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Contributions to the herpetofauna of the Angolan Okavango-Cuando-Zambezi River drainages. Part 2: Lizards (Sauria), chelonians, and crocodiles

[1,2,3,*]Werner Conradie, [2,3,4,5]Chad Keates, [3,6,7]Luke Verburgt, [3,8,9,10]Ninda L. Baptista, [3,11]James Harvey, [3,12]Timóteo Júlio, and [3]Götz Neef

[1]*Port Elizabeth Museum, Beach Road, Humewood, Port Elizabeth 6013, SOUTH AFRICA* [2]*Department of Nature Conservation Management, Natural Resource Science and Management Cluster, Faculty of Science, George Campus, Nelson Mandela University, George, SOUTH AFRICA* [3]*National Geographic Okavango Wilderness Project, Wild Bird Trust, SOUTH AFRICA* [4]*Department of Zoology and Entomology, Rhodes University, Grahamstown, SOUTH AFRICA* [5]*South African Institute for Aquatic Biodiversity (SAIAB), Makhanda, SOUTH AFRICA* [6]*Enviro-Insight CC, Unit 8 Oppidraai Office Park, Pretoria 0050, SOUTH AFRICA* [7]*Department of Zoology and Entomology, University of Pretoria, Pretoria, 0001, SOUTH AFRICA* [8]*CIBIO/InBio, Centro de Investigação em Biodiversidade e Recursos Genéticos, Laboratório Associado, Universidade do Porto, Campus Agrário de Vairão, Rua Padre Armando Quintas, 4485-661 Vairão, PORTUGAL* [9]*Faculdade de Ciências, Universidade do Porto, Porto, PORTUGAL* [10]*BIOPOLIS Program in Genomics, Biodiversity and Land Planning, CIBIO, Campus de Vairão, 4485-661 Vairão, PORTUGAL* [11]*Harvey Ecological, 41 Devonshire Avenue, Howick, 3290, SOUTH AFRICA* [12]*Fundação Kissama, Rua 60 Casa 560, Lar do Patriota, Luanda, ANGOLA*

***Abstract.*—This work is the second report of the results obtained from a series of rapid biodiversity surveys of the upper Cuito, Cubango, Cuando, Zambezi, and Kwanza River basins in Angola, which were conducted between 2015 and 2019 in conjunction with the National Geographic Okavango Wilderness Project. The herpetofauna of this region are poorly documented and the results of these surveys help to address the knowledge gap regarding the conservation importance of this region. Here, an updated checklist is provided for the current and historical records of lizards, chelonians, and crocodiles from the southeastern region of Angola. A total of 369 new records were documented comprising 40 species, bringing the total number of recognized lizard, chelonian, and crocodile species in this region to 58. These surveys documented four new country records (i.e., *Lygodactylus chobiensis*, *Agama armata*, *Pachydactylus wahlbergii*, and *Ichnotropis* cf. *grandiceps*) and increased the total number of reptile species known to occur in Angola (excluding snakes) from approximately 157 to 161. Finally, updated distribution maps for the whole country are provided for all of the species encountered in this study.**

Key words. Africa, Cuanavale, Cuito, headwaters, Okavango Delta, reptile

***Resumo.*—Este trabalho é a segunda parte dos resultados de uma série de levantamentos rápidos de biodiversidade realizados nas bacias dos rios Cuito, Cubango, Cuando, Zambeze e Kwanza em Angola, entre 2015 e 2019, em conjunto com o National Geographic Okavango Wilderness Project. A herpetofauna desta região está pouco documentada, e os resultados destes levantamentos ajudarão a colmatar a lacuna de conhecimento sobre a importância da sua conservação. Aqui apresentamos uma lista atualizada de registos históricos e recentes dos lagartos, quelónios e crocodilos do sudeste de Angola. Ao todo, foram documentado 369 novos registros, relativos a 40 espécies, elevando o número total de espécies desses três grupos na região para 58. Nestes levantamentos foram registadas em Angola pela primeira vez quatro as espécies de lagartos (*Lygodactylus chobiensis*, *Agama armata*, *Pachydactylus wahlbergii*, *Ichnotropis* cf. *grandiceps*), aumentando o número total de espécies conhecidas de répteis (excluindo cobras) de Angola de 157 para 161. Por fim, apresentamos mapas de ocorrência/distribuição atualizados das espécies encontradas neste estudo para todo o país.**

Palavras-chave. África, Cuanavale, Cuito, Delta do Okavango, nascentes, réptil

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Correspondence. **werner@bayworld.co.za*

Introduction

A surge of studies on the Angolan herpetofauna has occurred in the last decade, including numerous new species descriptions. This is especially true for lizards (Order Sauria), with 28 species newly described during this period (Conradie et al. 2012, 2022; Stanley et al. 2016; Branch et al. 2019a, 2021; Marques et al. 2019a,b, 2020, 2022a,b; Ceríaco et al. 2020a,b,c; Lobón-Rovira et al. 2021, 2022a; Parrinha et al. 2021; Wagner et al. 2021), and many more descriptions in preparation (e.g., Bates et al., pers. comm.). In addition, the taxonomic revisions in those studies have further refined the number of lizard species occurring in Angola, and they are the result of numerous collaborative biodiversity surveys which have also added many new country records (Marques et al. 2020; Lobón-Rovira et al. 2022b).

The most recent synthesis of Angolan reptiles, excluding snakes (Conradie et al. 2021), set the national total at 145 species (Marques et al. 2018; Branch et al. 2019b). Considering the new additions mentioned above and the results of taxonomic revisions since 2018, this elevates the total number of recognized species of lizards, chelonians, and crocodiles for Angola to 157 (excluding cases of unconfirmed subspecies status). The currently known Angolan lizard richness is nearly half that of South Africa (157 versus 286 species), a country almost equivalent in size and biome diversity (Branch et al. 2019b). This is higher than in neighboring countries to the east and north (Botswana ~74, Democratic Republic of the Congo [DRC] ~105, and Zambia ~81), and slightly lower than countries to the south (Namibia ~178) (Pietersen et al. 2021; Uetz et al. 2022; W. Conradie, unpub. data).

Branch et al. (2019b) predicted that at least 75 new lizard species will be added to the growing national list, and if the current rate of ~4 species per year is maintained, this estimate will be exceeded in less than two decades. This will make Angola one of the most herpetofauna-rich countries in mainland Africa.

This paper is the second installment in a series of articles which document the herpetofauna of the poorly studied southeastern Angolan region. The first provided a synthesis of the snakes of this region (Conradie et al. 2021), while the present paper focuses on lizards, chelonians and crocodiles, and a third paper on the amphibians is in preparation. The overarching aim of this project is to document and quantify the herpetofaunal diversity and richness of southeastern Angola, and improve our knowledge of the conservation importance of this area in both regional and national contexts.

Methods

See Conradie et al. (2021) for details on the number of surveys conducted, as well as a description of the study area, sampling techniques, and species mapping procedure. The specific methods pertaining to this paper are provided here.

Species Identification and Morphology

Upon completion of the fieldwork component of this study, preliminary species identifications were made using relevant field guides or published identification keys (FitzSimons 1943; Branch 1998; Pietersen et al. 2021) and through comparisons with material housed in the Port Elizabeth Museum (PEM). Nomenclature was based on the online Reptile Database (Uetz et al. 2022) and was updated as needed. Common names follow Marques et al. (2018) and Pietersen et al. (2021).

Snout-vent length (SVL, measured from the tip of the snout to the posterior end of the cloacal scale or vent opening) and tail length (TL, measured from the cloacal opening to the tip of the tail) were measured to the nearest 0.1 mm using a digital calliper. For the sake of brevity, in presenting these measurements, the SVL is presented first, followed by an addition sign (+) and then the TL is given. The following basic scale counts were also documented using a Nikon SMZ1270 binocular stereo microscope: number of scale rows at midbody; number of transverse scale rows dorsally (along the vertebral line, from the nuchal [excluded from count] to base of the tail; except for Lacertidae and Agamidae, where this was counted from the shoulder to the base of the tail); number of transverse scale rows ventrally (along the midline, from the mental [excluded from count] to the cloacal plate [excluded]; except for Lacertidae and Agamidae, where they were counted from the shoulder to the groin); number of longitudinal rows of ventral scales or enlarged ventral plates in Lacertidae and Gerrhosauridae; number of subdigital lamellae under 4th toe; number of supraciliaries; number of supralabials (in Lacertidae, but in Scincidae only those anterior to the subocular were counted); number of infralabials; number of femoral or precloacal pores (including number of rows, as observed in agamids); and maximum number of keels per scale. Where scale or pore counts are presented from both sides of the body they are separated by a slash (/) with the right counts given first, then the left counts. For amphisbaenids, the following additional scale counts were recorded: number of body annuli (counted dorsally from behind the head shields to anterior to the precloacal shield) and number of caudal annuli (counted ventrally from the posterior cloacal cap to the last annulus). Each scale count is presented as a range with the average in parentheses.

Results

The surveys yielded a total of 283 individual lizard, 12 chelonian, and 74 crocodile records from approximately 321 unique localities in southeastern Angola, primarily around the source lakes of the Cuito, Cuanavale, Cuando

and Quembo rivers. Herpetofauna trap arrays (see Conradie et al. 2021) were deployed for a total of 240 trap nights and resulted in the capture of 68 specimens comprising 12 species (Table 1). A total of 30 lizard species (comprising eight families and 17 genera), four chelonians (two families and two genera), and one crocodile were recorded during this study (Table 2). Five additional species (*Acanthocercus margaritae*, *Afroedura wulfhaackei*, *Ichnotropis bivitatta*, *Hemidactylus mabouia*, and *Trachylepis sulcata ansorgii*) are reported here. Although they were not collected from the defined core study area, these species are expected to occur within this area. Updated Angolan species distribution maps are provided for each of the 40 species discussed in this paper (Maps 1–40). The mapping exercise included collating 1,665 unique records: 626 historical records from Marques et al. (2018), 261 additional literature records, 171 virtual museum records, and 507 additional records mostly from our surveys or unpublished records in the Port Elizabeth Museum and Ditsong National Museum of Natural History (formerly Transvaal Museum, TM) collections. This mapping exercise increased the number of Angolan records for the 40 species of lizards, chelonians, and crocodiles by 65.6%.

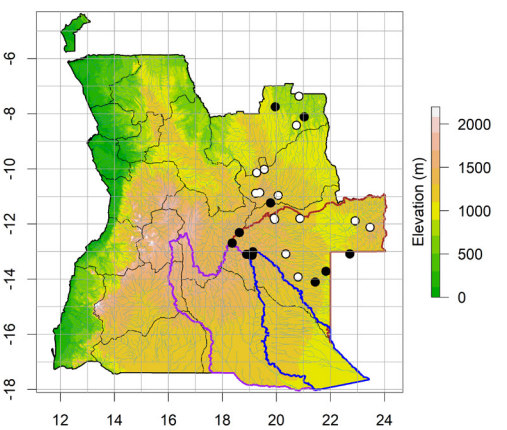
Fig. 1. Adult female *Acanthocercus* cf. *cyanocephalus* (PEM R23560) from Quembo River source. *Photo by Werner Conradie*.

Fig. 2. Adult male *Acanthocercus* cf. *cyanocephalus* (PEM R27387) from Luvu River camp. *Photo by Chad Keates*.

What follows is a checklist of all lizard, chelonian, and crocodile species found during these surveys. The account for each species includes a list of material examined, brief descriptions of newly collected material, and comments on habitat/natural history and taxonomy. Detailed morphological data and natural history notes, mostly for the adult material, can be found in Supplementary Table 1 at: https://doi.org/10.6084/m9.figshare.21670706.v1. The new distributional data used to compile the distribution maps can be found in Supplementary Table 2 at: https://doi.org/10.6084/m9.figshare.21670676. Abbreviations: asl, above sea level; DOR, dead on road; 't' after measurements refers to truncated, and 'r' refers to regenerated.

Reptilia
Squamata
Sauria
Agamidae

Acanthocercus cf. *cyanocephalus* (Falk, 1925)
Angolan or Western Tree Agama (Figs. 1–2, Map 1)
Material (9 specimens): PEM R23267, Cuanavale River source, -13.09330° 18.89396°, 1,367 m asl; PEM R23318, Cuito River source, -12.68935° 18.36012°, 1,435 m asl; PEM R23480, Cuando River source, -13.00164° 19.12960°, 1,372 m asl; PEM R23503, Sombanana village, -12.31082° 18.62392°, 1,403 m asl; PEM R23517, near Cuito River source, -12.68563° 18.36686°, 1,460 m asl; PEM R23529, INBAC: WC-4588, drive back from Quembo River source, -13.10543° 19.01698°, 1,555 m asl; PEM R23560, old hunters camp near Quembo River source, -13.13167° 19.09639°, 1,290 m asl; PEM R27387, Luvu River camp, -13.71200° 21.83538°, 1,082 m asl. **Description:** The absence of an enlarged occipital scale and its arboreal habits allow the distinction between sympatric congeners and *Agama*



Map 1. Distribution of *Acanthocercus* cf. *cyanocephalus* in Angola. Historical records are indicated by white dots while all new records are indicated by black dots. Axis values are in degrees (°). Purple polygon – Okavango River basin, blue polygon – Cuando River basin, brown polygon – Zambezi River basin.

Table 1. Herpetofauna drift fence funnel trap array sites for the 2016–2019 surveys, with coordinates presented in the WGS84 datum, elevation, brief habitat description, number of days installed (expressed as "trap nights"), and number of captures. R = river.

Trap site	Latitude	Longitude	Elevation (m asl)	Habitat description	Dates	Trap nights	Captures
Cuito R. 1	-12.688693	18.360164	1,426	Marginal vegetation at source lake	15–25 Feb 2016	10	9
Cuito R. 2	-12.688956	18.361870	1,438	Miombo woodland	15–25 Feb 2016	10	4
Cuito R. 3	-12.686020	18.364500	1,414	Grassy south-facing slope with scattered shrubs	16–25 Feb 2016	9	0
Cuanavale R. 1	-13.088937	18.892570	1,360	Marginal grassy vegetation at source lake	27 Feb–15 Mar 2016	18	2
Cuanavale R. 2	-13.092677	18.895518	1,357	Marginal grassy vegetation at source lake	27 Feb–15 Mar 2016	18	0
Cuanavale R. 3	-13.092813	18.894921	1,361	Degraded/secondary miombo woodland and grass	28 Feb–15 Mar 2016	17	2
Cuanavale R. 4	-13.050780	18.897450	1,396	Sandy basin with scattered grass	30 Feb–15 Mar 2016	15	6
Quembo R. 1	-13.135917	19.044167	1,369	Marginal grassy vegetation at source lake	27 Oct–11 Nov 2016	13	4
Quembo R. 2	-13.135444	19.043972	1,375	Miombo woodland	27 Oct–11 Nov 2016	13	2
Quembo R. 3	-13.130725	19.037245	1,443	Miombo woodland	29 Oct–11 Nov 2016	12	1
Quembo R. 4	-13.135863	19.047088	1,368	Marginal grassy vegetation at source lake	27 Oct–11 Nov 2016	12	6
Cuando R. 1	-13.003929	19.128079	1,351	Marginal grassy vegetation at source lake	12–23 Nov 2016	11	1
Cuando R. 2	-13.004259	19.127187	1,350	Marginal grassy vegetation at source lake	12–23 Nov 2016	11	0
Cuando R. 3	-13.003337	19.135640	1,360	Grassland	13–23 Nov 2016	10	1
Cuando R. 4	-13.001637	19.129598	1,374	Degraded/secondary miombo woodland and grass	13–23 Nov 2016	10	10
Lungwebungu R. 1	-12.580126	18.667396	1,298	Miombo woodland	21–25 Apr 2018	4	1
Lungwebungu R. 2	-12.581990	18.665616	1,208	Miombo woodland	21–25 Apr 2018	4	0
Lungwebungu R. 3	-12.580561	18.664190	1,302	Grassland	21–25 Apr 2018	4	3
Lungwebungu R. 4	-12.578694	18.664674	1,305	Grassland	21–25 Apr 2018	4	0
Lower Quembo R. 1	-13.52801	19.28147	1,236	Marginal grassy vegetation next to river	23–29 Nov 2019	7	1
Lower Quembo R. 2	-13.52816	19.28067	1,240	Miombo woodland	23–29 Nov 2019	7	5
Lower Quembo R. 3	-13.52778	19.27455	1,256	Grassland	23–29 Nov 2019	7	4
Lower Quembo R. 4	-13.25658	19.27810	1,248	Old cultivated lands/ fallow fields	23–29 Nov 2019	7	3
Luanguinga R. 1	-13.70885	21.26234	1,116	Degraded/secondary miombo woodland and grass	1–2 Dec 2019	1	2
Lake Hundo 1	-14.99158	2163096	1,100	Grassland	4–6 Dec 2019	2	1
Lake Hundo 2	-14.97279	21.62890	1,102	Miombo woodland	4–6 Dec 2019	2	0
Lake Hundo 3	-14.97002	21.63139	1,106	Degraded/secondary miombo and grass	4–6 Dec 2019	2	0

Table 2. Species of lizards, chelonians, and crocodiles recorded in the three Angolan Okavango-Cuando-Zambezi River basins. ? = not recorded from the core study area, but expected to occur based on nearby records.

