

**Bitis caudalis** (A. Smith)

*Vipera* (*Cerastes*) *caudalis* A. Smith, 1839, *Ill. Zool. S. Afr.*, *Reptiles*, pl. VII (type loc.: South Africa).

*Vipera schneideri* Boettger, 1886, *Ber. Senck. Nat. Ges.* p. 8, pl. I, fig. 1 a-e (Angra Pequena (=Luderitzbucht), South-West Africa).

*Vipera caudalis* Boettger, 1886, *Ber. Senck. Nat. Ges.* p. 6 (Angra Pequena, South-West Africa); 1887, p. 167 (Angra Pequena-Aus and Aus-Keetmanshoop, South-West Africa); 1894, p. 92 (Great Namaqualand and Kalahari). Fischer, 1888, *Mitt. Naturh. Mus. Hamb.* p. 11 (Aus, South-West Africa).

*Bitis caudalis* Werner, 1910, *Jena. Denkschr.* xvi, p. 367 (Rooibank, Salem, South Hereroland, Angra Pequena, Prince of Wales Bay, Kubub-Sinclair Mine, Kuikop-Tsirub and Keetmanshoop, South-West Africa; south of Rietfontein, Lehututu and Sekgoma, Kalahari). Sternfeld, 1910, *Mittl. Zool. Mus. Berlin*, v, p. 58 (Gobabis, Grootfontein, Windhuk, Karasberge and Warmbad, South-West Africa). Lampe, 1911, *Jahrb. nass. Ver. Nat.* LXIV, p. 206 (Rietmond, Luderitzbucht, Kuibis and Berseba, South-West Africa). Methuen and Hewitt, 1914, *Ann. Trans. Mus.* iv, p. 145 (Groot and Klein Karas Mountains, South-West Africa). Werner, 1915, in Michaelsen, *Land- u. Süßwasserfauna Deutsch-S.W.-Afrikas*, Lief. 3, p. 369 (Swakopmund, South-West Africa).

Nine specimens were collected as follows: V.L.K.E. No. 907 (March), between Molepolole and Kuke; Nos. 908-910 (April), Gomodimo Pan; Nos. 911 and 912 (April), Kaotwe; No. 914 (April), Okwa River; Nos. 913 and 915 (April), Damara Pan.

**DISTRIBUTION.** A western form ranging from the north-western Cape Province, northwards through the Kalahari and South-West Africa to Angola; and eastward into Southern Rhodesia and the north and western Transvaal.

**REMARKS.** Four adult female and five juvenile specimens. Rostral twice as broad as deep. 13-15 keeled scales across vertex from eye to eye. A single erect or backwardly curved, hornlike scale above each eye, on raised supra-ocular region. Scales round the eye, 13-13 in two specimens, 13-14 in three, 13-15 in one, 14-14 in two and 14-15 in one. Three to four rows of scales between eye and upper labials. Two rows of scales between supra-nasals. Upper labials, 11-11 in two specimens, 11-12 in one, 12-12 in four and 12-13 in two. Lower labials in contact with anterior chin-shields, 2-2 in five specimens, 2-3 in three and 3-3 in one. Scales round the body in 27-29 rows, strongly keeled, outer row smooth. Ventrals 133-140. Anal entire. Subcaudals 28-33, strongly keeled. (Only one juvenile male was collected, No. 907, with subcaudals smooth.) Tail 8.8-11.5 times into total length.

**COLOUR.** Above pale buff to straw colour; two rows of brownish spots on back, with pale centres (large and well marked in young, small or absent in adults); a vertebral series of squarish brown blotches, edged with yellowish white anteriorly and posteriorly (in young, interspaces between vertebral blotches often light slaty grey). Below uniform creamy white.

**FIELD NOTES.** Fairly common in the Kalahari, where their colouring matches closely their environment, which, combined with their sluggish habit, renders them somewhat difficult of detection. When annoyed they inhale with a loud hissing noise, blowing themselves up to almost twice their normal diameter when they will often hold their breath for minutes on end before slowly exhaling again. For so small a snake they are extremely ferocious, and when provoked will strike and lunge out in all directions with vicious abandon.

DIMENSIONS. A summary of the measurements of the four adult female specimens is as follows:

	Extremes	Average
Total length	335-406 mm.	381.2 mm.
Tail	35-38 mm.	36.2 mm.

### *Atractaspis bibronii* A. Smith

*Atractaspis bibronii* A. Smith, 1849, *Ill. Zool. S. Afr., Reptiles*, pl. LXXI (type loc.: eastern districts Cape Colony).

*Atractaspis irregularis* var. *bibronii* Boettger, 1887, *Ber. Senck. Nat. Ges.* p. 165 (between Angra Pequena and Aus, South-West Africa).

*Atractaspis bibronii* Sternfeld, 1910, *Mittl. Zool. Mus. Berlin*, v, p. 58 (Windhuk (Okahandja), South-West Africa).

A single half-grown specimen (V.L.K.E. No. 884), collected at Gomodimo Pan, March 1930.

DISTRIBUTION. An eastern species ranging from the north-eastern Congo through East Africa southwards to the eastern Cape Province; and west across the Transvaal and Kalahari to South-West Africa and Angola.

REMARKS. Portion of rostral visible from above slightly shorter than its distance from frontal. Dorsal scales in 21 rows. Ventrals 234. Subcaudals 26. Tail about 15 times into total length.

COLOUR. Above dark purplish brown. Below a clean yellowish white. Snout and end of tail tipped with delicate pink.

FIELD NOTES. Captured at night, after rain, near Gomodimo Pan. Conspicuous and easily followed on the light-coloured sand.

#### DIMENSIONS.

Total length	...	...	440 mm.
Tail	...	...	29 mm.

### Suborder LACERTILIA

#### Fam. GECKONIDAE

### *Ptenopus garrulus garrulus* (A. Smith)

*Stenodactylus garrulus* A. Smith, 1849, *Ill. Zool. S. Afr., Reptiles*, App. p. 6 (type loc.: sandy districts in the interior of Southern Africa).

*Ptenopus garrulus* Boettger, 1886, *Ber. Senck. Nat. Ges.* p. 10 (Angra Pequena); 1894, p. 88 (Rehoboth). Fischer, 1888, *Jahrb. Hamb. Wiss. Anst.* v, p. 12 (between Aus and Bethanien, South-West Africa). Werner, 1910, *Jena. Denkschr.* xvi, p. 306 (Prince of Wales Bay and Luderitzbucht, South-West Africa). Lampe, 1911, *Jahrb. nass. Ver. Nat.* LXIV, p. 151 (Luderitzbucht, South-West Africa). Hewitt and Power, 1913, *Trans. Roy. Soc. S. Afr.* III., p. 149 (Kyky and Nosob, S. Kalahari). Methuen and Hewitt, 1914, *Ann. Trans. Mus.* IV, p. 126 (Great Karas Mountains and immediate neighbourhood, South-West Africa).

Nineteen specimens were collected as follows: V.L.K.E. Nos. 21-25 and 1308-1317 (March 1930), Kuke; No. 26 (April), Gomodimo; No. 49 (April), Kaotwe; Nos. 27-28 (April), Damara Pan.

DISTRIBUTION. This species is restricted to the dry sandy areas of South Africa. Its distribution extends from Little Namaqualand and the northern Cape Province in the south, northwards to Damaraland, the Kalahari and the north-western Transvaal.

REMARKS. The above series comprises nine juvenile and ten semi-adult to adult specimens. Scales on back uniformly small and granular, subequal to those on belly. Tail covered with uniform rounded to squarish flattened scales, which are much larger than those on body. Labials vary greatly in number:

upper from six to nine, average 7; lower from six to nine, average 8. One or two large subtubercular scales on either side of root of tail, more strongly developed and projecting in males than in females. Mental longer, but usually narrower than adjacent labials.

**COLOUR.** Above a pale orange brown to buff or cream colour, with extensive suffusions or mottlings of chestnut to reddish brown (well marked in juveniles); these suffusions often aggregate on tail to form wide ill-defined transverse bands. Below creamy white; throat in adult males a bright pruinose yellow.

**FIELD NOTES.** Like *Colopus kalaharicus* these little geckos are restricted to the sand veld, and are strictly nocturnal in habit. They live in small burrows, about a foot in depth, set at a steep angle, usually under the lee of small bushes and shrubs. At sunset the males poke their heads out of the entrance and commence a persistent calling, which takes the form of a very sharp and penetrating "whick whick." This they keep up until dark, when all sound suddenly ceases. Where these animals occur in large numbers, as at Kuke, the din they create is almost deafening, but fortunately does not last for more than the twilight period. During this time they are extremely difficult to localise, and it is only by the utmost stealth that they can be approached and observed. The majority of our specimens were captured at night, with the aid of a lamp. A few were also secured in the early morning just before sunrise, when they were found crawling about sluggishly on the sand, partially numbed with cold.

**DIMENSIONS.** A summary of the measurements of seven adult specimens is as follows:

	Sex	No. of specimens	Extremes	Average
Total length	♂	4	73·0-80·0 mm.	76·0 mm.
	♀	3	70·5-82·5 mm.	76·0 mm.
Snout to vent	♂	4	43·5-48·0 mm.	45·6 mm.
	♀	3	42·8-49·5 mm.	45·6 mm.
Tail	♂	4	29·5-32·0 mm.	30·2 mm.
	♀	3	27·7-33·0 mm.	30·5 mm.
Arm	♂	4	13·5-15·0 mm.	14·1 mm.
	♀	3	13·5-14·5 mm.	14·0 mm.
Leg	♂	4	19·0-21·0 mm.	20·0 mm.
	♀	3	19·5-21·0 mm.	20·5 mm.
Head length	♂	4	11·4-12·3 mm.	11·7 mm.
	♀	3	11·4-12·5 mm.	11·8 mm.
Head width	♂	4	9·6-11·0 mm.	10·3 mm.
	♀	3	9·8-11·0 mm.	10·7 mm.

### ***Lygodactylus capensis capensis* (A. Smith)**

*Hemidactylus capensis* A. Smith, 1848, *Ill. Zool. S. Afr., Reptiles*, pl. LXXV, fig. 3 (type loc.: Kaffirland and the districts to the north of Cape Colony).

*Lygodactylus capensis* Boettger, 1886, *Ber. Senck. Nat. Ges.* p. 21 (Ghous, southern Kalahari). Werner, 1910, *Jena. Denkschr.* xvi, p. 305 (Keetmanshoop, South-West Africa; Kalahari). Methuen and Hewitt, 1914, *Ann. Trans. Mus.* iv, p. 127 (Wasserfall, Narudas Sud and Quibis, South-West Africa). Werner, 1915, in Michaelsen, *Land- u. Süswasserfauna Deutsch-S.W.-Afrikas*, Lief. 3, p. 336 (Okawango, South-West Africa).

Fifteen specimens were collected as follows: V.L.K.E. Nos. 1-2 (March 1930), Gaberones; Nos. 3-5 (April), Kaotwe; No. 10 (May), Mothatlogo,

Lake Ngami; No. 11 (May), Maun; Nos. 12 and 500 (June), Shaleshonto; Nos. 13-16 (June), Tsotsoroga Pan; No. 19 (August), Figtree; No. 20 (September), Zimbabwe.

**DISTRIBUTION.** The above records extend the known distribution of this southern species through the Kalahari, linking up with the records from South-West Africa of Boettger, Sternfeld, Werner, and Methuen and Hewitt. The range of this species may be summarised as follows: In the north from southern Angola to Southern Rhodesia and Portuguese East Africa south of Mozambique, and in the south extending from South-West Africa across the Kalahari to the Transvaal, Swaziland, Natal and Pondoland.

**REMARKS.** The collection comprises five juveniles and ten semi-adult to adult specimens. Among the latter there are five with regenerated tails and two in which the tail has been lost.

In regard to this series there are some points of interest which are worthy of mention. Typical *capensis* is described as having three nasals entering the nostril. This character proves however to be variable, five of the specimens collected agreeing with the above, while six have only two nasals entering nostril and in the remaining four an azygous condition prevails. In those cases where only two nasals enter the nostril, the third has been replaced or displaced by an upward prolongation of the first labial.

In all normal tails traces of segmentation are discernible dorsally and proximally, with from five to seven rows of scales to each segment. In regenerated tails no such segmentation occurs; here the dorsal scales are arranged haphazardly, while ventrally a median row of irregular transversely enlarged scales is developed. In view of the variability of the nostril character, and traces of segmentation on the tail as mentioned above, it would appear that *L. stevensonii*<sup>1</sup> is very closely allied to typical *capensis*, and may therefore be regarded as a subspecies thereof.

In four specimens there are well-defined adhesive subcaudal lamellae at the end of the tail. These are paired and vary from four to five in number. A few adjoining scales are also found to bear the characteristic adhesive "hairs." In no case was any such development found in regenerated tails as noted by Schmidt to occur in *L. picturatus gutturalis*<sup>2</sup>.

In adult males the two posterior-most rows of scales on the under side of the thigh, together with three rows on the tibia, are clearly differentiated from those adjoining. These are slightly swollen and raised, with roughened surfaces and a pale brown in colour.

In the Lake Ngami specimen, the scales on the head are more flattened than usual. In the Figtree specimen, the head is somewhat depressed, while the scales on occiput are only slightly larger than those on neck.

**COLOUR.** Above greyish brown to olive brown, with an interrupted line of paler spots running from the hind margin of eye along sides of body and proximal portion of tail; paler spots also present on limbs; scattered variegations of dark brown to black over back; often a dark streak from nostril, passing through eye, over shoulder to groin; a second dark streak from angle of jaw to shoulder. Below creamy white, passing to yellow under tail; throat more or less vermiculated with dark brown.

**FIELD NOTES.** These little geckos are extremely difficult to detect, as their colouring matches so closely their environment. They are largely arboreal, living usually under the bark of dead or living trees, although specimens were also obtained in rotting logs and among the dead leaves under trees and thick

<sup>1</sup> Hewitt, 1926, *Ann. Natal Mus.* v, p. 445.

<sup>2</sup> 1919, *Bull. Amer. Mus. Nat. Hist.* XXXIX, p. 464.

bush. When evading capture they display remarkable activity, and disappear round the tree trunks in short lightning-like darts.

