNB 1928. Adult male, forest stream, 550 m a.s.l., 0°37'301" N, 10°24'402" E, near Tchimbélé dam, Haut-Komo Department, Woleu-Ntem Province, Gabon, 20<sup>th</sup> June 2001.

**Paratype:** SMNS 11774. Male in non-breeding condition, forest stream, 460 m a.s.l., 0°36'841" N, 10°23'995" E, 12<sup>th</sup> June 2001, other data as holotype. Both specimens were caught in daytime by CHUCHEEP CHIMSUNCHART, OLIVIER S.G. PAUWELS and TARIQ STÉVART.

**Diagnosis:** Small, 21-22 mm SVL; compact frog with flat head; breeding males with three metacarpal spines; blackish throat with distinct parallel gular folds, close to lower jaw; small brownish spines on anterior part of throat; vomerine teeth distinct on two shorter ridges; finger and toe tips rounded to slightly pointed, without claw-like prolongation; forearms of breeding males normally shaped, no hypertrophic arms; belly white; dorsum a brownish black scattered with small clear spots, skin of back granular to warty.

**Description of the holotype:** Adult male in breeding condition, small stout frog with broad and comparatively flat head (Fig. 1, 2, 3), snout-vent-length 22.1 mm; head width 8.2 mm; inter-orbital distance 2.5 mm, width of eyelid 1.5 mm; eye diameter 2.2 mm; small but distinct tympanum, diameter 1.0 mm; distance from anterior corner of eye to nostril (1.2 mm) equals distance from nostril to snout tip (1.1 mm); inter-narial distance 2.8 mm; canthal region rounded; loreal region concave; upper and lower lips with white spots; a narrow supratympanal ridge from posterior part of eye to tympanum and from there stretches downward towards base of foreleg, it faints 1.0 mm anterior to foreleg; several rows of minute teeth on upper jaw; two ridges with about 11 hyalinish brown vomerine teeth each (Fig. 3c), ridges longer than space between them; heart-shaped tongue with anteromedian notch; anterior part of throat especially close to lower jaw beset with minute brownish spines; one long and one to two shorter gular folds, parallel to lower jaw; they stretch from the angle of the mouth and vanish shortly posterior to the level of the eyes; ground color of throat a blackish brown with white spots; the region of the gular folds is much darker than the rest of the throat (Fig. 3b); dorsum granular to warty, warts small (0.1-0.5 mm) and rounded; back and dorsal part of extremities chocolate brown to blackish brown, irregularly spotted with small (0.2-1.0 mm) white points; upper arms normally shaped, not enlarged; hand with large thenar and two smaller palmar tubercles (Fig. 3d); finger formulae: 1=2<3>4 (Fig. 3d, e); minute webbing between fingers (Fig. 3e); thumbs with three black metacarpal spines, two large and one small one, four black spines on dorsal part of phalange (Fig. 3e, f); finger one and two with one, finger three and four with two subdigital tubercles; femur length 8.3 mm; tibia length 8.0 mm; length of foot inclusive longest toe 15.5 mm; dorsal part of thighs and lower leg with longitudinal ridges and warts (Fig. 3a), without transversal blackish bars; toe formula: 1<2<3<4>5 (Fig. 3g); foot without webbing; small inner metatarsal tubercle; finger (Fig. 3h) and toe tips (Fig. 3i) rounded to slightly pointed; belly and ventral parts of thighs white; ventral part of lower leg whitish with numerous black points (Fig. 2).

**Variation:** The paratype is a subadult male or an adult in non-breeding condition of SVL 21.3 mm (Fig. 1, 2); head width 8.0 mm; inter-orbital distance 2.5 mm; eyelid width 1.3 mm; eye diameter 2.5 mm; tympanum diameter 1.0 mm; distance eye nostril

1.0 mm; distance nostril snout 1.0 mm; inter-narial distance 2.6 mm; femur length 8.5 mm; tibia length 8.0 mm; foot incl. longest toe 13.8 mm. The specimen has minute fat bodies; testes are hardly visible; it lacks spines on thumb and throat. Skin texture and coloration of back and extremities, as well as structure of toe and finger tips equals that of the holotype. The throat appears to be white, but in fact is densely beset with minute black dots. The ventral part of lower legs is less dotted than the holotype.

