

Report on the life colouration of the enigmatic burrowing skink *Voeltzkowia rubrocaudata* (Grandidier, 1869) from southwestern Madagascar

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Abstract. *Voeltzkowia* is a monophyletic genus of burrowing skinks endemic to Madagascar. The fossorial habits of these species make them hard to see and study, and witness their life history traits. During two herpetological surveys in southwestern Madagascar (in 2009 and 2011) we found several *Voeltzkowia rubrocaudata* individuals in a corn plantation, a habitat that differs from the forested habitat reported in the literature. Life colouration for this shy scincid is described for the first time.

Key words. Southwestern Madagascar, corn plantation, Squamata, Scincidae.

Voeltzkowia Boettger, 1893 is a poorly known monophyletic genus of scincid lizards endemic of Madagascar (Whiting et al. 2004, Schmitz et al. 2005, Crottini et al. 2009). Species of this genus belong to a phylogenetic clade that contains species of *Amphiglossus* sensu strictu, and the other limb-reduced *Pygomeles* and *Androngo*. With a body elongation and limb reduction, these shy and enigmatic skinks show burrowing habits (Brygoo 1981, Glaw & Vences 2007). The genus is currently composed of three completely limbless species (*V. lineata*, *V. mira* and *V. rubrocaudata*), and two species with very rudimentary hindlimbs (*V. petiti* and *V. fierinensis*), but a careful genus revision is currently in act and may increase the number of species of this enigmatic group (A. Miralles, pers. comm.). Despite exhaustive field surveys, fossorial skinks are usually hard to find and some species were not being observed on the island for more than a century (Brygoo 1981, Köhler et al. 2010).

According to the original description, a reddish tail characterizes *Voeltzkowia rubrocaudata*. This species is known from many locations in the arid regions of southwestern and western Madagascar (Grandidier 1869, Glaw & Vences 2007). In this manuscript we report for the first time on the life colouration of live individuals of the species *Voeltzkowia rubrocaudata*, providing also an update on its known distribution and details on habitat preferences.

The individuals reported were found during two herpetological surveys carried out in southwestern Madagascar in late 2009 and early 2011. According to available data summarised by Glaw & Vences (2007), *V. rubrocaudata* is known from Ambohimahalevona, Ampoza, Befandriana, Beroboka Avaratra, Fierin, Isalo, Toliana and Zombitse Forest (currently integrated in the complex Zombitse-Vohibasia National Park). Despite recent herpetological surveys in Zombitse, our team could not confirm its presence. Additionally, intensive research at Isalo National Park (e.g., Mercurio et al. 2008) provided similar results in that area: nevertheless, we observed traces on sand along dry rivers that probably refer to a burrowing skink species.

When pictures of other *Voeltzkowia* species were shown to local people in Andranomaitso (a small village on the Route Nationale 7, Commune rurale de Sakaraha), they informed us that similar animals would be found in the corn plantation near the village (S22° 53' 52.2" – E44° 39' 23.1", 710 m a.s.l.; fig. 1). An intensive search, performed by digging the earthy dry substrate close to the stems and roots, and flipping the rocks of the area, led us to find one individual [MRSN R3726; (corresponding to the tissue sample ACZC2565 where ACZC refers to field numbers of A. Crottini); GenBank accession number JQ005113] on the 11 December 2009 (fig. 2). Such individual (probably a male, SVL 52 mm, with 115 ventral



Fig. 1. Habitat of *Voeltzkowia rubrocaudata*: corn plantation (in foreground) near the village of Andranomaitso, Commune rurale de Sakaraha.

Table 1. Morphological measurements (all in mm) of specimens of *Voeltzkowia rubrocaudata* from southwestern Madagascar. Used abbreviations are: MRSN (Museo Regionale di Scienze Naturali, Torino), FAZC (Franco Andreone Zoological Collection, Field numbers), SVL (snout–vent length), TL (total length), VS (ventral scales), DS (dorsal scales), MBS (midbody scales).

