

Bonn zoological Bulletin	Volume 60	Issue 1	pp. 25–34	Bonn, May 2011
--------------------------	-----------	---------	-----------	----------------

## Studies on African *Agama* IX. New insights into *Agama finchi* Böhme et al., 2005 (Sauria: Agamidae), with the description of a new subspecies

Philipp Wagner<sup>1,2\*</sup>, Wolfram Freund<sup>1</sup>, David Modrý<sup>3,4</sup>, Andreas Schmitz<sup>5</sup> & Wolfgang Böhme<sup>1</sup>

<sup>1</sup> Zoologisches Forschungsmuseum Alexander Koenig, Adenauerallee 160, D-53113 Bonn, Germany

<sup>2</sup> Department of Biology, Villanova University, Villanova, Pennsylvania 19085, USA

<sup>3</sup> Dept. of Parasitology, Faculty of Veterinary Medicine, University of Veterinary and Pharmaceutical Sciences  
Brno, Palackého 1–3, 612 42 Brno, Czech Republic

<sup>4</sup> Biology Center, Institute of Parasitology, Academy of Sciences of the Czech Republic, Branišovská 31,  
370 05 České Budějovice, Czech Republic

<sup>5</sup> Department of Herpetology and Ichthyology, Muséum d'histoire naturelle, C.P. 6434, CH-1211 Geneva 6,  
Switzerland

\*corresponding author: philipp.wagner.zfmk@uni-bonn.de.

**Abstract.** We present new information on the distribution and morphology of *Agama finchi* from eastern Africa. For the first time, material from three different populations (including the type locality) was available and the question of a possible subspecies in Uganda was positively answered. Based on the distribution pattern of *Agama* species groups, a general distribution pattern is discussed.

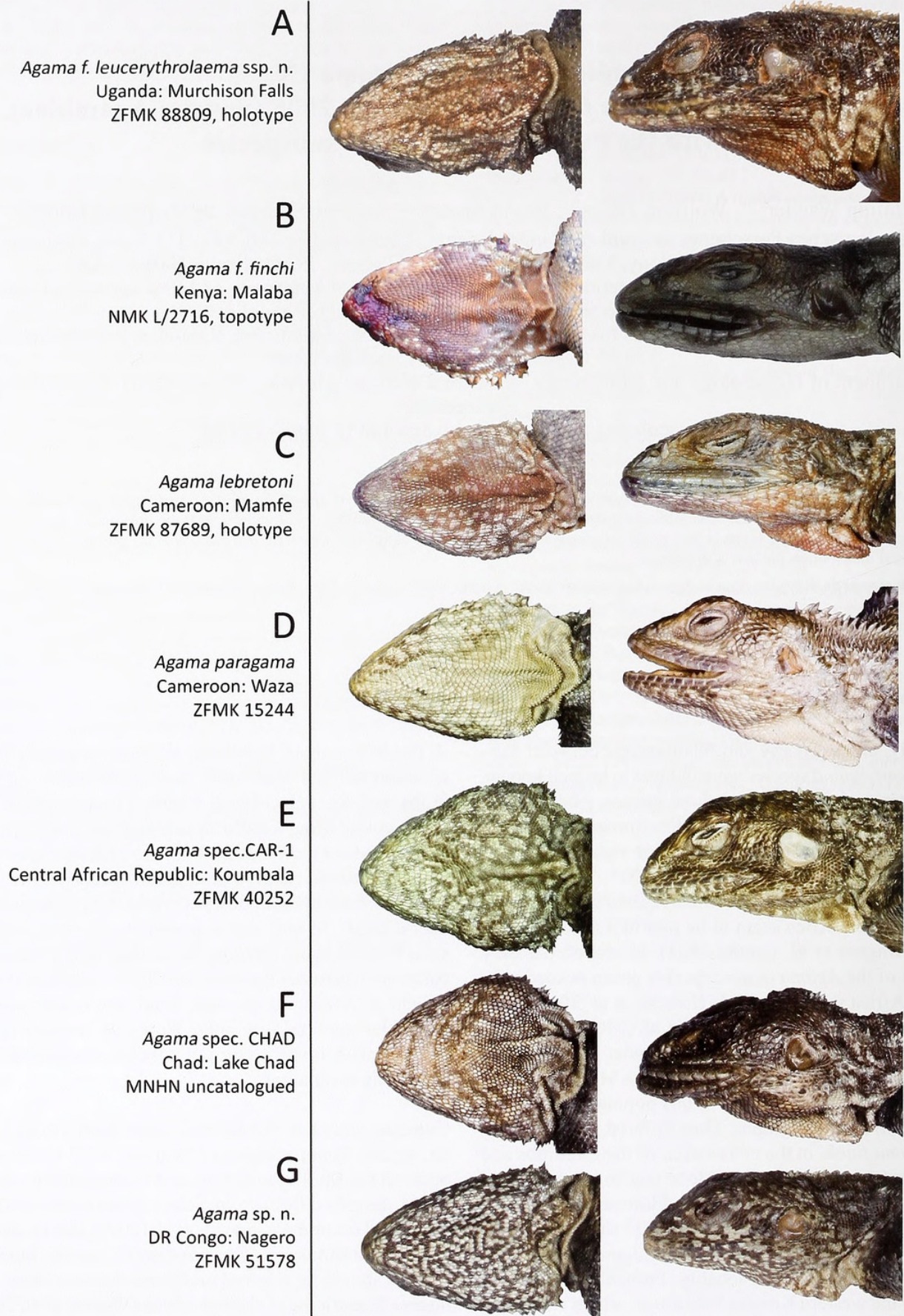
**Key words.** Reptilia, Sauria, Agamidae, *Agama finchi*, *Agama finchi* ssp. n., Africa, Kenya, Uganda, DR Congo, Ethiopia.