**Study site and natural history:** The Tchimbélé site is situated in the core area of the Monts de Cristal, near the border to Equatorial Guinea. In the Monts de Cristal, the mean annual temperature is 26 °C; the mean annual precipitation adds to more than 3200 mm. The Monts de Cristal belong to the Lower Guinea Forest Zone, a sub center of the Guinea diversity hotspot with a high percentage of endemic forest species (WHITE 1979). Its vegetation is characterized as belonging to the type of very humid, evergreen coastal forest (WHITE 1983). The canopy stratum of these dense forests reaches heights of about 30 m. This stratum is dominated by members of the families Caesalpiniaceae, Mimosaceae and Euphorbiaceae. Diversity of epiphytes is high. The under-story is dominated by species of the family Rubiaceae (NGOK BANAK 2002). This forest massif hosts about 3000 of the 7000 to 10000 vascular plants, currently known from Gabon. Among the 22 % of plant species endemic to Gabon, 100 are known from the Monts de Cristal. Numerous species have been described on the basis of vouchers collected in the Monts de Cristal, particularly begonias (SOSEF 1994) and orchids (CRIBB et al. 1989).

*Leptodactylodon stevarti* were found under rocks along streams in bottom of deep, narrow valleys; in low (15-20 m height) moderately dense primary forest, with shrub and herbaceous strata well represented, many epiphytes, and with a shallow soil with many rocky outcrops (Fig. 4). The paratype's stomach contained a large ant (ca. 10 mm) and a small ground beetle (Carabidae, *Bembidion* like species, 4 mm). It was found in syntopy (within a few meters and the same day) with *Trichobatrachus robustus* BOULENGER, 1900, *Nectophryne afra* BUCHHOLZ & PETERS, 1875, and the skink *Panaspis rohdei* (MÜLLER, 1910). In the same locality, but on 8<sup>th</sup> and 10<sup>th</sup> June 2001, *Leptopelis rufus* REICHENOW, 1874, *Leptopelis* cf. *calcaratus* (BOULENGER, 1906), *Scotobleps gabonicus* BOULENGER, 1900, *Petropedetes newtoni* (BOCAGE, 1895), and *Conraua* cf. *crassipes* (BUCHHOLZ & PETERS, 1875) were caught. Forty-eight reptile species have been recorded so far from the Monts de Cristal (PAUWELS et al. 2002). LÖTTERS et al. (2001) cite several amphibian species for the Monts de Cristal. Additional amphibian records will be published separately.

**Etymology:** We are pleased to name the new species after the botanist TARIQ STÉVART (University of Brussels) in recognition of his contributions to the knowledge of the orchids of western Central Africa and his invaluable help during field work of O.S.G. PAUWELS.

#### 4 Differential diagnosis and discussion

AMIET's (1980) revision of the genus is an outstanding work. His descriptions and definitions of diagnostic features provided the basis to recognize our records as belonging to a new species. Based on this revision, ÖHLER (1999) defined four species groups: the *L. mertensi* group (*L. mertensi* PERRET, 1959; *L. erythrogaster* AMIET, 1970 "1971"; *L. perreti* AMIET, 1971; *L. axillaris* AMIET, 1971), the *L. bicolor* group (*L. bicolor* AMIET, 1971), the *L. ornatus* group (*L. ornatus ornatus* AMIET, 1970 "1971";



Fig. 1. Dorsal view of *Leptodactylodon stevarti* nov. sp.; left IRSNB 1928 holotype; right SMNS 11774 paratype.

Rückenansicht von *L. stevarti* nov. sp.; links IRSNB 1928 Holotypus; rechts SMNS 11774 Paratypus.



Fig. 2. Ventral view of *Leptodactylodon stevarti* nov. sp.; left IRSNB 1928 holotype; right SMNS 11774 paratype.

Bauchansicht von *L. stevarti* nov. sp.; links IRSNB 1928 Holotypus; rechts SMNS 11774 Paratypus.