Species	Okavango River Basin	Cuando River Basin	Zambezi River Basin	Source of records
Agamidae				
Acanthocercus cf. *cyanocephalus* (Falk, 1925)	X	X	X	This study; Manaças 1963; Laurent 1964
Acanthocercus margaritae Wagner, Butler, Ceríaco, and Bauer, 2021	X			Monard 1937

Table 2 (continued). Species of lizards, chelonians, and crocodiles recorded in the three Angolan Okavango-Cuando-Zambezi River basins. ? = not recorded from the core study area, but expected to occur based on nearby records.

Species	Okavango River Basin	Cuando River Basin	Zambezi River Basin	Source of records
Agama aculeata Merrem, 1820			X	Monard 1937; Manaças 1963; Laurent 1964
Agama armata Peters, 1855	X		X	This study; Conradie et al. 2016 (as *A. aculeata*)
Agama schacki Mertens, 1938	X			This study
Amphisbaenidae				
Dalophia angolensis Gans, 1976	X		X	Monard 1937; Laurent 1964; Gans 1976
Dalophia ellenbergeri (Angel, 1920)	X	X	X	This study; Branch and McCartney 1992 (as *D. pistillum*)
Dalophia pistillum (Boettger, 1895)	X			Monard 1937
Monopeltis anchietae (Bocage, 1873)	X			Monard 1930, 1937
Monopeltis infuscata Broadley, 1997	X			Broadley et al. 1976
Zygaspis nigra Broadley and Gans, 1969		X	X	This study; Broadley and Gans 1969, 1975
Zygaspis quadrifrons (Peters, 1862)	X	X	X	Monard 1931; Conradie et al. 2016
Chamaeleonidae				
Chamaeleo dilepis Leach, 1819	X	X	X	This study; Mertens 1937; Monard 1937; Manaças 1963; Laurent 1964; Conradie et al. 2016.
Chamaeleo gracilis Hallowell, 1844			X	Laurent 1964
Gekkonidae				
Afroedura wulfhaackei Branch, Schmitz, Lobón-Rovira, Baptista, António, and Conradie, 2021	?			
Chondrodactylus laevigatus (Fischer, 1888)	X			Conradie et al. 2016
Hemidactylus mabouia (Moreau De Jonnès, 1818)	?	?	?	
Hemidactylus nzingae Ceríaco, Agarwal, Marques, and Bauer, 2020	X			Ceríaco et al. 2020a
Lygodactylus angolensis Bocage, 1896	X			This study
Lygodactylus nyaneka Marques, Ceríaco, Buehler, Bandeira, Janota, and Bauer, 2020	X			This study; Conradie et al. 2016 (as *L. bradfieldi*)
Lygodactylus chobiensis FitzSimons, 1932			X	This study
Lygodactylus tchokwe Marques, Ceríaco, Buehler, Bandeira, Janota, and Bauer, 2020			X	Marques et al. 2020
Pachydactylus cf. *punctatus* Peters, 1855	X			This study
Pachydactylus wahlbergii (Peters, 1869)		X		This study
Gerrhosauridae				
Gerrhosaurus auritus Boettger, 1887	X	X	X	This study
Gerrhosaurus cf. *nigrolineatus* Hallowell, 1857	X	X	X	This study; Monard 1937; Conradie et al. 2016
Tetradactylus ellenbergeri (Angel, 1922)	X	X	X	This study; Laurent 1964; Conradie et al. 2016
Lacertidae				
Ichnotropis bivittata Bocage, 1866	X		X	Monard 1937; Manaças 1973
Ichnotropis capensis (Smith, 1838)	X	X	X	This study; Branch and McCartney 1993; Conradie et al. 2016
Ichnotropis cf. *grandiceps* Broadley, 1967	X	X		This study
Heliobolus lugubris (Smith, 1838)	X			Conradie et al. 2016

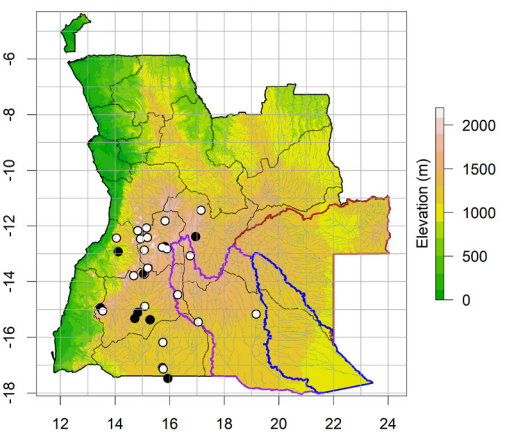
Table 2 (continued). Species of lizards, chelonians, and crocodiles recorded in the three Angolan Okavango-Cuando-Zambezi River basins. ? = not recorded from the core study area, but expected to occur based on nearby records.

Species	Okavango River Basin	Cuando River Basin	Zambezi River Basin	Source of records
Meroles squamulosus (Peters, 1854)	X			This study; Conradie et al. 2016
Nucras scalaris Laurent,1964	X			Baptista et al. 2020
Scincidae				
Acontias jappi Broadley, 1968			X	Broadley 1968
Acontias kgalagadi Lamb, Biswas, and Bauer, 2010		X		Conradie and Bourquin 2013; Conradie et al. 2016
Eumecia anchietae Bocage, 1870	X		X	This study; Monard 1931, 1937
Lubuya ivensii (Bocage, 1879)	X	X	X	This study; Manaças 1963; Conradie et al. 2016
Mochlus sundevallii (Smith, 1849)		X		Conradie et al. 2016
Panaspis maculicollis Jacobsen and Broadley, 2000		X		Conradie et al. 2016
Panaspis wahlbergii (Smith, 1849)	X			Ceríaco et al. 2020
Panaspis sp.	X	X	X	This study
Sepsina angolensis Bocage, 1866	X	X	X	This study; Monard 1931, 1937; Branch and Haagner 1992
Trachylepis albopunctata (Bocage 1867)	X		X	This study; Laurent 1964; Conradie et al. 2016
Trachylepis bayonii (Bocage, 1872)	X	X	X	This study; Monard 1937
Trachylepis chimbana (Boulenger, 1887)			X	Laurent 1964
Trachylepis damarana (Peters, 1870)	X	X	X	This study; Conradie et al. 2016 (as *T. varia*); Weinell and Bauer 2018
Trachylepis punctulata (Bocage, 1872)	X	X	X	This study
Trachylepis spilogaster (Peters, 1882)	X	X		This study; Conradie et al. 2016
Trachylepis sulcata ansorgii (Peters, 1882)	?			
Trachylepis wahlbergii (Peters, 1869)	X	X	X	This study; Conradie et al. 2016
Typhlacontias rohani Angel, 1923	X	X		This study; Angel 1921; Monard 1931; Conradie et al. 2016
Varanidae				
Varanus albigularis (Daudin, 1802)	X			Monard 1937
Varanus niloticus (Linnaeus, 1766)	X			This study; Monard 1937; Manaças 1963; Conradie et al. 2016
Crocodylidae				
Crocodylus niloticus Laurenti, 1768	X	X	X	This study; Monard 1937; Branch and Haagner 1992; Conradie et al. 2016
Order: Testudines				
Pelomedusidae				
Pelomedusa subrufa (Bonnaterre, 1789)	X	X		Monard 1931, 1937; Conradie et al. 2016
Pelusios bechuanicus FitzSimons, 1932		X	X	This study; Laurent 1964; Conradie et al. 2016
Pelusios nanus Laurent, 1956	X	X	X	This study; Monard 1937; Laurent 1964
Pelusios rhodesianus Hewitt, 1827	X	X	X	This study; Monard 1937; Laurent 1964
Testudinidae				
Kinixys belliana Gray, 1863	X		X	This study; Monard 1937; Laurent 1964; Conradie et al. 2016; Kindler et al. 2016
Stigmochelys pardalis (Bell, 1828)		X		Conradie et al. 2016
Species totals: 58	**44**	**29**	**32**	

spp. Large agamid with blue head, chest, and shoulders, mostly in males; 122–148 (133) dorsal scale rows at midbody; 68–74 (71) transverse ventral scales; 78–95 (87) transvers dorsal scales; 11–13 supralabials; 11–15 infralabials; 22–26 (24) subdigital lamellae under 4th toe; 17–35 precloacal pores in 2–3 rows. Largest female: 174.0 + 192.0 mm (PEM R23560); largest male: 137.0 + 162.0 mm (PEM R27387). The new material presented here represents the largest recorded sizes of both male and female for the species (Pietersen et al. 2021; Wagner et al. 2021). **Habitat and natural history notes:** Juveniles were collected in February from the bases of large trees in miombo woodland, while gravid females were collected in October. Adult specimens were found very close to holes in trees, into which they retreated when approached. **Comments:** Wagner et al. (2018) initially assigned all Angolan *Acanthocercus* material to *A. cyanocephalus*, and although they provided a detailed account of Falk's work in Angola, they assigned a specimen from northern Zambia as the neotype, and only examined three Angolan specimens from a single locality. Numerous records of *Acanthocercus* are known across the entire extent of Angola, and recent studies (Marques et al. 2018; Butler et al. 2019) allude to the fact that cryptic species are present in Angola. Follow-up studies (Wagner et al. 2021; Marques et al. 2022b) focused primarily on Namibian and Angolan material and further subdivided this group into three species: *A. margaritae*, ranging from northern Namibia northwards into central and western Angola, *A. ceriacoi* from north-western Angola, and *A. cyanocephalus* from eastern Angola. While these studies made use of integrative taxonomy, they only used a single gene (a fragment of the 16S rDNA) and a small morphological dataset to support their results. The genetic differences among the *Acanthocercus atricollis* group, which includes *A. atricollis*, *A. branchi*, *A. ceriacoi, A. cyanocephalus*, *A. margaritae*, *A. gregorii,* and *A. ugandaensis*, are very small (< 5%) and additional phylogenetic work is needed to support the current taxonomy. Based on geographic proximity, we tentatively assign our material collected from the eastern side of our study area to *A. cyanocephalus*, pending the results of further phylogenetic work.

Acanthocercus margaritae Wagner, Butler, Ceríaco, and Bauer, 2021
Margarita's Tree Agama (Map 2)
Material (1 specimen): PEM R20011, Huambo HALO training site, -12.73722° 15.81825°, 1,670 m asl. **Description:** Juvenile male specimen, measuring 55.9 + 72.0 mm; 120 scale rows at midbody; 76 transvers ventral scales; 76 transverse dorsal scales; 12/13 supralabials; 11/12 infralabials; 24 subdigital lamellae under 4th toe; 18 precloacal pores in two rows. **Habitat and natural history notes:** This specimen was found basking in the early morning on the shade cloth erected around the ablution blocks of the compound. **Comments:** Most historical material from central and western Angola has been reassigned to this recently described species, *A. margaritae* (Wagner et al. 2021). Since our record is from the known distribution of *A. margaritae*, we tentatively assign it to this species, pending further phylogenetic results. This species was not recorded from within the core study area, but based on historical records (Monard 1937), it is expected to occur in the western side of the study area.

Agama armata Peters, 1855
Peter's Ground Agama (Figs. 3–4, Map 3)
Material (12 specimens): PEM R23252, Cacundu falls, -13.77390° 18.75520°, 1,281 m asl; PEM R23310, between Cuchi River to Menongue, -14.67986° 17.17512°, 1,391 m asl; PEM R23319, Cuito River source lake, -12.68935° 18.36012°, 1,435 m asl; PEM R23356, Cuito River source lake, grasslands, -12.67756° 18.35589°, 1,495 m asl; PEM R23380, Kuvango River old hydro plant site, -14.38754° 16.30166°, 1,438 m asl; PEM R23391, camp near Malova Village, Mipanha River, -14.09140° 16.41476°, 1,569 m asl; PEM R23407, Lungwebungu River bridge crossing, -12.58346° 18.66598°, 1,304 m asl; PEM R23520, grassland west of Cuanavale River source, -13.01347° 18.81669°, 1,538 m asl; PEM R23994 (iNaturalist 12154222), Aquaculture farm outside Cuito town, -12.439722° 16.89833°, 1,691 m asl; PEM R27388, Luvu River camp, -13.71200° 21.83538°, 1,082 m asl; INBAC: WC-5169, Huambo HALO training site, -12.73726° 15.81828°, 1,665 m asl; INBAC: WC-4574, Lungwebungu River bridge crossing, -12.58347° 18.66598°, 1,294 m asl. **Description:** In juveniles, the ventral scales are more keeled and the ventrum has small, black-edged white circular blotches that seem to fade or disappear with age. The gular region is spotted in both juveniles and adults, although more defined in juveniles. Dorsal scales strongly keeled with nine rows of enlarged scales arranged in longitudinal rows; 89–97 (93) scale rows at midbody; 71–81 (76) transverse ventral scale rows; 45–62 (54) transverse dorsal scale rows; 11–14 supralabials; 10–13 infralabials;

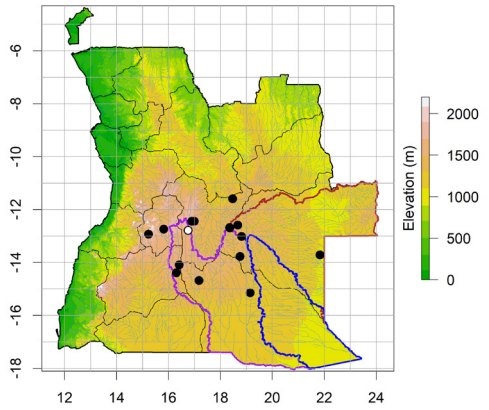


Map 2. Distribution of *Acanthocercus margaritae* in Angola.

Fig. 3. Adult male *Agama armata* (PEM R23252) from Cacundu Falls. *Photo by Werner Conradie*.

Fig. 4. Gravid female *Agama armata* (PEM R27388) from Luvu River camp. *Photo by Chad Keates*.

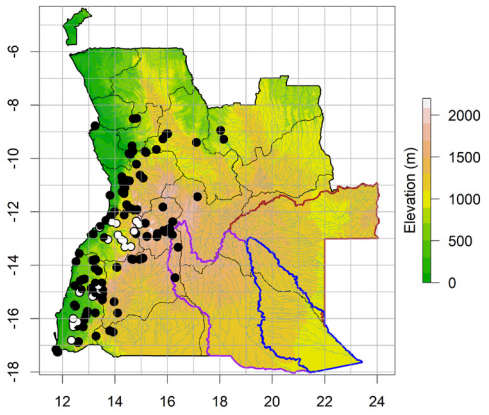
15–18 (16) subdigital lamellae under 4th toe; 10–12 precloacal pores in a single row. Largest female: 88.5 + 95.0 mm (INBAC: WC-4574); largest male: 85.9 + 113.0 mm (PEM R23380, new maximum size). **Habitat and natural history notes:** Juveniles were collected in February, while gravid females were collected in October. **Comments:** Species identification was based on the gular pattern (spotted versus striped in *A. aculeata*) as documented by Jacobsen (1992). Re-examination of a specimen recorded as *A. aculeata* from north of Cachingues in Conradie et al. (2016) also conforms to this species. Although some historical Angolan material was referred to *A. armata* (see Bocage 1895; Boulenger 1905), Marques et al. (2018) regarded all material from Angola as *A. aculeata*, and mention that *A. armata* is 'extralimital' and restricted to southeastern South Africa. In contrast, *A. armata* has been regularly documented from adjacent Zambia (Broadley 1971; Pietersen et al. 2017, 2021; Bittencourt-Silva 2019). All available historical Angolan material under the names *A. aculeata* and *A. armata*, especially those from eastern Angola (Manaças 1963; Laurent 1964), needs to be re-examined to establish the true identification and full extent of the ranges of these two species in Angola. It is noteworthy that members of the *Agama aculeata-armata* group are genetically similar, which may necessitate the synonymy of these species in the future (Leaché et al. 2014). If the specific status of these two species is confirmed, then both might be present in Angola, with *A. aculeata* restricted to the more arid western regions of Angola and *A. armata* to the more mesic eastern regions.



Map 3. Distribution of *Agama armata* in Angola.