### INTRODUCTION

Cursorily, the taxonomy and relationships between eastern African *Agama* species were thought to be well known, but after intensive research on these species, it became obvious that species limits were underestimated and several taxa were described, revalidated or regarded as synonyms (Böhme et al. 2005; Wagner 2007; Wagner et al. 2008a, 2008b; Wagner 2010). Most *Agama* species occurring in eastern Africa seem to be part of a monophyletic group (Wagner et al. unpubl. data). However, the only member of the *Agama agama* species group occurring in eastern Africa is still *A. finchi* (Leaché et al. 2009). This species was described by Böhme et al. (2005) from Malaba in western Kenya close to the Ugandan border. These authors also mentioned a population from Murchison Falls in Uganda, but specimens from this population were only known from photographs. They differed from topotypical *Agama finchi* in the colouration of the forelimbs and until recently, it was not possible to confirm these photographs with voucher specimens. Additionally, further information given by Böhme et al. (2005) show the occurrence of *A. finchi* at the 'Yale River in Uganda', but it was not possible to trace this locality. Probably the locality refers to the western Kenyan Yala River, which was in the 'Uganda' province of East Africa before 1926 (pers. comm. Stephen Spawls, 25.I.2011).

*A. finchi* is a small lizard and is characterized by its bi-coloured red and black tails, scarlet-red heads and forelimbs and the velvet-black bodies of adult males. The throat colouration is uniform pale reddish, with a pattern of longitudinal dark reddish lines. The females are different in colouration from other *Agama* species as they possess a uniform brown body with reddish to yellow dorsolateral bands. In both sexes, a white to yellowish supralabial line is usually obvious. Nevertheless, differences in colouration between the specimens from Uganda and topotypical *A. finchi* are obvious, since the former possess body-like coloured forelimbs. However, without voucher specimens, it was so far not possible to assess the status of this population.

Currently, only few *Agama* species are known from Uganda. *Agama lionotus elgonis* Lönnberg, 1922 is known to occur in the Mt. Elgon region, and most probably *Agama finchi*, described from an area close to the border to Uganda, should occur there. Spawls et al. (2002) also mentioned a wide distribution of *Agama agama* in Uganda, but these records should be referred to *Agama lionotus* since *A. a. agama* is restricted to Central Africa (Wagner et al. 2009).



**Fig. 1.** Throat and left head side of male *Agama* species.

Since the description of *A. finchi*, specimens from Uganda became available and it was possible to recognize the species from other countries by images and specimens. Therefore, the aim of this publication is to summarize and discuss the distribution of *A. finchi* and to assess the status of the populations possessing body-like coloured forelimbs.

## MATERIAL AND METHODS

**Material and morphological sampling.** 21 specimens of *Agama finchi*, including type material, were examined. Specimens from collections of the following institutions (Institutional abbreviations in parenthesis) were used: Muséum d'histoire naturelle, Genève (MHNG); National Museums of Kenya (NMK); Zoologisches Forschungsmuseum Alexander Koenig, Bonn (ZFMK). Type material of the new species is deposited in the Zoologisches Forschungsmuseum A. Koenig, Bonn.

For each specimen, external characters were recorded: snout-vent-length (SVL), length of tail (TL), head width between the anterior margins of the ear openings (HW), head length from the tip of the snout to the anterior margin of the ear opening on the left side (HL), head height at the highest point of the head (HH), number of scales beneath the 4th toe on the left side (SD), number of scales around mid-body (MBS), number of scales between gular- and inguinal fold (V; ventrals), and the number of precloacal pores (PP). Measurements were taken with a dial calliper to the nearest 0.1 mm. Measurements and scale counts were done according to Grandison (1968) and Moody & Böhme (1984). Colour patterns in living specimens were described using field notes and life photographs.

**Material examined.** *Agama f. finchi* Kenya. Malaba: ZFMK 82091–82094, NMK L/2533/3, L/2534/1,3,6. *Agama f. ssp. n.* Ethiopia. Gambela: ZFMK 8709–8711, 66271. Uganda. Murchison Falls: ZFMK 88808–814, 88829. *Agama lebretoni*. Cameroon. Douala, Foyer du Marin: MHNG 2713.31; Fako (Mt. Cameroon), Limbe (Victoria): ZFMK 18891–894; Korup, Mundemba: ZFMK 61243; Magba: ZFMK 51686, 54906–907; Makum: ZMB 55709, 37061; Mamfe: ZFMK 87694–699, 87700; Mamfe, Mukwecha, Amebisu: ZFMK 87694–699; Metchum, Wum: ZFMK 15194–15200; Mt. Nlonako, Nguengue: ZFMK 69017, Rumpi Hills, Mofako Balue: MHNG 2713.29; Rumpi Hills, Big Massaka: MHNG 2713.30, 2713.32. Equatorial Guinea. Bioko Island, San Carlos: ZFMK 9353–359. Gabon. Fougamou: ZFMK 73239–245; Ngouassa: IRSNB 15686–687. *Agama paragama*. Cameroon. Logone et Chari, Waza: ZFMK 15242–256. Niger. Agadez: ZFMK 36599; Tessaoua: ZFMK

33749–750. *Agama cf. paragama*. Cameroon. Benoué, Boki: ZFMK 15227–241. *Agama cf. sylvanus*. Cameroon. Benoué: ZFMK 33751–754. *Agama spec.* | CAR-1. Central African Republic. Koumbala: ZFMK 40251–260. *Agama spec.* | CAR-2. Mélé: ZFMK 33766; Ndélé: ZFMK 33755–7654; Sibut: ZFMK 33765. *Agama spec.* | Chad Chad. Bol (near Lake Chad): 2917I–2922I (will be inventoried at the collection of the MNHN). *Agama sp. n.* Democratic Republic of the Congo. Nagero: ZFMK 51576–587; Isiro: ZFMK 51588.