**DIMENSIONS.** A summary of the measurements and other characters is as follows:

	Sex	No. of specimens	Extremes	Average
Total length	♂	2	67·00-75·00 mm.	71·00 mm.
	♀	2	63·50-66·00 mm.	64·75 mm.
Snout to vent	♂	5	30·50-34·00 mm.	32·20 mm.
	♀	6	30·10-33·30 mm.	32·00 mm.
Tail	♂	2	36·50-41·00 mm.	38·75 mm.
	♀	2	32·10-35·90 mm.	34·00 mm.
Tail/length	♂	2	0·54	0·54
	♀	2	0·50-0·54	0·52
Arm	♂	5	9·20-10·50 mm.	9·96 mm.
	♀	6	9·40-10·60 mm.	10·00 mm.
Leg	♂	5	13·00-13·40 mm.	13·20 mm.
	♀	6	12·00-13·60 mm.	12·50 mm.
Head length	♂	5	8·40-9·00 mm.	8·70 mm.
	♀	6	8·00-8·80 mm.	8·50 mm.
Head width	♂	5	5·70-6·30 mm.	6·10 mm.
	♀	6	5·60-6·00 mm.	5·75 mm.
Preanal pores	♂	5	4-5	4
Subcaudal lamellae	♂ and ♀	4	4-5	4

***Lygodactylus capensis ngamiensis* FitzSimons**

(Figs. 8 and 9)

*Lygodactylus capensis ngamiensis* FitzSimons, 1932, *Ann. Trans. Mus.* xv, p. 35 (type loc.: Mabeleapudi, Ngamiland).

**TYPE.** A half-grown male (V.L.K.E. No. 9 and T.M. 14467), collected at Mabeleapudi, Ngamiland, May 1930. Also one paratype, a juvenile (V.L.K.E. No. 7).

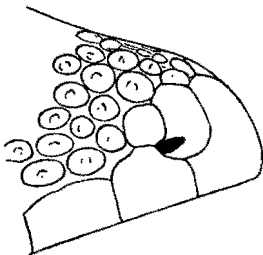


Fig. 8.

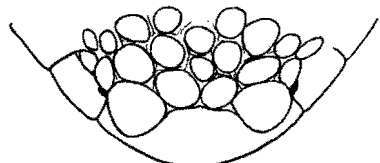


Fig. 9.

Fig. 8. *Lygodactylus capensis ngamiensis* FitzSimons. Side view of snout.

Fig. 9. *Lygodactylus capensis ngamiensis* FitzSimons. Dorsal view of snout.

**DESCRIPTION.** This form appears to be separable from typical *capensis* in the following characters: Snout shorter and blunter, subequal or only slightly longer than distance between eye and ear opening; head but slightly longer than broad; the two large supranasals widely separated by two rounded scales placed side by side transversely; nostril pierced between two nasals and first labial, which has a strong upward prolongation anteriorly; six to seven upper labials, and five to six lower labials; differentiation between scales on occiput and those on neck not well marked; tail distinctly segmented throughout, with five transverse rows of scales to each segment dorsally; pads not so strongly dilated.

**COLOUR.** Dark olive brown above, with a black lateral streak arising on snout and passing through eye, broken up along sides of body and tail by a well-marked series of bluish grey ocelli. Below greyish white, with darker infuscation on throat.

**FIELD NOTES** These little geckos were found on some small isolated hills, composed largely of granite boulders, on and among which they lived. They proved very active, disappearing on the slightest provocation into rock slits, from which it was extremely difficult to dislodge them. It was only after much assiduous stalking and patience that two specimens were finally captured.

**DIMENSIONS.**

	Type ♂ (No. 9)			
Total length	...	...	...	56.0 mm.
Snout to vent	...	...	...	26.2 mm.
Tail	...	...	...	29.8 mm.
Arm	...	...	...	7.8 mm.
Leg	...	...	...	10.5 mm.
Head length	...	...	...	6.8 mm.
Head width	...	...	...	5.2 mm.
Preanal pores	...	...	...	5
Subcaudal lamellae	...	...	...	4

***Lygodactylus picturatus chobiensis* FitzSimons**

(Fig. 10)

*Lygodactylus picturatus chobiensis* FitzSimons, 1932, *Ann. Trans. Mus.* xv, p. 35 (type loc.: Chobe River at Kabulabula).

Three specimens were collected along the banks of the Chobe River, V.L.K.E. Nos. 17 and 501 (July 1930) at Kabulabula, and No. 18 (July) at Kasane.

**TYPE.** An adult male (V.L.K.E. No. 501 and T.M. 14580), collected at Kabulabula, 11th July, 1930.

**DESCRIPTION.** Head much longer than broad, distinct from neck; snout much longer than distance from eye to ear opening, about twice the diameter of eye; ear opening small, almost vertically elongate; rostral twice as broad as deep; nostril pierced above and well behind suture of rostral and first labial, and bounded by latter and two nasals—a large anterior and a very much smaller posterior; an upward projection of the first labial narrowly separates a third nasal from entering nostril posteriorly. A single scale between the anterior nasals. Upper labials 7–8, lower labials 6–7. Mental large, subtriangular, not nearly extending to posterior edges of adjacent labials, no mental clefts; three postmentals, of which outer are twice as large as median shield; adjoining the lower labials is a series of irregularly sized chin-shields, which pass into the small granular scales on throat and thence give way on the neck to the large, smooth, flat, hexagonal, juxtaposed or subimbricate scales over chest and belly. Scales on snout large and convex, becoming smaller and more flattened on occiput, and passing on neck to the small granular scales over back. Digits unequal; five pairs of lamellae on digital expansions of fingers and toes, except inner, which is rudimentary. Preanal pores ten, set in two series of five forming almost a right angle with apex directed anteriorly. Tail tapering, rounded above and slightly flattened ventrally; above with regular series of small subimbricate scales, showing



Fig. 10. *Lygodactylus picturatus chobiensis* FitzSimons. Subcaudal lamellae at extremity of tail.

traces of segmentation basally, with seven to eight rows of scales to each segment; below with a median row of transversely enlarged scales, bordered on either side by a row of large irregular imbricate scales. Tip of tail expanded laterally, with seven pairs of subcaudal lamellae; a few irregularly shaped scales adjoining lamellae proximally, with roughened adhesive surfaces.

**COLOUR.** Above dull grey to greyish brown, with irregularly scattered black-edged light bluish grey patches and spots; a dark streak from nostril through eye to shoulder; a russet brown band on lower flanks, from armpit to axilla. Below ochre yellow from chest to root of tail; latter slate grey below, with an ill-defined darker streak along median row of enlarged scales; an ill-defined greyish brown chevron or arrow-head shaped marking on throat; a thin dark streak along edge of chin-shields, from mental to below ear opening; lower labials tinged with reddish brown.

**REMARKS.** In addition to the type there is a paratype female (No. 17) together with another female (No. 18) collected at Kasane, 17 miles down stream from the type locality. In the latter the tip of tail is regenerated, but with no development of adhesive surfaces to scales. Paratype female with eight subcaudal lamellae. Preanal pores only faintly discernible in females as shallow pits in the enlarged preanal scales, eight in the paratype and ten in No. 18. Chevron-shaped marking on throat present also in females.

In the type male, the rows of scales on under side of thigh and tibia are slightly raised, with roughened surfaces and brownish in colour.

**DISCUSSION.** The above-described form clearly belongs to the tropical *L. picturatus* group, and appears to be closely related to *L. picturatus gutturalis*, from West Africa and the Sudan. From the latter it may be separated by general colour pattern, the single ill-defined chevron on throat, greater number of preanal pores, number of submentals and other less conspicuous characters. The occurrence of this form so far south is of interest, and comprises, together with Loveridge's<sup>1</sup> record of *L. picturatus picturatus* from Victoria Falls, the most southerly record of this group.

**FIELD NOTES.** All three specimens were found living on the heavily barked trunks of large Acacia trees (*Acacia giraffae*), which bordered the river forest, within three to four hundred yards of the Chobe River.

**DIMENSIONS.**

	Type ♂ No. 501	Paratype ♀ No. 17	♀ No. 18
Total length	80.0 mm.	67.0 mm.	52.8 mm.
Snout to vent	39.6 mm.	36.0 mm.	32.3 mm.
Tail	40.4 mm.	31.0 mm.	20.5 mm.
Arm	12.7 mm.	11.0 mm.	10.4 mm.
Leg	15.0 mm.	13.0 mm.	12.0 mm.
Head length	9.9 mm.	9.2 mm.	8.4 mm.
Head width	7.3 mm.	6.1 mm.	5.8 mm.
Preanal pores	10	8	10
Subcaudal lamellae	7	8	

***Pachydactylus bibronii bibronii* A. Smith**

*Pachydactylus bibronii* A. Smith, 1846, *Ill. Zool. S. Afr., Reptiles*, pl. L, fig. 1 (type loc.: Southern Africa). Boettger, 1886, *Ber. Senck. Nat. Ges.* p. 15 (Angra Pequena, South-West Africa); 1887, p. 141 (Aus, South-West Africa). Werner, 1910, *Jena. Denkschr.* xvi, p. 308 (Okahandja, Luderitzbucht, Bethany, Kubub, Keetmanshoop, Koviesberge and Chamis, South-West Africa). Sternfeld, 1911, *Mittl. Zool. Mus. Berlin*, v, p. 396

<sup>1</sup> 1929, *U.S. Nat. Mus. Bull.* No. 151, p. 46.

(Windhuk-Okahandja, Karasberge, Outjo, Nauchas and Warmbad, South-West Africa). Lampe, 1911, *Jahrb. nass. Ver. Nat.* LXIV, p. 157 (Rietmond and Kuibis, South-West Africa). Methuen and Hewitt, 1914, *Ann. Trans. Mus.* IV, p. 129 (Great Karas Mountains and Quibis, South-West Africa). Werner, 1915, in Michaelsen, *Land- u. Süßwasserfauna Deutsch-S.W.-Afrikas*, Lief. 3, p. 333 (Windhuk, Tsumeb, Penguin Island, Seeheim, Swakopmund and Rehoboth, South-West Africa).

Fifty-five specimens were collected as follows: V.L.K.E. Nos. 163, 164 and 168 (Dec. 1929), Titumi; No. 167 (Dec. 1929), Kalakamati; Nos. 165, 166 and 109-123 (March 1930), Molepolole; Nos. 108 and 124 (March), Gaberones; Nos. 125-129 (May), between Machumi Pan and Mabeleapudi; Nos. 130 and 131 (May), Mabeleapudi; Nos. 132-150 (May), between Mabeleapudi and Lake Ngami; Nos. 151-153 (May), Motlhatlogo, Lake Ngami; Nos. 154 and 155 (June), Maun; No. 156 (August), Figtree, Southern Rhodesia.

**DISTRIBUTION.** South Africa, excluding Zululand, Natal, Pondoland and the southern coastal belt; extending north into Tanganyika Territory on the east and southern Angola on the west.

**REMARKS.** The above series comprises eighteen adult and thirty-seven semi-adult to juvenile specimens. Nineteen bear regenerated tails, the proportion in adults being about 55 per cent. Normal tails subequal to or slightly longer or shorter than head and body. Scales on snout strongly convex, almost subconical in some specimens. Average number of labials, upper and lower, nine.

**COLOUR.** Grey to greyish brown above, with black wavy transverse bands over body and tail; scattered tubercles whitish; a blackish streak on either side of head, arising just above third upper labial, passing through eye and curving round back of head; a second streak often present, running from nostril to upper edge of orbit. Markings often indistinct in adults but usually well defined in young and half-grown specimens. Below a dirty white to greyish white. Regenerated tails a uniform greyish brown.

**FIELD NOTES.** Found under stones, under the loosened bark of dead trees and in deserted termite hills, where they often live in association with Namaqua mice and other small rodents. From one such termite hill, which was dug open, over twenty of these geckos were secured. No specimens were seen in the central Kalahari, and, unlike *P. capensis capensis*, they do not appear to have invaded that region as yet.

**DIMENSIONS.** A summary of the measurements of eighteen adult specimens is as follows:

	No. of specimens	Extremes	Average
Total length	7	141-182.0 mm.	161.0 mm.
Snout to vent	18	74- 90.0 mm.	83.0 mm.
Tail	7	71- 93.0 mm.	81.0 mm.
Arm	18	20- 25.0 mm.	23.1 mm.
Leg	18	29- 36.0 mm.	32.7 mm.
Head length	18	20- 25.5 mm.	22.3 mm.
Head width	18	18- 24.3 mm.	21.1 mm.

### *Pachydactylus capensis capensis* A. Smith

*Pachydactylus capensis* A. Smith, 1846, *Ill. Zool. S. Afr., Reptiles*, pl. L, fig. 2 (type loc.: interior of Southern Africa). Werner, 1910, *Jena. Denkschr.* XVI, p. 309 (Vleij Topan and Severelela, Kalahari; Steinkopf). Sternfeld,



1911, *Mittl. Zool. Mus. Berlin*, v, p. 397 (Luderitzbucht, South-West Africa).

Thirty-five specimens were collected as follows: V.L.K.E. No. 157 (Dec. 1929), Lobatsi; Nos. 75, 76 and 1307 (March 1930), Kuke; Nos. 78-80 (April), Gomodimo; Nos. 77, 81-85 (April), Chukudu; Nos. 86-88 (April), Kaotwe; Nos. 89-101 (April), Okwa River; Nos. 102 and 103 (April), Damara Pan; Nos. 104-106 (May), Gembok; No. 107 (May), between Machumi Pan and Mabeleapudi.

**DISTRIBUTION.** South Africa, bounded in the north by Mozambique, Southern Rhodesia and South-West Africa, and in the south by the Little Karroo. So far as records show this species does not occur along the southern coastal belt, being restricted to the northern side of the coastal mountain chain.

**REMARKS.** This series comprises thirteen adult and twenty-two semi-adult to juvenile specimens. There are thirty specimens bearing tails, of which half are normal and half regenerated. The proportion of regenerated tails in adults is very high, being anything up to 80 per cent. Mental constantly much longer than broad. Labials average seven upper and six lower. Enlarged tubercles on back of head faintly keeled. Tubercles on back rounded or oval, usually distinctly keeled and arranged in more or less regular longitudinal series. Average number of lamellae under median digits, five. Normal tails distinctly annulate, with transverse rows of large-keeled tubercles dorsally; slightly longer than head and body. Regenerated tails covered with irregular smooth flattened imbricate scales, smaller above than below; very much thickened basally, tapering sharply to a point; shorter than head and body.

**COLOUR.** Adult: Above light greyish brown, variegated with dark brown markings, which are often fused to form irregular transverse bands; a dark streak on side of head from nostril, through eye to just above ear opening; a dark crescentic or straight band round back of head. Below whitish. Young: Above greyish brown with or without darker variegations; scattered tubercles over body and tubercles on tail whitish.