Agama schacki Mertens, 1938
Schack's Rock Agama (Fig. 5, Map 4)
Material (16 specimens): PEM R23367, en route to Cuito, east of Huambo, -12.73615° 15.97442°, 1,777 m asl; PEM R23381–7, INBAC: WC-5208–9, campsite near old Cuvango Mission on Cubango River, -13.32887° 16.41167°, 1,520 m asl; PEM R23395–400, INBAC: WC-5162, Cubango River near source, -12.66256° 16.09324°, 1,764 m asl. **Description:** Large, rupicolous agama. Male with orange head and tail; 84–101 (92) scale rows at midbody; 80–94 (88) transverse ventral scale rows; 71–80 (74) transverse dorsal scale rows; 9–11 supralabials; 9–12 infralabials; 21–24 (22) subdigital lamellae under 4th toe; 11–13 precloacal pores in a single row. Largest female: 102.3 + 142.0 mm (PEM R23383); largest male: 118.0 + 95t mm (PEM R23387 had the longest intact tail which measured 173 mm [1.5 x SVL]). **Habitat and natural history notes:** Individuals were associated with large rocky outcrops, especially along the upper Cubango River. **Comment:** Based on the higher midbody scale counts, we can confidently assign our material to the *A. schacki* group (Mertens 1938). Ignoring the erroneous records of Monard (1937) from Cuando Cubango Province, our material represents the most easterly records for this species. The status of the Angolan Rock Agamas was briefly discussed by Ceríaco et al. (2014). Preliminary phylogenetic results indicate that *A. schacki* should be treated as a full species, and that more cryptic species are present in the larger Angolan Rock Agama group (Marques et al. 2018; Butler 2020). We follow these studies and treat *A. schacki* as a distinct species from *A. planiceps*, restricting the latter to the arid regions of the Namibe Province, and we treat all other records as *A.* aff. *schacki* until the taxonomic status of the cryptic species are addressed. Butler (2020) lacked genetic material from central Angola, and our material may potentially represent either of the two inland clades identified in that study. Since efforts

Fig. 5. Adult male *Agama schacki* (PEM R23367) from near source of the Cubango River. *Photo by Werner Conradie*.



Map 4. Distribution of *Agama planiceps* complex in Angola.

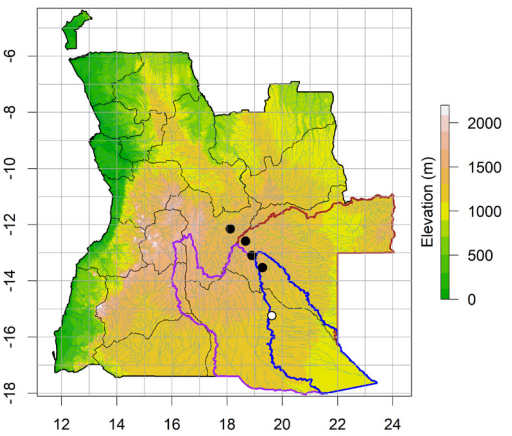
to separate the species in the *Agama planiceps* complex are still ongoing, we produced a map for the entire species complex (Map 4).

Amphisbaenidae

Dalophia ellenbergeri (Angel, 1920)
Ellenberger's Worm Lizard (Fig. 6, Map 5)
Material (4 specimens): PEM R23408, Lungwebungu River camp bridge crossing, -12.58346° 18.66598°, 1,304 m asl; PEM R23492, Cuanavale River source lake, -13.09442° 18.89372°, 1,396 m asl; PEM R24002, 5 km west of Cuemba, -12.14751° 18.11650°, 1,329 m asl; PEM R27392, Quembo River bridge camp, -13.52745° 19.2806°, 1,241 m asl. **Description:** All specimens exhibit the diagnostic 'herringbone' scale arrangement on the dorsal side of the tail; 16–21 dorsal segments per body annulus; 12–14 ventral segments per body annulus; 309–319 body annuli; 29–43 caudal annuli; caudal autonomy site at the 8th caudal annulus; 3–4 supralabials; 3 infralabials. Largest specimen: 336.0 + 76.0 mm (PEM R27392). **Habitat and natural history notes:** All specimens were excavated from sandy soils, except for one individual that was found on the surface after heavy rain and another which was found taking refuge under a tree log. **Comments:** Angola has one of the richest assemblages of amphisbaenians in Africa, represented by three genera and 11 species (Marques et al. 2018). The taxonomy of Angolan amphisbaenians has a turbid history, and many of the species have not been evaluated in a phylogenetic framework. The only phylogenetic study on African amphisbaenians incorporated only one Angolan sample (Measey and Tolley 2013). *Dalophia ellenbergeri* was first reported from Angola by Branch and McCartney (1992) under the name *D. pistillum* and later re-identified as *D. ellenbergeri* (Broadley 1997). This is only the second time this species has been recorded from Angola and it is now documented from four additional localities. Elsewhere it is only recorded from western Zambia (Broadley 1971; Pietersen et al. 2021).

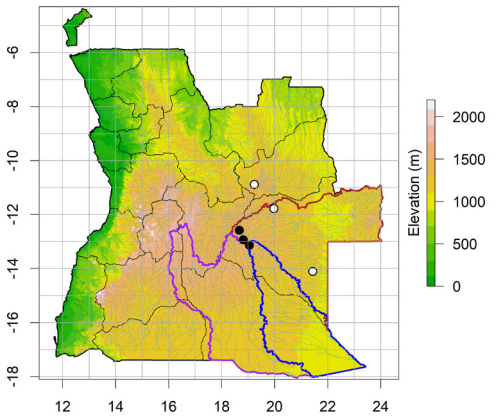
Zygaspis nigra Broadley and Gans, 1969
Black Round-headed Worm Lizard (Fig. 7, Map 6)
Material (3 specimens): PEM R23564–5, Samanunga village, -12.93250° 18.81476°, 1,363 m asl; PEM R23984, Lungwebungu River crossing, -12.58020° 18.66773°, 1,298 m asl. **Additional records:** Quembo River source, -13.13586° 19.04709°, 1,368 m asl (stomach contents of *Xenocalamus mechowii* – PEM R23463). **Description:** Male (PEM R23564) with four precloacal pores; hemipenis bifurcated and extending to 6–7th caudal annuli. Female (PEM R23564) with

Fig. 6. Adult *Dalophia ellenbergeri* (PEM R23408) from Lungwebungu River. *Photo by Werner Conradie*.



Map 5. Distribution of *Dalophia ellenbergeri* in Angola.

Fig. 7. Adult *Zygaspis nigra* (PEM R23564) from Samanunga village. *Photo by Werner Conradie*.



Map 6. Distribution of *Zygaspis nigra* in Angola.

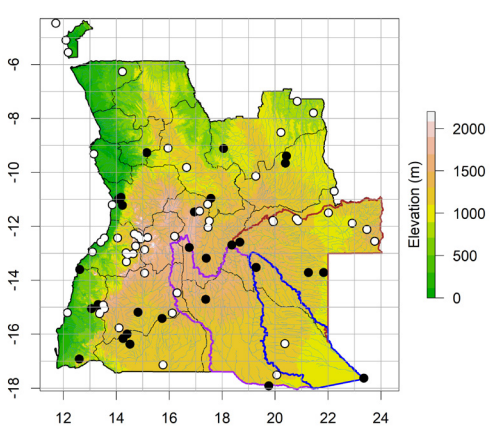
truncated tail at 7th annulus. Adults have distinct black bars, while juveniles are much lighter in color; 16–17 dorsal segments per body annulus; 12 ventral segments per body annulus; 189–194 body annuli; 42–43 caudal annuli, caudal autonomy site at 7th caudal annulus; 3 supralabials; 3 infralabials. Largest female: 216.0 + 8t mm (PEM R23565); largest male: 232.0 + 41.0 mm (PEM R23564). **Habitat and natural history notes:** One female contained three elongated eggs (20 x 5 mm). Two specimens were excavated by local farmers while preparing agricultural fields. **Comments:** Only two species of *Zygaspis* are known from scattered records in southern and eastern Angola (Marques et al. 2018; Baptista et al. 2019; Butler et al. 2019). *Zygaspis nigra* was originally described from western Zambia, with only a few records from eastern Angola and the Zambezi Region in northeastern Namibia (Broadley and Gans 1969; Pietersen et al. 2021). Historically this species is only known from three localities in eastern Angola (Marques et al. 2018), so these new records double the number of known localities from Angola.

Chamaeleonidae

Chamaeleo dilepis Leach, 1819 complex
Flap-necked Chameleon (Fig. 8, Map 7)

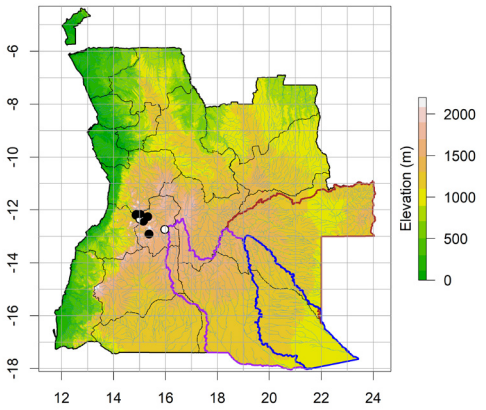
Fig. 8. Adult female *Chamaeleo dilepis* (not collected) from lower Quembo River. *Photo by Werner Conradie*.

Material (5 specimens): PEM R23322, Cuito River source lake, -12.68935° 18.36012°, 1,435 m asl; PEM R27391, Luvu River camp, -13.71200° 21.83538°, 1,082 m asl; PEM R27389–90, INBAC: WC-6789, Lungwebungu River camp, -12.58439° 18.66748°, 1,297 m asl. **Additional observations:** Quembo River, walk back from small waterfall, -13.52987° 19.28340°, 1,242 m asl; Quembo River right side tributary (Micongo River) past village, -13.51877° 19.28486°, 1,248 m asl; Camp at side tributary (Luandai River) of the Luanguinga River, -13.70885° 21.26234°, 1,116 m asl; Cuelei River west of Menongue, -14.70511° 17.38014°, 1,392 m asl; Chitembo, -12.78792° 16.75706°, 1,693 m asl. **Description:** All specimens presented a small, reduced occipital flap. Largest female: 97.1 + 84.0 mm (PEM R27391); largest male: 88.5 + 95.0 mm (PEM R23322). **Habitat and natural history notes:** All adult specimens were encountered sleeping at night in larger trees up to a height of 2 m, while hatchlings were found very low on scrub below 30 cm height. A gravid female (photographed and released) was found at the Cuito River source in February. **Comment:** Although the casques and occipital lobes of our material seem very reduced (a feature diagnostic of *C. gracilis*), the tail is long and the dorsal keel is formed by a single row of enlarged tubercles (double in *C. anchietae*), conforming to typical



Map 7. Distribution of *Chamaeleo dilepis* in Angola.

Fig. 9. Adult female *Afroedura wulfhaackei* (PEM R22490) from 1 km west of Candumbo on road to Boas Águas. *Photo by Luke Verburgt*.



Map 8. Distribution of *Afroedura wulfhaackei* in Angola.

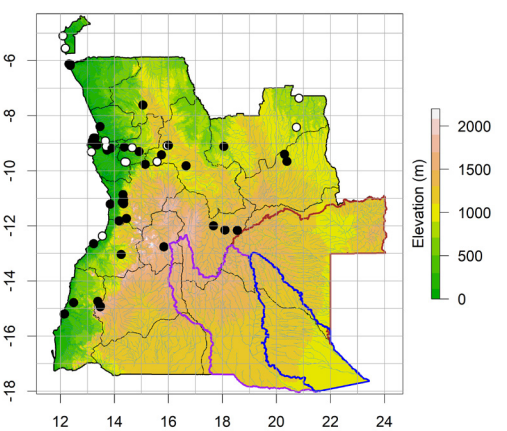
C. dilepis features (Tilbury 2010, 2018). Chameleons are very poorly represented in Angola, with only two genera and five species recorded (Marques et al. 2018). Of these, *C. dilepis* is the most common and widespread (Marques et al. 2018), although only a few records are known from the southeast (Conradie et al. 2016). The new records presented here fill the sampling gap in the distribution of this species in Angola. Numerous subspecies and variations have been described in this group over the years (Uetz et al. 2022), but a recent large-scale phylogenetic study (Main et al. 2022) identified only three species-level lineages that do not fully agree with previously identified subspecies. Of these lineages, two occur in Angola, but due to the lack of topotypic material and the fact that the recognized lineages are incongruent with previously described subspecies, further studies are recommended for this taxon. We therefore refer to our collected material by the binominal name.

Gekkonidae

Afroedura wulfhaackei Branch, Schmitz, Lobón-Rovira, Baptista, António, and Conradie, 2021
Angolan Flat Gecko (Fig. 9, Map 8)
Material (3 specimens): PEM R22490–1, PEM R24200, Candumbo Rocks Memorial, -12.73614° 15.97442°, 1,777 m asl. **Description:** 77–79 dorsal midbody scale rows; 8–9 supralabials; 8 infralabials; 7–8 enlarged scales under 4th toe; 4 ventral verticils and 5 dorsal verticils per tail whorl. Largest female: 54.4 + 0t mm (PEM R 22491). **Habitat and natural history notes:** Found under exfoliating rocks among larger rock boulders. **Comment:** These represent the most inland records of this recently described species (Branch et al. 2021). Although this species was not documented from within the defined core study area of this project, suitable habitat is found along the northern and western edge of the study area.

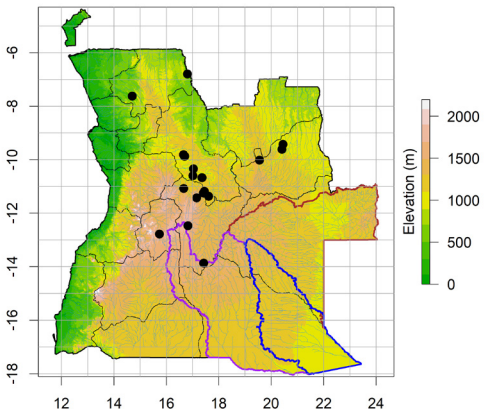
Hemidactylus mabouia (Moreau de Jonnès, 1818)
Common Tropical House Gecko (Map 9)

Material (3 specimens): PEM R24001, Cuemba town, -12.14786° 18.09100°, 1,351 m asl; PEM R23558, Munhango village, -12.16445° 18.5548°, 1,435 m asl; PEM R23377, Kwanza River bridge, -11.99348° 17.66965°, 1,727 m asl. **Description:** Subcaudal scales enlarged and elongated; 88–89 dorsal midbody scale rows; 16–17 longitudinal rows of enlarged keeled tubercles; 34 ventral midbody scale rows; 10 supralabials; 9–10 infralabials; 6–7 divided scansors under 4th toe; 14/15 precloacal pores in a single row. Largest female: 52.6 + 61.0 mm (PEM R23558); largest male: 53.5 + 62.0 mm (PEM R24001). **Habitat and natural history notes:** All specimens were found on or near anthropogenic structures. **Comment:** The species is present across most of Angola, but has not yet been recorded from extreme southeastern Angola (Marques et al. 2018; Ceríaco et al. 2020a; Lobón-Rovira et al. 2021). Due to its high human-assisted dispersal capacity and adaptation to anthropogenic structures (Agarwal et al. 2021), this species is expected to spread to larger towns and settlements in southeastern Angola. A recent large-scale phylogenetic study revealed at least 20 species-level lineages, with most Angolan material corresponding to the *H. mabouia sensu stricto* lineage (Agarwal et al. 2021).



Map 9. Distribution of *Hemidactylus mabouia* in Angola.

Fig. 10. Adult male *Hemidactylus nzingae* (PEM R23991) from Cuquema River. *Photo by Werner Conradie*.



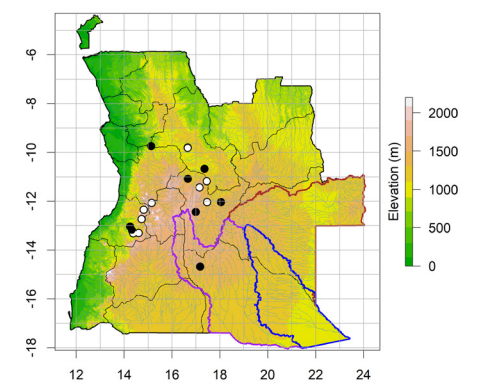
Map 10. Distribution of *Hemidactylus nzingae* in Angola.

Hemidactylus nzingae Ceríaco, Agarwal, Marques, and Bauer, 2020
Queen Nzinga's Tropical Gecko (Fig. 10, Map 10)
Material (2 specimens): PEM R23990 (iNaturalist 12128372), Rio Cuquema, downstream, -12.47021° 16.82334°, 1,644 m asl; PEM R23991, Rio Cuquema, upstream, -12.46902° 16.82415°, 1,640 m asl. **Description:** 58–66 dorsal midbody scale rows; 16 longitudinal rows of enlarged keeled tubercles; 25 ventral midbody scale rows; 9–10 supralabials; 8–9 infralabials; 7 divided scansors under 4th toe; 3/3 precloacal pores in a single row. Largest male: 40.2 + 37.9 mm (PEM R23991). **Habitat and natural history notes:** Specimens were found actively running on the ground during the day. **Comment:** This species was only recently described and seems to be common in miombo woodland on the Angolan plateau (Ceríaco et al. 2020a; Lobón-Rovira et al. 2021). In a follow-up study, 'unpatterned' specimens that occur sympatrically with *H. nzingae* were described as a new species, *H. hannahsabinae* (Ceríaco et al. 2020b). The addition of more material, with some from this study including these 'unpatterned' specimens, showed that the latter taxon is a junior synonym of *H. nzingae* (Lobón-Rovira et al. 2021).