## RESULTS

### *Agama finchi leucerythrolaema ssp. n.*

**Holotype.** ZFMK 88809, adult male from Murchison Falls, Uganda; collected by W. Freund, July 2009.

**Paratypes.** ZFMK 88810, adult male from Murchison Falls, Uganda; collected by W. Freund, July 2009.

ZFMK 88811, 88829, adult females from Murchison Falls, Uganda; collected by W. Freund, July 2009.

ZFMK 88808, 88812–814, juveniles from Murchison Falls, Uganda; collected by W. Freund, July 2009.

**Diagnosis.** This is a medium-sized lizard of the genus *Agama* (total length of adult males up to 275 mm), which is characterized by a large gular fold, a reticulated throat and a bright nuptial coloration of adult males. The throat colouration (Fig. 1A) is a reticular pattern of red lines, which thus far is only known from *A. paragama* (Fig. 1D), *A. sylvanus* (no true specimen available), *A. lebretoni* (Fig. 1C) and from recently unidentified material from the Central African Republic (formerly identified as *A. sylvanus*; Fig. 1E) Lake Chad (Fig. 1F) and DR Congo (Fig. 1G). Females are similar to those of the nominate form.

**Differentiated diagnosis.** *A. finchi leucerythrolaema ssp. n.* not only differs from the nominotypic form by its larger size, but additionally males of the new taxon are distinct as they possess a large gular fold, a reticulated colour pattern of the throat (for both see Fig. 1A) and body-like coloured forelimbs. Differences in pholidosis to the nominate form are only marginal but the new subspecies has a lower count of body scales (Table 1).

Because of the reticulated throat, the new subspecies is similar to some other *Agama* species. From the two Central Africa species, *A. paragama* and *A. lebretoni*, the new subspecies differs as follows:

*Agama paragama* possesses a yellow-whitish to chalk white head and has a higher number of scale rows around the midbody (Tab. 1). Additionally, adult males of *A.*



**Fig. 2.** Male holotype (ZFMK 88809) of *Agama finchi leucerythrolaema* ssp. n. from Murchison Falls, Uganda.

*paragama* show a black instead of a dark blue tail tip. Similar to the herein described new species, Grandison (1968) described the colouration of the throat of *A. paragama* as 'a dark network on a cream ground which takes the form of isolated, round, cream spots' (Fig. 1D), which is present in both sexes, and therefore similar to *A. finchi leucerythrolaema* ssp. n. as the females also have a striated throat pattern.

*A. lebretoni* differs from the new subspecies by having a pale vertebral band and scattered white body scales. Additionally, the average snout-vent-length in this species is larger than in the new subspecies (*A. lebretoni*: 117.8 mm; *A. f. leucerythrolaema* ssp. n.: 102.4 mm).

The new subspecies differs from the West African, *A. sylvanus*, in having a higher mid-body scale count. According to MacDonald (1981), *A. sylvanus* has 59 to 66 scale rows, whereas *A. finchi leucerythrolaema* ssp. n. has 71 to 78 rows. The same author described the pattern of the throat as 'marked with an irregular pattern of longitudinal whitish lines and (more rarely) small spots', which is similar to the herein described subspecies.

*A. finchi leucerythrolaema* ssp. n. is clearly dissimilar to the Central African *A. a. agama*, since the latter possesses a uniform to striated red throat, a tri-coloured tail and a yellow head. However, according to Grandison (1968), her specimens of *A. agama* from Nigeria (currently not traceable if it is *A. agama* sensu stricto or sensu lato) has 59 to 77 rows, which is similar to *A. f. leucerythrolaema* ssp. n. (71 to 78 rows).

*A. finchi leucerythrolaema* ssp. n. differs from other East African *Agama* species as follows:

- from *A. lionotus* in having a reticulated throat, a tri-coloured tail and a dark blue body colouration, in having lower scale counts around the midbody (*A. l. lionotus*: 67–91 | 75.4; *A. l. elgonis*: 79–87 | 81.8; *A. finchi leucerythrolaema* ssp. n.: 73.9) and a large gular fold;
- from *A. turuensis* in having a reticulated throat, a gular fold and lower count of scale rows around the midbody (*A. turuensis*: 71–85 | 77.6; *A. finchi leucerythrolaema* ssp. n.: 73.9);
- from *A. kaimosae* in having a reticulated throat, a gular fold, a blue body colouration, lower scale counts around the midbody (*A. kaimosae*: 79–82 | 80.0; *A. finchi leucerythrolaema* ssp. n.: 73.9) and a tricoloured tail;
- from *A. mwanzae* in having a reticulated throat, a gular fold, a blue body colouration, lower scale counts around the midbody (*A. mwanzae*: 67–82 | 75.2; *A. finchi leucerythrolaema* ssp. n.: 73.9) and a tri-coloured tail;
- from *A. caudospinosa* in having a reticulated throat, a gular fold, a blue body colouration, lower scale counts around the midbody (*A. caudospinosa*: 74–116 | 93.3; *A. finchi leucerythrolaema* ssp. n.: 73.9) and a tri-coloured tail;
- from *A. montana*, *A. mossambica* and the much smaller *A. armata* in not possessing a heterogeneous body scalation.