*L. o. permaculatus* AMIET, 1971), and the *L. ovatus* group [*L. ovatus ovatus* ANDERSSON, 1903; *L. o. orientalis* AMIET, 1971; *L. bouleengeri* NIEDEN, 1910; *L. ventrimarmoratus* (BOULENGER, 1904); *L. albiventris albiventris* (BOULENGER, 1905); *L. a. bueanus* AMIET, 1980; *L. blanci* OHLER, 1999; *L. polycanthus polycanthus* AMIET, 1970 "1971"; *L. p. punctiventris* AMIET, 1971]. In addition AMIET & DOWSETT-LEMAIRE (2000) described *L. wildi* and raised *L. bueanus* to species rank. *L. wildi* is a member of the *L. ovatus* group.

*Leptodactylodon stevarti* is a member of the *L. ovatus* group. It differs from species of the *L. mertensi* group by the absence of axillary protuberances and the presence of distinct vomerine teeth. It differs from the *L. bicolor* group by the coloration and the presence of distinct vomerine teeth. In contrast to *L. stevarti*, members of the *L. ornatus* group have a tongue without an anterior notch and only one metacarpal spine. *L. stevarti* is characterized as a member of the *L. ovatus* group by the presence of a notched tongue and several metacarpal spines. From *L. ovatus*, *L. ventrimarmoratus* and *L. bouleengeri*, the new species differs by its much smaller size, SVL 21-22 mm in *L. stevarti* and 35-44 mm in the other three species. *L. polycanthus* differs from the new species by the absence of gular folds and the presence of 5-6 metacarpal spines. *L.*

