

## Suborder SERPENTES

## Family TYPHILOPIDAE

McDowell and Bogert (1954, p. 75) have suggested that this family should be removed from the Serpentes, basing their opinion on osteological studies. More recently, Fox (1965) has drawn attention to similarities in the urogenital organs and ducts of Typhlops and Leptotyphlops and concluded that it would be unwise to place these families in separate suborders. It is possible that they will eventually require a suborder to themselves, but until the position is clarified they are retained in the Serpentes.

## TYPHILOPS BRAMINUS (Daudin)

- Eryx braminus Daudin, 1803, Hist. Nat. Rept., 7, p. 279: Bengal, India.  
Onychocephalus Capensis A Smith, 1838, Ill. Zool. S. Africa, Rept., pl. 11, fig. 3, and pl. liv, figs. 9 - 16: "Interior of South Africa" (? = Cape Town).  
Typhlops capensis Peters, 1854, p. 621 (Mozambique and Querimba Islands).  
Typhlops braminus Peters, 1882, p. 92 (Inhambane); Bocage, 1896, p. 90; Loveridge, 1957, p. 244.

One specimen examined from: MOZAMBIQUE. Beira.

Literature records. MOZAMBIQUE. Inhambane; Mozambique Island; Querimba Island.

Description. Rostral narrow, about one third the width of the head; prefrontal small and rounded, subequal to the scale posterior to it; supra-ocular transverse, its lateral apex wedged between the ocular and the pre-ocular; nostril pierced laterally in a divided nasal, the suture arising from the preocular; eye distinct beneath the ocular. Midbody scale rows 20.

Coloration. Blackish brown, a little paler below, tip of tail white.

Size. (UM. 9261 - Beira) 161 + 4 = 165 mm.

Distribution. A south-east Asian species, now cosmopolitan in the tropics (Loveridge, 1957). Widespread on Madagascar (Guibe, 1958, p. 192, fig. 2). Established on the East African coast from Somalia (Gans, Laurent & Pandit, 1965, p. 50) to Inhambane; in south Tanganyika, extending inland 120 miles to Livala (Loveridge, 1955, p. 181). FitzSimons (1937, p. 273) has suggested that the types of O. capensis A. Smith did not come from South Africa. It is possible that they came from Cape Town and that a local colony has subsequently died out.

TYPHLOPS GRACILIS Sternfeld

Typhlops gracilis Sternfeld, 1910, Mitt. Zool. Mus. Berlin, 5, p. 70:

Kitungulu, Urungu, Tanganyika; Vesey-FitzGerald, 1958, p. 34 (Abercorn); Loveridge, 1957, pp. 243 & 245 (footnote); Broadley & Pitman, 1960, p. 438 (Bulaya; Mweru-Wantipa).

Typhlops lumbriciformis (not Peters) Boulenger, 1896, p. 590 (Fwambo).

Typhlops leptosoma Witte, 1933, Rev. Zool. Bot. Afr., 23, p. 189 and Ann. Mus. Congo Zool. (1) 3, p. 83; Lukafu, Katanga; Mertens, 1937, p. 12 (Nsombo).

Fifteen specimens examined from: ZAMBIA. Abercorn; Kaputa (IRSNB); Mporokoso (IRSNB); Mulupa (IRSNB).

Literature records. ZAMBIA. Abercorn; Bulaya; Fwambo; Mweru-Wantipa; Nsombo.

Description. Rostral very large, nearly three-quarters the width of the head; prefrontal broad, subtrapezoidal, larger than the scale posterior to it; supraocular transverse, broadly bordering the enormous nasal; no preocular; nostril inferior; nasal suture rising from first labial; eye not distinguishable. Midbody scale rows 22; midbody diameter into length 73 - 91 times.

Coloration. Uniform flesh pink, rostral yellowish.

Size. Largest (UM. 2542 - Abercorn)  $535 + 5 = 540$  mm.

Enemies. A Nsombo specimen was recovered from the stomach of an Atractaspis bibroni (Mertens, 1937).

Distribution. South-western Tanganyika and northern Zambia.

TYPHLOPS FORNASINII Bianconi

Typhlops fornasinii Bianconi, 1847, Spec. Zool. Mossamb., p. 13, pl. iii, fig. 1: Mozambique; Jan, 1864, 5, pls. v & vi, fig. 5; Peters, 1882, p. 94, pl. xv, fig. 3 (Inhambane; Lourenco Marques); Boulenger, 1893, p. 38 and 1910, p. 497 (Delagoa Bay); FitzSimons, 1962, p. 65; Laurent, 1964a, p. 421.