**FIELD NOTES.** In the sand veld of the Kalahari proper, these geckos were found in rotting logs, under the loose bark of dead trees and on the ground among the dead leaves, etc., under bushes and shrubs. Along the edges of the Kalahari, where outcrops of stone and rock occur, they seemed to prefer sheltering under these. Comparatively sluggish and easy to capture, shedding their tails under the slightest provocation.

**DIMENSIONS.** A summary of the measurements of adult specimens is as follows:

	Sex	No. of specimens	Extremes	Average
Total length	♂	2	100·0-110·0 mm.	105·0 mm.
Snout to vent	♂	6	48·0- 60·0 mm.	54·0 mm.
	♀	7	52·0- 64·0 mm.	58·0 mm.
Tail	♂	2	52·0- 57·0 mm.	54·5 mm.
Arm	♂	6	14·0- 18·0 mm.	16·0 mm.
	♀	7	15·0- 18·5 mm.	16·6 mm.
Leg	♂	6	19·0- 25·0 mm.	21·6 mm.
	♀	7	19·0- 25·0 mm.	21·9 mm.
Head length	♂	6	12·0- 14·7 mm.	13·7 mm.
	♀	7	13·0- 15·4 mm.	14·0 mm.
Head width	♂	6	9·7- 11·7 mm.	11·2 mm.
	♀	7	10·3- 12·5 mm.	11·5 mm.

**Pachydactylus punctatus punctatus** Peters

*Pachydactylus punctatus* Peters, 1854, *Mon. Berl. Akad.* p. 615 (type loc.: Mozambique). Hewitt, 1916, *Ann. Natal Mus.* II, p. 483 (Serowe).

Six specimens were collected as follows: V.L.K.E. Nos. 158-162 (December 1929), Titumi; No. 71 (August 1930), Kalakamati.

DISTRIBUTION. From Mozambique in the east, westwards across Southern Rhodesia and the northern Transvaal to the eastern edge of Bechuanaland. The specimens recorded by Methuen and Hewitt<sup>1</sup>, from the Great Karas Mountains, Great Namaqualand, will I think prove to belong to a distinct subspecies.

REMARKS. Of the above series, four are adult (3 ♂♂ and 1 ♀), while two are juvenile. Tail regenerated in one specimen and lost in one. They agree closely with the type description, and are not separable from specimens obtained in the northern Transvaal and Southern Rhodesia. On examining a long series of specimens from northern and eastern Transvaal, the snout length was found to vary from  $1\frac{1}{2}$  to almost twice the length of eye. As the greater length of snout seems to be the only definitely distinctive character of *P. brunthaleri* Werner, I would reduce the latter to synonymy or at best consider it as a very weak subspecies of *punctatus*.

COLOUR. Light brown above, with scattered spots and vermiculations of dark brown; a dark brown streak from nostril, passing through eye and fading out just beyond ear opening. Below a uniform creamy white.

FIELD NOTES. Found under stones lying in open mopane forest. Slow of movement and easy to capture.

## DIMENSIONS.

	♂ (No. 158)	♂ (No. 159)	♂ (No. 160)	♀ (No. 161)
Total length	73.0 mm.	68.0 mm.	76.0 mm.	—
Snout to vent	37.3 mm.	30.0 mm.	36.8 mm.	40.3 mm.
Tail	35.7 mm.	38.0 mm.	39.2 mm.	—
Arm	10.4 mm.	8.5 mm.	10.5 mm.	10.5 mm.
Leg	13.3 mm.	11.8 mm.	13.0 mm.	14.0 mm.
Head length	10.0 mm.	8.4 mm.	9.8 mm.	10.3 mm.
Head width	7.5 mm.	6.3 mm.	7.4 mm.	7.7 mm.

**Pachydactylus punctatus langi** FitzSimons

*Pachydactylus punctatus langi* FitzSimons, 1932, *Ann. Trans. Mus.* xv, p. 35 (type loc.: Gembok, Ghanzi District).

Twenty-four specimens were collected as follows: V.L.K.E. Nos. 52-65 and 73 (April-May 1930), Gembok; Nos. 8-9, 66-68 and 72 (May), Mabeleapudi; No. 74 (May), between Mabeleapudi and Lake Ngami; Nos. 69 and 70 (May), Motlhatlogo, on Lake Ngami.

TYPE. An adult male (V.L.K.E. No. 62 and T.M. 14574), collected near Gembok Pan, May 1930.

DESCRIPTION. Habit more slender, with head shorter and narrower than in typical *punctatus*; nasorostrals in good contact; nostril widely separated from rostral and narrowly from first labial; rostral about  $1\frac{1}{2}$  times as broad as deep. Snout not more than  $1\frac{1}{2}$  times as long as eye. Upper labials seven, lower six. Mental  $1\frac{1}{2}$  times as long as broad, subequal in width to adjacent labials. Scales on snout two to three times as large as those on occiput. Dorsal scales more or less flattened, a little smaller than ventrals, which are strongly imbricate. Scales on tail large, imbricate, at least twice as large as those on back; slightly larger ventrally. Each digit with four lamellae; scales along middle of digits inferiorly, all transversely enlarged.

<sup>1</sup> 1914, *Ann. Trans. Mus.* IV, p. 130.

**COLOUR.** Above a light greyish to purplish brown, with an irregular dorso-lateral series of large transversely arranged dark brown blotches or infusions; isolated scales whitish; a dark streak from nostril to eye. Below white.

**REMARKS.** The above series comprises nine adult, eight half-grown and seven juvenile specimens. Characters within the series are very constant. In juvenile and some half-grown specimens, colour above a uniform greyish brown, with scattered whitish scales. Males with three enlarged scales on either side root of tail.

**DISCUSSION.** Allied to typical *punctatus*, but differing therefrom as follows: habit more slender; head shorter and narrower; scales on occiput larger; scales on back not so flattened, only slightly smaller than ventrals; caudal scales proportionately larger; well-defined colour markings.

**FIELD NOTES.** Found under stones out in the open (Gemsbok) or in the thick bush (Mabeleapudi and Lake Ngami). Very sluggish of movement and easily captured.

**DIMENSIONS.**

	Type ♂ No. 62	Paratype ♀ No. 59	♂ No. 74	♀ No. 70
Total length	73·0 mm.	68·0 mm.	62·0 mm.	68·0 mm.
Snout to vent	34·0 mm.	34·0 mm.	31·4 mm.	35·0 mm.
Tail	39·0 mm.	34·0 mm.	30·6 mm.	33·0 mm.
Arm	9·3 mm.	10·0 mm.	10·0 mm.	9·4 mm.
Leg	13·0 mm.	13·0 mm.	12·0 mm.	12·0 mm.
Head length	8·6 mm.	8·6 mm.	7·2 mm.	8·3 mm.
Head width	6·7 mm.	6·3 mm.	5·7 mm.	6·0 mm.

***Colopus kalaharicus* FitzSimons**

(Figs. 11-14)

*Colopus kalaharicus* FitzSimons, 1932, *Ann. Trans. Mus.* xv, p. 36 (type loc.: Kaotwe Pan, central Kalahari).

Twenty-two specimens were collected as follows: V.L.K.E. No. 29 (March 1930), Matapa Pan, 15 miles north-east of Kuke; Nos. 30-32 (March), between Kuke and Gomodimo; Nos. 33-35 (April), Gomodimo; Nos. 36-48, 50 and 51 (April), Kaotwe.

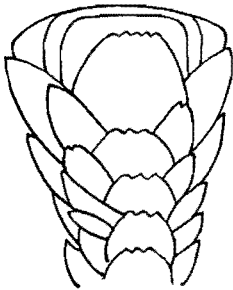


Fig. 11.

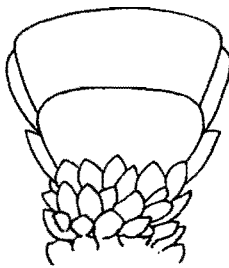


Fig. 12.



Fig. 13.

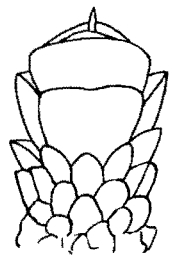


Fig. 14.

- Fig. 11. *Colopus kalaharicus* FitzSimons. Extremity of third digit of left fore limb (dorsal view).  
 Fig. 12. *Colopus kalaharicus* FitzSimons. Extremity of third digit of left fore limb (ventral view).  
 Fig. 13. *Colopus kalaharicus* FitzSimons. Extremity of fourth digit of left hind limb (dorsal view).  
 Fig. 14. *Colopus kalaharicus* FitzSimons. Extremity of fourth digit of left hind limb (ventral view).

TYPE. An adult male (V.L.K.E. No. 48 and T.M. 14552), collected near Kaotwe Pan, 8th April, 1930.

DESCRIPTION. Head short, convex, slightly longer than broad, distinct from neck; ear opening small and oblique; scales on snout slightly convex, hexagonal and distinctly larger than those on back. Rostral almost twice as broad as mental. Nostril between three nasals, of which the anterior is by far the largest; large anterior nasals well separated mesially by a single large somewhat elongate scale. Upper labials 8-9, lower labials 7-8. Mental longer than broad, narrower than adjoining labials; chin-shields subequal to scales on back; scales on throat very small and subimbricate, passing over neck and chest to the larger smooth subhexagonal imbricate scales on belly. Digits short. Tips of fingers slightly dilated, with two large undivided lamellae at extremities; above a median series of overlapping scales with serrated distal edges terminating in a large nail-like scale. Tips of toes narrowed, with scaling similar to fingers, but smaller; a minute claw present on all digits. Scales on back small, rounded, convex and juxtaposed, becoming slightly smaller towards anus and on root of tail. Tail cylindrical, tapering to a point; slightly shorter than head and body; above with scales larger than on back, subquadrangular and subimbricate, arranged in irregular series; below scales slightly larger than above, irregular in shape and imbricate. On either side of base of tail in males a series of four large elongate scales arranged fanwise, with pointed apices directed upwards.

COLOUR. Above pale olive brown, with large irregular spots or mottlings of chalky yellow, often edged with scattered chocolate brown scales; these yellow markings often confluent along back into irregular cross-bands; a dark streak from hind edge of eye, over shoulder, fading out on back; a yellow streak arising at angle of jaw passing over shoulder and breaking up on flanks into a series of yellow spots; darker edging to yellow markings more distinct on tail. Below a uniform pale creamy yellow.

REMARKS. In the above series there are seven juveniles, and fifteen semi-adult to adult specimens, comprising nine males and six females. Of these only four specimens bear regenerated tails. The sexes are easily separable, as the males may be readily distinguished by the pronounced testacular swellings at base of tail, and the four enlarged scales on either side; these latter are poorly developed or absent in the females. A thorough examination of the entire series disclosed no preanal or femoral pores. In one specimen tail equal to length of head and body, while in two others tail slightly longer. Upper labials vary from seven to ten in number, average eight; lower vary from six to nine, average seven.

The colour marking is fairly constant throughout the series. In one specimen the back is a uniform pale olive brown, with no yellow mottling, except on tail. A median yellow streak sometimes present from occiput and down back.

DISCUSSION. The above species, while closely resembling *C. wahlbergii*, differs therefrom in having claws to all the digits of the hind limb. It was at first presumed that, owing to the smallness of these claws, this character had perhaps been overlooked in descriptions of *C. wahlbergii*. Reference to literature, however, revealed detailed descriptions by such eminent and careful workers as Peters<sup>1</sup>, Boulenger<sup>2</sup>, Sternfeld<sup>3</sup> and Werner<sup>4</sup>, and it may thus be

<sup>1</sup> 1869, *Monatsber. Berl. Akad. Wiss.* p. 57, pl., fig. 1.

<sup>2</sup> 1885, *Cat. Lizards*, 1, p. 208.

<sup>3</sup> 1911, *Fauna der Deutschen Kolonien*, Reihe IV, Heft 2, p. 16.

<sup>4</sup> 1910, *Schultze, Forschungsreise in Südafrika*, IV, p. 315.

taken for granted that the specimens examined by them had no claws, as all have definitely stated. It is therefore suggested that *C. wahlbergi* from Damara-land and the southern Kalahari have lost their claws owing to the ground being of a different nature to that of the central Kalahari, where the sand is coarse grained and usually closely packed. These two species belong obviously to the same genus, and an alteration of "no claws" to "hind limbs with or without claws" in the generic diagnosis will embrace the two forms.

FIELD NOTES. These interesting geckos are strictly nocturnal in habit, retiring during the daylight hours into holes under small bushes. They were invariably restricted to the sand veld typical of the central Kalahari, where they were all captured at night—especially after rain—with the aid of a strong light. Although difficult to detect, owing to their pale colouring and sluggish movement, when once marked down they proved easy of capture.

DIMENSIONS. The following table sets out detailed dimensions of a few of the larger specimens:

	Type ♂ No. 48	Paratype ♂ No. 40	Paratype ♀ No. 42	♀ No. 31
Total length	99·0 mm.	92·5 mm.	96·0 mm.	96·0 mm.
Snout to vent	52·0 mm.	48·0 mm.	53·0 mm.	45·7 mm.
Tail	47·0 mm.	44·5 mm.	43·0 mm.	50·3 mm.
Arm	15·0 mm.	13·6 mm.	15·0 mm.	14·0 mm.
Leg	20·0 mm.	18·4 mm.	20·5 mm.	18·7 mm.
Head length	12·3 mm.	11·3 mm.	12·0 mm.	11·0 mm.
Head width	10·0 mm.	8·9 mm.	10·0 mm.	8·2 mm.

#### Fam. AGAMIDAE

##### *Agama hispida distanti* Boulenger

*Agama distanti* Boulenger, 1902, *A.M.N.H.* (7), ix, p. 339 (type loc.: Pretoria and Rustenburg).

Four specimens were collected as follows: V.L.K.E. No. 265 (March 1930), Gaberones; Nos. 190 and 263 (March), Molepolole; No. 236 (July), Wankie.

DISTRIBUTION. The northernmost record of this form is Dodoma, in Tanganyika Territory; ranging thence southwards through Southern Rhodesia, along the eastern edge of the Kalahari to the Transvaal and northern Cape Province, reaching its southernmost limit in the east central region of the latter.

The identification of the specimens from Gaberones and Molepolole is more or less arbitrary, as they present considerable difficulty, owing to their immaturity and variability of characters, linking them up with both *A. aculeata* and *A. armata*. It has therefore been necessary to base the determination on combinations of characters. No. 236, a half-grown male from Wankie, may be definitely assigned to *A. distanti*, although the dorsal scaling approaches more nearly to *A. aculeata*.

FIELD NOTES. All the above were captured on open flat dry stony areas, in the vicinity of rocky hills.