### Description of the holotype (ZFMK 88809, Fig. 2)

Habitus stout, snout-vent length 118.2 mm, tail length 150.1 mm, head length 30.3 mm, head width 19.4 mm, head height 12.8 mm.

Large triangular nasal scale slightly above the canthus rostralis and pierced with the nostril in the posterior part, directed and supplied obliquely upwards. Between the nasal scales, a single narrow longitudinal smooth scale is visible, followed by one smooth scale, larger than the other head scales. Ten supralabial and sublabial scales are on both sides. Head scales between the eyes are smooth, directed sideward from a midline of two rows of feebly keeled scale; head scales between posterior end of the eyes and neck smooth to feebly keeled, directed forwards; head scales of the temporal region smooth to feebly keeled, not directed to one side; free anterior margins of head scales with sensory pits; supraocular scales smooth. Parietal shield large and more or less pentagonal, pineal organ visible, pierced more or less in the middle of the shield. Ear hole large, about the same size as the eye, margin being composed by spiny scales, surrounded by four tufts of more or less spiny, mucronate scales; tympanum superficial. Nuchal crest low, consisting of 13 lanceolate scales. Gular scales flat, smooth, juxtaposed and becoming smaller towards the large gular fold. Dorsal body scales strongly keeled, but becoming feebly keeled at the vertebral region, mucronate, equal in size, in 56 scales from midpoint of pectoral region to midpoint of the pelvic region. Ventral body scales smooth, slightly imbricate at their posterior margins, in 69 scales from midpoint of pectoral region to midpoint of pelvic region. There are 72 scales rows around the midbody. Ten precloacal scales stringed in one row only. Tail scales strongly keeled and mucronate. Scales on the upper side of the forelimb strongly keeled, smooth on the underside, on the upper arm scales twice as large as the dorsal body scales, becoming smaller towards the underside and the manus. 4<sup>th</sup> finger longest, digital length decreasing 3-2-5-1, subdigital lamellae keeled and mucronate. Scales on the upper side of the hindlimb strongly keeled, becoming smooth on the underside, on the upper thighs slightly larger in size than the dorsal body scales, becoming larger towards the lower thighs. 4<sup>th</sup> toe longest, digital length decreasing 3-2-5-1.



**Fig. 3.** Living specimens from the type localities (A) male and (B) female of *Agama finchi leucerythrolaema* ssp. n. from Murchison Falls, Uganda (photos by David Modry); (C) male and (D) female of *Agama finchi finchi* from Malaba, Kenya (Photos: Brian Finch).

**Colouration.** (in alcohol after three months of preservation). Head and neck red with a light red vertebral band extending to the back. Limbs, body and anterior third of the tail dark blue. Tail tri-coloured, at the base dark blue, followed by red and dark blue. Belly and underside of the limbs blue, tail anterior whitish, posterior bluish. Throat and the large gular fold with a reticulated pattern of red stripes on a white background.

**Colouration in life. Males.** Head, neck and parts of the shoulders red, a broad vertebral red band extends on the back from head to about half way to hindlimbs. Body, limbs and anterior third of the tail dark blue. Tail tri-banded: dark blue (extending from the body), followed by red and dark blue at the tip (Figs 3a, 4a). Belly and underside of limbs blue; throat with a reticulate pattern of red stripes on a white background.

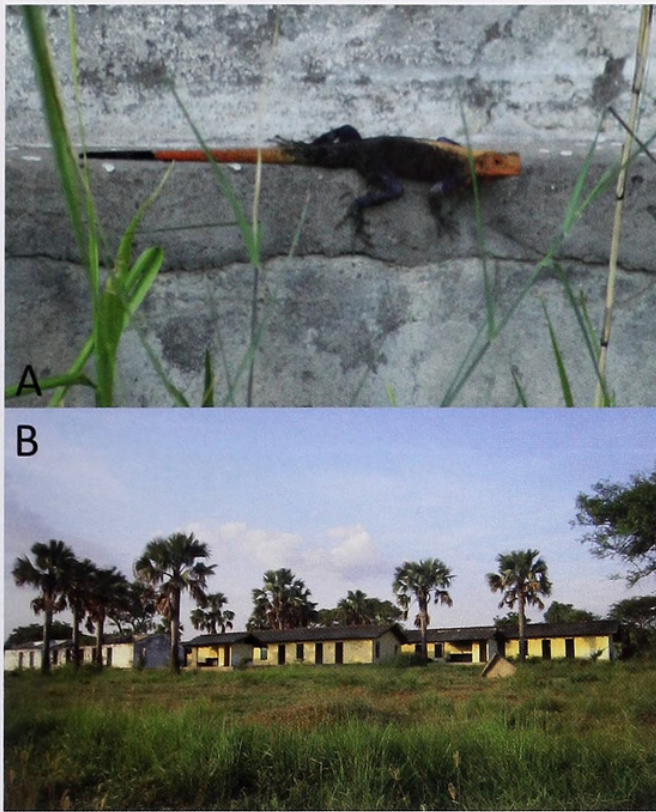
**Females.** Head yellowish brown, with fine yellow stripes and dots; stripes and dots usually extending to the shoulders. Body and tail light brownish with broad lateral yellow bands (Fig. 3b). Underside whitish, with fine dark longitudinal stripes on the throat.