Onychocephalus mossambicus Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 621: Mozambique and Anjoanna Islands.

Onychocephalus trilineatus Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 621: Lourenco Marques & Inhambane, Mozambique.



Onychocephalus tettensis Peters, 1860, Monatsb. Akad. Wiss. Berlin, p. 80:  
Tete, Mozambique.

Typhlops eschrichtii (not Schlegel, 1844) Bianconi, 1849b, p. 203 and 1850,  
p. 10.

Typhlops bianconii Jan, 1860, Icon. Gen. Ophidiens, p. 23, pls. v & vi, fig. 2.

Typhlops mossambicus Jan, 1864, 5, p. 22, pls. v & vi, fig. 3; Peters, 1882,  
p. 93, pl. xv, fig. 2 (Mozambique Island); Boulenger, 1893, p. 41;  
Boulenger, 1910, p. 498; Essex, 1927, p. 925, figs. 77 & 78; Fitz-  
Simons, 1962, p. 66 (Lourenco Marques).

One specimen examined from: MOZAMBIQUE. Inhaca Island.

Literature records. MOZAMBIQUE. Delagoa Bay; Inhambane; Lourenco  
Marques; Mozambique Island; Tete (?).

Description. Rostral moderate, slightly more than half the width of  
the head; prefrontal small and rounded, subequal to the scale posterior to  
it; supracocular transverse, its lateral apex wedged between the ocular and  
the preocular; nostril pierced inferiorly in a divided nasal, the suture  
arising from the first labial; eye distinct, below the posterior border of  
the ocular. Midbody scale rows 22 - 27; midbody diameter into length 23 -  
38 times.

Coloration. Blackish-brown above and below, underside of head and anal  
region yellowish.

Size. Largest (TM. 4827 - Lourenco Marques)  $154 + 3 = 157$  mm.

Remarks. T. mossambicus and T. tettensis have recently been placed in  
the synonymy of T. forasini by Laurent (1964a).

Habitat. Coastal alluvium.

Distribution. The Mozambique Plain, from Mozambique Island south to  
Zululand.

#### TYPHLOPS OBTUSUS Peters

Typhlops (Onychocephalus) obtusus Peters, 1865, Monatsb. Akad. Wiss. Berlin,  
p. 260, pl., fig. 2; Shire River, Malawi.

Typhlops obtusus Peters, 1882, p. 95; Boulenger, 1891, p. 306 and 1893,  
p. 38; Gunther, 1893, p. 555; Bocage, 1896, p. 90 ("Zambezia");  
Boulenger 1896, p. 586 (Zomba); 1915, p. 615; Laurent, 1964, p. 420.

Typhlops decorosus (not Bucholtz & Peters) Sternfeld, 1908, p. 242 (Mlanje  
Mtn.).

Typhlops tettensis obtusus Loveridge, 1942, p. 257 and 1953, p. 243 (Mlanje and Cholo Mtns.; Blantyre).

One specimen examined from: RHODESIA. Umtali.

Literature records. MALAWI. Blantyre; Cholo Mtn.; Mlanje Mtn.; Shire River; Zomba. MOZAMBIQUE. "Zambezia".

Description. Rostral large, more than half the width of the head; prefrontal broad, subhexagonal, larger than the scale posterior to it; supraocular transverse, its lateral apex wedged between the ocular and the preocular; nostril pierced inferiorly, nasal suture arising from the first labial; eye not distinguishable. Midbody scale rows 22 - 24; midbody diameter into length 48 - 95 times.

Coloration. Blackish above, scales white at the base, whitish below, with the dark dorsal coloration intruding irregularly laterally.

Size. Largest (MZ. 51027 - Mlanje Mtn.)  $357 + 3 = 360$  mm.

Remarks. The Umtali snake is provisionally referred to obtusus, but has not yet been compared with topotypic material

Diet. Winged ants, termites and termite larvae (Loveridge, 1953a).

Parasites. A nematode (Kalicephalus) in a Mlanje specimen (Loveridge, 1953a.).

Distribution. Highlands of south-eastern Malawi and adjoining Mozambique; ? eastern highlands of Rhodesia.