##### *Agama hispida makarikarica* FitzSimons

*Agama hispida makarikarica* FitzSimons, 1932, *Ann. Trans. Mus.* xv, p. 36 (type loc.: Makarikari Pan, northern Bechuanaland).

TYPE. An adult male (V.L.K.E. No. 252 and T.M. 14451), one of a series of sixteen specimens (V.L.K.E. Nos. 241-256), collected near the northern edge of the Makarikari Pan, August 1930.

DESCRIPTION. Habit short and stout, body depressed. Head subcordiform, strongly convex, as broad as long; occipital lobes very prominent. Snout short

and rounded, nostrils directed outwards and upwards, pierced in a slightly convex shield on canthus rostralis. Length of head into body about  $3\frac{1}{2}$  times. Diameter of ear opening not more than half length of eye cleft. Addressed hind limb reaches shoulder or just beyond. Length of hand distinctly less than depth of head. Fingers short, third longest. Toes short, third much longer than fourth, fifth extending not nearly as far as first. Tibia much shorter than head, subequal to foot. Tail cylindrical, slender, slightly longer than head and body.

Roughened above with small-keeled spinose scales, together with enlarged spinose scales disposed in six more or less regular longitudinal series on either side of median line; 90 scales round middle of body. Small groups of spinose scales near ear opening, longest less than diameter of latter. Vertebral crest low but distinct over nape and back, absent on tail. Head scales unequal, rugose, but not keeled; three in middle of forehead enlarged and subconical. Occipital large and flanked by slightly enlarged subconical scales; pineal foramen distinct in a crater-like pit. Thirteen scales across head between superciliary series. Upper labials 10-11 in number; lower labials 11-13. Four rows of scales between nasal and upper labials. Gular scales not or but feebly keeled, imbricate but not mucronate. Ventrals not or but feebly keeled, imbricate and feebly mucronate on sides and posteriorly. Upper scale at base of claws slightly longer than others. Subdigital scales strongly spinose, twelve in longitudinal series under third toe. Caudal scales strongly keeled and shortly mucronate. Scales on upper surface of tibia subequal in size. Males with a single row of small preanal pores, twelve in number.

COLOUR. Above dark grey, with a series of four large dark squarish spots, on either side of vertebral line, arranged in pairs, pale edged along inner margins. A well-marked yellowish vertebral streak present from occiput to root of tail. Two dark chevron-like bands across head between eyes; a wide blackish band from posterior corner of eye to just above ear opening, and another from lower edge of eye to ear. Pineal pit light brown. Bright orange yellow blotches between angle of jaw and forearm, in armpit and groin. Cheeks and lips bright blue. Below white to pale yellow, with blackish vermiculations on throat.

REMARKS. The above series comprises six adults, and ten half-grown to juvenile specimens. The following variations were noted: Tail usually slightly longer than head and body in males, slightly shorter in females. Enlarged spinose scales in six to eight longitudinal series. Scales round middle of body 80-90. Two to four enlarged subconical scales on forehead. Upper labials 10-12: 11-13 scales under third toe (not including terminal scale). Preanal pores in males 10-12. Colour above light to dark grey or greyish brown, with or without the series of enlarged spots on back. Vertebral streak sometimes absent. Cheeks and lips blue only in males. Blackish vermiculations below often extending over belly.

## DIMENSIONS.

	Type ♂ No. 252	Paratype ♂ No. 253
Total length	142.0 mm.	137.0 mm.
Head length	18.0 mm.	18.0 mm.
Head width	18.0 mm.	18.0 mm.
Head depth	12.0 mm.	11.5 mm.
Diameter eye cleft	3.8 mm.	3.7 mm.
Diameter ear opening	1.6 mm.	1.6 mm.
Hand	10.0 mm.	10.0 mm.
Tibia	16.2 mm.	16.3 mm.
Foot	16.2 mm.	16.0 mm.
Tail	76.0 mm.	72.0 mm.

DISCUSSION. Closely allied to *A. hispida distanti*, but readily distinguished therefrom by the following: smaller size generally; diameter of ear opening only half length of eye cleft; greater depth of head; shorter limbs; distinct vertebral crest from nape to root of tail; upper head-shields rugose but not keeled; third toe distinctly longer than fourth; fifth toe extending not nearly as far as first.

FIELD NOTES. These small agamas were found on the dry open flats, along the northern edge of the Makarikari Salt Pan. Here the ground is heavily impregnated with lime and hard-baked on the surface, supporting mainly a small stunted "Ink-bush" type of flora, under which these lizards have their burrows. Stomach contents consist almost exclusively of the remains of small diurnal tenebrionid beetles.

### *Agama hispida aculeata* Merrem

*Agama aculeata* Merrem, 1820, *Tent. Syst. Amph.* p. 53 (type loc.: South Africa). Boettger, 1894, *Ber. Senck. Nat. Ges.* p. 89 (Rehoboth and Great Namaqualand, South-West Africa). Werner, 1910, *Jena. Denkschr.* xvi, p. 318 (southern Hereroland and Kubub, South-West Africa; Lehututu, Mokane, Lokanong-Severelela and Vleij Topan, Kalahari). Methuen and Hewitt, 1914, *Ann. Trans. Mus.* iv, p. 136 (Quibis, Wasserfall, Great Karas Mountains, Groendoorn and Narudas Sud, South-West Africa).

*Agama hispida* (non Linn.) Boettger, 1887, *Ber. Senck. Nat. Ges.* p. 141 (Aus and Damaraland, South-West Africa). Werner, 1910, *Jena. Denkschr.* xvi, p. 317 (Kooa and Mashoning, Kalahari; Okahandja, South-West Africa). Sternfeld, 1911, *Mittl. Zool. Mus. Berlin*, v, p. 398 (Okahandja-Windhuk, Karasberge, Nauchas, Warmbad, Okowakuatjiwi and Hereroland, South-West Africa).

Seventy-one specimens were collected as follows: V.L.K.E. No. 169 (March 1930), between Molepolole and Kuke; Nos. 170-183, 267, 268 and 953 (March), Kuke; Nos. 184-187 (March), between Kuke and Gomodimo; Nos. 188, 189 and 191-195 (April), Gomodimo; Nos. 196-210 (April), Kaotwe; Nos. 211 and 212 (April), Damara Pan; No. 213 (April), Gemsbok; Nos. 214 and 215 (May), between Sunnyside and Machumi Pan; Nos. 216-218 (May), Mabeleapudi; Nos. 219-222 (May), Motlhatlogo, on Lake Ngami; No. 223 (May), Maun; Nos. 224-231 (June), Shorobe; No. 232 (June), Shaleshonto; Nos. 233 and 234 (June), Kwaai; No. 235 (June), Zweizwe River; Nos. 239 and 240 (August), N'kate.

DISTRIBUTION. South-West Africa and the Kalahari, southwards to the west and central Cape Province, embracing the Karroo areas.

REMARKS. The above series comprises eighteen adult and fifty-three semi-adult to juvenile specimens. Great difficulty was experienced in separating certain individuals from *A. hispida distanti* on the one side and *A. hispida armata* on the other. In these cases the distinction has been arbitrary and based for the most part on averages. Head usually slightly longer than broad in adults, subequal in young. Length of head in snout to vent, 3.3-4.4 times. Diameter of ear opening less than eye cleft. Tibia shorter than head, shorter than or subequal to foot. Fourth toe usually longer than third; fifth extending as far as or farther than first. In adults gular and ventral scales usually quite smooth, occasionally feebly keeled and mucronate; in juveniles, often distinctly keeled and mucronate. Scales on tibia equal or subequal in size. Dorsal crest distinct, extending from nape to root of tail. Males usually with a single row of 9-12 preanal pores; in two specimens a double row occurs. Enlarged dorsal

scales invariably arranged in three more or less regular series on either side vertebral line. Thirteen to fourteen upper labials. Tail  $1\frac{1}{3}$ – $1\frac{2}{3}$  as long as head and body.

**COLOUR.** Above pale yellowish to greyish or dark brown, sometimes uniform, but usually with a series of four dark brown to blackish blotches on either side vertebral line, or with five to six irregular wavy transverse bands; occasionally an interrupted pale vertebral streak from occiput to root of tail. Two dark V-shaped cross-bars usually present on head between the eyes; in large males head uniform olive green. Limbs and tail with black cross-barring, often very indistinct in old specimens. Below whitish, throat and upper chest often streaked longitudinally with blue to blackish wavy lines; a faint network of bluish wavy lines sometimes discernible on belly; adult males with throat entirely or partially suffused with dark blue to black.

**FIELD NOTES.** These agamas were invariably confined to the acacia belts found round the pans in the Kalahari. They were abroad during the sunny portion of the day, darting into deserted spring-hare, ground squirrel and gerbille holes when alarmed. They proved most inquisitive creatures and would reappear after a few minutes, and, with heads raised, stare fixedly in the direction of the intruder. From an examination of stomach contents, their diet appears to consist chiefly of termites and diurnal harvesting ants, together with occasional beetles, grasshoppers and caterpillars.

**DIMENSIONS.** A summary of the measurements of the eighteen adult specimens is as follows:

	Sex	No. of specimens	Extremes	Average
Total length	♂	15	161·0–256·0 mm.	205·20 mm.
	♀	2	204·0–207·0 mm.	205·50 mm.
Snout to vent	♂	16	66·0–110·0 mm.	83·50 mm.
	♀	2	85·0–109·0 mm.	97·00 mm.
Tail	♂	15	91·0–151·0 mm.	125·60 mm.
	♀	2	98·0–119·0 mm.	108·50 mm.
Arm	♂	16	30·0–44·0 mm.	37·20 mm.
	♀	2	39·0–40·0 mm.	38·50 mm.
Leg	♂	16	44·0–63·0 mm.	53·50 mm.
	♀	2	53·0–55·0 mm.	54·00 mm.
Hand	♂	16	10·5–16·0 mm.	13·30 mm.
	♀	2	14·0–14·2 mm.	14·10 mm.
Tibia	♂	16	16·0–23·5 mm.	20·00 mm.
	♀	2	21·0 mm.	21·00 mm.
Foot	♂	16	17·0–23·5 mm.	20·50 mm.
	♀	2	21·0–22·0 mm.	21·50 mm.
Head length	♂	16	18·5–27·5 mm.	22·00 mm.
	♀	2	23·3–24·0 mm.	23·60 mm.
Head width	♂	16	18·0–26·5 mm.	21·40 mm.
	♀	2	22·3–22·6 mm.	22·45 mm.
Preanal pores	♂	16	9–12	11·40

### *Agama hispida armata* Peters

*Agama armata* Peters, 1854, *Mon. Berl. Akad.* p. 618 (type loc.: Sena River, Tette).

Two immature specimens (V.L.K.E. Nos. 237 and 238) were collected at Figtree, Southern Rhodesia, during August 1930.

**DISTRIBUTION.** An eastern form ranging from just south of the Zambesi, through Southern Rhodesia and Portuguese East Africa to the Transvaal and Natal.



REMARKS. The above specimens, while agreeing with *A. distanti* in many respects, may be assigned to *armata* on the following combination of characters: habit less stout, body not so depressed; head longer; snout more pointed; head-shields moderately keeled; diameter of ear opening distinctly less than eye cleft; dorsal scaling not so rough, enlarged scales arranged in three more or less regular longitudinal series; vertebral crest low on nape, distinct on back; ventrals distinctly keeled and mucronate.

FIELD NOTES. Found among rocks at the foot of small granite koppies.

### *Agama atra atra* Daudin

*Agama atra* Daudin, 1802, *Hist. Rept.* III, p. 349 (type loc.: South Africa). Fischer, 1888, *Mittl. Naturh. Mus. Hamb.* p. 12 (Aus, South-West Africa). Werner, 1910, *Jena. Denkschr.* XVI, p. 320 (Luderitzbucht, Angra Pequena, Namib-Wüste and Kubub, South-West Africa). Lampe, 1911, *Jahrb. nass. Ver. Nat.* LXIV, p. 160 (desert near Garub, South-West Africa). Sternfeld, 1911, *Mittl. Zool. Mus. Berlin*, v, p. 401 (Karasberge and Warmbad, South-West Africa). Methuen and Hewitt, 1914, *Ann. Trans. Mus.* IV, p. 135 (Aus, Great and Little Karas Mountains, South-West Africa).

Four specimens (V.L.K.E. Nos. 257, 258, 262 and 264) were collected at Gabani, near Gaborones, during March 1930.

DISTRIBUTION. This rupicolous form ranges from Southern Rhodesia and Portuguese East Africa to the Transvaal, Natal, Basutoland, Orange Free State, Cape Province and South-West Africa. Its most southerly limit is the Cape Peninsula, east of which it is replaced along the coast—as far north as Lourenço Marques—by *A. atra rudis*.

REMARKS. The above series comprises three adult males and one juvenile, two of the former bearing damaged tails. Upper head scales subequal, and more or less smooth; length of head about 3·8 times into length from snout to vent; fourteen upper labials. Fourth finger longer than third; fourth toe longer than third; fifth extending farther than first; twenty scales under third toe. Scales on tibia equal. About 140 scales round body. Tail with a well-defined dorsal crest, arising one-fifth of the way down from root; length of tail  $1\frac{1}{3}$  times as long as head and body. Twelve well-developed preanal pores.

COLOUR. Above reddish brown, with numerous small dark brown to blackish spots, which are sometimes ocellate with yellowish centres. Below with greenish blue suffusion, heavy on throat and chest, paler over belly; sides of belly, especially towards the groin, vermilion; sides of tail ochre yellow.

HABITS. These rupicolous agamas were found only on the rocky hills near Gabani. Here they were often seen sunning themselves on exposed rock ledges. They are very alert and shy, and when alarmed dart into cracks and crevices, whence they are dislodged only with the greatest difficulty. Stomach contents: remains of ants (a large form of Poneridae), locusts and fossorial wasps, together with minute particles of what appears to be vegetable matter of some kind.

DIMENSIONS. A summary of measurements is as follows:

	Sex	No. of specimens	Extremes	Average
Total length	♂	1	267 mm.	267·0 mm.
Snout to vent	♂	3	107–117 mm.	111·3 mm.
Tail	♂	1	150 mm.	150·0 mm.
Arm	♂	3	48–52 mm.	49·3 mm.
Leg	♂	3	70–78 mm.	73·7 mm.
Head length	♂	3	29–30 mm.	29·3 mm.
Head width	♂	3	28–30 mm.	29·0 mm.

**Agama kirkii** Boulenger

*Agama kirkii* Boulenger, 1885, *Cat. Liz. Brit. Mus.* 1, p. 354, pl. XXVIII, fig. 2 (type loc.: East Africa, Zambesi Exped.).