Lygodactylus angolensis Bocage, 1896
Angolan Dwarf Day Gecko (Fig. 11, Map 11)
Material (3 specimens): PEM R23311, drive back from Cuchi to Menongue, -14.67986° 17.17512°, 1,391 m asl; PEM R23343, 10 km west of Cuemba village, -12.03481° 18.04869°, 1,437 m asl; PEM R23995 (iNaturalist 12123557), south of Cuito town, -12.43930° 16.99143°, 1,624 m asl. **Description:** Mental divided by a pair of lateral clefts; 81–87 (84) dorsal midbody scale rows; 21–22 ventral midbody scale rows; 7–8 supralabials; 7–8 infralabials; 2–3 scales touching nostril; 4 divided scansors under 4th toe; 9 precloacal pores in a V-shape. Largest female: 29.8 + 34.0 mm (PEM R23995); largest male: 30.1 + 34.6 mm (PEM R23311). **Habitat and natural history notes:** Found on tree trunks during the day in miombo woodland. **Comment:** Assigned to *L. angolensis* based on the high number of precloacal pores (9) and the number of scales touching the nostril (~3; Marques et al. 2020). One specimen (PEM R23312) was found in sympatry with *L. nyaneka* and constitutes the southernmost Angolan record and the first from Cuando Cubango Province.

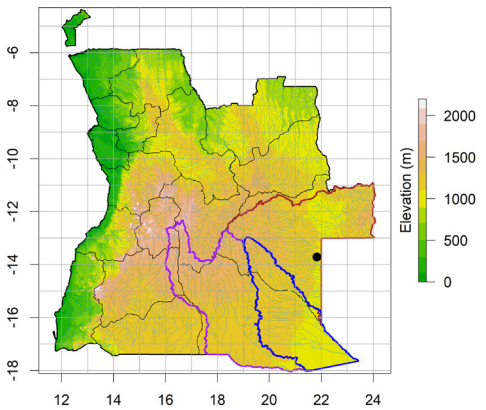
Lygodactylus chobiensis FitzSimons, 1932
Okavango Dwarf Gecko (Fig. 12, Map 12)
Material (1 specimen): PEM R27402, Luvu River camp, -13.71200° 21.83538°, 1,082 m asl. **Description:** Mental

Fig. 11. Adult female *Lygodactylus angolensis* (PEM R23995) from south of Cuito town. *Photo by Alex Rebelo*.



Map 11. Distribution of *Lygodactylus angolensis* in Angola.

Fig. 12. Adult female *Lygodactylus chobiensis* from Luvu River. *Photo by Chad Keates*.



Map 12. Distribution of *Lygodactylus chobiensis* in Angola.

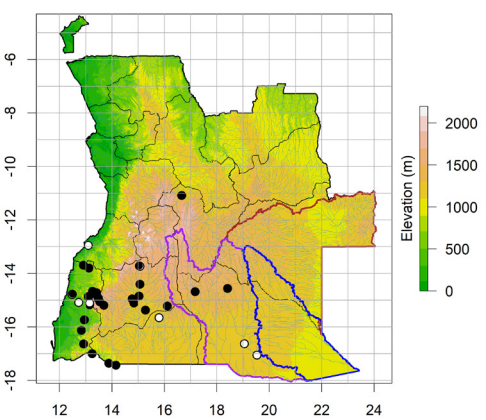
not divided by lateral clefts, two faint dark V-shaped chevrons on throat; 74 dorsal midbody scale rows; 22 ventral midbody scale rows; 6/6 supralabials; 6/6 infralabials; 4 scales touching nostril; 5 divided scansors under 4th toe. Largest female: 25.5 + 26.2 mm (PEM R27402). **Habitat and natural history notes:** Found sleeping in a tree at night. **Comment:** This represents the first documented record for Angola, although this species has been predicted to occur in eastern and southeastern Angola (Marques et al. 2018).

Lygodactylus nyaneka Marques, Ceríaco, Buehler, Bandeira, Janota, and Bauer, 2020
Nyaneka Dwarf Gecko (Fig. 13, Map 13)
Material (2 specimens): PEM R23312, drive back from Cuchi to Menongue, -14.67986° 17.17512°, 1,391 m asl; PEM R23540, Longa River, -14.55956° 18.41389°, 1,320 m asl. **Description:** Mental divided by a pair of lateral clefts; 83 and 93 dorsal midbody scale rows; 16 and 22 ventral midbody scale rows; 7–8 supralabials; 7–8 infralabials; 3–4 scales touching nostril; 4 divided scansors under 4th toe; 6 precloacal pores in a V-shape. Largest female: 32.4 + 30.3 mm (PEM R23540); largest male: 35.2 + 17.4t mm (PEM R23312). **Habitat and natural history notes:** Found in miombo woodland. **Comment:** We tentatively assign our new material, including the material reported as *L. bradfieldi* by Conradie et al. (2016), to this species based on shared morphological characters (number of scales touching the nostril and low number of precloacal pores, Marques et al. 2020) until further phylogenetic studies are conducted.

Pachydactylus cf. *punctatus* Peters, 1854 complex
Speckled Thick-toed Gecko (Fig. 14, Map 14)
Material (2 specimens): PEM R23262, Cuchi River gorge, -14.59000° 16.90758°, 1,350 m asl; PEM R23537, Cuchi River gorge, -14.58983° 16.90744°, 1,364 m asl. **Description:** Specimens are light brown above with fine white speckles; 74 and 76 midbody scale rows; 6–7 supralabials; 8–6 infralabials; 4 undivided scansors under 4th toe. Largest female 33.8 + 32.7 mm (PEM R23262); largest male: 34.7 + 25.8t mm (PEM R23537). **Habitat and natural history notes:** Specimens were found active at night on rock surfaces adjacent to Cuchi River gorge. **Comment:** The taxonomic status of this species complex is currently under revision and it may represent multiple cryptic lineages (H. M. Heinz, unpub. data).

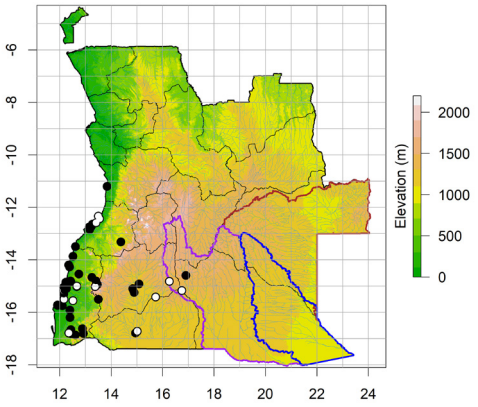
Pachydactylus wahlbergii (Peters, 1869)
Kalahari Ground Gecko (Fig. 15, Map 15)
Material: PEM R25083, Cuando River, CUD2018 AC Camp 22, -15.82175° 21.58647°, 1,050 m asl.

Fig. 13. Adult male *Lygodactylus nyaneka* (PEM R23312) from west of Menongue. *Photo by Werner Conradie*.



Map 13. Distribution of *Lygodactylus nyaneka* in Angola.

Fig. 14. Adult female *Pachydactylus* cf. *punctatus* (PEM R23262) from Cuchi River gorge. *Photo by Werner Conradie*.



Map 14. Distribution of *Pachydactylus punctatus* complex in Angola.

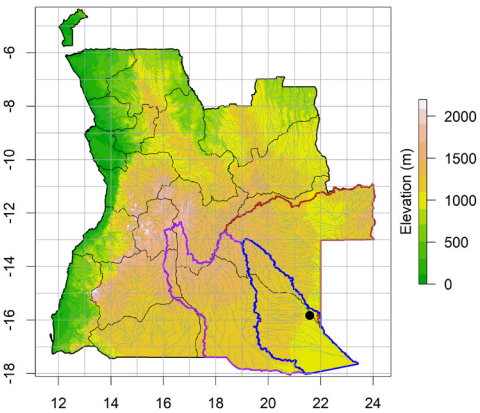
Description: 72 midbody scale rows; 7/8 supralabials; 6/6 infralabials; 2 undivided scansors under 4th toe. Largest male: 25.5 + 26.2 mm (PEM R25083). **Habitat and natural history notes:** Found beneath a tent pitched on the sandy bank adjacent to the Cuando River. **Comment:** Although Haacke (1976) recorded this species from the border between Angola and Namibia, no official records have been documented from Angola. This therefore represents the first confirmed record for Angola. This new record is unsurprising, given the recent record of this species in western Zambia (Pietersen et al. 2017).

Gerrhosauridae

Gerrhosaurus auritus Boettger, 1887
Kalahari Plated Lizard (Fig. 16, Map 16)
Material (7 specimens): PEM R23273, Cuanavale River source, -13.09330° 18.89396°, 1,367 m asl; PEM R23313, drive to Quemba village on grasslands, -12.14597° 18.39728°, 1,402 m asl; PEM R23324, Cuito River source lake, -12.68935° 18.36012°, 1,435 m asl; PEM R23481, Cuando River source, trap 4, -13.00164° 19.1296°, 1,372 m asl; PEM R23557, DOR en route from Munhango to Cuanavale River source, -12.56364° 18.66669°, 1,317 m asl; PEM R23974 (iNaturalist 12410724), Lungwebungu River, ad hoc, -12.58619° 18.66538°, 1,300 m asl; PEM R23975 (iNaturalist 12410714), Lungwebungu River new campsite, -12.58445° 18.66538°, 1,308 m asl. **Description:** No dorsolateral yellow stripe; flanks with scattered orange scales; tympanic shield very broad and crescentic; weak to moderately keeled lateral scales; scales on soles of feet keeled; 26–28 (26) dorsal midbody scale rows; 8 enlarged ventral plates; 50–52 (51) transverse ventral scale rows; 3 supralabials; 3–4 infralabials; 4–5 supraciliaries; 16–18 (17) subdigital lamellae under 4th toe; 13–17 (15) femoral pores per thigh. Largest female: 156.0 + 254.0 mm (PEM R23557); largest male: 143.5 + 249.0 mm (PEM R23273). **Habitat and natural history notes:** Found active during the day in close proximity to their burrows in miombo woodland or grasslands, to which they retreated when disturbed. **Comment**: Although a historical record exists from Lunda Sul Province (Monard 1937), these are the first modern records of this species for Angola. The species has also been recorded from adjacent western Zambia (Pietersen et al. 2017).

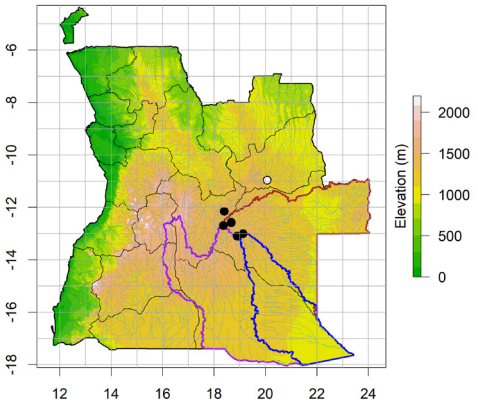
Gerrhosaurus cf. *nigrolineatus* Hallowell, 1857 complex
Black-lined Plated Lizard (Fig. 17, Map 17)

Fig. 15. Adult male *Pachydactylus wahlbergii* (PEM R25083) from middle Cuando River. *Photo by Götz Neef.*



Map 15. Distribution of *Pachydactylus wahlbergii* in Angola.

Fig. 16. Adult male *Gerrhosaurus auritus* (PEM R23273) from Cuanavale River source. *Photo by Werner Conradie*.

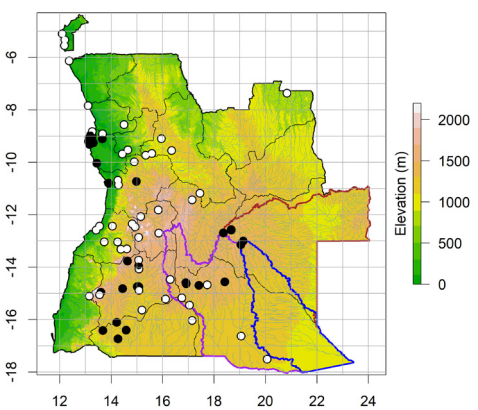


Map 16. Distribution of *Gerrhosaurus auritus* in Angola.

Material (10 specimens): PEM R23260, R23302, Cuchi River gorge, -14.5900° 16.90758°, 1,350 m asl; PEM R23324–5, Cuito River source lake, -12.68935° 18.36012°, 1,435 m asl; PEM R23447, Cuando River source, trap 3, -13.00334° 19.13564°, 1,364 m asl; PEM R23534, EN280 west of Menongue, -14.68908° 17.41242°, 1,454 m asl; PEM R23541, Longa River, -14.55942° 18.41431°, 1,321 m asl; PEM R23544–5, Quembo River source camp, -13.14557° 19.04571°, 1,423 m asl; PEM R23973, Lungwebungu River, ad hoc, -12.58619° 18.66538°, 1,300 m asl; PEM R23988, Lungwebungu River, ad hoc, -12.56806° 18.66639°, 1,294 m asl. **Description:** Distinct dorsolateral yellow stripe and bright orange flanks with yellow spots; tympanic shield narrow; weak to moderately keeled lateral scales; scales on soles of feet smooth; 23–24 (24) dorsal midbody scale rows; 8 enlarged ventral plates; 49–51 (50) transverse ventral scale rows; 3 supralabials; 3 infralabials; 4 supraciliaries; 15–18 subdigital lamellae under 4th toe; 15–20 (16) precloacal pores per thigh. Largest female: 150.9 + 233.0 mm (PEM R23544); largest male: 139.0 + 277.0 mm (PEM R23325). **Habitat and natural history notes:** Found sympatrically with *G. auritus* at certain localities, e.g., Cuito River source and Lungwebungu River bridge site. *Gerrhosaurus* cf. *nigrolineatus* utilizes the same habitats as *G. auritus* and exhibits similar behavior. **Comment:** A species with a wide distribution in Africa and in Angola (Marques et al. 2018). Eastern African populations of *G. nigrolineatus* were re-assigned to *G. intermedius* by Bates et al. (2013), and the status of the Angolan north-central and western populations of *G. multilineatus*, as well as their relationships within the *G. nigrolineatus* complex in Angola, are under investigation (M. Bates, pers. comm.).

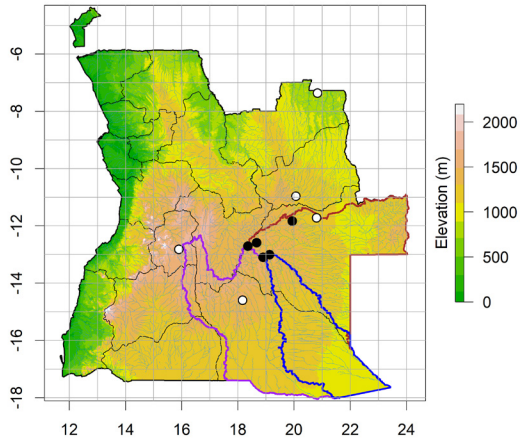
Tetradactylus ellenbergeri (Angel, 1922)
Ellenberger's Long-tailed Seps (Fig. 18, Map 18)
Material (4 specimens): PEM R23375 (neonate), outlet of Cuito River source lake, -12.70453° 18.35445°, 1,429 m asl; PEM R23424, Cuando River source, -13.00345° 19.12751°, 1,343 m asl; PEM R23976 (posterior half of body and tail only), Lungwebungu River campsite, -12.58319° 18.66573°, 1,284 m asl; PEM R24275, Cuanavale River source lake, -13.09442° 18.89372°, 1,397 m asl. **Description:** Dorsal scales ridged with a central keel; 12–14 dorsal midbody scale rows; 6 enlarged longitudinal ventral plates; 63 transverse ventral scale rows; 63 transverse dorsal scale rows; 4 supralabials; 3 infralabials; 3 supraciliaries; no front limbs; hind limbs monodactyle (< 2 mm). Largest specimen: 62.5 + 160.0

Fig. 17. Adult male *Gerrhosaurus* cf. *nigrolineatus* (PEM R23325) complex from Cuito River source. *Photo by Werner Conradie*.



Map 17. Distribution of *Gerrhosaurus nigrolineatus* complex in Angola.

Fig. 18. Adult female *Tetradactylus ellenbergeri* (PEM R23424) from Cuando River source. *Photo by Werner Conradie*.