#### TYPHLOPS RONDOENSIS Loveridge

Typhlops tettensis rondoensis Loveridge, 1942, Bull. Mus. Comp. Zool. 91, p. 256: Nchingidi, Rondo Plateau, S. E. Tanganyika.

Typhlops rondoensis Laurent, 1964, p. 419.

One specimen examined from: MOZAMBIQUE. Mitucue Mountain.

Description. Rostral very large, about three-quarters the width of the head; prefrontal broad, subtrapezoidal (but posterior corners rounded), much longer than the scale posterior to it; supraocular oblique, its lateral apex between nasal and preocular; nostril pierced inferiorly, nasal suture rising from the first labial; eye visible below the preocular. Midbody scale rows 22 - 24; midbody diameter into length 30 - 77 times.



Coloration. Pale brown above, each scale paler at the base, uniform yellowish-white below.

Size. (UM. 8029 - Mitucue Mountain)  $227 + 3 = 230$  mm.

Habitat. Found under a log near a stream on the lower slopes of Mitucue Mountain, the soil was dry granitic sand.

Distribution. Rondo Plateau in south-eastern Tanganyika and Mitucue Mountain in northern Mozambique (320 miles to the south-west).

TYPHLOPS SCHMIDTI SCHMIDTI Laurent

Typhlops schmidtii Laurent, 1956, Ann. Mus. Congo (Zool), 48, p. 71, figs. 9 - 11, pl. viii, fig. 4; Nyunzu, Albertville, Congo; Johnsen, 1962, p. 117 (Ndola).

Typhlops punctatus (not Leach) Vesey-FitzGerald, 1958, p. 33 (Abercorn).

Typhlops punctatus ? punctatus (not Leach) Broadley & Pitman, 1962, p. 438.

Typhlops schmidtii schmidtii Laurent, 1964, p. 417 (Abercorn; Edge of Liuwa Plain).

Eighteen specimens examined from: ZAMBIA. Abercorn; Chipangali; Ikelenge; Kabompo; Kalabo; Kasempa; Lusongwa River; Mkanda; Mukupa (IRSNB); Ndola (ZMD); Solwezi.

Literature records. ZAMBIA. Abercorn; Liuwa Plain; Ndola.

Description. Rostral large, about two thirds width of head; prefrontal large, subtrapezoidal, much larger than the scale posterior to it; supra-ocular oblique, its lateral apex wedged between nasal and preocular; nostril inferior, nasal suture rising from first labial; eye visible below the ocular. Midbody scale rows 24 in 15, 26 in 3; midbody diameter into length 22 - 38 times.

Coloration. Lineolate, each scale grey with a pale spot, uniform yellowish-white below.

Size. Largest (ZMD. 5215 - Ndola)  $487 + 5 = 492$  mm.

Distribution. Katanga, north-eastern Angola and Zambia (See map in Laurent, 1964a, p. 409).

## TYPHLOPS SCHINZI Boettger

Typhlops (Onychocephalus) Schinzi Boettger, 1887, Ber. Senck. Ges., p. 154, pl. v., figs. 1a - e & 2: Between Aus and Keetmanshoop, Great Namaqualand, also Noi Xas, Ghanzi, Bechuanaland.

Typhlops schinzi Boulenger, 1893, p. 47; FitzSimons, 1962, p. 70.

No specimens examined.

Literature record. BECHUANALAND. Noi Xas.

Distribution. North-western Cape Province, southern and central South West Africa, western Bechuanaland.

## TYPHLOPS BOYLEI FitzSimons

Typhlops boylei FitzSimons, 1932, Ann. Transvaal Mus. 15, p. 38 and 1935b, p. 308: Gembok Pan, Ghanzi, Bechuanaland; also 1962, p. 69.

No specimens examined.

Literature record. BECHUANALAND. Gembok Pan.

Distribution. North-western Bechuanaland and north-eastern South West Africa.

## TYPHLOPS DELALANDEI Schlegel

Typhlops delalandei Schlegel, 1944, Abbild. Amph., p. 38, pl. xxxi, figs. 17 - 20: "Cape of Good Hope".

Typhlops delalandei Bocage, 1896c, p. 119 (Shoshong, B. P.); Chubb, 1909a, p. 595 and 1909b, p. 35 (Bulawayo); Boulenger, 1910, p. 498; Broadley, 1959, p. 8; FitzSimons, 1962, p. 71.