**Juveniles.** Similar to females but with more distinct yellow dots and stripes on the head on the shoulders. Yellow lateral bands sometimes extending to the back. Underside whitish, with a fine dark reticulated pattern on the throat.

**Variation.** Variations in morphology are shown in the appendix and compared to other agamid species in Table 1. Colouration of males is not variable and all show the typical colour pattern of throat and forelimb.

**Etymology.** The new species is named after its remarkably characteristic red and white vermiculated throat as compared to the nominate form. The name is derived from the Greek words 'leukos' for white, 'erythros' for red and 'laema' for the throat.

**Distribution.** Beside the type localities of the two subspecies, *A. finchi* was also identified from Gambela in Ethiopia, represented by material from the collection of the Zoologisches Forschungsmuseum A. Koenig (ZFMK 8709–8711; ZFMK 66639, 66271–72). In contrast to the specimens of *A. f. finchi* from Kenya and DR Congo (see below and figs 3, 5), the adult males of this population



**Fig. 4.** (A) Living male and (B) habitat of *Agama finchi leucerythrolaema* ssp. n. from Murchison Falls, Uganda (Photos: Wolfram Freund).

show body-like coloured forelimbs and therefore represent the new subspecies. The colouration of the throat is not distinguishable, because of the long preservation time. However, specimens from Gambela are similar in the average of their snout-vent-length to topotypical material of the nominal subspecies (Ethiopia: 86.2 mm | Kenya: 85.7 mm). *A. f. leucerythrolaema* ssp. n. is also cryptically mentioned in Largen & Spawls (2010). Within the species chapter on *Agama agama* (sic., as *Agama agama* in neither occurs in Ethiopia nor Eritrea), specimens from Gambela are figured (Largen & Spawls 2010, fig. 147) showing the herein described subspecies. According to Stephen Spawls (pers. comm. 07.X.2010), the western population of the former '*Agama agama*' in Ethiopia and Eritrea belongs to *A. finchi*, whereas the southern ones belong to *Agama lionotus*.

Quite recently, the new subspecies was also recorded from the Lorionotom Range, Ilemi Triangle (approx coordinates: 4°53'38.53"N, 35°31'59.44"E) by Miroslav Jirku (specimens will be inventoried in the collection of the National Museums of Kenya, Nairobi), which fills the gap between the Ethiopian and Ugandan localities.

**Habitat.** Specimens at Murchison Falls were collected in open grassland (Fig. 4b), sitting on old houses (Fig. 4a)

and on palm trees. The habitat of the Ethiopian populations is unknown, but is likely to be similar.

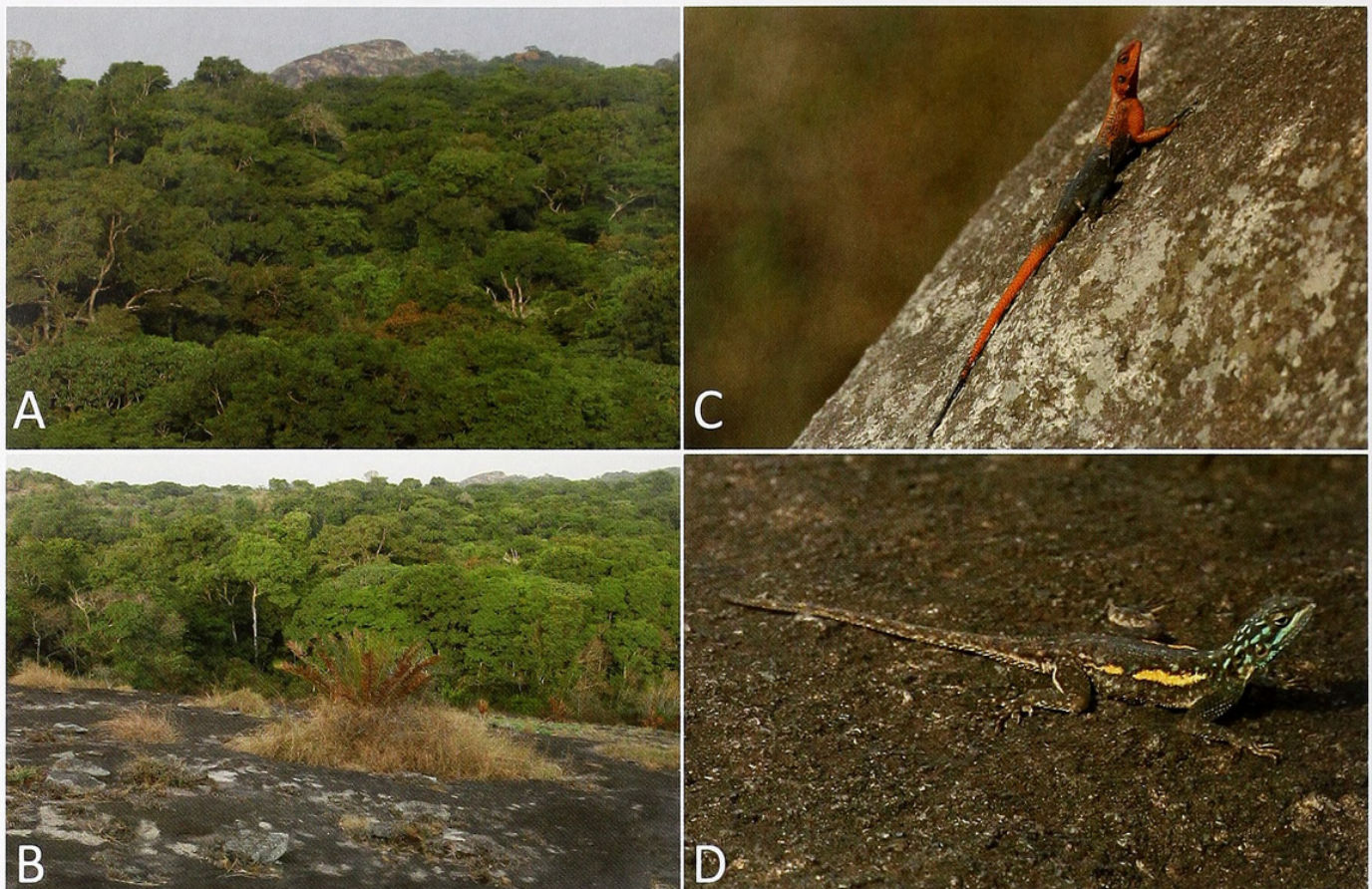
**Relationships.** According to Wagner et al. (unpubl. data) *Agama finchi* sensu lato is differentiated in two clades. Individuals from the type locality of the nominate form are distinct in colouration of forelimbs, throat, and in body size to specimens from Uganda and Ethiopia, but there are few other morphological differences (see Appendix). Genetic analysis indicates (Wagner et al. unpubl. data) that the new taxon is closely related to *A. finchi* and both taxa are members of the *Agama agama* species group.