MRSN	FAZC	SVL	TL	VS	DS	MBS
R3726	14370	52	82.5 *	115	113	18
R3738	14776	90	127.5	120	119	19
R3742	14777	63.5	100	116	120	19
R3743	14778	58	90.5	116	118	19
R3744	14775	78	127	117	119	19

* tip of the tail removed as DNA tissue sample.

scales, 113 dorsals, 18 around midbody) was burrowed <10 cm deep near a corn root. Nine other individuals were found during a second visit that took place in the same area on the 14 February 2011. Of these, four are now hosted in the zoological collection of the Museo Regionale di Scienze Naturali (Turin, Italy) (MRSN R3738, R3742–3744), and five are hosted in the zoological collection of the Parc Botanique et Zoologique de Tzimbaza-

za (Antananarivo, Madagascar) (Franco Andreone field numbers FAZC 14779–14783). Morphological measurements are presented in Table 1 and overall fit the descriptions provided by Mocquard (1894) and Brygoo (1981).

All these individuals are attributed to *V. rubrocaudata* due to the absence of hindlimbs, high number of ventral scales, and nostril in contact with first suprabial, according to the indications by Brygoo (1981). Notwithstanding, one major diagnostic character, the red tail (from which the specific epithet) was missing from all the examined live individuals. Chromatic differences among the individuals do not seem to be accentuated. The overall live coloration was light beige with pinkish and yellowish nuances on the back, and dark arrays of small dark points that form longitudinal stripes on the caudal portion. In particular, two individuals currently hosted in MRSN, and featured by a rather small body size (MRSN R3742–3743) have the dark lines on the tail quite evident and contrasted. The ventral side of the individuals was a slightly lighter. The five specimens housed in MRSN after about three years (MRSN R3726) and one year (MRSN R3738, R3742–3744) of preservation in ethanol (70%) show a general fade from beige into an almost whitish coloration, with persistence of the dark point and lines. In such a context it appeared quite unusual the absence of the red coloration reported by Grandidier (1869) and stressed by Brygoo (1981).