Fourteen specimens examined from: RHODESIA. Bembesi; Bulawayo and 9 mls S; Esserivale; Heany; Irisvale; Sawmills; Whitewaters (Umtali).

Literature records. BECHUANALAND. Shoshong. RHODESIA. Bulawayo.



Description. Rostral large, about two thirds width of head; prefrontal small, variable in shape and only slightly larger than the scale posterior to it; supraocular transverse, its lateral apex wedged between ocular and preocular; nostril inferior; nasal suture rising from first labial; eye visible below the ocular. Midbody scale rows 23; midbody diameter into length 40 - 57 times.

Coloration. Dark grey above, each scale pale-edged, giving a reticulate effect, white below.

Size. Largest (NMSR. 2199 - Bembezi)  $291 + 5 = 296$  mm.

Enemies. The Whitewaters specimen was recovered from the stomach of an Atractaspis bibroni, fortunately it had been swallowed tail first.

Distribution. Cape Province, north through the western Orange Free State and Transvaal and eastern Bechuanaland to southern Rhodesia.

TYPHLOPS SCHLEGELI SCHLEGELI Bianconi

Typhlops schlegelii Bianconi, 1847, Spec. Zool. Mossamb., p. 13, pl. iii, fig. 1: Inhambane, Mozambique; Jan, 1864, p. 27, pl. vi, fig. 1; Peters, 1882, p. 99; Boulenger (part) 1893, p. 44 (Delagoa Bay); Bocage, 1896, p. 99; Roux, 1907, p. 75 (Rikatla); Boulenger, 1910, p. 499.

Typhlops micrurus (not Peters) Boulenger (part) 1893, p. 46 and 1910, p. 498 (Delagoa Bay).

Typhlops schlegelii schlegelii FitzSimons, 1962, p. 73 (Macia; Guija; Lourenco Marques; Mochudi; Rikatla).

No local material examined.

Literature records. BECHUANALAND. Mochudi. MOZAMBIQUE. Delagoa Bay; Guija; Inhambane; Lourenco Marques; Macia; Rikatla.

Variation. Midbody scale rows 36 - 44; midbody diameter into length 23 - 40 times.

Distribution. Southern Mozambique, northern Zululand, Swaziland, eastern and northern Transvaal and adjoining Bechuanaland.

TYPHLOPS SCHLEGELI MICRUSO (Peters)

Onychocephalus micrurus Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 621: Macanga, Mozambique (restricted by Loveridge, 1933, p. 216) also Tete; Gunther, 1864, p. 307 (Zambezi Expedition).

Onychocephalus dinga Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 620;

Tete, Sena and Chupanga, Mozambique.

Onychocephalus varius Peters, 1860, Monatsb. Akad. Wiss. Berlin, p. 82;

Sena, Mozambique.

Typhlops (Onychocephalus) riparius Peters, 1881, Sitzber. Ges. naturf

Freunde, Berlin, p. 50: Chupanga, Mozambique.

Typhlops micrurus Peters, 1882, p. 95, pl. xiii, fig. 3; Boulenger (part)

1893, p. 46 (Zambezi) and 1896, p. 588 (Fwambo; Zomba); Bocage, 1896, p. 90 (Beira); Boulenger, 1897, p. 800 (Nkata Bay to Ruarwe) and 1907a, p. 9 (Mezi River; Petauke); Chubb, 1909a, p. 595 (Bulawayo, Matopos) and 1909b, p. 35 (Empandene; Syringa); Boulenger (part), 1910, p. 498 (Salisbury); Hewitt & Power, 1913, p. 160 (Marandellas; Eldorado; Francistown); Boulenger, 1915, p. 197; Loveridge, 1929, p. 17 (Kafue River); Pitman, 1934, p. 292 (Broken Hill; Mumbwa); Cott, 1935, p. 964 (Charre); Cunha, 1935, p. 1 (Massangulo); Themido, 1941, p. 15.

Typhlops varius Peters, 1882, p. 97, pl. xiv, fig. 2 & pl. xiv A, fig. 1.

Typhlops riparius Peters, 1882, p. 98, pl. xiv A, fig. 2.

Typhlops dinga Peters, 1882, p. 98, pl. xiv, fig. 1 & pl. xiv A, fig. 3;

Boulenger, 1893, p. 46; Bocage, 1896, p. 99; Boulenger, 1907b, p. 486, (Beira) and 1910, p. 498.