***Agama f. finchi*: new distribution record.** *Democratic Republic of the Congo.* The nominate species was documented by photographs from the Ituri forest (Fig. 5) where it occurs on an inselberg surrounded by rainforest is not otherwise connected to savannah areas. Ecologically, this inselberg is an arid area, as rainwater flows off immediately, and the unshaded dark rocks are heated up by sunlight during the day. Therefore, fauna and flora (with e.g. rock hyrax and aloe plants; pers. comm. Reto Kuster) of this inselberg are very different from those of the surrounding rainforest. The status of these forests as a true rainforest is supported by the occurrence of *Lepidothyris hinkeli* Wagner et al., 2009, which is a character species of equatorial rainforests (Wagner et al. 2009). As can be seen from the figures 4 C–D, the specimens are identical in colouration to the specimens from the type locality of *A. f. finchi* in western Kenya. However, the throat colouration is still unknown. The distribution of both taxa is shown in figure 6.

## DISCUSSION

Preliminary genetic analyses (unpubl. data) separated *Agama finchi* sensu lato into two distinct clades: this was supported by differences in the colouration of the forelimbs of adult males. However, there are more morphological differences between the Ugandan and Kenyan populations than between the Ugandan and Ethiopian. The Ugandan population is distinct from the Kenyan population because of the reticulated throat and the much larger size of adult males. Also, the Ugandan population is larger than the Ethiopian population. Furthermore, only small series were collected from all populations, and body-sizes are probably underestimated. Because the Ethiopian specimens were preserved a long time ago, the throat colouration is not identifiable anymore.

Little information is available about the species limits within the genus *Agama*. In contrast to genetic distances in-between other *Agama* species, the distances within the *A. finchi* sensu lato populations are comparatively small.



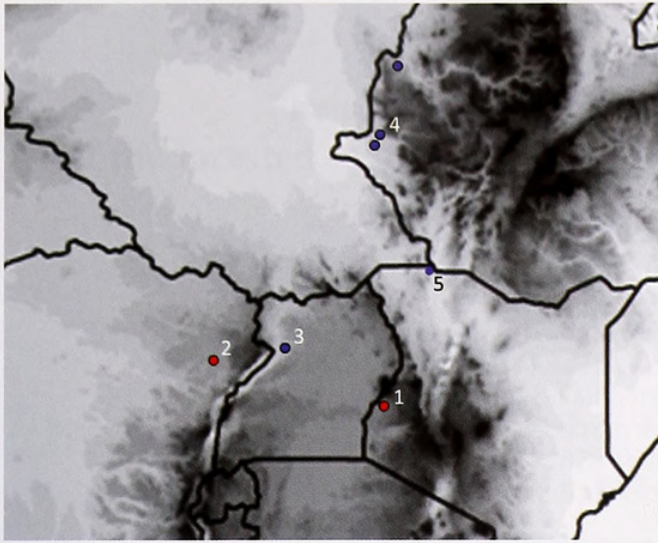
**Fig. 5.** *Agama f. finchi* occurrence on an inselberg within the Ituri Forest, DR Congo **(A)** View to the inselberg within the forest. **(B)** Habitat on the inselberg. **(C)** Living male of *A. f. finchi* from the same locality. **(D)** Living female of *A. f. finchi* from the same locality (Photos: Reto Kuster).

However, identification of the subspecies is possible and demonstrated by pholidosis, differences in colouration of adult males, and the colour pattern of the throat. Therefore, these populations should be recognized as a developing species and according to article 45.6 of the International Code of Zoological Nomenclature (ICZN 1999), they can be recognized as the taxonomic rank of a subspecies.