Sixteen specimens (V.L.K.E. Nos. 269-284) were collected near Zimbabwe, Southern Rhodesia, during September 1930.

DISTRIBUTION. Southern Rhodesia, extending northwards into Northern Rhodesia and Nyasaland, and east into Portuguese East Africa.

REMARKS. The series comprises five adults (3 ♂♂ and 2 ♀♀) and eleven semi-adult to juvenile specimens. The following notes on characters may be added to Boulenger's original description. Head longer than broad; nostril directed outwards and slightly upwards, pierced in the posterior portion of a small nasal, on or just below canthus rostralis; length of head 3.8-4.2 times in length from snout to vent. Diameter of ear opening equal to or slightly less than eye cleft.

Head-shields heterogeneous, smooth and slightly convex; occipital enlarged, with a very shallow ill-defined pineal pit; groups of small spinose scales on sides of neck and round ear opening. Dorsal scales not so strongly keeled and mucronate in females. In adult males dorsal crest enlarged on nape, low but distinct over back, and again strongly marked on tail. In females and immature males crests distinct but lower and not so well defined as in adult males. Tail covered with enlarged, strongly keeled mucronate scales, arranged in more or less regular annuli; more slender, but less compressed, in females; almost twice as long as head and body in males, just over  $1\frac{1}{2}$  in females. Males with a single row of 10-12 preanal pores; No. 282 with a double row.

COLOUR. Adult male: Head and neck, above and below, light coral red. Back bluish black, with a wide pale bluish white vertebral band from nape to lumbar region; limbs lighter than back; chest and belly navy blue, lighter under tail, which has a series of narrow pale bluish annular bands. Adult female: Above a rich brown; with irregular infusions of darker brown; snout and postorbital regions tinged with blue. Below dirty white, with dusky brown infuscations. Immature males: Above olive brown, with irregular darker markings or with a dark network enclosing light-coloured ocelli. Below dirty white, with dark brown infuscation or vermiculation on throat and chest, sometimes spreading over belly as well.

DISCUSSION. Boulenger's original description was evidently made from a young male, as he makes no mention of the brilliant colouring of the fully adult breeding males.

FIELD NOTES. These rupicolous agamas were quite plentiful on the boulder-strewn hills in and about Zimbabwe, showing a marked preference for those rocks lying on the more bushy slopes. The prevailing formation in this area is granite, and according to Chubb<sup>1</sup> *A. kirkii* is among those forms localised to this particular formation. They were found living exclusively on granite boulders, over which they move with the greatest celerity, darting into cracks and crevices when pursued. The seemingly conspicuous coral pink of the adult males matches very closely the colour of one of the prevailing lichens found in this area, and thus a specimen at rest is often overlooked. They are very curious creatures, and with heads well raised will peer over the tops of boulders at any intruder.

<sup>1</sup> 1909, *P.Z.S. London*, p. 590.

DIMENSIONS. A summary of the dimensions of the five adult specimens is as follows:

	Sex	No. of specimens	Extremes	Average
Total length	♂	3	235·0-270·0 mm.	257·6 mm.
	♀	1	212·0 mm.	212·0 mm.
Body	♂	3	83·0- 97·0 mm.	91·6 mm.
	♀	2	81·0- 88·0 mm.	84·5 mm.
Tail	♂	3	152·0-173·0 mm.	166·0 mm.
	♀	1	131·0 mm.	131·0 mm.
Arm	♂	3	40·0- 42·0 mm.	41·0 mm.
	♀	2	38·0- 39·0 mm.	38·5 mm.
Leg	♂	3	62·0- 67·0 mm.	65·3 mm.
	♀	2	56·0- 58·0 mm.	57·0 mm.
Head length	♂	3	21·5- 23·0 mm.	22·5 mm.
	♀	2	21·0- 22·0 mm.	21·5 mm.
Head width	♂	3	18·5- 20·5 mm.	19·6 mm.
	♀	2	18·5- 19·5 mm.	19·0 mm.

### *Agama atricollis* A. Smith

*Agama atricollis* A. Smith, 1849, *Ill. Zool. S. Afr.*, *Reptiles*, App. p. 14 (type loc.: interior of Southern Africa and country round Port Natal).

Four specimens were collected as follows: V.L.K.E. Nos. 259, 260 and 266 (March 1930), Gabani, near Gaborones; No. 261 (August), Kalakamati.

DISTRIBUTION. Ranging on the east, from Kenya and the eastern Ituri, southwards to the Transvaal and Natal; on the west from northern Angola to South-West Africa and the northern Cape Province. In the south this arboreal agama extends westwards to the eastern edge of Bechuanaland, where the Kalahari forms a barrier to a linking up with those of the west coast.

REMARKS. The above series comprises three adult males and one juvenile, of which one adult specimen bears a regenerated tail. Nostril in a slightly convex shield, pierced just below canthus rostralis. Upper head-shields smooth or but faintly keeled. Scaling on upper surfaces of limbs heterogeneous. Fourth finger slightly longer than third. Ventral scales smooth. Two rows of preanal pores, averaging 10-12.

COLOUR. Above bluish black; enlarged scales italian blue anteriorly, passing to straw yellow posteriorly; head ultramarine, merging into bluish green on neck and continuing as a wide band along back to pelvic region. Below peacock blue on throat, fading out over chest; belly with an irregular patterning of bluish, and with a few scattered brown and yellow scales. Tail above dull green, on the sides and below dirty greenish yellow. Juvenile: Above slate grey, vermiculated with darker, forming an irregular network over back, ill-defined paler blotches on either side vertebral line. Below dirty white, with faint tracings of bluish. Tail banded with blackish.

DISCUSSION. Schmidt in his "Herpetology of the Belgian Congo"<sup>1</sup> draws attention to the homogeneous squamation of the upper surface of the limbs in the Ituri forms, as opposed to the heterogeneous condition found in those from South Africa. In addition to this, I find that a comparison of dimensions between the Ituri and South African forms discloses the fact that the former are generally more slender, with longer tails and narrower heads. It seems probable that further comparative study on series of the two forms will result

<sup>1</sup> 1919, *Bull. Amer. Mus. Nat. Hist.* xxxix, p. 478.

in the separation of the Ituri forms as a distinct subspecies. The nostril character used by Boulenger<sup>1</sup> to separate *A. atricollis* and *A. cyanogaster* is by no means constant. A long series of South African *atricollis* were examined, and in quite 30 per cent. the nostril was pierced just below the canthus rostralis.

FIELD NOTES. Found on trees in more or less open forest. Very elusive and difficult to detect owing to their colouring and habit of slipping round the branches and tree trunks to the side farthest away from the intruder.

DIMENSIONS. A summary of the measurements of the three male specimens obtained is as follows:

	No. of specimens	Extremes	Average
Total length	2	297·0-330·0 mm.	313·5 mm.
Snout to vent	3	125·0-145·0 mm.	132·3 mm.
Tail	2	170·0-185·0 mm.	177·5 mm.
Arm	3	50·0- 58·0 mm.	54·3 mm.
Leg	3	68·0- 83·0 mm.	74·3 mm.
Head length	3	33·5- 38·0 mm.	35·5 mm.
Head width	3	28·0- 32·5 mm.	29·8 mm.
Head width (including gular pouches)	3	35·0- 45·0 mm.	39·3 mm.

### Fam. ZONURIDAE

#### *Zonurus giganteus* (A. Smith)

*Cordylus giganteus* A. Smith, 1849, *Ill. Zool. S. Afr., Reptiles*, pls. XXXV and XXXVI (type loc.: "Interior districts of Southern Africa").

Three specimens (V.L.K.E. Nos. 301-303) were collected on the farm "Geluk," about twenty miles west of Kroonstad, Orange Free State, during March 1930.

DISTRIBUTION. The range of this species is limited to the Orange Free State, and adjacent areas of the Cape Province in the south, Basutoland in the east, and the Transvaal in the north.

REMARKS. The series comprises one adult female and two half-grown specimens (male and female). These specimens agree closely with that of the type description.

FIELD NOTES. These large zonurids are fairly common in and about Kroonstad and east over the open flat country to Harrismith. Here they may often be seen sunning themselves on small mounds, ant-hills or other promontories. When alarmed they retire below ground, into what have all the appearance of gerbille burrows.

DIMENSIONS. The following measurements are of an adult female:

Total length	...	365·0 mm.	Leg	...	90·0 mm.
Body	...	195·0 mm.	Head length	...	51·0 mm.
Tail	...	170·0 mm.	Head width	...	42·5 mm.
Arm	...	70·0 mm.			

#### *Zonurus cordylus jonesii* Boulenger

*Zonurus jonesii* Boulenger, 1891, *A.M.N.H.* (6), VII, p. 417 (type loc.: Murchison range, northern Transvaal).

Four specimens were collected as follows: V.L.K.E. No. 300 (December 1929), Titumi; Nos. 297 and 298 (March 1930), between Molepolole and Kuke; No. 299 (August), Bulawayo, Southern Rhodesia.

DISTRIBUTION. A southern species, ranging from the Transvaal, into Southern Rhodesia as far north as Bulawayo, the southern part of Portuguese East Africa and along the eastern edge of the Kalahari into the northern Cape Province.

<sup>1</sup> 1885, *Cat. Liz. Brit. Mus.* 1, p. 337.

REMARKS. The above series comprises two adult males, one female and one juvenile. Tails in all three adult specimens damaged and foreshortened. Head from 1.25 to 1.3 times as long as broad. In Nos. 297 and 298 frontonasal rhombic to diamond-shaped, about as broad as long and separated from frontal by prefrontals, which form good contact in middle line. In Nos. 299 and 300 frontonasal in contact with frontal, separating prefrontals. Temporals irregularly disposed. Dorsal scales in 21-22 transverse rows and 20-22 longitudinal rows. Ventrals in 22-25 transverse rows of 12 scales each. Males with six femoral pores on each side.

COLOUR. Above dirty brown, with a vertebral series of irregularly paired blackish spots (ill-defined in female); a wide black lateral band from just behind ear opening to groin. Below dirty white. Juvenile, a uniform sudan brown above.

DISCUSSION. The Bulawayo specimen is identical with *Z. c. jonesii* from the Transvaal, although Hewitt<sup>1</sup> suggests that the typical *Z. cordylus* recorded from Bulawayo by J. H. Power<sup>2</sup> is probably *Z. c. rhodesianus*. In the meantime I am more inclined however to assign all Bulawayo specimens to *jonesii*.

FIELD NOTES. The two specimens from between Molepolole and Kuke were found under the loosened bark of dead trees, growing in typical Kalahari sand veld. The Titumi specimen was secured among some dead wood in open mopane forest; while the Bulawayo specimen was captured on a fencing pole right in the middle of the town.

DIMENSIONS. In the following short summary of measurements, those of total length and tail have been omitted, as tails are not normal:

	♂ (average)	♀
Body	73.50 mm.	68.0 mm.
Arm	23.50 mm.	21.5 mm.
Leg	31.00 mm.	28.2 mm.
Head length	22.75 mm.	21.2 mm.
Head width	17.50 mm.	15.8 mm.

### *Platysaurus guttatus* A. Smith

*Platysaurus guttatus* A. Smith, 1849, *Ill. Zool. S. Afr., Reptiles*, App. p. 8 (type loc.: "Limpopo River near the Tropic of Capricorn").

Fourteen specimens were collected as follows: V.L.K.E. Nos. 315 and 316 (August 1930), World's View, Matoppos; Nos. 304-314 and 317 (September), Zimbabwe.

DISTRIBUTION. Southern Rhodesia and the Transvaal.

REMARKS. The above series comprises eight adult (6 ♂♂ and 2 ♀♀) and six half-grown or juvenile specimens. One specimen (No. 317) bears a bifurcated tail, which forks two-thirds down from root, and has prongs of equal length. Frontonasal forming suture with rostral and separating nasals in eight specimens, not forming a suture with rostral or separating nasals in six. Interparietal five-sided, in contact with occipital in ten cases, separated in four. No elongate quadrangular shield between occipital and interparietal. Two rows of enlarged temporals, upper (4) much larger than lower (3). Granules on sides of neck much enlarged and sharply pointed in males. Dorsal scales small and slightly convex; scales on flanks much larger than dorsals. Ventrals square or slightly broader than long, in 36-38 transverse and 20 longitudinal rows. Preanal scales distinctly enlarged in adult males, larger than ventrals. Six to eight large plates under tibia. Eighteen to twenty femoral pores on each side. Caudal scales large, elongate, keeled, very strongly on sides; smooth below.

<sup>1</sup> 1933, *Occ. Papers Rhod. Mus.* No. 2, p. 48.

<sup>2</sup> 1930, *Ann. Tol. Mus.* XIV, p. 16.

The following table shows the variation in the occipital-interparietal and frontonasal-rostral characters:

No.	Occipital-interparietal	Frontonasal-rostral
304	In wide contact	In contact
305	In wide contact	Separated
306	In wide contact	Separated
307	In wide contact	Separated
308	Narrowly separated	In narrow contact
309	Widely separated	In contact
310	In wide contact	In contact
311	In wide contact	In narrow contact
312	In wide contact	In contact
313	Widely separated	Separated
314	In narrow contact	Separated
315	Widely separated	In narrow contact
316	Widely separated	Separated
317	In contact	In contact

**COLOUR.** Adult male: Dark bluish black above, with a greenish iridescence anteriorly, passing to reddish brown posteriorly; head with three pale blue longitudinal stripes, those on sides rising from hind edge of eye, median stripe from snout; in young males these stripes are often continued over body as pale interrupted bands; scattered bluish white guttae over back and upper surface of limbs. Below a bright yellowish green on chin, passing to pea green on throat and chest; belly in the middle blue-black to blackish, on sides a rich reddy brown anteriorly and bright blue posteriorly; under side legs blue. Tail dirty salmon. Adult female: Above blackish brown, with three well-defined bluish white longitudinal stripes over head and body, fading out on proximal portion of tail; pale whitish guttae on thighs. Below uniformly bluish, or belly often with irregular blue-black suffusions, and chest tinged with reddish brown. Tail olive brown.

**DISCUSSION.** Differing in many respects from Smith's original description, but agreeing with Boulenger's Mazoe specimen. Certainly distinct from *P. capensis*, under which Boulenger<sup>1</sup> has synonymised *P. guttatus*.

**FIELD NOTES.** Very common on the granite hills about Zimbabwe, where it is found in association with *Agama kirkii*, *Mabuia quinquetaeniata* and *Gerrhosaurus validus*.