Typhlops schlegelii (not Bianconi) Boulenger, 1902, p. 17, (Mazoe); Peracca, 1910, p. 3 (Barotseland).

Typhlops viridiflavus Peracca, 1912, Ann. Mus. Zool. Univ. Napoli, (2), 3,

No. 25, p. 3: Lake Bangweulu, Zambia; Boulenger, 1915, p. 197; Pitman, 1934, p. 293.

Typhlops schlegelii schlegelii (not Bianconi) Loveridge (Part), 1933, p. 214

(Tete; Mezi River; Chifumbazi; Bulawayo; Chikore; Mount Silinda; Eldorado; Kafue River); Bogert, 1940, p. 15 (Mount Silinda); Loveridge, 1953 a, p. 245 (Tete); FitzSimons, 1962, p. 73 (part - Zumbo).

Typhlops schlegelii micrurus Loveridge, 1933, p. 216 (East African and Angolan

synonyms); Mertens, 1937, p. 11 (Inhamitanga); FitzSimons, 1939b, p. 20, (Mount Silinda); Bogert, 1940, p. 16 (Fort Johnston); Loveridge, 1953a, p. 245 (Misuku Mtns.; Mtimbuka; Blantyre) and 1953c, p. 143 (Zomba), also 1957, p. 241; Vesey-FitzGerald, 1958, p. 32 (Abercorn; Mpulungu); Broadley, 1959b, p. 8; Broadley & Pitman, 1960, p. 438; Hamney, 1961, p. 21 (Blantyre); Broadley, 1962d, p. 825; FitzSimons, 1962, p. 75 (Que Que; Trelawney; Wankie); Johnson, 1962, p. 114/ Wilson, 1965, p. 151. (Chingola - Solwezi; 15 Km NW of Ndola; Kawambwa);

Three hundred and six specimens examined from: RHODESIA. Ard-bennie; Balla Balla; 5 mls S of Beatrice; Bellingwe; Birchencough Bridge; Bulawayo and 9 mls S; Bushtiek Mine; Chipinga; Chirinda Forest; Chishawasha; Condo; Dett; Dorowa; Eastlands Farm; Essexvale; Fern Valley;



Catooma; Glen Clova; 4 mls S of Gwaai Bridge; Haroni - Lusitu Confluence; Helvetia; Insiza; Inyatura; Irisvale; Jersey Estate; 3 mls Sw of Kamativi; Kapani and 6 & 10 mls SE; Kariba; Legion Mine; Mabelreign; Malonga River Bridge; Marandellas; Matopos; Mount Silinda; Norton; Odzani; Oisi; Old Untali; Penhalonga; Redbank; Saffron Walden; Salisbury and 10 mls W; Selukwe; Sinoid; Stapleford; Syringa; Toronto; Turk Mine; Untali; Victoria Falls; Warren Hills; Westacre; West Selangwe. ZAMBIA. Abercorn; Bwana Mbatwa; Chikotukuta; Chikowa; Chilanga; Chingola - Solwezi Road; Chipengali; Chisanga; Changwe; Fort Jameson; near Fort Manning; Kabompo; Kafue River (USNM); Kalichero; Kalomo; Kalomo Boma; Kalubushi River; Kaputa (IISNB); Kasama; Kasempa; Kasusu; Kawambwa; Kitwe; Lundazi; Lusaka; Mambwe (IISNB); Mporokoso; <sup>(IISNB)</sup> Msantile; Msoro; Mumbwa; Mweru - Wantipa (IISNB); Ndola and 10 mls NW; Neama (IISNB); Palm Grove, Livingstone. MALAWI. Blantyre; Cape Maclear; Lilongwe; Luferi; Mlua (USNM); Muzu; Rumpi; Zomba. MOZAMBIQUE. Chemezi; 9 mls SSW of Inhalinga; Macuti; Beira; Maforga; Metuchira; Vila Machado; Xiluvo.