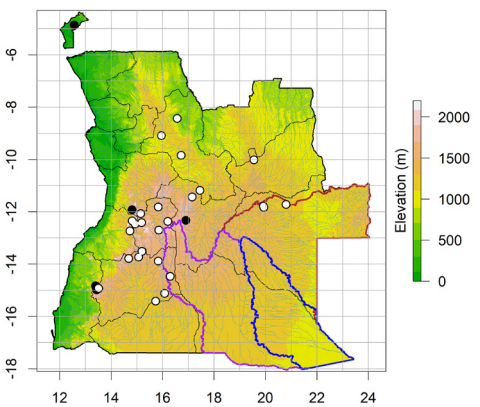
Map 18. Distribution of *Tetradactylus ellenbergeri* in Angola.

mm (PEM R24275). **Habitat and natural history notes:** All specimens were found near waterbodies. One female specimen (PEM R23424) was captured by a Cattle Egret (*Bubulcus ibis*) that released the specimen upon being startled. The specimen contained two eggs (8.4 x 3.5 mm) in November. One neonate (PEM R23375) was collected at the outlet of the Cuito River source lake in February. **Comment:** These new records fill the gap between the most southeastern Luassinga River record (Conradie et al. 2016) and the northeastern Angolan records (Monard 1937; Laurent 1964), and they are the first records for the Cuando River basin. The taxonomy of this species in Angola has been complicated by the naming of *T. lundensis* Monard, 1937 and *T. fitzsimonsi simplex* Laurent, 1950. Laurent (1964) synonymized these two species with *T. boulengeri*, which he in turn separated from *T. ellenbergeri* based on the lower number of dorsal scale rows (12 versus 14). Broadley (1971) rejected this, as he found specimens in eastern Zambia whose dorsal scale rows varied from 12–14 (the outer scale rows being much smaller). Most of our specimens had 12 dorsal scale rows, except for two specimens from the Cuando River (PEM R23424) and the Luassingua River (Conradie et al. 2016), which each had 14 dorsal scale rows (outer scale rows half the size of adjacent rows).

Lacertidae

Ichnotropis bivittata Bocage, 1866
Angolan Rough-scaled Lizard (Fig. 19, Map 19)
Material (1 specimen): PEM R23530, west of Cuito town on Aludungo road, -12.32784° 16.90673°, 1,742 m asl. **Description:** 35 midbody scale rows; 10 longitudinal rows of enlarged ventral plates; 31 transverse ventral scale rows; 4/4 supralabials; 6/6 infralabials; 4/4 supraciliaries; 19 subdigital lamellae under 4th toe; 10/10 femoral pores per thigh. Largest female: 59.9 + 98.0 mm (PEM R23530). **Comment:** Collected outside of the core study area, but it contributes to the distributional data for both the species and the region. Laurent (1964) described *I. b. pallida* from Huíla based on duller coloration and minor differences in head scalation. Recently, Butler et al. (2019) and Bandeira (2019) erroneously referred material from Bicuar National Park to *I. b. pallida*, but these are actually subadult non-breeding *I. capensis* (see Baptista et al. 2019 and the following species account). Bandeira

Fig. 19. Adult female *Ichnotropis bivittata* (PEM R23530) from west of Cuito town on the Aludungo road. *Photo by Werner Conradie*.

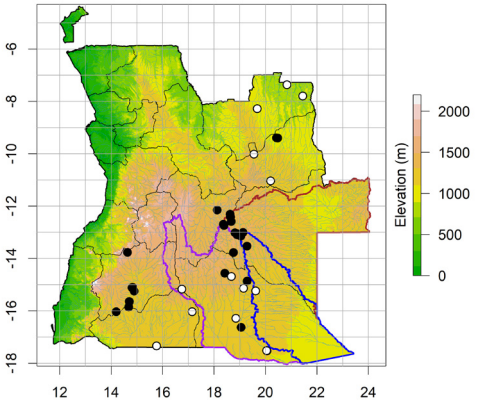


Map 19. Distribution of *Ichnotropis bivittata* in Angola.

Fig. 20. Adult male *Ichnotropis capensis* from Lungwebungu River camp. *Photo by Werner Conradie*.

Fig. 21. Adult female *Ichnotropis capensis* from Sombanana village. *Photo by Werner Conradie*.

Fig. 22. Juvenile *Ichnotropis capensis* (iNaturalist 12228725) from east of Cuemba. *Photo by Alex Rebelo*.



Map 20. Distribution of *Ichnotropis capensis* in Angola.

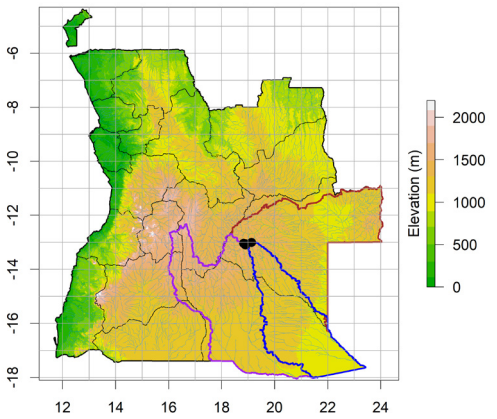
(2019) found that material from the type locality of *I. b. pallida* (KTH09-075 and AMB 10722) shows very little genetic difference from typical *I. bivittata* (JVV 2970 and CAS 258409), and thus should remain in the synonymy of the latter until more material becomes available for a detailed phylogenetic study.

Ichnotropis capensis (Smith, 1838)
Cape Rough-scaled Lizard (Figs. 20–22, Map 20)
Material (66 specimens): PEM R23274–8, Cuanavale River source, -13.0933° 18.89396°, 1,367 m asl; PEM R23253–4, Cacundu falls, -13.7739° 18.7552°, 1,281 m asl; PEM R23298, grasslands W of Cuanavale to Samanunga village, -13.07508° 18.88481°, 1,366 m asl; PEM R23326–8, INBAC: (no number); Cuito River source lake, -12.68935° 18.36012°, 1,435 m asl; PEM R23351–3, Kulua River source, 6 km SE of Cuito River source, -12.736749° 18.3931022°, 1,446 m asl; PEM R23370, INBAC: (no number), Cuanavale River source, -14.85472° 19.28639°, 1,203 m asl; PEM R23409–10, Lungwebungu River camp bridge crossing, -12.58346° 18.66598°, 1,304 m asl; PEM R23414–9, Cuando River source, -13.00345° 19.12751°, 1,343 m asl; PEM R23440, INBAC: (no number x2), Cuando River source trap 1, -13.00393° 19.12808°, 1,351 m asl; PEM R23453, INBAC: WC-4584 (plus 1 additional specimen), Quembo River trap 4, -13.13586° 19.04709°, 1,368 m asl; PEM R23489, Quembo River trap 2, -13.13544° 19.04397°, 1,375 m asl; PEM R23493–5, Cuanavale River source lake camp side, -13.09442° 18.89372°, 1,396 m asl; PEM R23502, Sombanana village, -12.31082° 18.62392°, 1,403 m asl; PEM R23505–7, source lake north of Lungwebungu River crossing, -12.41024° 18.63483°, 1,414 m asl; PEM R23508–9, amphitheatre at Cuanavale River source, -13.05048° 18.89623°, 1,415 m asl; PEM R23521–2, grassland drive west of Cuanavale River source, -13.01347° 18.81669°, 1,538 m asl; PEM R23531, Sombanana village, Dala River, -12.3071° 18.6235°, 1,407 m asl; PEM R23539, Longa River, -14.55956° 18.41419°, 1,321 m asl; PEM R23546–8, Quembo River source camp, -13.14557° 19.04571°, 1,423 m asl; PEM R23977, Lungwebungu River near trap 2, ad hoc, -12.58200° 18.66562°, 1,208 m asl; PEM R23986, Lungwebungu River trap 1, -12.580126° 18.667396°, 1,298 m asl; PEM R23996–7, INBAC: WC-4544 (plus 2 additional specimens), Lake Tchanssengwe, -12.41402° 18.64418°, 1,393 m asl; PEM R27393, INBAC: WC-6796, Cuanavale River source lake, -13.09052° 18.89394°, 1,357 m asl; PEM R27394–401, INBAC: WC-6796, Quembo River bridge camp, -13.52745° 19.2806°, 1,241 m asl. **Description:** 35–46 (40) midbody scale rows; 8–10 (9) longitudinal

Fig. 23. Adult male *Ichnotropis* cf. *grandiceps* from Cuando River source. *Photo by Werner Conradie*.

Fig. 24. Adult female *Ichnotropis* cf. *grandiceps* from grasslands west of Cuanavale River source to Samanunga village. *Photo by Werner Conradie*.

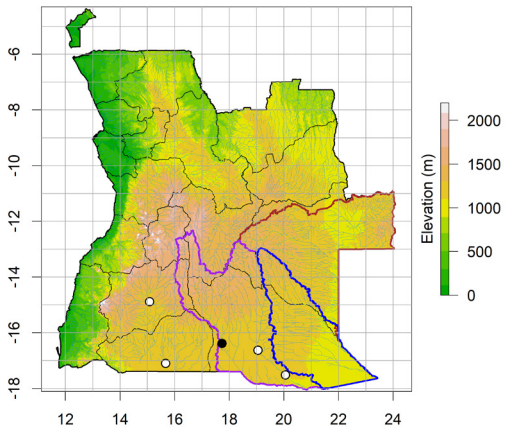
Fig. 25. Juvenile *Ichnotropis* cf. *grandiceps* (PEM R23300) from Cuanavale River source. *Photo by Werner Conradie*.



Map 21. Distribution of *Ichnotropis* cf. *grandiceps* in Angola.

rows of enlarged ventral plates; 26–31 (27) transverse ventral scale rows; 4–5 supralabials; 6–7 infralabials; 4/4 supraciliaries; 19–26 (22) subdigital lamellae under 4th toe; 9–13 (10) femoral pores per thigh. Largest female: 63.1 + 117.0 mm (PEM R23531); largest male: 67.7 + 160.0 mm (PEM R23410, new maximum size record). **Habitat and natural history notes:** In February 2016 and April 2018, only juveniles and subadult specimens were observed, while in October 2016 and November 2019 only adult specimens were observed. **Comment:** Based on general coloration and morphology, we assign these specimens to the widespread *I. capensis*. The large series of material (adults, subadults, and juveniles) allowed us to assess the color variability within this species, and in doing so we could confirm that previous material assigned to *Ichnotropis* sp. by Conradie et al. (2016) and *I. b. pallida* by Butler et al. (2019) and Bandeira (2019) is referrable to subadult *I. capensis*. The status of *I. c. overlaeti* remains unresolved, although Marques et al. (2018) suggest that it might be a valid species based on its geographical separation from the nominotypical form that occurs further south. These new records and unpublished PEM records from Saurimo in Lunda Sul Province breach the distributional gap, potentially forming a link between the southern and northwestern Zambian and DRC records (Haagner et al. 2000; Pietersen et al. 2021).

Ichnotropis cf. *grandiceps* Broadley, 1967
Caprivi Rough-scaled Lizard (Figs. 23–25, Map 21)
Material (17 specimens): PEM R23279–80; INBAC (no number), Cuanavale River source, -13.0933° 18.89396°, 1,367 m asl; PEM R23299–300, Grassland W of Cuanavale River to Samanunga village, -13.07508° 18.88481°, 1,366 m asl; PEM R23303–9, 4 km upstream from Cuanavale River source, -13.05084° 18.89726°, 1,380 m asl; PEM R23361–2, drive to Cuanavale River camp from Samanunga village, -13.03803° 18.82977°, 1,605 m asl; PEM R23420–1, Cuando River source, -13.00345° 19.12751°, 1,343 m asl; PEM R23482, Cuando River source Trap 4, -13.00164° 19.1296°, 1,372 m asl. **Description:** 41–49 (44) midbody scale rows; 9–10 (10) longitudinal ventral scale rows; 30–37 (34) transverse ventral scale rows; 4–5 supralabials; 6–7 infralabials; 5–6 supraciliaries; 19–26 (22) subdigital lamellae under 4th toe; 10–13 (12) femoral pores per thigh. Largest female: 78.2 + 126.0 mm (PEM R23362); largest male: 73.5 + 95t mm (PEM R23420, longest tail measured 117 mm [2x SVL]). **Habitat and natural history notes:** Juveniles were only observed in February 2016 on sandy areas around the source of the Cuanavale River, while two adults were found on the elevated grassland ridges. In October



Map 22. Distribution of *Meroles squamulosus* in Angola.

2016, only adult specimens were found in sympatry with adult *I. capensis*. **Comment:** Described from the Zambezi Region in northeastern Namibia based on only three specimens (Broadley 1967), and further known only from four additional specimens collected from northeastern Namibia (Haacke 1970) and one specimen from western Zambia (Pietersen et al. 2017). The newly collected material conforms in part (broad head, large overall size, dorsal coloration, and higher midbody scale counts) with the original description. These therefore represent the first records from Angola and the largest series of specimens for this species ever collected. The species displays a substantial amount of ontogenetic variation (coloration and size), which originally led to the belief that the juveniles and adults of *I. grandiceps* represented separate species (W. Conradie, pers. obs.). Since this is the first genetic material available for this species, a phylogenetic study is underway (W. Conradie, in prep.).

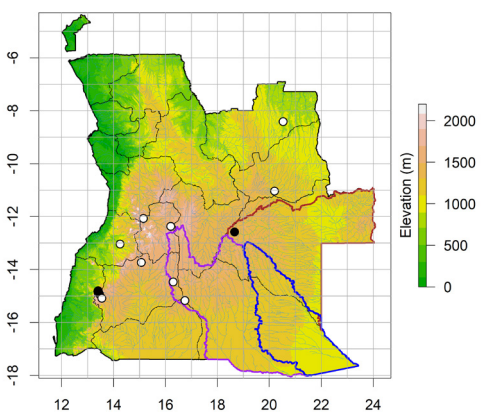
Meroles squamulosus (Peters, 1854)
Common Rough-scaled Lizard (Map 22)
Material (1 specimen): PEM R24291, EN140 road between Caiundo and Katwitwi, -16.38169° 17.7337°, 1,143 m asl. **Description:** 53 midbody scale rows; 8 longitudinal and 36 transverse ventral scale rows; 7/7 supralabials; 7/7 infralabials; 4/4 supraciliaries; 17 subdigital lamellae under 4th toe; 14 femoral pores per thigh. Largest male: 60.8 + 88.0 mm (PEM R24291). **Habitat and natural history notes:** Found active during the day in Zambezian *Baikiaea* woodland. **Comment:** This species is only known from a handful of records in southern Angola (Monard 1937; Conradie et al. 2016), although it is more widespread further south and east (Branch 1998; Pietersen et al. 2021).

Scincidae

Eumecia anchietae Bocage, 1870
Anchieta's Serpentiform Skink (Fig. 26, Map 23)
Material (1 specimen): PEM R23983 (iNaturalist 12410715), Lungwebungu River campsite, ad hoc, -12.58027° 18.66278°, 1,302 m asl. **Description:** Dorsal scales with two keels per scale; tail 1.3 times the SVL; 22 midbody scale rows; 107 transverse ventral scale rows; 3/4 supralabials; 4/4 infralabials; 4 supraciliaries (1st semi-divided); 2 toes on front limbs and 3 on hind limbs. Size (male): 127.0 + 157.0 mm (PEM R23983). **Habitat and natural history notes:** Found dead on road. Stomach contained unidentified grasshopper, caterpillar, and small beetles. **Comment:** Laurent (1964) described *E. a. major* from northern Angola, based on the first supraciliary being fused with the second. Monard (1937) documented the same difference for material from Lunda. The new specimen reported here conforms to the description of *E. a. major* and was collected in close proximity to the material documented by Laurent (1964). The status of this subspecies needs to be determined using phylogenetic analyses.

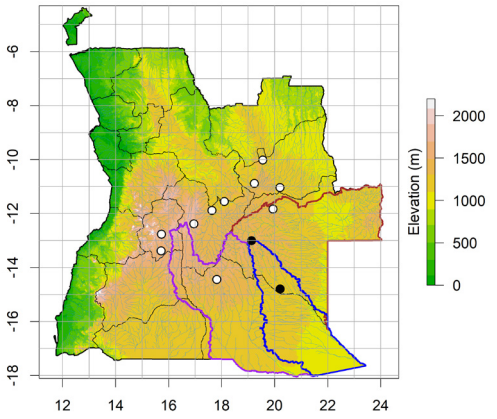
Lubuya ivensii (Bocage, 1879)
Iven's Water Skink (Fig. 27, Map 24)
Material (2 specimens): PEM R23422, Cuando River source, -13.00345° 19.12751°, 1,343 m asl;

Fig. 26. Subadult male *Eumecia anchietae* (PEM R23983) from Lungwebungu River campsite. *Photo by Werner Conradie*.



Map 23. Distribution of *Eumecia anchietae* in Angola.

Fig. 27. Juvenile *Lubuya ivensii* (PEM R23422) from Cuando River source. *Photo by Werner Conradie*.

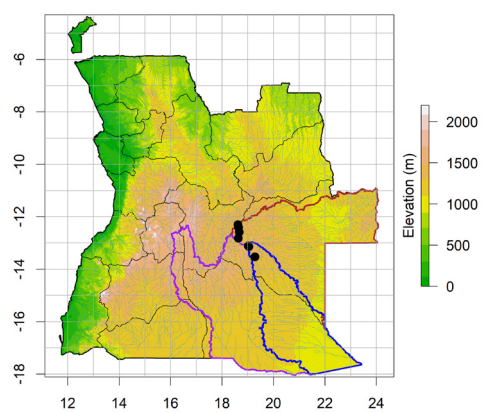


Map 24. Distribution of *Lubuya ivensii* in Angola.