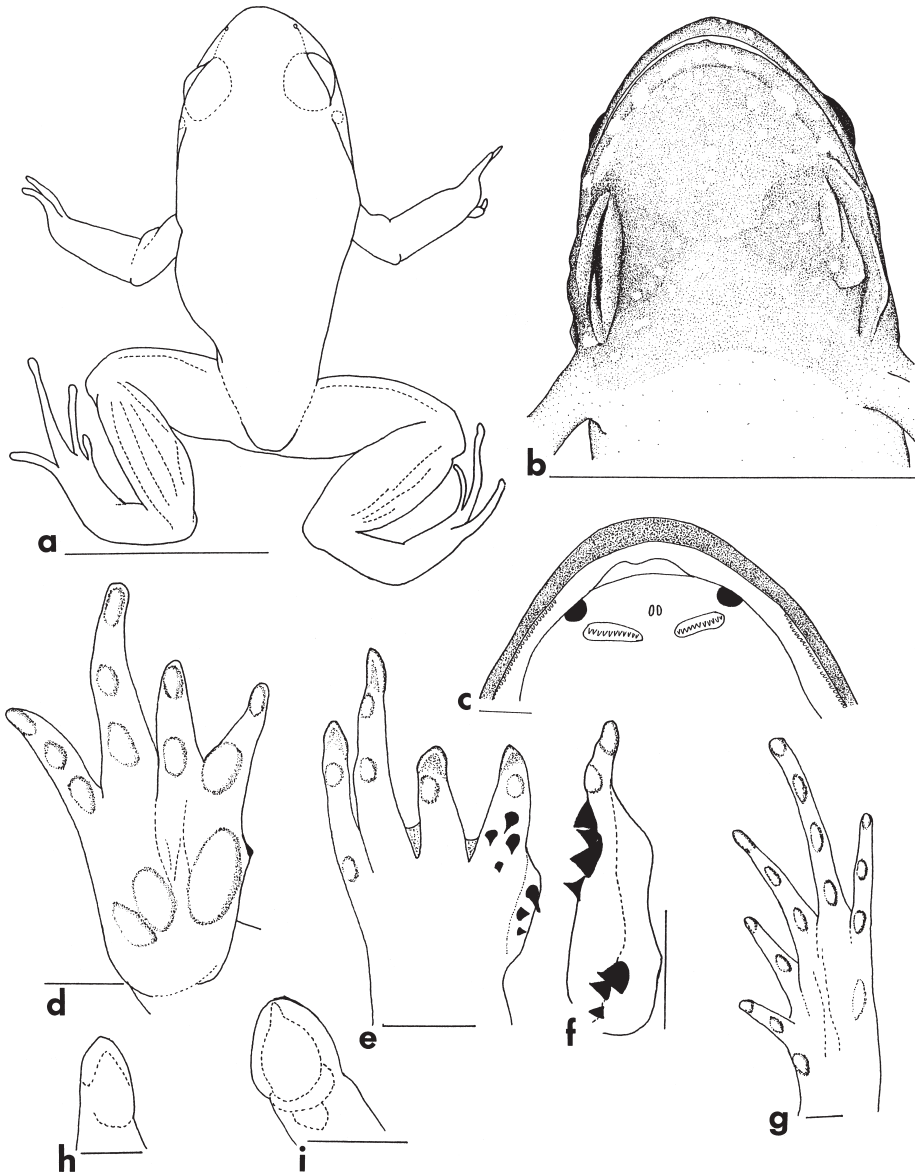


Fig. 3. *Leptodactylodon stevarti* nov. sp. IRSNB 1928 holotype; a: body shape, note ridges on legs; b: throat, note gular folds; c: vomerine teeth; d: ventral view of right hand; e: dorsal view of left hand; f: thumb of left hand; g: ventral view of left foot; h: tip of second finger of right hand; i: tip of third toe of right foot. Scale bar: a, b = 10 mm; c, d, e, f, g = 1 mm; h, i = 0.5 mm.

*L. stevarti* nov. sp. IRSNB 1928 Holotypus; a: Körperform, beachte die Leisten auf den Hinterextremitäten; b: Kehle, beachte Kehlfalten; c: Vomerbezaehlung; d: Ventralansicht der rechten Hand; e: Dorsalansicht der linken Hand; f: Daumen der linken Hand; g: Ventralansicht des linken Fußes; h: Spitze des zweiten Fingers der rechten Hand; i: Spitze der dritten Zehe des rechten Fußes. Maßstab: a, b = 10 mm; c, d, e, f, g = 1 mm; h, i = 0,5 mm.

*blanci* differs from *L. stevarti* by its ventral coloration, a dark brown with white marbling. In contrast to *L. stevarti*, *L. wildi* possesses a hypertrophic arm and four metacarpal spines. The new species seems to be most similar to *L. albiventris* and *L. bueanus*. With these it shares a clear venter, a blackish throat with white spots, the presence of gular folds, and the absence of a hypertrophic arm in males.

However, it differs by several characters from both of them (Tab. 1). The new species is smaller, it has shorter thighs in relation to snout vent length and different coloration. In contrast to *L. albiventris*, *L. stevarti* possesses three instead of two metacarpal spines and it lacks the claw like prolongation of toe and finger tips.

*Leptodactylodon bueanus* is only known from the East flank of Mount Cameroon (AMIET 1980, 1987). According to AMIET (1980, 1987) *L. albiventris* is known from only five localities on the south Cameroonian Plateau. Some older records under that name (e. g. NIEDEN 1908, MERTENS 1940, SCHIØTZ 1963) belong to other species, mostly to *L. bueanus* (AMIET 1980).

Recently DE LA RIVA (1994) reported *L. albiventris* from Equatorial Guinea. He depicts a specimen with a brown dorsum, speckled with numerous white dots. He recorded two call types (DE LA RIVA 1994, DE LA RIVA et al. 2001). One of them resembled that of AMIET & SCHIØTZ (1975) published for *L. albiventris*. However, they heard that call during day and night. According to AMIET (1980) *L. albiventris* calls exclusively during the day. Unfortunately DE LA RIVA (1994) gives no further morphological details of his records. The vouchers are now probably inaccessible because the Equatorial Guinea society, where they have been deposited, is not longer existent (DE LA RIVA pers. comm.). Given the color differences of the specimen figured by him to AMIET's (1980) description of *L. albiventris* and the very restricted ranges of almost all *Leptodactylodon* species (AMIET 1971a, b, c, 1980, 1987, AMIET & DOWSETT-LEMAIRE 2000), it is likely, that the Equatorial Guinean specimens either belong to *L. stevarti* or represent an undescribed species.