Distribution patterns and relationships are poorly known in *Agama* lizards. For decades, the genus was not in the focus of herpetological interests and most of the taxa were recognized as subspecies of *Agama agama* which, because of this original taxonomic classification, was supposed to be distributed nearly everywhere in sub-Saharan Africa. Therefore, in the older literature, *A. agama* is supposed to have a distribution range with includes nearly every Afrotropical country. Additionally, many specimens are misidentified or simply inaccurately labelled as *A. agama* in museum collections. Wagner et al. (2009) described a neotype and restricted *A. agama* s. str. to northern Cameroon. The whole *A. agama* species complex is now

distributed along the southern border of the Sahara desert from western to eastern Africa and along the Atlantic coast to Namibia. Other than that, former East African subspecies of *A. agama* are now recognized as a distinct species (Böhme et al. 2005), forming the *A. lionotus* species group, which is distributed from Ethiopia through Kenya to southern Tanzania. However, the distribution patterns of the *A. agama* and *A. lionotus* species groups generally follow the theory of African arid corridors and is comparable to distributions of other reptile species groups, such as *Varanus exanthematicus/albigularis* (see Wagner 2010).

The only representative of the *A. agama* species complex in eastern Africa (including Ethiopia) is *A. finchi*, as none of the other *A. agama* species complex taxa are present in Ethiopia and Uganda (pers. comm. Steven Spawls). To date, both subspecies of *A. finchi* have only been found west of the eastern branch of the East African Rift, but it is not possible to recognize this geological barrier as a distribution limit since this species is only known in four localities.



**Fig. 6.** Distribution of *Agama finchi*. Red dots refer to *A. f. finchi*, whereas blue dots refer to *A. f. leucerythrolaema* ssp. n. (1) Kenya: road to Busia near Malaba (type locality); (2) DR Congo (photo documentation); (3) Uganda: Murchison Falls (type locality); (4) Ethiopia: Gambela. Other Ethiopian localities obtained from Largen & Spawls 2010; (5) Kenya: Lorionotom Range, Ilemi Triangle (approx coordinates: 4°53'38.53"N, 35°31'59.44"E).

Distribution was also influenced by the dispersal and retraction of the equatorial rain forest in the past. The population in the Ituri Forest is a relict population found on an inselberg surrounded by rainforest, usually a non-suitable habitat for *Agama* species. The status of the Guineo-Congolian rainforest is supported by the occurrence of *Lepidothyris hinkeli*, which is a character species of this forest type (Wagner et al. 2009). Therefore, the rainforests in this area seem to be relatively young as *A. finchi* was enclosed on its inselberg during an extension of the rainforest. As a result, the species must have been widely distributed within the area during the time when the rainforest last receded.

**Acknowledgements.** We are grateful to Reto Kuster for permission to publish his images of *Agama finchi* from DR Congo and his comments on the occurrence of this species in the DR Congo. Moreover, we are grateful to Stephen Spawls and Miroslav Jirku for their information about *A. finchi* in Ethiopia and Kenya. We thank the two referees for their comments which have improved the manuscript, and especially to Shelley Barts-Pankow who did the English review.

## REFERENCES

- Böhme W, Wagner P, Malonza P, Lötters S, Köhler J (2005) A new species of the *Agama agama* group (Squamata: Agamidae) from western Kenya, East Africa, with comments on *Agama lionotus* Boulenger, 1896. *Russian Journal of Herpetology* 12: 83–90
- Grandison AGC (1968) Nigerian lizards of the genus *Agama* (Sauria: Agamidae). *Bulletin of the British Museum of Natural History Zoology* 17: 67–90
- ICZN (1999) International Code of Zoological Nomenclature. International Trust for Zoological Nomenclature, Fourth Edition: 306 pp.
- Largen M, Spawls S (2010) The amphibians and reptiles of Ethiopia and Eritrea. Edition Chimaira, 693 pp.
- Macdonald MA (1981) A new species of agamid lizard from Ghana. *Journal of Zoology* 193: 191–199
- Moody SM, Böhme W (1984) Merkmalsvariationen und taxonomische Stellung von *Agama doriae* Boulenger, 1885 und *Agama benueensis* Monard, 1951 (Reptilia: Agamidae) aus dem Sudangürtel Afrikas. *Bonn. zool. Beiträge* 35: 107–128
- Spawls S, Howell K, Drewes RC, Ashe J (2002) Field Guide to the Reptiles of East Africa: All the Reptiles of Kenya, Tanzania, Uganda, Rwanda and Burundi. Princeton Field Guides: 543 pp.
- Wagner P (2007) Studies in African *Agama* I – On the taxonomic status of *Agama lionotus usambarae* Barbour & Loveridge, 1928 (Squamata: Agamidae). *Herpetozoa* 20: 69–73
- Wagner P, Burmann A, Böhme W (2008a) Studies on African *Agama* II. Resurrection of *Agama agama kaimosae* Loveridge, 1935 (Squamata: Agamidae) from synonymy and its elevation to species rank. *Russian Journal of Herpetology* 15: 1–7
- Wagner P, Krause P, Böhme W (2008b) Studies on African *Agama* III. Resurrection of *Agama agama turuensis* Loveridge, 1932 (Squamata: Agamidae) from synonymy and its elevation to species rank. *Salamandra* 44: 35–42
- Wagner P, Wilms TM, Bauer A, Böhme W (2009) Studies on African *Agama* V. On the origin of *Lacerta agama* Linnaeus, 1758 (Squamata: Agamidae). *Bonner Zoologische Beiträge* 56: 215–223
- Wagner P (2010) Diversity and distribution of African reptiles. Unpublished PhD thesis, University of Bonn: 374 pp.