Literature records. BECHUANALAND. Francistown. RHODESIA. Bulawayo; Chikore; Eldorado; Empandene; Macheke (T); Marandellas; Matopos; Masee; Mount Silinda; Que Que; Salisbury; Syringa; Trelawney; Wankie. ZAMBIA. Abercorn; Broken Hill; Chingola - Solwezi; Pwambo; Kafue River; Kawambwa; Lake Bangweulu; Mpulungu; Mumbwa; 15 Km N of Ndola; Petauke. MALAWI. Blantyre; Fort Johnston; Misuku Mts.; Mtimbuka; Mkata Bay to Ruwwe; Zomba. MOZAMBIQUE. Beira; Charro; Chupanga; Chifumbazi; Inhalinga; Macanga; Massangulo; Mozi River; Sena; Tete.

Description. Rostral large, nearly two-thirds width of head; prefrontal small, subequal to the scale posterior to it; supracocular subarrescentic, its lateral apex wedged between ocular and preocular; nostril inferior, nasal suture rising from first labial; eye visible below the ocular. Midbody scale rows 30 - 36 (rarely 38); midbody diameter into length 21 - 36 times.

Coloration. (a) Lineolate - subadults blue-grey to black, each scale paler in the centre, giving the effect of a narrow dark line between each dorsal scale row; below uniform white or yellowish. Adults often become uniform dark grey or brown above.

(b) Blotched - subadults show a faint blue-grey lineolate pattern with irregular black blotches superimposed, uniform white below. Some adults are strikingly marked with irregular patches of black on a pure white ground.

Size. Largest (USNM. 137358 - Mlua, Malawi)  $938 + 12 = 950$  mm.



Discussion. Although the name dinga has page preference over micruso for this widespread and common form, the former was placed in the synonymy of T. s. schlegeli by Loveridge in 1933 and micruso is now too well established to be superseded. Loveridge (1933, p. 215) referred 18 specimens from Mozambique, Rhodesia and the Transvaal to the typical form, although they had only 32 - 38 midbody scale rows (average 34.4). He thought that all the material came from south of the Zambezi, which he used to divide the typical form from T. s. micruso to the north. Actually the specimens from Mezi River, Chifumbazi and Kafue River came from north of the Zambezi.

Loveridge also restricted the type locality of micruso to Macanga, for the rest of Peters' material came from the South bank of the Zambezi, and the names dinga, varius and ripaxius were consequently placed in the synonymy of T. s. schlegeli, but must now be transferred to the synonymy of T. s. micruso.

There is a cline in average midbody scale counts, which increase gradually from north to south, (See Table 5 below), until at about Latitude 22°S there is abrupt increase to the high counts of the typical form (36 - 44). Unfortunately there is a shortage of material from this critical transition zone.

REGION	MIDBODY SCALE ROWS								TOTAL	MEAN
	30	31	32	33	34	35	36	37		
SOUTH TANGANYIKA	27	3	99	13	42	1	8	-	193	32.3
ZAMBIA & MALAWI	5	3	41	5	66	5	20	-	145	33.5
RHODESIA & SOUTH MOZAMBIQUE	2	2	26	1	49	6	33	1	120	34.1

Table 5. Variation in midbody scale counts for southern populations of Typhlops schlegeli micruso, incorporating Loveridge's data for south Tanganyika (1955, p. 180) and Malawi - Tete (1953a, p. 245).

Breeding. On 31st May a 645 mm Bulawayo ♀ held 37 eggs measuring 17 x 10 mm. In August a 700 mm Umtali ♀ contained 46 large eggs. In eastern Zambia a 783 mm ♀ contained 94 small eggs on 4th October and a 400 mm ♀ held 18 eggs on 25th June (Wilson, 1965). A 570 mm Zomba ♀ held 24 eggs measuring 14 x 8 mm (Loveridge, 1953c).

Diet. Termites in a Charre specimen (Cott, 1935), these insects probably form the staple diet of Typhlops.

Enemies. This species has been recovered from the stomachs of Calamellaps u. mialepis at Odzi and Maforga and is readily eaten by captive Calamellaps, Thelotornis kirtlandi and Psammophis sibilans. Atractaspis bibroni also preys upon Typhlops s. micruso (Wilson, 1965).



Habitat. Widespread in savanna, but absent from the Kalahari and Barotseland. Small specimens are often found under logs and stones, the large adults are usually driven to the surface by heavy rain.

Distribution. Kenya, Tanganyika, Mozambique (south of the Save River) Malawi, Zambia, Katanga, Angola, northern South West Africa, Rhodesia and north-eastern Bechuanaland.