PEM R24276, Cuando River, Camp 19, -14.79365° 20.20482°, 1,121 m asl. **Description:** Dorsal scales with three keels each; tail twice SVL; 29 midbody scale rows; 64–66 transverse ventral scale rows; 62–64 transverse ventral scale rows; 6–7 supralabials; 6 infralabials; 3–4 supraciliaries; 16–19 subdigital lamellae under 4th toe. Largest specimen: 113.0 + 216.0 mm (PEM R24276). **Habitat and natural history notes:** One of the specimens was caught basking on top of dense grass within a grassy wetland. **Comment:** Monard (1937) reported that the material from northeastern Angola has an extra lateral white line, but took no taxonomic action. Subsequently, Laurent (1964) described northeastern material as *Mabuya ivensi septemlineata.* Branch and Haagner (1993), while reporting on a large collection of specimens from northwestern Zambia and adjacent DRC, found no evidence to support the continued recognition of *M. i. septemlineata*. The two new records reported here and the record in Conradie et al. (2016) represent the most southern records of this species and the first from the Okavango and Cuando River basins.

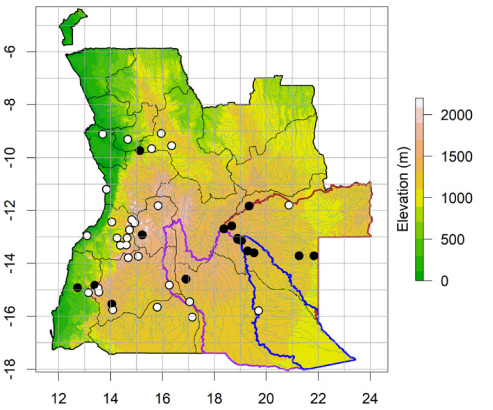
Panaspis sp.
Snake-eyed Skink (Fig. 28, Map 25)
Material (14 specimens): PEM R23317, Protea stop en route to Cuito River source, -12.3004° 18.6207°, 1,425 m asl; PEM R23347, road from Cuanavale River to Cuito River sources, -12.81739° 18.63236°, 1,446 m asl; PEM R23411, Lungwebungu River camp bridge crossing, -12.58346° 18.66598°, 1,304 m asl; PEM R23469, Quembo River source, trap 1, -13.13592° 19.04417°, 1,369 m asl; PEM R23524, Quembo River source, -13.11264° 19.01789°, 1,539 m asl; PEM R23980, Lungwebungu River trap 3, -12.58056° 18.66419°, 1,302 m asl; PEM R23998 (iNaturalist 12261402), Lake Tchanssengwe, -12.41402° 18.64418°, 1,393 m asl; PEM R27407, Quembo River bridge camp, -13.527455° 19.2806°, 1,241 m asl; PEM R27403–6, INBAC: WC-6984, lower Quembo River bridge camp trap 2, -13.52816° 19.28067°, 1,240 m asl. **Description:** No white spots on lateral sides of neck; no dorsolateral white stripes; 25–29 (27) midbody scale rows; 55–61 (57) transverse ventral scale rows; 54–61 (58) transverse dorsal scale rows; 4 supralabials; 7 infralabials; 5–6 supraciliaries; 12–14 (13) subdigital lamellae under 4th toe. Largest female: 41.4 + 56.0 mm (PEM R3524); largest male: 39.2 + 56.0 mm (PEM R23411). **Habitat and natural history notes:** Found among leaf litter in closed canopy miombo woodland. **Comment:** The snake-eyed skinks of Angola were recently reviewed (Ceríaco et al. 2020c) with the recognition of five species occurring in Angola: *P. cabindae*, *P. breviceps*,

Fig. 28. Adult unsexed *Panaspis* sp. (PEM R23347) from en route to the Cuito River source. *Photo by Werner Conradie*.



Map 25. Distribution of *Panaspis* sp. in Angola.

Fig. 29. Adult unsexed *Sepsina angolensis* (PEM R23498) from Cuanavale River source. *Photo by Werner Conradie.*



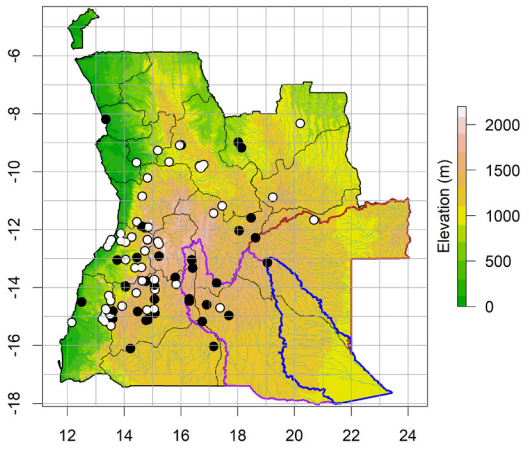
Map 26. Distribution of *Sepsina angolensis* in Angola.

P. wahlbergii, *P. maculicollis,* and the newly described *P. mocamedensis*. Our specimens lack the typical white neck spots diagnostic of the *P. maculicollis* group and the diagnostic black-edged white dorsolateral stripe of the *P. wahlbergii* group. The taxonomic status of this material is pending the outcome of future phylogenetic studies.

Sepsina angolensis (Bocage, 1866)
Angola Reduced-limb Skink (Fig. 29, Map 26)
Material (20 specimens): PEM R23264, Cuchi River gorge, -14.59° 16.90758°, 1,350 m asl; PEM R23316, Cuanavale River, trap 4 active search, -13.05071° 18.89843°, 1,419 m asl; PEM R23332–3, Cuito River source lake, -12.68935° 18.36012°, 1,435 m asl; PEM R23460, Quembo River source, trap 5, -13.13586° 19.04709°, 1,368 m asl; PEM R23498–9, INBAC: WC4571, Cuanavale source lake, -13.08934° 18.89485°, 1,396 m asl; PEM R23515, Quembo River source, trap 3, -13.13072° 19.03724°, 1,443 m asl; PEM R23972, Lungwebungu River campsite, ad hoc, -12.58862° 18.66827°, 1,309 m asl; PEM R23978 (iNaturalist 12373403), Lungwebungu River, trap 2, -12.58199° 18.66562°, 1,208 m asl; PEM R27412, Quembo River bridge camp, -13.52816° 19.28067°, 1,240 m asl; PEM R27413,INBAC: WC-6792, Quembo River bridge camp, trap 3, -13.52778° 19.27455°, 1,256 m asl; PEM R27414, Quembo River bridge camp, -13.52745° 19.2806°, 1,241 m asl; PEM R27415, left side tributary (Condinde River) at Cuando River bridge, -13.60076° 19.52675°, 1,219 m asl; PEM R27416, Camp at side tributary (Luandai River) of the Luanguinga River, -13.708854° 21.262343°, 1,116 m asl; PEM R27417, lower Quembo River bridge camp, trap 4, -13.52658° 19.27810°, 1,248 m asl; PEM R27418–9, Luvu River camp, -13.71200° 21.83538°, 1,082 m asl. **Description:** Smooth dorsal scales; 24–25 (24) midbody scale rows; 90–98 (95) transverse ventral scale rows; 89–97 (93) transverse dorsal scale rows; 5–6 supralabials; 6–7 infralabials; 5 supraciliaries; reduced limbs with three clawed toes per limb. Largest female: 84.6 + 56.0 mm (PEM R27413); largest male: 71.0 + 54.0 mm (PEM R23515). **Habitat and natural history notes:** Tracks of these fossorial species can be seen in the early mornings on sandy soil. Most specimens were either caught in traps or by raking through leaf litter. Some specimens were collected under tree logs. **Comment:** This species is known from Angola, Namibia, Zambia, and DRC (Branch 1998; Marques et al. 2018; Pietersen et al. 2021). These records fill the gap within the known distribution in Angola and western Zambia (Broadley 1971; Pietersen et al. 2021).

Trachylepis albopunctata (Bocage, 1867)
White-spotted Variable Skink (Fig. 30, Map 27)
Material (15 specimens): PEM R23256–8, south of Menongue en route to Cuebe River, -14.96288° 17.69089°, 1,300 m asl; PEM R23265, INBAC (no number), Cuchi River gorge, -14.59° 16.90758°, 1,350 m asl; PEM R23344–5, 10 km west of Cuemba village, -12.03481° 18.04869°, 1,437 m asl; PEM R23355, Stop 2: road to Cuito River source, -12.2823° 18.6291°, 1,487 m asl; PEM R23379, Kuvango River hydro plant site, -14.38775° 16.29365°, 1,429 m asl; PEM R23389, INBAC: WC-5207, Cubango River campsite 2 near mission, -13.32887° 16.41167°, 1,520 m asl; PEM R23390, Cubango River, campsite 1 below rapids, west of Fundo village, -13.04483° 16.3752°, 1,557 m asl; PEM R23479, Quembo River source trap 4, -13.13586° 19.04709°, 1,369 m asl; PEM R23543, EN140 North of Menongue, -13.84775° 17.25308°, 1,503 m asl. **Description:** Dorsal scales with three keels each; 30–35 (33) midbody scale rows; 44–47 (45) transverse ventral scale rows; 47–55 (51) transverse dorsal scale rows; 4–6 (5) supralabials; 6–7 (6) infralabials; 4–7 (5) supraciliaries; 19–21 (20) subdigital lamellae under 4th toe. Largest specimen: 55.6 + 92.0 mm (PEM R23265). **Habitat and natural history notes:** Diurnal species found active in miombo woodland. **Comment:** Part of the larger *Trachylepis varia* group (Weinell and Bauer 2018; Weinell et al. 2019). Two species of this group occur in Angola: *T. damarana*, known only from southeastern Angola, and *T. albopunctata*, from the central and coastal regions of Angola. The two species

Fig. 30. Adult unsexed *Trachylepis albopunctata* (PEM R23256) from south of Menongue. *Photo by Werner Conradie*.

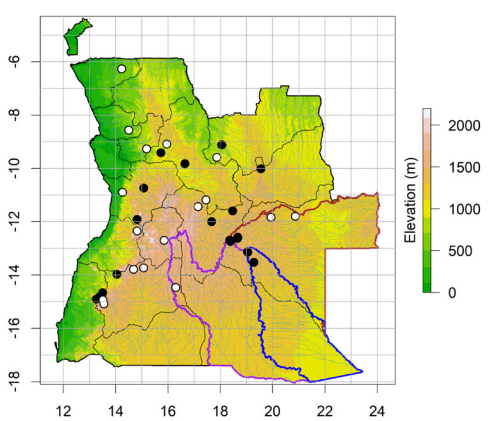


Map 27. Distribution of *Trachylepis albopunctata* in Angola.

can be separated by head scalation and coloration. In *T. albopunctata,* the parietals are mostly in contact anterior of the interparietal (13 out of 19 specimens examined), mostly five supralabials (average 4.6, $n = 22$) that are dark-edged anteriorly, and a mostly uniform dark brown dorsum with less white speckling compared to *T. damarana*.

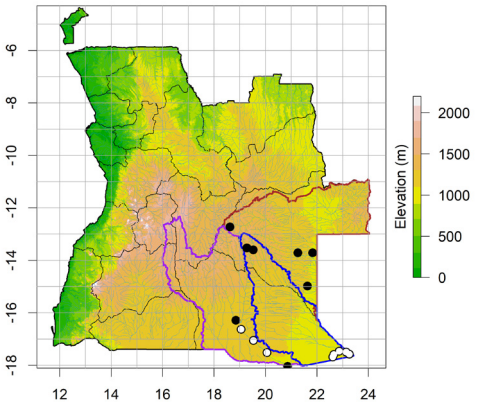
Trachylepis bayonii (Bocage, 1872)
Bayão's Skink (Fig. 31, Map 28)
Material (21 specimens): PEM R23336–8, Cuito River source lake, -12.68935° 18.36012°, 1,435 m asl; PEM R23354, Kulua River source lake, 6 km SE of Cuito River source, -12.736749° 18.3931022°, 1,446 m asl; PEM R23378, Kwanza River bridge, -11.99348° 17.66965°, 1,273 m asl; PEM R23477, Quembo River trap 2, -13.13544° 19.04397°, 1,369 m asl; PEM R23478, Quembo River trap 3, -13.13072° 19.03724°, 1,369 m asl; PEM R23501, Quembo River source lake, -13.14104° 19.05426°, 1,399 m asl; PEM R23514, Cuito River source lake, -12.68866° 18.36025°, 1,426 m asl; PEM R23516, Kulua River source, -12.73723° 18.3934°, 1,444 m asl; PEM R23553–5, INBAC: WC-4674, Quembo River source camp, -13.14104° 19.05426°, 1,371 m asl; PEM R23971 (iNaturalist 12347684), Rio Comba, -12.62442° 18.65159°, 1,299 m asl; PEM R23987, Lungwebungu River trap 1, -12.58012° 18.66740°, 1,298 m asl; PEM R27420, Lungwebungu River camp, at bridge, -12.58391° 18.66545°, 1,295 m asl; PEM R27421, Lungwebungu River camp, -12.58439° 18.66748°, 1,297 m asl; PEM R27422, Quembo River bridge camp, trap 1, -13.52801° 19.28147°, 1,236 m asl; PEM R27423–4, Quembo River right side tributary (Micongo River) past village, -13.51877° 19.284866°, 1,248 m asl. **Description**: Dorsal scales with five keels each; scales under toes spinose; 30–35 (32) midbody scale rows; 45–56 (52) transverse ventral scale rows; 40–53 (49) transverse dorsal scale rows; 4–6 supralabials; 6–8 infralabials; 3–4 supraciliaries; 15–17 (16) subdigital lamellae under 4th toe. Largest specimen: 76.2 + 152 mm (PEM R27424). **Habitat and natural history notes:** Lateral sides of body and tail orange in breeding males. **Comment:** Two subspecies are currently recognized: *T. b. bayonii* and *T. b. huilensis*. Weinell et al. (2019) showed that *T. b. huilensis* requires full species recognition. Our new material is tentatively assigned to *T. b. bayonii*, based on distribution and unpublished barcoding results (W. Conradie, unpub. data).

Fig. 31. Adult unsexed *Trachylepis bayonii* from Cuito River source. *Photo by Werner Conradie*.



Map 28. Distribution of *Trachylepis bayonii* in Angola.

Fig. 32. Adult male *Trachylepis damarana* (PEM R27434) from Quembo River bridge camp. *Photo by Chad Keates*.

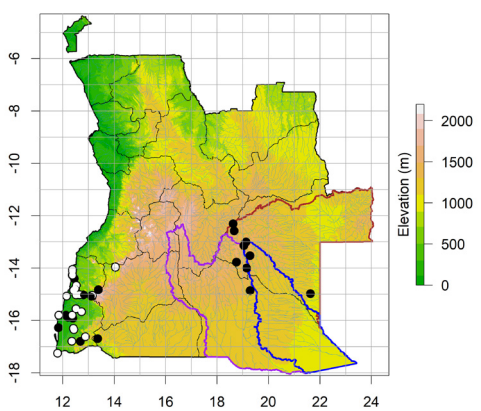


Map 29. Distribution of *Trachylepis damarana* in Angola.

Trachylepis damarana (Peters, 1870)
Damara Variable Skink (Fig. 32, Map 29)
Material (14 specimens): PEM R23266, en route to Cuanavale River source, -12.72368° 18.6228°, 1,355 m asl; PEM R27425–6, PEM R27430, camp at side tributary (Luandai River) of the Luanguinga River, -13.708854° 21.262343°, 1,116 m asl; PEM R27427, R27431, Lake Hundo, -14.974308° 21.629657°, 1,100 m asl; PEM R27428–9, R27432–3, INBAC: WC-6769, Quembo River bridge camp, -13.527455° 19.2806°, 1,241 m asl; PEM R27434, PEM R27436, Quembo River bridge camp, trap 3, -13.527782° 19.274545°, 1,256 m asl; PEM R27435, left side tributary (Condinde River) at Cuando River bridge, -13.60076° 19.52675°, 1,219 m asl; PEM R27437, Luvu River camp, -13.712001° 21.835381°, 1,082 m asl. **Description:** Dorsal scales with three keels each; 30–35 (33) midbody scale rows; 40–46 (43) transverse ventral scale rows; 50–59 (53) transverse dorsal scale rows; 4–5 (4) supralabials; 6–7 (6) infralabials; 4–6 (5) supraciliaries; 20–23 (22) subdigital lamellae under 4th toe. Largest specimen: 59.6 + 0t mm (PEM R27425, longest tail 89.8 mm [1.7 x SVL]). **Habitat and natural history notes:** Lateral sides of body and tail orange in breeding males (Fig. 32). All specimens were found in degraded/secondary miombo woodland. **Comment:** See *T. albopunctata* species account for details on taxonomy and identification.