Received: 25.11.2010

Accepted: 25.02.2011

Corresponding editor: F. Herder

## APPENDIX

Taxon	No.	Locality	SVL	TL	ToL	HH	HW	HL	HL/HH	HL/HW	VEN	DOR	SaM	Fi	Toe	PCP	LBL	Sex
<i>A. f. finchi</i>	ZFMK 82093	Kenya: Malaba	44.0	68.3*	112.3	5.9	10.4	14.2	2.4	1.4	81	77	78	17	20	—	22.4	juv.
<i>A. f. finchi</i>	ZFMK 82094	Kenya: Malaba	44.6	39.3*	83.9	4.9	11.9	12.6	2.6	1.1	81	—	76	18	21	—	29.2	juv.
<i>A. f. finchi</i>	NMK L/2534/6	Kenya: Malaba	52.4	77.1*	129.6	6.8	11.5	16.7	2.4	1.5	80	78	71	17	21	—	25.7	juv.
<i>A. f. finchi</i>	NMK L/2534/3	Kenya: Malaba	38.6	56.4*	95.0	6.3	9.3	11.2	1.8	1.2	78	78	70	18	21	—	18.4	juv.
<i>A. f. finchi</i>	NMK L/2534/1	Kenya: Malaba	46.0	30.4*	76.4	6.6	9.5	13.6	2.1	1.4	83	80	76	18	20	—	24.2	juv.
<i>A. f. finchi</i>	NMK L/2533/3	Kenya: Malaba	59.4	103.9	163.3	7.1	13.6	17.5	2.5	1.3	83	80	74	18	19	—	21.1	female
<i>A. f. finchi</i>	ZFMK 82091	Kenya: Malaba	78.8	123.0*	201.8	10.0	16.3	23.5	2.4	1.5	84	—	—	19	20	12	41.1	male
<i>A. f. finchi</i>	ZFMK 82092	Kenya: Malaba	88.6	69.8*	158.4	9.5	17.7	21.5	2.3	1.2	86	79	79	18	22	11	44.8	male
<i>A. f. finchi</i>	NMK L/2534/2	Kenya: Malaba	87.7	154.6*	242.3	9.8	15.7	23.2	2.4	1.5	82	79	79	18	21	12	42.8	male
<i>A. f. leucerythrolaema</i>	ZFMK 8710	Ethiopia: Gambela	88.2	137.5	225.7	10.7	16.8	22.6	2.1	1.3	80	79	70	19	21	—	42.8	female
<i>A. f. leucerythrolaema</i>	ZFMK 8711	Ethiopia: Gambela	85.4	141.1	226.5	11.2	16.4	22.2	2.0	1.4	78	61	77	20	21	—	40.4	female
<i>A. f. leucerythrolaema</i>	ZFMK 8709	Ethiopia: Gambela	85.5	139.9	225.4	11.3	17.0	24.5	2.2	1.4	83	60	71	19	23	13	40.3	male
<i>A. f. leucerythrolaema</i>	ZFMK 66271	Ethiopia: Gambela	85.6	—	—	10.1	15.9	22.9	2.3	1.4	77	60	75	19	21	12	44.5	male
<i>A. f. leucerythrolaema</i>	ZFMK 88809	Uganda: Murch. Falls	118.4	—	—	13.4	19.0	29.6	2.2	1.6	80	60	74	18	19	11	60.5	male
<i>A. f. leucerythrolaema</i>	ZFMK 88810	Uganda: Murch. Falls	116.2	162.2	278.4	14.0	20.0	28.6	2.0	1.4	81	76	75	19	22	12	60.4	male
<i>A. f. leucerythrolaema</i>	ZFMK 88811	Uganda: Murch. Falls	90.2	143.6	233.8	9.5	15.1	22.2	2.3	1.5	77	60	74	17	19	—	47.1	female
<i>A. f. leucerythrolaema</i>	ZFMK 88829	Uganda: Murch. Falls	86.9	139.8	226.7	10.1	15.9	22.5	2.2	1.4	85	63	70	16	17	—	43.1	female

SVL= snout-vent-length; TL= tail length; ToL= total length; HH= head height; HW= head width; HL= head length; VEN= Ventralia; DOR= Dorsalia; SaM= Scales around midbody; Fi= lamellas beneath left 4<sup>th</sup> finger; Toe= lamellas beneath left 4<sup>th</sup> toe; PCP= number of precloacal pores; LBL= length between limbs.



Wagner, Philipp et al. 2011. "Studies on African Agama IX. New insights into Agama finchi Böhme et al., 2005 (Sauria: Agamidae) with the description of a new subspecies." *Bonn zoological bulletin* 60, 25–34.

**View This Item Online:** <https://www.biodiversitylibrary.org/item/156770>

**Permalink:** <https://www.biodiversitylibrary.org/partpdf/120217>

#### **Holding Institution**

Smithsonian Libraries and Archives

#### **Sponsored by**

Biodiversity Heritage Library

#### **Copyright & Reuse**

Copyright Status: In Copyright. Digitized with the permission of the rights holder.

Rights Holder: Zoologisches Forschungsmuseum Alexander Koenig

License: <http://creativecommons.org/licenses/by-nc-sa/3.0/>

Rights: <https://www.biodiversitylibrary.org/permissions/>

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.