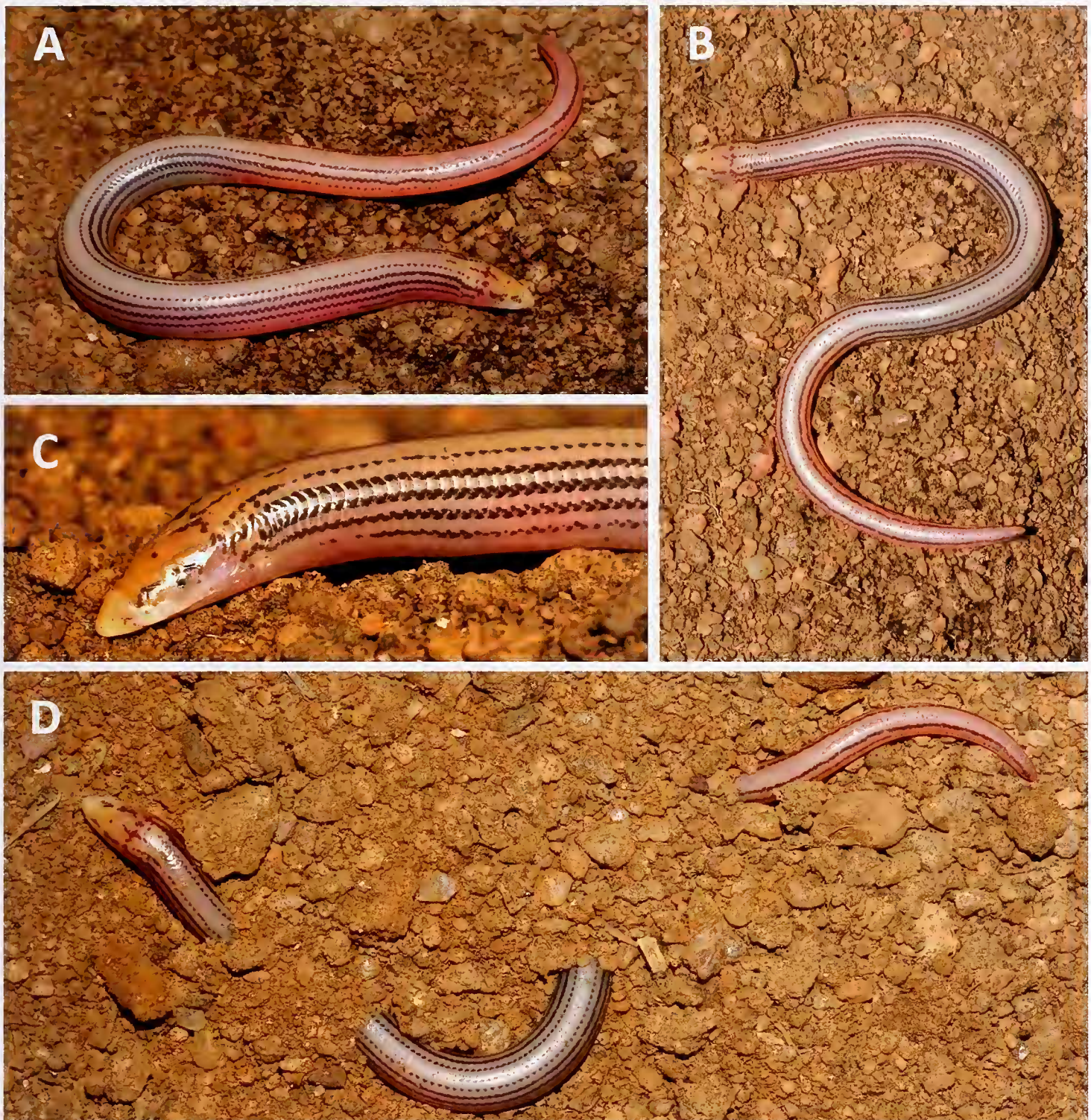


Fig. 2. *Voeltzkowia rubrocaudata* individual (MRSN R3726) in life from Andranomaitso village, southwestern Madagascar, found on the 11 December 2009: **A.** dorso-lateral overview; **B.** dorsal view; **C.** head close up; **D.** individual burrowing in the substrate. Photos by Gonçalo M. Rosa.

Further studies are necessary to understand the population variability of the species, and verify the persistence of the red colouration in the tails of specimens coming from the type locality (Fierin). Moreover, the habitats and ecology of this species are still poorly known, but this burrowing skink seems to be tolerant to anthropogenically-modified areas, benefiting from shaded habitat created by the plantation, as well as soil tillage that makes digging easier.

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REFERENCES

- Brygoo ER (1981) Systématique des lézards scincidés de la région malgache. VII. Révision des genres *Voeltzkowia* Boettger, 1893, *Grandidierina* Mocquard, 1894, et *Cryptoscincus* Mocquard, 1894 [sic!]. Bulletin du Muséum National d'Histoire Naturelle, Paris 4me Série, 3, Section A 2: 675–688
- Crottini A, Dordel J, Köhler J, Glaw F, Schmitz A, Vences M (2009) A multilocus phylogeny of Malagasy scincid lizards elucidates the relationships of the fossorial genera *Androngo* and *Cryptoscincus*. Molecular Phylogenetics and Evolution 53: 345–350
- Glaw F, Vences M (2007) A field guide to the amphibians and reptiles of Madagascar. Third edition, Cologne, Vences & Glaw Verlag, 496 pp
- Grandidier MA (1869) Descriptions de quelques animaux nouveaux découverts, pendant l'année 1869, sur la côte ouest de Madagascar. Revue et Magazine de Zoologie (Paris) 2(21): 337–342
- Köhler J, Vences M, Erbacher M, Glaw F (2010) Systematics of limbless scincid lizards from northern Madagascar: morphology, phylogenetic relationships and implications for classification (Squamata: Scincidae). Organisms, Diversity & Evolution 10: 147–159
- Mercurio V, Aprea G, Crottini A, Mattioli F, Randrianirina JE, Razafindrabe TJ, Andreone F (2008) The amphibians of Isalo Massif, southern-central Madagascar: high frog diversity in an apparently hostile dry habitat. Pp. 143–196 in: Andreone F (eds.). A Conservation Strategy for the Amphibians of Madagascar. Monografie XLV. Museo Regionale di Scienze Naturali, Torino
- Mocquard F (1894) Reptiles nouveaux ou insuffisamment connus de Madagascar. Compte-Rendu Sommaire des Séances de la Société Philomathique de Paris 17: 1–8
- Schmitz A, Brandley MC, Mausfeld P, Vences M, Glaw F, Nussbaum RA, Reeder TW (2005) Opening the black box: phylogenetics and morphological evolution of the Malagasy fossorial lizards of the subfamily “Scincinae”. Molecular Phylogenetics and Evolution 34: 118–133
- Whiting AS, Sites Jr, Bauer AM (2004) Molecular phylogenetics of Malagasy skinks (Squamata: Scincidae). African Journal of Herpetology 53(2): 135–146