Little is known on the biology of *Leptodactylodon* species. With the exception of mostly short habitat descriptions (e. g. PERRET 1966, DE LA RIVA 1994, DE LA RIVA et al. 2001, LASSO et al. 2002) only AMIET gave more detailed biological information. He published the only known tadpole description (AMIET 1970), the calls of almost all species (AMIET & SCHIØTZ 1975, AMIET & DOWSETT-LEMAIRE 2000) and reported on parasitic protozoan of tadpoles and adults (AMIET & AFFA'A 1985). Unfortunately, we can not add further biological information on the new species. Concerning its mountainous forest habitat close to flowing water it is typical for the genus. The paratype, a male almost the size of the holotype, but without secondary sex characters, might be a hint for the correctness of AMIET's (1980) supposition, that these characters may faint or even disappear in non reproductive animals.

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character/Merkmal	<i>L. stevarti</i> , N = 2	<i>L. albiventris</i> , N = 9	<i>L. bueanus</i> , N = 6
SVL in males / Kopf-Rumpf-Länge (KRL) der Männchen	21-22 mm	24.8-26.5 mm, $\bar{x}$ = 25.7 mm	24-27 mm, $\bar{x}$ = 25.9 mm
femur length in % of SVL / Oberschenkellänge in % der KRL	37.6-39.9	40-44, $\bar{x}$ = 41.6	$\bar{x}$ = 43.9, Type = 49.6
head width in % of SVL / Kopfbreite in % der KRL	37.1-37.6	35.3-38.9, $\bar{x}$ = 36.8	$\bar{x}$ = 37.9, Type = 36.3
# of metacarpal spines / Anzahl der Metacarpaldornen	3	2	3 (rarely 1 or 2)
skin texture / Hautstruktur	granular to warty / granulär bis warzig	nearly smooth with the exception of the head and the flanks / mit Ausnahme von Kopf und Flanken glatt	?
flexible prolongations of toe and finger tips / flexible Verlängerung von Zehen- und Fingerspitzen	absent / nicht vorhanden	present / vorhanden	absent / nicht vorhanden
color of back / Rückenfärbung	blackish brown with small whitish spots	uniform brown, grayish inter-ocular spot, two orange spots around vent / einheitlich braun, grauer Zwischenaugenfleck, zwei orange Flecken neben der Kloake	anterior part brown, posterior part beige / vorderer Bereich braun, hinterer beige
color of thighs / Oberschenkelzeichnung	like back / wie der Rücken	anterior half brown, posterior half pale orange with brown transversal bars / vordere Hälfte braun, hintere blassorange mit braunen Querbarren	brown / braun

Tab. 1. Distinguishing characters for *Leptodactylodon stevarti*, *L. albiventris* and *L. bueanus*. Data for *L. albiventris* and *L. bueanus* according to AMIET (1980); coloration of *L. albiventris* according to BOULENGER'S (1905) description: dark brown or black above with small round white spots on the side, hind limb with light spots or marbling.

Differenzialmerkmale *Leptodactylodon stevarti*, *L. albiventris* und *L. bueanus*. Daten für *L. albiventris* und *L. bueanus* nach AMIET (1980); Zeichnung von *L. albiventris* nach BOULENGERS (1905) Originalbeschreibung: Oberseite dunkelbraun bis schwarz mit kleinen weißen Punkten auf den Flanken, Hinterextremitäten mit hellen Flecken oder Marmorierung.



Fig. 4. Small forest stream. Locality of the paratype (SMNS 11774). Photo by T. STÉVART.

Kleiner Waldbach, Lokalität des Paratypus (SMNS 11774).

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### **Eine neue *Leptodactylodon*-Art aus Gabun (Amphibia: Anura: Astylosternidae)**

Wir beschreiben eine neue *Leptodactylodon*-Art aus Gabun. Die neue Art gehört zur *Leptodactylodon ovatus* Artengruppe. Sie ist charakterisiert durch eine Kombination folgender Merkmale: geringe Körpergröße, weißer Bauch, granulärer Rücken, ausgeprägte Kehlfalten und drei Metacarpaldornen bei reproduktiven Männchen sowie der Form von Finger- und Zehenspitzen. *Leptodactylodon stevarti* nov. sp. ist die zweite aus Gabun bekannte Art der Gattung. Unsere Nachweise stellen das zweite und dritte bekannte Exemplar der Gattung für das Land. Bislang ist die neue Art nur aus den Kristallbergen bekannt.

Schlagwörter: Amphibia: Anura: Astylosternidae: *Leptodactylodon stevarti* nov. sp.; Kristallberge; Gabun.



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