**DIMENSIONS.** A summary of the measurements of the eight adult specimens is as follows:

	Sex	No. of specimens	Extremes	Average
Total length	♂	5	204.0-274.0 mm.	232.7 mm.
	♀	2	170.0-196.0 mm.	183.0 mm.
Body	♂	6	82.0-102.0 mm.	93.1 mm.
	♀	2	76.0- 78.0 mm.	77.0 mm.
Tail	♂	5	120.0-172.0 mm.	141.0 mm.
	♀	2	92.0-120.0 mm.	106.0 mm.
Arm	♂	6	34.0- 41.0 mm.	37.6 mm.
	♀	2	31.0- 32.0 mm.	31.5 mm.
Leg	♂	6	51.0- 62.0 mm.	55.5 mm.
	♀	2	46.0- 47.0 mm.	46.5 mm.
Head length	♂	6	21.0- 25.5 mm.	23.9 mm.
	♀	2	18.3- 20.3 mm.	19.8 mm.
Head width	♂	6	15.8- 20.3 mm.	18.4 mm.
	♀	2	13.8- 14.5 mm.	14.1 mm.
Femoral pores	♂	6	18 - 20	19

<sup>1</sup> 1910, *Ann. S. Afr. Mus.* v, p. 469.

## Fam. VARANIDAE

*Varanus albigularis* (Daudin)

*Tupinambis albigularis* Daudin, 1801, *Hist. Nat. Rept.* III, p. 72, pl. 32 (type loc.: unknown).

*Varanus albigularis* Boettger, 1894, *Ber. Senck. Nat. Ges.* p. 327 (Chamis and Okahandja, South-West Africa; Khakhea and Kooa, Kalahari). Sternfeld, 1911, *Mittl. Zool. Mus. Berlin*, v, p. 403 (Okowakuatjiwi and Hereroland, South-West Africa). Lampe, 1911, *Jahrb. nass. Ver. Nat.* LXIV, p. 165 (Kalahari).

Seven specimens were collected as follows: V.L.K.E. Nos. 286-288 (March), Gaberones; No. 285 (March), Metsimaklaba River; Nos. 289 and 290 (April), Gemsbok; No. 294 (June), Tsotsoroga.

DISTRIBUTION. South and East Africa; ranging south from Kenya in the east, and Angola in the west.

REMARKS. Nos. 285-287 are alcohol specimens, while the remainder are flat skins and skulls; the series comprising four adults and three juveniles.

COLOUR. Above dark greyish brown, with greyish white to yellowish, rounded black-edged blotches, arranged in five to six transverse series on back; a dark temporal streak from hind edge of eye, along side of neck to just beyond shoulder; hind limb spotted with yellowish. Below a dirty yellowish white, with scattered dark greyish brown spots. Tail with alternate bands of dark brown and yellowish. Juveniles generally greyer in colour, with dark greyish vermiculations below.

DISCUSSION. In view of the intergradation between this species and *ocellatus*, and the probable linking up of the latter with *exanthematicus*, Schmidt<sup>1</sup> has classified both *albigularis* and *ocellatus* as subspecies of *exanthematicus*.

FIELD NOTES. The majority of our specimens were found in more or less open bush country, usually in the vicinity of native maize lands. In its habits it resembles very closely *V. exanthematicus*, and the field notes given for that species by Schmidt in his "Herpetology of the Belgian Congo" may be taken as applying to *albigularis* as well.

DIMENSIONS. A summary of measurements of adult specimens is as follows:

	No. of specimens	Extremes	Average
Total length	3	874-1318 mm.	1137.0 mm.
Body	4	408- 590 mm.	521.0 mm.
Tail	3	466- 755 mm.	617.0 mm.
Skull length	2	71- 95 mm.	88.5 mm.
Skull width	2	44- 45 mm.	44.5 mm.

*Varanus niloticus* (Linnaeus)

*Lacerta nilotica* Linnaeus, 1766, *Syst. Nat.* ed. 12, p. 369 (type loc.: Egypt).

Five specimens were collected as follows: V.L.K.E. Nos. 291-293 (May-June 1930), Thamalakane River at Maun; Nos. 295 and 296 (July), Chobe River at Kabulabula.

DISTRIBUTION. This riparian species is distributed over most of Africa, with the exception of those desert areas where no flowing rivers exist.

REMARKS. The above series consists of five adult unsexed specimens, preserved as flat skins with skulls.

<sup>1</sup> 1919, *Bull. Amer. Mus. Nat. Hist.* xxxix, p. 483.

COLOUR. Above dark olive brown to blackish, with scattered scales and interrupted cross-bands of greenish yellow across head, body and limbs. Below yellowish, with wide indefinite greyish cross-bands. Tail barred alternately with black and yellow.

FIELD NOTES. Very plentiful along the Thamalakane and Chobe Rivers. Usually found during the day lying on rocks or overhanging branches of trees along the river banks. One specimen was discovered basking in the sun on an ant-hill at least 50-100 yards from the river. They are very clumsy runners, moving usually in short jerky spurts. When cornered they are most aggressive, slashing out with their tails and snapping viciously. Stomach contents consisted mainly of fresh-water crabs and snails, together with small fish, frogs and flying insects of various kinds.

DIMENSIONS. A summary of the measurements taken is as follows:

	No. of specimens	Extremes	Average
Total length	5	1240-1643 mm.	1426.2 mm.
Body	5	460-628 mm.	537.2 mm.
Tail	5	780-1015 mm.	889.0 mm.
Skull length	5	80-104 mm.	90.2 mm.
Skull width	5	31-43 mm.	36.4 mm.

### Fam. AMPHISBAENIDAE

#### *Amphisbaena quadrifrons* Peters

*Amphisbaena quadrifrons* Peters, 1862, *Mon. Berl. Akad.* p. 25 (type loc.: Hereroland, South-West Africa). Boettger, 1887, *Ber. Senck. Nat. Ges.* p. 144 (Noi Xas, near Ghanzi, Kalahari). Werner, 1910, *Jena. Denkschr.* xvi, p. 327 (Okahandja and Tsaobis, South-West Africa; Severelela and Khakhea, Kalahari). Sternfeld, 1911, *Mittl. Zool. Mus. Berlin*, v, p. 403 (Windhuk and Outjo, South-West Africa). Werner, 1915, in Michaelsen, *Land- u. Süßwasserfauna Deutsch-S.W.-Afrikas*, Lief. 3, p. 339 (Grootfontein and Neudamm, South-West Africa).

Twenty-three specimens were collected as follows: V.L.K.E. No. 318 (March 1930), between Molepolole and Kuke; No. 321 (April), Gomodimo; No. 322 (April), Chukudu; Nos. 323 and 324 (April), Kaotwe; No. 325 (April), Sunnyside; Nos. 326 and 327 (May), Gemsbok; Nos. 328-330 (May), between Sunnyside and Machumi Pan; Nos. 331 and 332 (May), between Mabeleapudi and Lake Ngami; No. 333 (May), Motthatlogo on Lake Ngami; No. 334 (June), Shaleshonto; Nos. 335-342 (July), Kabulabula.

DISTRIBUTION. A western form ranging from north-western Rhodesia, south into the northern Transvaal, Kalahari and South-West Africa.

REMARKS. In the above series there are ten adult specimens, of which three bear regenerated tails. The Kabulabula forms differ slightly from those of the Kalahari in the average number of annuli and of transverse scales, as shown in the following table:

	Annuli on body	Annuli on tail	Dorsal scales to each annulus	Ventral scales to each annulus
Kabulabula	217.6	48.6	16	14
Kalahari	231.1	45.6	18	16

COLOUR. Above vinaceous purple; below vinaceous pink.

FIELD NOTES. Essentially creatures of the sand veld, where they are usually found in the soft ground under stones and logs, lying in wait for small insects seeking refuge. On being exposed they immediately burrow out of sight.



DIMENSIONS. A summary of the measurements of adult specimens is as follows:

	No. of specimens	Extremes	Average
Total length	7	180-210 mm.	193.4 mm.
Body	10	155-193 mm.	169.0 mm.
Tail	7	24-35 mm.	29.3 mm.

### *Monopeltis vernayi* FitzSimons

(Figs. 15 and 16)

*Monopeltis vernayi* FitzSimons, 1932, *Ann. Trans. Mus.* xv, p. 36 (type loc.: Gomodimo, central Kalahari).

TYPE. An adult specimen (V.L.K.E. No. 320 and T.M. 14468) collected at Gomodimo, April 1930.

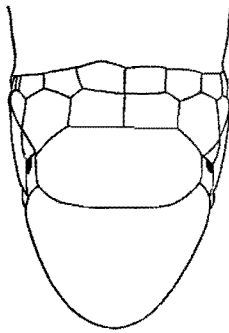


Fig. 15.

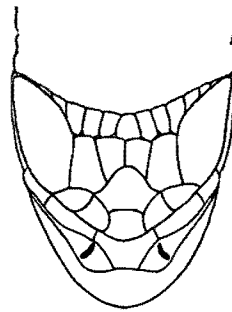


Fig. 16.

Fig. 15. *Monopeltis vernayi* FitzSimons. Dorsal view of head.

Fig. 16. *Monopeltis vernayi* FitzSimons. Ventral view of head.

DESCRIPTION. Rostral trapezoid, separating the nasals; two large shields on head, anterior being larger (slightly longer and wider), with a very sharp projecting horizontal edge; a pair of small transverse parietals; ocular small, diamond-shaped with eye showing distinctly near lower posterior edge; three upper labials, the third largest; a large temporal, in contact with parietal and posterior head-shield; separated from third labial by two small postoculars; three lower labials, third by far the largest; mental small and almost square, followed by a median postmental, broader than long, extending on sides to suture between first and second labials, and in contact posteriorly with a row of four slightly elongate chin-shields, of which outer pair larger than inner; behind again is a row of small irregular scales. Two pairs of large elongate pectoral shields, middle pair longest and slightly narrowed anteriorly; four rows of scales on neck. 198 annuli on body and 10 on tail; annulus about middle of body with 22 dorsal and 18 ventral scales; two median rows of ventral scales broader than long. Two pairs of anal segments, inner larger than outer.

COLOUR. Above purplish brown; snout a dirty pinkish yellow. Below vinaceous pink.

REMARKS. A half-grown specimen (V.L.K.E. No. 319) collected at Kuke during March 1930 shows great similarity to the type, differing only in the following: six elongate pectoral shields (the outer on left side is divided into

two); 224 annuli on body; annulus about middle of body with 28 dorsal and 26 ventral scales. As the number of annuli and scales to each annulus on body is so variable in this genus, these characters cannot be greatly relied upon for specific distinction. The pectoral shields in the Kuke specimen are very similar in shape and size to those in the type, and the greater number appear merely to be abnormal in this case.

DISCUSSION. The above-described species may be distinguished from Werner's *M. leonhardi*<sup>1</sup>, collected about 100 miles farther south, by the following characters: posterior head-shield longer, over two-thirds the length of anterior; median postmental shield reaching on sides only to suture between first and second lower labials; presence of a pair of larger better-defined occipitals and temporals; four elongate pectorals, middle pair narrowed anteriorly; greater number of annuli and scales to each annulus. Differs from *M. quadriscutata* as follows: longer snout; longer posterior head-shield; clearly defined occipitals and temporals; postmental smaller, reaching only to suture between first and second labials; in row of four submentals, outer pair larger; pectorals more elongate, and narrower; two median series of ventral scales not nearly so transversely enlarged; four large preanal plates.

FIELD NOTES. Found in typical Kalahari sand veld, where they were exposed and secured while excavating gerbille holes.

DIMENSIONS.

	Type (No. 320)	No. 319
Total length	243.0 mm.	190 mm.
Body	231.0 mm.	180 mm.
Tail	12.0 mm.	10 mm.
Body diameter	7.4 mm.	6 mm.
Annuli on body	198	224
Annuli on tail	11	10
Scales to dorsal segment of annulus	22	28
Scales to ventral segment of annulus	18	26

Fam. LACERTIDAE

*Nucras intertexta* (A. Smith)

*Lacerta intertexta* A. Smith, 1838, *Mag. Nat. Hist.* (2), 11, p. 93 (type loc.: Latakoo [nr. Kuruman]).

*Nucras intertexta* Boulenger, 1921, *Monogr. Lacertidae*, 11, p. 381 (Kokong, near Lehututu, Kalahari).

One adult male specimen (V.L.K.E. No. 378) collected at Kuke during March 1930.

DISTRIBUTION. Restricted to the dry areas of the northern and western Transvaal, southern Kalahari and northern Cape Province. The following characters clearly distinguish this form from the closely related *N. tessellata*.

REMARKS. Length of head  $4\frac{1}{3}$  times into length from snout to vent; adpressed hind limb reaches wrist; foot only slightly longer than head; tail cylindrical,  $2\frac{1}{3}$  times as long as head and body; first supraocular very small, in narrow contact with frontal; six supraciliaries; three small scales between supraciliaries and supraoculars; anterior loreal less than half length of second; scales on temple hexagonal and slightly larger than dorsals; tympanic shield round and distinct; lower eyelid with five vertically elongate scales; collar composed of nine even-edged plates; 40 dorsal scales across body; ventral plates in six longitudinal and 32 transverse series; two large subequal preanal

<sup>1</sup> 1910, *Jena. Denkschr.* xvi, p. 328, pl. VI, fig. 2.

plates, one in front of the other; five transversely enlarged plates on lower side of fore limb; 26 lamellar scales under fourth toe; 12 femoral pores.

COLOUR. Above reddish brown with darker speckling; a suggestion of a black-edged vertebral streak on nape, and an indistinct longitudinal row of dark-edged whitish spots on either side of body; limbs pale brown, with lighter spots. On sides alternate prolongations of the dorsal brown colour and the ventral white give a striped effect, clearly defined on sides of neck, but becoming indistinct and more or less ocellate posteriorly. Below a uniform white. Tail a pale reddish brown above, with spotting of darker brown; below white.

DISCUSSION. While differing slightly in the shorter head and longer tail, the above specimen is clearly referable to *N. intertexta* forma typica of Boulenger<sup>1</sup>; in colouring it approaches very closely his specimens from Pietersburg, as figured in the publication cited below, but shows more extensive striping on the sides.

FIELD NOTES. Captured on the dry grass-covered flats in and about Kuke Pan. Very active and swift of movement.

DIMENSIONS.

Total length	...	257 mm.	Head depth	...	8 mm.
Snout to vent	...	77 mm.	Arm	...	21 mm.
Tail	...	180 mm.	Leg	...	35 mm.
Head length	...	16 mm.	Foot	...	17 mm.
Head width	...	10 mm.			

*Ichnotropis capensis* (A. Smith)

*Algyra capensis* A. Smith, 1838, *Mag. Nat. Hist.* (2), II, p. 94 (type loc.: Latakoo).