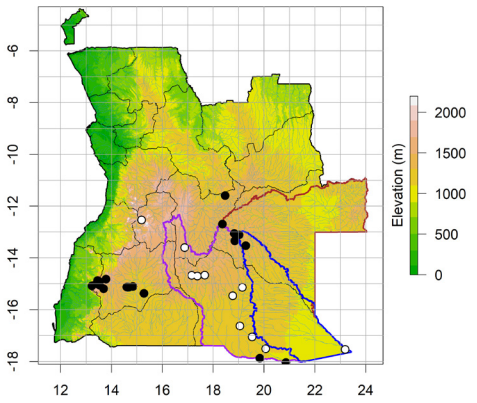
Trachylepis cf. *punctulata* (Bocage, 1872)
Speckled Sand Skink (Fig. 33, Map 30)
Material (18 specimens): PEM R23255, Cacundu falls, -13.7739° 18.7552°, 1,281 m asl; PEM R23371, Cuanavale River source, -14.85472° 19.28639°; PEM R23372, Cuanavale River, -13.99475° 19.14919°; PEM R23425–6, Cuando River source, -13.00345° 19.12751°, 1,343 m asl; PEM R23461–2, Quembo River, trap 4, -13.13586° 19.04709°, 1,368 m asl; PEM R23504, Sombanana village river, -12.3071° 18.6235°, 1,408 m asl; PEM R23550–2, Quembo River source camp, -13.14557° 19.04571°; PEM R23981–2, Lungwebungu River trap 3, -12.58056° 18.66419°, 1,302 m asl; PEM R27438–40, WC-6769, Quembo River bridge camp, -13.52746° 19.28060°, 1,241 m asl; WC-6942, Lake Hundo, -14.974308° 21.629657°, 1,100 m asl. **Description:** Dorsal scales with five keels each; scales under toes spinose; 31–35 (33) midbody scale rows; 45–55 (51) transverse ventral scale rows; 40–50 (45) transverse dorsal scale rows; 5–6 supralabials; 6 infralabials; 4–5 supraciliaries; 16–22 (19) subdigital lamellae under 4th toe. Largest specimen: 46.0 + 45 mm (PEM R 23255). **Habitat and natural history notes:** A small skink that

Fig. 33. Adult unsexed *Trachylepis* cf. *punctulata* from Quembo River source. *Photo by Werner Conradie*.



Map 30. Distribution of *Trachylepis punctulata* in Angola.

Fig. 34. Adult female *Trachylepis* cf. *spilogaster* (PEM R23334) from Cuito River source. *Photo by Werner Conradie*.



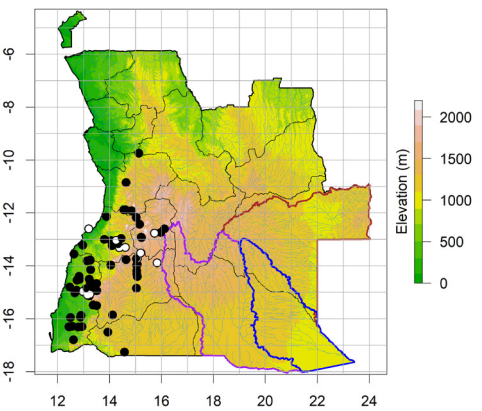
Map 31. Distribution of *Trachylepis* cf. *spilogaster* in Angola.

was often found moving around on the sandier regions, in close proximity to water sources. **Comment:** Most of the Angolan distribution is centred around the arid south-western regions of the country (Marques et al. 2018). Our records are the first from eastern Angola, forming a link with the records from western Zambia and the Zambezi Region of Namibia (Broadley 1971, 1975; Pietersen et al. 2017, 2021). The taxonomic status of this Kalahari Basin population requires further investigation.

Trachylepis cf. *spilogaster* (Peters, 1882)
Kalahari Tree Skink (Fig. 34, Map 31)
Material (7 specimens): PEM R23334–5, Cuito River source lake, -12.68935° 18.36012°, 1,435 m asl; PEM R23528, Quembo River source, -13.10699° 19.01785°, 1,545 m asl; PEM R23358–60, DOR en route to village, -13.05967° 18.83239°, 1,567 m asl; PEM R27441, DOR en route between Cuanavale River source and Tempué, -13.33954° 18.85122°, 1,386 m asl; INBAC: WC-6813, Quembo River, walk back from small waterfall, -13.52988° 19.28340°, 1,242 m asl. **Description:** Dorsal scales with five keels each; scales under toes spinose; 35–38 (37) midbody scale rows; 54–59 (57) transverse ventral scale rows; 47–48 (48) transverse dorsal scale rows; 5–6 supralabials; 6 infralabials; 4–6 supraciliaries; 19–20 (20) subdigital lamellae under 4th toe. Largest specimen: 81.4 + 125 mm (PEM R23334). **Habitat and natural history notes:** This species was often observed on the ground at the base of trees but quickly ascended the tree trunks in miombo woodland when disturbed. **Comment:** The status of *Trachylepis* cf. *spilogaster* is discussed by Conradie et al. (2016). Broadley (2000) reported that specimens from northwestern Botswana do not have the characteristic ventral black markings. The new material from the source lakes and material reported by Conradie et al. (2016) either lack ventral markings, or have markings restricted to the gular region. The taxonomic status of this population is currently under review (L. M. P. Ceríaco et al., pers. comm.).

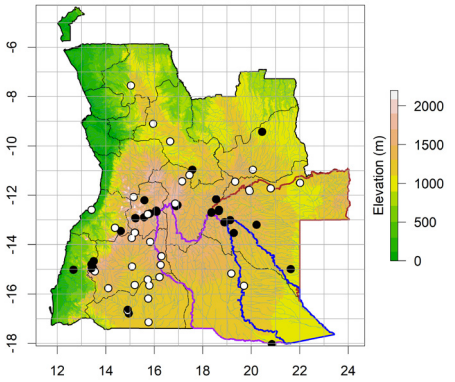
Trachylepis sulcata ansorgii (Boulenger, 1907)
Western Rock Skink (Fig. 35, Map 32)
Material (1 specimen): PEM R23368, en route to Cuito, east of Huambo, -12.73615° 15.97442°, 1,777 m asl. **Description:** Dorsal scales with five keels each; scales under toes smooth; 39 midbody scale rows; 53 transverse ventral scale rows; 49 transverse dorsal scale rows; 5/5 supralabials; 7/7 infralabials; 5/5 supraciliaries; 23 subdigital lamellae under 4th toe. Size: 80.6 + 0t mm. **Habitat and natural history notes:** Rupicolous skink

Fig. 35. Adult female *Trachylepis sulcata ansorgii* (PEM R23368) from en route between Huambo and Cuito. *Photo by Luke Verburgt*.



Map 32. Distribution of *Trachylepis sulcata* in Angola.

Fig. 36. Adult male *Trachylepis wahlbergii* from Cuito town. *Photo by Werner Conradie*.

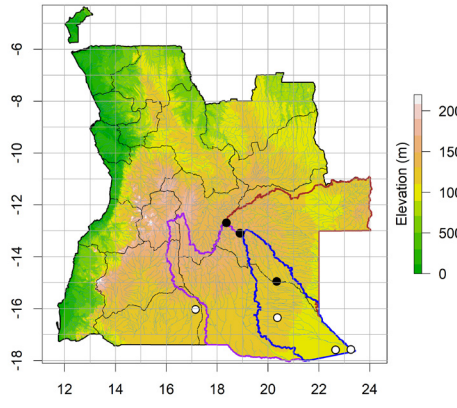


Map 33. Distribution of *Trachylepis wahlbergii* in Angola.

found in sympatry with *Agama planiceps* and *Afroedura wulfhaackei*. **Comment:** Both Butler et al. (2019) and Weinell et al. (2019) showed that *T. s. ansorgii* deserves full species recognition. As this species group is still under taxonomic revision, we mapped it at the species level. Not collected within the core study area, but this record contributes to the overall distribution of this species and the region and this species is expected to occur along the western edge of the study area.

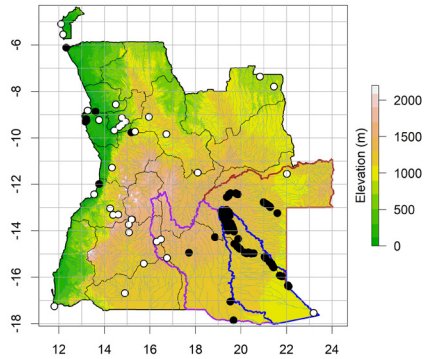
Trachylepis wahlbergii (Peters, 1869)
Wahlberg's Striped Skink (Fig. 36, Map 33)
Material (33 specimens): PEM R23259, en route to Cuanavale River source, -12.63683° 18.65984°, 1,316 m asl; PEM R23289–95, Cuanavale River source, -13.0933° 18.89396°, 1,356 m asl; PEM R23339–41, Cuito River source lake, -12.68935° 18.36012°, 1,435 m asl; PEM R23363–6, HALO Cuito, -12.39584° 16.96067°, 1,700 m asl; PEM R23376, outlet of Cuito River source lake, -12.70453° 18.35445°, 1,429 m asl; PEM R23393, Huambo HALO training camp, -12.73726° 15.81828°, 1,667 m asl; PEM R23401, INBAC: WC-5181, Cubango River source site, -12.66051° 16.08998°, 1,777 m asl; PEM R23412, Lungwebungu River camp bridge crossing, -12.58346° 18.66598°, 1,304 m asl; PEM R23427, INBAC (2 x no number), Cuando River source, -13.00345° 19.12751°, 1,343 m asl; PEM R23484–5, INBAC: WC-4776, Cuando River source trap 4, -13.00164° 19.1296°, 1,372 m asl; PEM R23513, Cuito River source lake, -12.68866° 18.36025°, 1,426 m asl; PEM R23559, Munhango village, -12.16067° 18.55042°, 1,428 m asl; PEM R27442, Quembo River bridge camp, -13.527455° 19.2806°, 1,241 m asl; PEM R27443, INBAC (no number), Luio River camp floodplains, -13.197108° 20.221937°, 1,181 m asl; PEM R27444, INBAC: WC-6919, Lake Hundo, trap 1, -14.99158° 21.63096°, 1,100 m asl. **Description:** Dorsal scales with 3–5 keels each; 38–42 (38) midbody scale rows; 51–63 (58) transverse ventral scale rows; 44–52 (49) transverse dorsal scale rows; 5–6 supralabials; 5–8 infralabials; 4–7 supraciliaries; 18–22 (19) subdigital lamellae under 4th toe. Largest female: 88.2 + 105.0 mm (PEM R23364); largest male 86.0 + 104 mm (PEM R23485). **Habitat and natural history notes:** Specimens were mostly encountered running on sand and retreating to holes when approached. No specimens were encountered on trees. **Comment:** This species has a wide distribution in southern Africa (Branch 1998; Pietersen et al. 2021) and Angola (Marques et al. 2018). The taxonomy of the *Trachylepis striata* species complex, to which this species belongs, is still unresolved and requires further investigation (Weinell et al. 2019; Stephens et al. 2021).

Fig. 37. Adult unsexed *Typhlacontias rohani* (PEM R27445) from Cuanavale River source. *Photo by Werner Conradie*.



Map 34. Distribution of *Typhlacontias rohani* in Angola.

Fig. 38. Adult unsexed *Varanus niloticus* from en route between the Munhango and Cuanavale River sources. *Photo by Werner Conradie*.



Map 35. Distribution of *Varanus niloticus* in Angola.

Typhlacontias rohani Angel, 1923
Rohan's Blind Legless Skink (Fig. 37, Map 34)
Material (5 specimens): PEM R23342, Cuito River source lake, -12.68935° 18.36012°, 1,435 m asl; PEM R23497, Cuanavale River source lake, camp side, -13.09442° 18.89372°, 1,396 m asl; PEM R24279, Cuando River, Camp 21, -14.94935° 20.34483°, 1,115 m asl; PEM R27445, Cuanavale River source lake, -13.090523° 18.89394°, 1,357 m asl; PEM R27446, en route from Cuando River to Cangamba. **Description:** Dorsal scales smooth; 18 midbody scale rows; 117–129 (123) transverse dorsal scale rows; 4 supralabials; 4 infralabials; 2 supraciliaries. Largest specimen: 76 + 39.8 mm (PEM R27445). **Habitat and natural history notes:** All specimens were found while raking through leaf litter in sandy soil. **Comments:** This fossorial legless skink is known from southeastern Angola, northeastern Namibia, western Zimbabwe, northern Botswana, and western Zambia (Haacke 1997; Marques et al. 2018; Pietersen et al. 2021). Although described from southeastern Angola (Angel 1923), very few records exist for the country (Monard 1937; Conradie et al. 2016). These new records are the northernmost for Angola. Most of the genus is restricted to the western coastal regions of Namibia and Angola, with only two species occurring in the Kalahari Basin, i.e., *T. rohani* and *T. gracillis*. The former is widespread while the latter is restricted to western Zambia. The two species occur in sympatry at Kalabo in western Zambia (Haacke 1997). Future studies should utilize an integrative systematic approach to elucidate the species boundaries and taxonomic structuring within the whole genus.

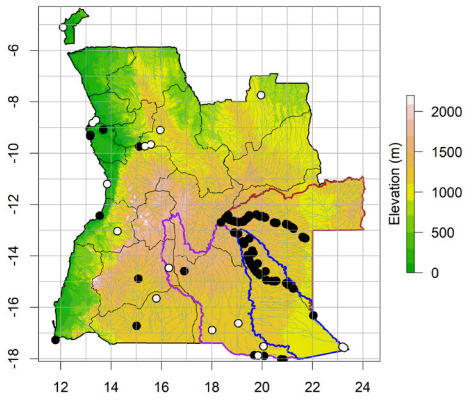
Varanidae

Varanus niloticus (Linnaeus, 1766)
Water Monitor (Fig. 38, Map 35)
Observations: Cuando River -13.09320° 19.36016°, -13.10063° 19.37254°, -13.12122° 19.39664°, -13.17326° 19.42046°, -13.18493° 19.43374°, -13.19005° 19.44007°, -13.19016° 19.44147°, -13.20209° 19.46860°, -13.21743° 19.45877°, -13.31917° 19.49327°, -13.32957° 19.49497°, -13.35510° 19.50343°, -13.35558° 19.50442°, -13.67297° 19.56172°, -13.79270° 19.61024°, -13.85453° 19.629620°, -13.90348° 19.65057°, -13.92381° 19.65753°, -14.03595° 19.69015°, -14.27281° 18.85794° (iNaturalist 1727927), -14.346620° 19.87581°, -14.92236° 20.31874°; Quembo River -13.17842° 19.13734°, -13.25178° 19.17143°, -13.25356° 19.17294°, -13.29163° 19.18123°, -13.33984° 19.20500°, -13.43206° 19.23945°, -13.48539° 19.24675°, -13.56702° 19.305067°, -13.56871° 19.30585°, -13.67061° 19.35595°, -13.67866° 19.35836°, -13.77110° 19.37386°, -13.79160° 19.38176°, -13.80572° 19.38648°, -13.81202° 19.38591°, -13.88262° 19.39604°, -13.93431° 19.42397°, -13.93599° 19.42577°, -13.99462° 19.43543°, -14.55758° 19.70635°, -14.67219° 19.83275°, -14.68235° 19.84010°, -14.68799° 19.85021°, -14.74537° 19.90861°, -14.76761° 19.93762°, -14.77509° 19.95381°, -14.92917° 20.15534°, -14.95729° 20.21396°, -14.95792° 20.36728°, -14.96685° 20.29766°, -14.96740° 20.46661°, -14.97001° 20.56494°, -14.97947° 20.23928°, -14.97965° 20.43558°, -14.98357° 20.45164°, -15.12585° 21.03947°, -15.18248° 21.08478°, -15.34301° 21.25209°, -15.42151° 21.34750°, -15.42435° 21.34192°, -15.49507° 21.38893°, -15.53690° 21.40043°, -15.58262° 21.43537°, -15.92187° 21.70659°, -15.96243° 21.79459°, -16.34916° 22.06133°, -16.37759° 22.069423°, -16.38589° 22.08581°, -16.39687° 22.097313°; Lungwebungu River -12.55000° 19.37939°, -12.50378° 19.44091°, -12.43436° 19.47018°, -12.38381° 19.54014°, -12.38389° 19.77781°, -12.40754° 19.80887°, -12.42778° 19.84023°, -12.43711° 19.85936°, -12.77029° 20.98921°, -12.80185° 21.03409°, -12.81192° 21.04544°, -12.85937° 21.14091°, -12.93685° 21.24336°, -12.95462° 21.26790°, -12.98417° 21.28638°, -13.24428° 21.59976°. **Comment:** This species was mostly encountered on the banks of rivers or basking on overhanging fig trees. However, one individual was captured very far from any known water source, presumably during a migration event between water sources.

Crocodylia
Crocodylidae

Crocodylus niloticus Laurenti, 1768
Nile Crocodile (Fig. 39, Map 36)

Fig. 39. Juvenile *Crocodylus niloticus* from Quembo River bridge camp. *Photo by Chad Keates*.



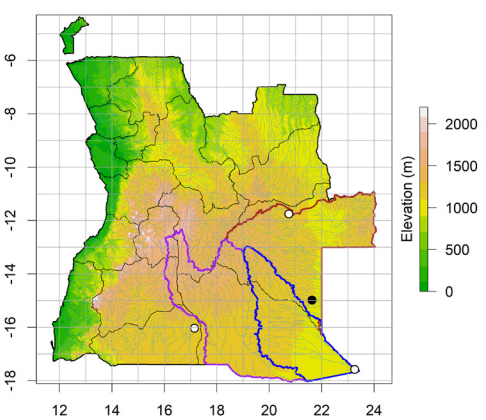
Map 36. Distribution of *Crocodylus niloticus* in Angola.