*Ichnotropis capensis* Werner, 1910, *Jena. Denkschr.* XVI, p. 329 (between Lokaneng and Severelela, Kalahari). Boulenger, 1921, *Monogr. Lacertidae*, II, p. 425 (30 miles north of Okwa, Kalahari).

Four specimens were collected as follows: V.L.K.E. No. 467 (April 1930), between Kaotwe and Damara Pan; No. 468 (July), Kabulubula; Nos. 469 and 470 (August), N'kate.

DISTRIBUTION. From the lower Congo, Angola, Rhodesia and Portuguese East Africa, southwards to South-West Africa, Bechuanaland, the Transvaal and Natal.

REMARKS. The above series comprises three half-grown specimens (2 ♂♂ and 1 ♀) and a juvenile. Postocular in contact with prefrontal; interparietal in contact with occipital in three cases; four to six labials anterior to subocular; scales round body 36-40; ventral scales in 10 longitudinal and 26-28 transverse rows; 22-23 lamellae under fourth toe; foot distinctly longer than head (up to 1½ times), and in the two male specimens adpressed hind limb reaches the ear or beyond.

COLOUR. Above tawny brown, with two interrupted series of black spots on back, sometimes indistinct and ill-defined; usually a black-edged whitish streak along sides from just below eye, through ear to groin. Below dirty white.

FIELD NOTES. Very shy and elusive, and difficult to detect owing to their dun colour, which matches well with the Kalahari scrub.

DISCUSSION. An examination of a long series of specimens from South Africa, including Southern Rhodesia and South-West Africa, discloses great variation in length of foot and hind limb, the foot in many cases being as much

<sup>1</sup> 1917, *Ann. S. Afr. Mus.* XIII, p. 205, pl. VI, figs. 6-10.

as  $1\frac{1}{2}$  times length of head and adpressed hind limb reaching ear or beyond. It is mainly by these two characters that Boulenger has separated his *I. longipes*<sup>1</sup>, which we may now consider along with *I. macrolepidota* as a synonym of *capensis*.

DIMENSIONS. The measurements of the two largest specimens are as follows:

	♂ (No. 470)	♀ (No. 469)
Total length	151.0 mm.	144.0 mm.
Snout to vent	41.0 mm.	43.0 mm.
Tail	110.0 mm.	101.0 mm.
Snout to fore limb	18.0 mm.	17.7 mm.
Head length	11.6 mm.	11.7 mm.
Head width	6.7 mm.	7.1 mm.
Head depth	5.0 mm.	5.0 mm.
Arm	17.0 mm.	16.0 mm.
Leg	30.0 mm.	31.0 mm.
Foot	16.0 mm.	15.5 mm.
Femoral pores	10-11	11

### *Ichnotropis squamulosa* Peters

*Ichnotropis squamulosa* Peters, 1854, *Mon. Berl. Akad.* p. 617 (type loc.: Tette, Mozambique). Boettger, 1894, *Ber. Senck. Nat. Ges.* p. 89 (Rehoboth, South-West Africa). Sternfeld, 1911, *Mittl. Zool. Mus. Berlin*, v, p. 404 (Namutoni-Outjo, South-West Africa). Boulenger, 1921, *Monogr. Lacertidae*, II, p. 193 (Molopo River, Kalahari).

Thirty-six specimens were collected as follows: V.L.K.E. No. 343 (March 1930), Gabani; No. 344 (March), Molepolole; No. 466 (March), Kuke; No. 345 (March), Matapha Pan; No. 346 (April), Kaotwe; Nos. 347 and 348 (April), between Kaotwe and Damara Pan; Nos. 349-354 (April), Damara Pan; Nos. 358 and 359 (May), between Sunnyside and Mabeleapudi; Nos. 355-357, 360 and 361 (May), Mabeleapudi; No. 362 (May), Maun; Nos. 363 and 364 (June), Shorobe; No. 365 (June), Kwaai; Nos. 366-377 (June-July), Tsotsoroga.

DISTRIBUTION. An eastern species extending from Tanganyika Territory in the north, southwards through Nyasaland, Rhodesia and Portuguese East Africa, to Natal and the Transvaal, and thence across into Bechuanaland and South-West Africa.

REMARKS. The above series comprises 25 adult (8 ♂♂ and 17 ♀♀) and 11 immature (8 ♂♂ and 3 ♀♀) specimens. In six specimens the tail has been lost or regenerated. Males may be distinguished from the females by the generally longer head, longer tail, well-defined and protuberant femoral pores, and conspicuous thickening at base of tail. Specimens from Tsotsoroga are, generally speaking, slightly smaller, due probably to sparseness of undergrowth and consequent scarcity of insect food.

COLOUR. Above coppery to greyish brown, often with four longitudinal series of bluish to greyish white black-edged spots on back, upper pair from superciliary ridge to tail and lower from ear opening to groin; the latter usually showing up as a distinct whitish streak from ear to shoulder. Below yellowish to greyish white. Adult males usually darker above, with lower labials and chin-shields a dark greyish brown to blackish. Breeding males bright orange to tangerine on throat and chest. Males from Tsotsoroga dark slate below, scales edged with lighter.

FIELD NOTES. Distributed throughout the Kalahari, but nowhere very plentiful. Extremely active and quick of movement, and often difficult to

<sup>1</sup> 1902, *P.Z.S. Lond.* II, p. 17, pl. III, fig. 2.

follow with the eye. When disturbed they usually rush off in short dashes of a few yards, from cover to cover, where they lie low until disturbed again. It was only by carefully marking down these halting places and then approaching stealthily that they could be captured. In the Kalahari they were not restricted to the near vicinity of pans, but seemed to prefer the open sand veld. At Tsotsoroga they were found living in open stretches of dwarf or shrubby mopane, within the forest. A large female (No. 361) contained twelve well-developed eggs, averaging  $12 \times 7$  mm.; another (No. 347) contained ten eggs measuring  $11 \times 7$  mm. Stomach contents consist chiefly of diurnal termites (*Hadotermes*).

DIMENSIONS. A summary of the measurements of adult specimens is as follows:

	Sex	No. of specimens	Extremes	Average
Total length	♂	8	208.0-235.0 mm.	220.00 mm.
	♀	11	190.0-223.0 mm.	208.30 mm.
Snout to vent	♂	8	63.0-73.0 mm.	66.40 mm.
	♀	17	64.0-78.0 mm.	69.80 mm.
Tail	♂	8	146.0-167.0 mm.	155.00 mm.
	♀	11	123.0-148.0 mm.	137.00 mm.
Snout to arm	♂	8	26.0-32.0 mm.	28.20 mm.
	♀	17	23.0-29.0 mm.	26.20 mm.
Head length	♂	8	17.0-18.5 mm.	17.60 mm.
	♀	17	15.3-17.8 mm.	16.60 mm.
Head width	♂	8	10.5-12.2 mm.	11.36 mm.
	♀	17	10.0-12.0 mm.	11.17 mm.
Head depth	♂	8	8.2-9.4 mm.	8.70 mm.
	♀	17	7.5-9.5 mm.	8.40 mm.
Arm	♂	8	22.0-26.0 mm.	23.00 mm.
	♀	17	20.0-25.0 mm.	22.90 mm.
Leg	♂	8	36.0-43.0 mm.	40.20 mm.
	♀	17	34.0-41.5 mm.	38.30 mm.
Foot	♂	8	18.0-21.0 mm.	18.70 mm.
	♀	17	16.0-19.6 mm.	17.80 mm.
Femoral pores	♂	8	12-16	13.7
	♀	17	12-16	13.1

### *Eremias lugubris* (A. Smith)

*Lacerta lugubris* A. Smith, 1838, *Mag. Nat. Hist.* (2), 11, p. 93 (type loc.: arid regions beyond northern boundary of Cape Colony).

*Eremias lugubris* Boettger, 1894, *Ber. Senck. Nat. Ges.* p. 90 (Rehoboth, South-West Africa). Werner, 1910, *Jena. Denkschr.* xvi, p. 330 (south Hereroland, South-West Africa; Lehututu-Kang, Kalahari). Methuen and Hewitt, 1914, *Ann. Trans. Mus.* iv, p. 138 (Narudas Sud and Wasserfall, South-West Africa). Boulenger, 1921, *Monogr. Lacertidae*, 11, p. 239 (Mahalapye, Lake Ngami and Gordonia, Bechuanaland). Werner, 1915, in Michaelsen, *Land- u. Süßwasserfauna Deutsch-S.W.-Afrikas*, Lief. 3, p. 341 (Okahandja and Okavango, South-West Africa).

Thirty specimens were collected as follows: V.L.K.E. Nos. 425 and 426 (March 1930), between Molepolole and Kuke; No. 427 (March), Kuke; Nos. 428 and 429 (April), between Kuke and Gomodimo; Nos. 430-431 (April), Gomodimo; No. 432 (April), Kaotwe; No. 433 (April), Okwa River; Nos. 434-436 (April), Damara Pan; No. 441 (May), between Sunnyside and Machumi Pan; Nos. 438-440, 442 and 444 (May), Mabeleapudi; Nos. 449-451, 456 and 457 (May), Lake Ngami; No. 458 (May), Maun; Nos. 460 and 461 (June), Shorobe; Nos. 462-465 (July), Kabulabula.

**DISTRIBUTION.** A western species ranging from southern Angola and Southern Rhodesia southwards into South-West Africa, Bechuanaland and the northern and eastern Transvaal.

**REMARKS.** The above series comprises eleven adult (6 ♂♂ and 5 ♀♀), nine half-grown and ten juvenile specimens. Remarkable uniformity was found in the head-shields, while other variations in scaling were as follows: four to six upper labials anterior to subocular; 74-86 scales round middle of body; ventral scales in six longitudinal and 22-26 transverse series; 26-30 lamellae under fourth toe; 14-16 femoral pores.

**COLOUR.** Adult: Above greyish to tawny brown, with three pale longitudinal streaks on back, median usually forked on the nape, and often continued from a third to a half way down tail; dorsolateral streaks arise on first loreal, passing below eye and through ear to groin; between the dorsal streaks are two rows of irregular, transversely enlarged blackish spots, connected up by a reddish brown band; large pale dark-edged ocellar spots on limbs. Below white. Tail reddish brown, with an indistinct pale lateral streak. Juvenile: Black above and below, with yellowish spots and markings arranged as follows: a streak along upper edge of orbit, an elongate spot on upper lip anterior to eye, a narrow bar behind and below eye and ear, a rounded spot above shoulder, and three rows of elongate spots down back. Last vertebral spot continues as a stripe down anterior third of tail, which is reddish yellow. Limbs above also with clearly defined yellowish spots. As these lizards grow to maturity the general black colour fades to brownish above and white below. The dorsal rows of spots become continuous to form definite streaks; while the interrupted rows of dark spots between become well defined. The various gradations from juvenile to adult coloration are clearly shown in the half-grown specimens.

**FIELD NOTES.** Very active, and usually abroad during the sunny part of the day. Habits very similar to *I. squamulosa*, and like the latter prefer the open sand veld to the harder areas round the pans.

**DIMENSIONS.** A summary of the measurements of adult specimens is as follows:

	Sex	No. of specimens	Extremes	Average
Total length	+♂♂	4	168·0-178·0 mm.	172·90 mm.
	+♀♀	4	159·0-171·0 mm.	165·00 mm.
Body	+♂♂	6	47·0- 55·0 mm.	50·25 mm.
	+♀♀	5	46·0- 58·0 mm.	49·20 mm.
Tail	+♂♂	4	121·0-126·0 mm.	124·20 mm.
	+♀♀	4	113·0-123·0 mm.	118·00 mm.
Snout to arm	+♂♂	6	17·7- 20·0 mm.	18·80 mm.
	+♀♀	5	17·0- 20·0 mm.	17·90 mm.
Head length	+♂♂	6	12·3- 14·4 mm.	13·10 mm.
	+♀♀	5	12·2- 14·0 mm.	12·80 mm.
Head width	+♂♂	6	8·0- 9·5 mm.	8·70 mm.
	+♀♀	5	7·5- 9·0 mm.	8·20 mm.
Head depth	+♂♂	6	6·0- 7·3 mm.	6·50 mm.
	+♀♀	5	5·6- 6·6 mm.	6·00 mm.
Arm	+♂♂	6	18·5- 21·0 mm.	19·25 mm.
	+♀♀	5	18·0- 20·0 mm.	18·60 mm.
Leg	+♂♂	6	37·0- 41·0 mm.	38·70 mm.
	+♀♀	5	35·0- 39·0 mm.	37·20 mm.
Foot	+♂♂	6	19·0- 21·0 mm.	20·00 mm.
	+♀♀	5	18·0- 20·0 mm.	19·30 mm.

**Eremias namaquensis** Duméril and Bibron

*Eremias namaquensis* Duméril and Bibron, 1839, *Erpet. Gen.* v, p. 307 (type loc.: Cape of Good Hope). A. Smith, 1849, *Ill. Zool. S. Afr., Reptiles*, pl. XLIV, fig. 2 and pl. XLVIII, fig. 6 (Great Namaqualand). Werner, 1910, *Jena. Denkschr.* xvi, p. 331 (Otjimbingue, Keetmanshoop and south Hereroland, South-West Africa). Sternfeld, 1911, *Mittl. Zool. Mus. Berlin*, v, p. 404 (Walfisch Bay, South-West Africa). Methuen and Hewitt, 1914, *Ann. Trans. Mus.* iv, p. 138 (below Great Karas Mountains, South-West Africa).

Fifty specimens were collected as follows: V.L.K.E. No. 379 (March 1930), between Molepolole and Kuke; Nos. 380-406, 408-413, 415 and 416 (March), Kuke; Nos. 418 and 419 (April), Gomodimo; Nos. 420-424 (April), Kaotwe; No. 437 (April), Gembok; Nos. 447 and 448, 452-455 (May), Motlhatlogo, on Lake Ngami.

**DISTRIBUTION.** A western species ranging from Bechuanaland and South-West Africa, south throughout the dry areas of the Cape Province, as far east as Matatiele.

**REMARKS.** The series comprises 24 adult (16 ♂♂ and 8 ♀♀) and 26 semi-adult and juvenile specimens. Head-shields usually smooth, slightly rugose in old specimens. Prefrontals in good contact in four specimens, and very narrow contact in three; separated by a single small shield in 38, by two shields in three and by three small shields in two cases. Frontonasal not divided longitudinally. Occipital small, narrower than interparietal, in contact with latter in 42 specimens, separated by suture of parietals in seven and by a small shield in one. Three to five upper labials anterior to subocular. Seven to eight plates in collar. 62-68 scales round middle of body. Ventrals in 12 longitudinal and 28-30 transverse rows. Preanal plates usually distinctly enlarged. 11-14 femoral pores. 24-28 lamellae under fourth toe. Tail from 2 to  $2\frac{2}{3}$  as long as head and body.