Observations: Cuito River source lake, -12.68935° 18.36012°; Cuchi River gorge, -14.59000° 16.90758°, 1,350 m asl; Kulua River source, lake 6 km SE of Cuito source, -12.736749° 18.3931022°, 1,446 m asl; Cuanavale River source lake, -13.09052° 18.89394°; Quembo River source lake, -13.13586° 19.04709°; Quembo River bridge site, -13.52801° 19.28147°; Lake Tchanssengwe, -12.41402° 18.64418°, 1,393 m asl; Cuando River -13.32009° 19.49338°, -13.79438° 19.60793°, -13.88734° 19.64641°, -14.29429° 19.81956°, -14.602330° 20.13131°, Quembo River -13.43374° 19.24170°, -13.53046° 19.28822°, -13.96865° 19.42061°, -13.99376° 19.43288°, -14.027810° 19.44206°, -14.09658° 19.46397°, -14.11456° 19.46687°, -14.15561° 19.48322°, -14.15577° 19.48615°, -14.22304° 19.50668°, -14.27701° 19.54167°, -14.34465° 19.57520°, -14.38198° 19.60944°, -14.39925° 19.61876°, -14.41994° 19.63391°, -14.51911° 19.69112°, -14.61351° 19.76039°, -14.67203° 19.83250°, -14.73636° 19.90068°, -14.94193° 20.16986°, -14.96962° 20.55838°, -14.97661° 20.53455°, -14.97668° 20.50791°, -14.97877° 20.38383°, -14.9834° 20.51638°, -15.05622° 20.95461°, -15.12544° 21.03706°, -15.26815° 21.23438°, -16.31355° 22.0369°, -16.31651° 22.0363°; Lungwebungu River -12.51823° 18.54648°, -12.57812° 18.67840°, -12.63833° 18.82899°, -12.64124° 18.86644°, -12.67050° 18.96596°, -12.68586° 19.06160°, -12.66937° 19.17765°, -12.66345° 19.21794°, -12.65688° 19.25919°, -12.60808° 19.29928°, -12.57965° 19.34484°, -12.52636° 19.40970°, -12.45915° 19.47460°, -12.45031° 19.47158°, -12.41964° 19.48228°, -12.38694° 19.77156°, -12.45968° 19.90906°, -12.45414° 20.005371°, -12.45218° 20.01162°, -12.48533° 20.09848°, -12.50573° 20.11481°, -12.70198° 20.47726°, -12.72187° 20.56667°, -12.75665° 20.94848°, -12.78606° 21.02360°, -12.88576° 21.18927°, -12.93852° 21.24419°, -13.25902° 21.61123°, -13.28100° 21.62614°, -13.31189° 21.71873°. **Comment:** No evidence was found that this species was breeding in the upper reaches of the rivers.

Testudines
Pelomedusidae

Pelusios bechuanicus FitzSimons, 1932
Okavango Mud Terrapin (Fig. 40, Map 37)
Material (2 specimens): PEM R27408–9, Lake Hundo, -14.97431° 21.62966°, 1,100 m asl. **Description:** Specimen with large carapace (235 mm; PEM R27409) collected on the edge of a lake and a sub-adult female (123 mm; PEM R27408) collected from the lake itself. Head black with yellow blotches; plastron and carapace uniform black; front limbs black with yellow markings; interlimb skin pale white. **Habitat and natural history notes:** The specimen caught alive was captured with a

Fig. 40. Subadult female *Pelusios bechuanicus* (PEM R27408) from Lake Hundo. *Photo by Werner Conradie*.



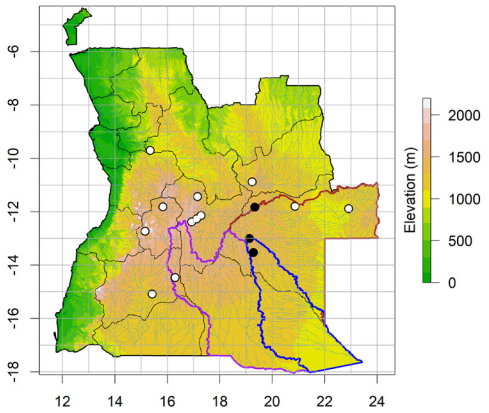
Map 37. Distribution of *Pelusios bechuanicus* in Angola.

Fig. 41. Adult female *Pelusios nanus* (PEM R23423) from Cuando River source. *Photo by Werner Conradie*.

net while collecting fish in the deeper waters of the lake. **Comment:** This is only the 4th record of this species for Angola (see Conradie et al. 2016; Marques et al. 2018). Elsewhere this species is restricted to the Okavango and Zambezi River systems (Pietersen et al. 2021).

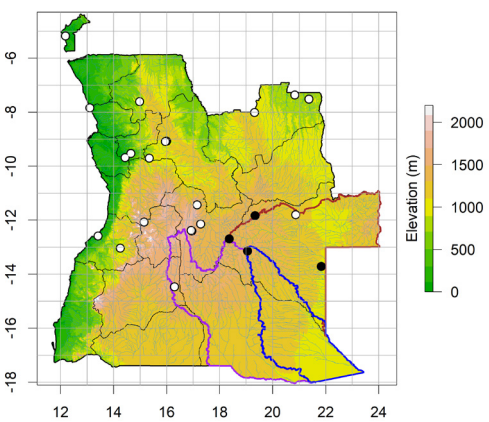
Pelusios nanus Laurent, 1956
African Dwarf Mud Terrapin (Fig. 41, Map 38)
Material (2 specimens): PEM R23423, Cuando River source, -13.00345° 19.12751°, 1,343 m asl; PEM R27410 (shell), Quembo River bridge camp, -13.52745° 19.2806°, 1,241 m asl. **Description:** Carapace lengths 91.6 mm (PEM R27410) and 88.4 mm (PEM R23423), respectively. Carapace very smooth and rounded, uniform dark brown with black edges to scutes; plastron beige with lateral and anterior edges dark brown to black; head brown with yellow vermiculation; limbs dark brown; skin of neck and limbs light yellow. **Habitat and natural history notes:** The live specimen was caught in shallow water covered by grass at the source of the Cuando River. **Comment:** The new records close the distributional gap between the central and eastern Angolan records (Marques et al. 2018) and are the first from the Cuando River basin.

Fig. 42. Subadult female *Pelusios rhodesianus* (PEM R23329) from Cuito River source. *Photo by Werner Conradie*.



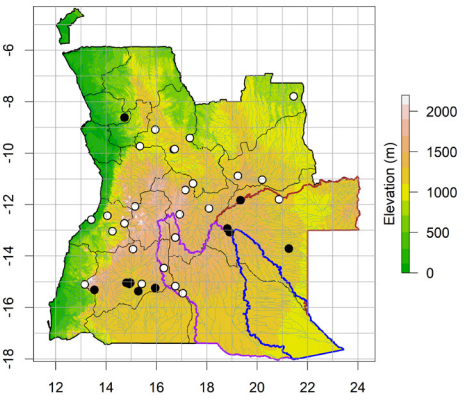
Map 38. Distribution of *Pelusios nanus* in Angola.

Pelusios rhodesianus Hewitt, 1927
Variable Mud Terrapin (Fig. 42, Map 39)
Material (4 specimens): PEM R23329, Cuito River source lake, -12.68935° 18.36012°, 1,435 m asl; PEM R23490 (shell), Quembo River source, -13.13959° 19.04890°, 1,375 m asl; PEM R23562, en route to the Cuando and Quembo confluence; PEM R27411, Luvu River camp, -13.71200° 21.83538°, 1,082 m asl; uncatalogued individual from middle Cubango River. **Description:** Most specimens were juveniles, but one adult carapace measured 177 mm (PEM R23490). The carapace and plastron of the shell were uniform dark brown to black. Juveniles had dark brown carapaces, but the plastrons varied from uniform black to beige with darker centers; head and limbs uniform brown; interlimb skin white to yellowish. The adult carapace was elongate and smooth with a weak vertebral keel anteriorly, while all the juveniles' carapaces were rounded with a pronounced vertebral crest. **Habitat and natural history notes:** Juvenile specimens were caught with a net while collecting fish in the deeper waters of the lake and rivers. **Comment:** The new records fill the gap in the known distribution between central Angola and the Okavango Delta (Rhodin et al. 2021).



Map 39. Distribution of *Pelusios rhodesianus* in Angola.

Fig. 43. Adult female *Kinixys belliana* from Samanunga village. *Photo by Werner Conradie*.



Map 40. Distribution of *Kinixys belliana* in Angola.

Testudinidae

Kinixys belliana Gray, 1831
Bell's Hinge-back Tortoise (Fig. 43, Map 40)
Observations: Camp at side tributary (Luandai River) of the Luanguinga River, -13.70885° 21.26234°, 1,116 m asl; Samanunga village, approx. -12.93169° 18.81458°; between Tempué and Cuanavale, approx. -13.07438° 18.9075°. **Habitat and natural history notes:** All specimens were collected or encountered in miombo woodland. **Comment:** According to the revision of the *Kinixys* genus by Kindler et al. (2012), eastern Angolan material should be assigned to *Kinixys belliana.*

Discussion

The findings of this study contribute to our growing knowledge of the Angolan herpetofauna, increasing the number of documented lizard, chelonian, and crocodile species in the country from 157 to approximately 161. This number is expected to increase even more in the coming years as more remote regions are surveyed and taxonomic revisions that are currently underway are completed. Southeastern Angola has been regarded as one of the most poorly studied regions in Angola (Marques et al. 2018). Due to a series of biodiversity surveys in the region since 2012 (Conradie et al. 2016, 2021; this study) our knowledge of the region has grown, resulting in a more robust understanding of the herpetofaunal diversity of southeastern Angola. However, most of the records originate from the more easily accessible areas, while most of southeastern Angola remains unexplored due to its remoteness and lack of road infrastructure. Consequently, the region is likely to harbor additional species that were not detected during the surveys in this study and will require further explorative surveys in the near future.

At a regional level, the results of this survey raise the number of lizard, chelonian, and crocodile species known from the Angolan Okavango-Cuando River system to 52, an increase of 14 species from a previously compiled checklist for the region (Conradie et al. 2016). When the Zambezi River system is included, the number of species recorded for southeastern Angola increases to 58.

Since a previous compilation of historical records for Angola (Marques et al. 2018), citizen science activity has escalated dramatically, and numerous additional biodiversity expeditions in Angola have increased the number of herpetological records from Angola. This new information has led to an increase of ~60% in the new unique occurrence records for Angola, and allowed us to update the distribution maps for the 40 species documented during this study. Many of these new records fill the gaps between the central Angolan and western Zambian records (e.g., *Chamaeleo dilepis*, *Ichnotropis capensis*, and *Sepsina angolensis*), demonstrating that these species have more continuous distributions than previous data had suggested.

The results of this study confirm the presence of three species that were previously only predicted (Conradie et al. 2016; Marques et al. 2018) to occur in the region (i.e., *Pachydactylus wahlbergii*, *Lygodactylus chobiensis*, and *Ichnotropis* cf. *grandiceps*). Our records of these three species also represent the first confirmed country records. The presence of *Agama armata* from eastern Angola was confirmed with records from Huambo region (Map 3), indicating that this species might be much more widely distributed in Angola than previously considered. One recommendation is that all available historical material assigned to either *A. aculeata* or *A. armata* should be re-examined to document the presence of both species and their respective ranges in Angola. These surveys further provided the first modern record of *Gerrhosaurus auritus* for eastern Angola and have shown that it occurs sympatrically with *Gerrhosaurus nigrolineatus*, noting that the taxonomy of the latter group is still unresolved (Bates et al. 2013). New records were also documented for several rare species (e.g., *Dalophia ellenbergeri*, *Zygaspis nigra*, and *Pelusios bechuanicus*), which are only known from a handful of records within Angola.

Given the robust sampling regime afforded by this study (e.g., 240 trapping nights) additional surveys in southeastern Angola are unlikely to yield many more

species for the Angolan Okavango-Cuando-Zambezi River drainages. At least two additional species (*Typhlacontias gracilis* and *Trachylepis maculilabris*) are expected (Auerbach 1987; Branch 1998; Broadley 1971; Pietersen et al. 2017, 2021). However, ongoing phylogenetic studies on the newly collected material may lead to the description of additional undescribed species, such as in the genus *Panaspis*.

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Werner Conradie has a Masters in Environmental Science (M.Env.Sc.) and 18 years of experience working with the southern African herpetofauna. His main research interests focus on the taxonomy, conservation, and ecology of amphibians and reptiles. Werner has published numerous principal and collaborative scientific papers, and has served on a number of conservation and scientific panels, including the Southern African Reptile and Amphibian Relisting Committees. He has undertaken research expeditions to many African countries, including Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Zambia, and Zimbabwe. Werner is currently the Curator of Herpetology at the Port Elizabeth Museum (Bayworld), South Africa.

Chad Keates is currently a Post-doctoral Fellow at the Port Elizabeth Museum, funded by WC research funds through Nelson Mandela University (Port Elizabeth, South Africa). Having recently completed his Ph.D. in Zoology, Chad's research focuses on the African herpetofauna and its evolutionary and ecological structuring. In Chad's short professional career, he has published several principal and collaborative peer-reviewed scientific papers and book chapters. As a strong advocate for reptile and amphibian awareness, Chad regularly conducts walks, talks, and presentations and he has produced numerous popular scientific outputs on the subject. He has undertaken numerous expeditions in various African countries, such as Angola, Zambia, and South Africa, with a variety of both professional and scientific organizations.

Luke Verburgt is a consulting herpetologist in South Africa with over 19 years of herpetofauna survey experience across 23 African countries (Angola, Botswana, Cameroon, Democratic Republic of Congo, Ghana, Ivory Coast, Kenya, Lesotho, Liberia, Namibia, Madagascar, Malawi, Mali, Morocco, Mozambique, Republic of Guinea, São Tomé and Príncipe, Sierra Leone, South Africa, Swaziland, Tanzania, Uganda, and Zimbabwe). He is a co-owner of Enviro-Insight (Pretoria, South Africa), holds an M.Sc. in Zoology from the University of Pretoria and is a registered scientific professional with the South African Council for Natural Scientific Professions (SACNASP). Luke has published more than 30 scientific articles, which include the descriptions of several new African herpetofauna species, and he is a co-author of the book *Snakes and other Reptiles of Zambia and Malawi* (Struik Random House Publishers, Cape Town, South Africa). He is also an extraordinary lecturer in the Department of Zoology & Entomology at the University of Pretoria.

Ninda Baptista is an Angolan biologist with an M.Sc. degree in Conservation Biology from the University of Lisbon (Portugal). She is currently pursuing a Ph.D. in Biodiversity, Genetics, and Evolution at the University of Porto (Portugal) that addresses the diversity of Angolan amphibians. Over the last 13 years, she has worked on research, *in-situ* conservation projects, and environmental consulting in Angola, including priority areas for conservation along the Angolan escarpment and highlands. She has conducted herpetological surveys throughout the country and created a herpetological collection (Colecção Herpetológica do Lubango) that is currently deposited in Instituto Superior de Ciências da Educação da Huíla (ISCED – Huíla) in Angola. Ninda is an author of various scientific papers and book chapters on Angolan herpetology and ornithology. She also works on scientific outreach, producing magazine articles, books for children and posters about the country's biodiversity in collaboration with Fundação Kissama (Luanda, Angola).

James Harvey lives in South Africa and works as an independent herpetologist, ecological researcher, and consultant. He holds degrees in Zoology, Hydrology, and Environmental Management, and has performed herpetological fieldwork widely, primarily within Africa, in such places as South Africa, Botswana, Zimbabwe, Angola, Malawi, Kenya, Mali, Democratic Republic of Congo, Madagascar, and Vietnam. His interests are diverse but center on the taxonomy, ecology, and conservation of herpetofauna and other biodiversity. James has contributed to conservation assessments, workshops, and Red Data publications for reptiles, amphibians, mammals, and plants for the southern and eastern African regions. James regularly attends herpetological conferences, and has published several scientific papers and contributed to a number of herpetological publications as an author.

Timóteo Júlio is an Angolan with a degree in Biology. He is a researcher with five years of experience with the Angolan herpetofauna, where his research is directed towards the study of the conservation and ecology of reptiles and amphibians. He has worked on surveying snake bite incidents in Angola, in the region of Luanda, and served as a co-author of scientific articles published on work done in southern and eastern Angola. He has carried out some work with the herpetological collections of the Kissama Foundation and Holísticos (Colecção herpetologica da Fundação Kissama e Holísticos) in Luanda and as a collaborator with the Amphibian Survival Alliance in Angola.

Götz Neef is a Namibian-born Biologist who joined the National Geographic Okavango Wilderness Project in 2015 as the Research Manager. Since then, he has coordinated all the research, data, and sample collection efforts for the project. During the expeditions, he works closely with the various specialists and research assistants who undertake the sampling, trapping, and data recording.