**COLOUR.** Adult: Above pale greyish to greyish brown, with five longitudinal black streaks on back; vertebral streak narrow, bifurcating on neck and often fading out over posterior half of body; lateral streaks band-like, bearing yellowish brown ocellar spots or broken up into a series of irregular blackish spots, with interspaces of light reddish brown. Males often ochraceous orange on sides and behind thighs. Limbs dark brown with rounded yellowish white spots. Tail usually reddish orange. Below white. Juvenile: Brightly streaked above, with five well-defined black streaks and white interspaces; median streak bifurcated over neck as in adult; lateral streaks with crenulated edges, due to partial transverse breaking up into spots.

**DISCUSSION.** The Kalahari specimens are generally not so depressed as typical *namaquensis*, with which the Lake Ngami series, with narrower snout and strongly depressed bodies, agree more closely.

**FIELD NOTES.** Like *E. lineo-ocellata*, these lizards seemed to prefer the hard ground in the acacia belts, around the pans. Here they were usually fairly plentiful, and were often seen abroad throughout the day. They live in small shallow burrows under bushes, and when alarmed retire therein with great speed. When pursuit is not too insistent, however, they will often pause in their flight, working their fore limbs up and down rapidly in a kneading fashion. Whether this is purely a nervous reaction, or due to the heat of the ground, or to keep off the all too persistent ants, it is difficult to say. It is of interest, however, to record that many of the specimens captured were found to have lost digits and often a whole hand or foot. In all probability these losses

were caused by the attacks of various large carnivorous ants, which were found on many of the lizards captured. Stomach contents (No. 380) consist chiefly of the remains of diurnal termites (*Hadotermes*) with a few wing membranes of various small flying insects.

DIMENSIONS. A summary of the measurements of adults is as follows:

	Sex	No. of specimens	Extremes	Average
Total length	♂	14	145·0-184·0 mm.	160·8 mm.
	♀	8	130·0-157·0 mm.	144·8 mm.
Body	♂	16	45·0- 54·0 mm.	49·3 mm.
	♀	8	46·0- 50·0 mm.	48·1 mm.
Tail	♂	14	98·0-130·0 mm.	112·6 mm.
	♀	8	83·0-108·0 mm.	96·7 mm.
Snout to arm	♂	16	18·5- 22·0 mm.	20·1 mm.
	♀	8	17·5- 20·5 mm.	18·3 mm.
Head length	♂	16	11·5- 13·2 mm.	12·9 mm.
	♀	8	11·5- 12·4 mm.	12·0 mm.
Head width	♂	16	7·5- 8·9 mm.	8·4 mm.
	♀	8	7·5- 8·3 mm.	7·8 mm.
Head depth	♂	16	5·0- 6·3 mm.	5·8 mm.
	♀	8	5·3- 6·0 mm.	5·6 mm.
Arm	♂	16	16·4- 20·0 mm.	18·0 mm.
	♀	8	15·0- 17·0 mm.	16·5 mm.
Leg	♂	16	32·8- 38·0 mm.	35·0 mm.
	♀	8	29·0- 32·5 mm.	30·4 mm.
Foot	♂	16	16·0- 18·6 mm.	17·3 mm.
	♀	8	14·0- 16·0 mm.	15·0 mm.

### *Eremias lineo-ocellata lineo-ocellata* Duméril and Bibron

*Eremias lineo-ocellata* Duméril and Bibron, 1839, *Erpet. Gen.* v, p. 314 (type loc.: South Africa). Werner, 1910, *Jena. Denkschr.* xvi, p. 334 (Kooa, Mookane and Vleij Topan, Kalahari).

Seventeen specimens were collected as follows: V.L.K.E. Nos. 407 and 414 (March 1930), Kuke; No. 417 (April), between Kuke and Gomodimo; No. 471 (April), Kaotwe; Nos. 443 and 445 (May), Mabeleapudi; No. 446 (May), Ramatudi; No. 459 (June), Shorobe; Nos. 472-480 (August), Makarikari.

DISTRIBUTION. Ranging throughout the Transvaal and Kalahari, and extending south through the Orange Free State towards the eastern districts of the Cape Province.

REMARKS. The above series comprises for the most part immature and young, there being only one adult specimen (male). An zygous shield separating prefrontals present in three cases (Nos. 407, 443 and 476); lateral border of prefrontals completely separated from supraocular by single row of small granular scales in two specimens, and partially in five. Head-shields flat and smooth to feebly convex and rugose. Dorsal scaling variable, equal in size or smaller than scales on tibia; rhombic, flattened or slightly convex; subimbricate and more or less keeled posteriorly. Ventrals in 12 longitudinal and 32-34 transverse rows. 60-68 scales round middle of body. An average of 12-13 plates on collar. Subdigital lamellae mostly bicarinate, 24-28 under fourth toe. Adpressed hind limb reaches ear. Femoral pores 12-16. Tail over twice length from snout to vent.



COLOUR. Considerable variation in colour and markings occurs within this series. Young specimens from Kuke, above slate grey, with clearly defined pale dorso-lateral streaks, ocellar spots indistinct or absent on back or sides; limbs brownish, with paler spots; Kaotwe specimen with a few scattered spots dorsally. Ngamiland specimens slaty brown above, with dark bands between pale dorso-lateral streaks, bearing bluish ocellar spots; limbs and tail as above. Makarikari specimens brightly coloured, bluish grey above; pale dorsal streaks replaced by a series of dark-edged, pale bluish elongate spots, from hind edge of eye to anterior portion of tail; bordered above and below by small whitish ocellar spots.

DISCUSSION. The western form, *E. l. pulchella*, has as its centre of distribution South-West Africa, from which it extends south into Little Namaqualand, east across the Karroo to the Albany district and north round the Kalahari to the western Transvaal.

FIELD NOTES. These lizards, unlike *E. lugubris* and *I. squamulosa*, were usually found in association with *E. namaquensis*, frequenting the harder ground in and about the pans. They were often seen abroad during the hottest hours of the day, hunting for food, which consists chiefly of diurnal ants of various kinds. They are very active and timid, and when alarmed disappear into their holes among the roots of small shrubs in a flash.

DIMENSIONS. The following measurements are of the three largest specimens. All males.

	No. 443	No. 445	No. 459
Total length	—	158·0 mm.	138·0 mm.
Body	60·0 mm.	49·0 mm.	48·0 mm.
Tail	—	109·0 mm.	90·0 mm.
Snout to arm	23·0 mm.	19·0 mm.	19·0 mm.
Head length	15·5 mm.	12·2 mm.	13·0 mm.
Head width	10·0 mm.	8·3 mm.	8·3 mm.
Head depth	7·0 mm.	6·7 mm.	6·0 mm.
Arm	23·0 mm.	20·0 mm.	20·0 mm.
Leg	42·0 mm.	34·0 mm.	36·0 mm.
Foot	19·0 mm.	17·0 mm.	17·0 mm.

### Fam. GERRHOSAURIDAE

#### *Gerrhosaurus validus* A. Smith

*Gerrhosaurus validus* A. Smith, 1849, *Ill. Zool. S. Afr., Reptiles*, App. p. 9 (type loc.: interior of Southern Africa, towards the sources of the Gariep or Orange River).

Four specimens (V.L.K.E. Nos. 496-499) were collected at Zimbabwe during September 1930.

DISTRIBUTION. A rupicolous species ranging from southern Angola, Southern Rhodesia and Portuguese East Africa, south into the northern and eastern Transvaal. The occurrence of this species at Neu-Barmen, Gobabis, as recorded by Sternfeld<sup>1</sup>, is extremely improbable.

REMARKS. Four adult specimens, comprising three males and one female. Head and body depressed; head-shields feebly striated; frontonasal much broader (one-third) than long, well separated from rostral by median suture of nasals; prefrontals in long contact; tympanic shield subtriangular, two-

<sup>1</sup> 1911, *Fauna der deutschen Kolonien*, Reihe IV, Deutsch-Südwestafrika, Heft 2, p. 35.

thirds as wide as high, covering upper third of ear opening. Dorsal scales with posterior edges serrated (feebly anteriorly, more strongly posteriorly and on tail), tri- or quinque-carinate, in 30-32 longitudinal and 53-54 transverse rows. Ventrals in 16-18 longitudinal and 34-38 transverse rows; outer row scales much narrower than inner. Femoral pores 18-24. Soles of feet with rounded convex calloused scales; 23 scales under fourth toe. Tail 1.3-1.4 times length head and body (tip of tail missing in all four specimens).

COLOUR. Above dark brown to blackish, each scale with a citron yellow spot or streak on its inner edge; a wide yellow band (continuous in young, interrupted in adult specimens) along each side, from hindmost supraocular or supraciliary, to anterior portion of tail; head flecked and spotted with yellow. Below brownish, very dark and dense over belly and below tail, paler on chest, throat and under limbs; soles of feet black.

FIELD NOTES. A strictly rupicolous species, not uncommon on the boulder-strewn hills in and about Zimbabwe, where it was found living in association with other granite formation frequenting forms, e.g. *Agama kirkii*, *Platysaurus guttatus* and *Mabuia quinqueaeniata*. These large gerrhosaurids are somewhat clumsy of movement, and never venture far from their rocky retreats. When alarmed they disappear into the nearest crack or crevice, where they lie low until all danger is past. It is often incredible the narrow openings into which these large lizards can squeeze; here they wedge themselves so securely that nothing can dislodge them save lifting of the rock.

DIMENSIONS. A summary of the measurements is as follows:

	Sex	No. of specimens	Extremes	Average
Total length	♂	3	553-681 mm.	625.7 mm.
	♀	1	509 mm.	509.0 mm.
Body	♂	3	235-275 mm.	257.0 mm.
	♀	1	228 mm.	228.0 mm.
Tail	♂	3	318-406 mm.	368.7 mm.
	♀	1	281 mm.	281.0 mm.
Head length	♂	3	49-56 mm.	52.3 mm.
	♀	1	45.4 mm.	45.4 mm.
Head width	♂	3	36.5-44 mm.	41.1 mm.
	♀	1	33 mm.	33.0 mm.
Arm	♂	3	58-68 mm.	63.0 mm.
	♀	1	56 mm.	56.0 mm.
Leg	♂	3	90-106 mm.	98.7 mm.
	♀	1	90 mm.	90.0 mm.
Foot	♂	3	43-48 mm.	45.7 mm.
	♀	1	42 mm.	42.0 mm.

### *Gerrhosaurus auritus* Boettger

*Gerrhosaurus auritus* Boettger, 1887, *Ber. Senck. Nat. Ges.* p. 148, pl. V, fig. 3 a-d (type loc.: Ondonga, Ovamboland).

Nine specimens were collected as follows: V.L.K.E. No. 487 (April 1930), Kaotwe; No. 488 (April), between Okwa River and Damara Pan; Nos. 489 and 490 (April), Damara Pan; Nos. 491 and 492 (April), Gemsbok; Nos. 493 and 494 (May), Mabeleapudi; No. 495 (June), Kwaai.

DISTRIBUTION. Restricted to the open sand veld of northern South-West Africa (Ovamboland) and the Kalahari.

REMARKS. The series comprises six adult (2 ♂♂ and 4 ♀♀), one half-grown (female) and two juvenile specimens. Head moderate, 1.3–1.5 times as long as broad, length about five times into snout to vent; head-shields smooth; frontonasal broader than long and separated from rostral by a short suture of supranasals. Prefrontals in long contact; tympanic shield large, covering upper half of ear opening, with a semicircular hind edge, a third to a half as broad as high; eight temporals. Dorsal scales strongly keeled, but not striated, in 26 longitudinal and 51–54 transverse rows; last four longitudinal rows on sides quite smooth in adults, feebly keeled in juveniles. Ventral scales in eight longitudinal and 32–34 transverse series; outermost row of ventrals equal to or but slightly narrower than remainder. Limbs short and stout; median row of scales under digits well marked, 16–18 under fourth toe; soles of feet covered with regular series of keeled scales. Femoral pores 14–16. Tail 1.6 to almost twice as long as head and body.

COLOUR. Above light sepia brown, flecked and spotted with darker on head and body; dorso-laterally there are three or four dark-edged whitish longitudinal stripes along body and sides of tail; upper stripe starting from supra-ciliaries and lower from behind head. Pale on sides, spotted with dark sepia and with irregular pinkish infusions. Below creamy white. Limbs above with large yellowish dark-edged spots. Juveniles and immature specimens, sepia above, with a treble series of white-centred darker spots down middle of back, median row largest; narrow dorso-lateral whitish, dark-edged stripe from back of head down body and tail. Sides pale brownish, with a series of vertically enlarged yellowish white spots.

DISCUSSION. The above series definitely establishes the validity of Boettger's species, which has been much questioned in the past, largely owing to lack of comparative material. The single large nasal in Boettger's specimen may be regarded as an abnormality, as in all the Kalahari specimens the nasal is distinctly divided into two. *G. auritus* may be readily distinguished from *flavigularis* by the following characters: stout, robust build; short thick-set limbs; dorsal scales in not more than 54 transverse rows, not striated and with four lower longitudinal rows smooth; wide semicircular tympanic shield; outer row of ventrals subequal to middle rows; tail less than twice length of head; colour markings.

FIELD NOTES. These gerrhosaurids were the only species found throughout the Kalahari sand veld. Owing to their pale colouring and habit of lying low until closely approached, they were very difficult to detect and consequently easily overlooked. They appeared to show a marked preference for those areas where "Terminalia" scrub flourished, among the undergrowth of which they live and have their burrows. The stomach contents of two specimens were examined and were as follows: No. 488, remains of tenebrionid beetles, a scorpion, young termites and parasitic worms. No. 493, remains of grasshoppers, beetles and a centipede (*S. morsitans*).

DIMENSIONS. A summary of the measurements of adult specimens is as follows:

	No. of specimens	Extremes	Average
Total length	4	376.0–387.0 mm.	380.5 mm.
Snout to vent	6	133.0–146.0 mm.	137.6 mm.
Tail	4	232.0–248.0 mm.	242.0 mm.
Head length	6	26.4–30.4 mm.	27.3 mm.
Head width	6	18.8–20.4 mm.	19.3 mm.
Arm	6	31.5–34.3 mm.	32.6 mm.
Leg	6	56.0–62.3 mm.	59.4 mm.
Foot	6	27.0–29.0 mm.	28.5 mm.