Family LEPTOTYPHLOPIDAE

Genus LEPTOTYPHLOPS

LEPTOTYPHLOPS LONGICAUDA (Peters)

Stenostoma longicaudatum Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 621:

Tete, Mozambique, and 1882, p. 102, pl. xv, fig. 5; Bocage, 1896, p. 99.

Glauconia longicauda Boulenger, 1893, p. 66 and 1907a, p. 9 (Ulungu Mtn.)

also 1915, p. 198; Loveridge, 1923d, p. 875 (Lumbo).

Glauconia nigricans (not Schlegel) Boulenger, 1896, p. 591 (Umfuli River).

\* Leptotyphlops longicauda Pitman, 1934, p. 293; Loveridge, 1953a, p. 247 (Tete); Broadley, 1959, p. 10; Hanney, 1961, p. 23 (Karonga); Broadley, 1962d, p. 826; FitzSimons, 1962, p. 80.

Leptotyphlops nigricans (not Schlegel) Manacas, 1954, p. 7 (Cafumpe).

Twenty-two specimens examined from RHODESIA. Irisvale; 10 mls SE of Kapami; Kariba; Kariba Lake - Charara Confluence; Rekomitjie Research Station. ZAMBIA. Ulungu Mtn. (BM). MOZAMBIQUE. Mida - Lamago; 9 mls S of Mwanza.

Literature records. RHODESIA. Umfuli River. ZAMBIA. Ulungu Mtn. MALAWI. Karonga; Kota Kota. MOZAMBIQUE. Cafumpe; Lumbo; Tete.

Description. Rostral small, not extending back to the level of the eyes, separated from the supraocular by the upper part of the nasal; supraocular subequal in size to prefrontal; diameter into length 51 - 81 times; tail .07 to .18 of total length.

Coloration. Pale grey or reddish-brown above, flesh pink below.

Size. Largest (UM. 4938 - Rekomitjie Research Station)  $220 + 22 = 242$  mm.

Breeding. A 205 mm Irisvale ♀ contained two eggs measuring  $21 \times 4$  mm on 22nd November.

\* Glauconia emini (not Boulenger) Loveridge, 1923d, p. 874 ("Kosa Kola" = Kota Kota).

Habitat. Ten specimens were taken in association with four L. scutifrons on a quartz reef at Irisvale, another was on a granite outcrop nearby. One was under a log on Kalahari sand near Kapami. The Kariba specimens were in Mopane woodland.

Distribution. Coastal Kenya, Tanganyika, Mozambique, Malawi, Zambia, Rhodesia, northern and eastern Transvaal.

LEPTOTYPHLOPS EMINI EMINI (Boulenger)

Glaucania emini Boulenger, 1890, Ann. Mag. Nat. Hist., (6) 6, p. 91:

Karagwe, Victoria Nyanza, and 1893, p. 64 (Nyankola), also 1915, p. 198.

Leptotyphlops emini Pitman, 1934, p. 293.

Leptotyphlops emini emini Johnsen, 1962, p. 117 (Ndola).

Ten specimens examined from: ZAMBIA. Bwana Maubwa; Chongwe; Kabompo; Kasempa; Kaungashi; Mwinilunga District; Ndola.

Literature records. ZAMBIA. Ndola; Nyankolo.

Description. Rostral small, not extending back to the level of the eyes, separated from the supraocular by the upper part of the nasal; supraocular much larger than prefrontal; diameter into length 40 to 57 times; tail .07 to .10 of total length.

Coloration. Brown above, slightly paler below.

Size. Largest (NMSR. 53 - Kasempa)  $153 + 12 = 170$  mm.

Distribution. Southern Sudan, Ethiopia, Somalia, Uganda, Kenya, Tanganyika, south through the eastern Congo to northern and western Zambia.

LEPTOTYPHLOPS CONJUNCTA (Jan)

Stenostoma nigricans (not Schlegel) Peters, 1854, p. 621 and 1882, p. 102 (Mozambique Island).

Stenostoma conjunctum Jan, 1861, Arch. Zool. Anat. Fisiol., 1, p. 189:

"South Africa".

Glaucania conjuncta Boulenger, 1893, p. 67.

Glaucania nigricans (not Schlegel) Boulenger, 1907a, p. 9 (Petauke; Luangwa Valley).





Leptotyphlops conjuncta Pitman, 1934, p. 293; FitzSimons, 1939b, p. 20 (Mount Silinda; Changadzi River); Broadley, 1959b, p. 9; FitzSimons, 1962, p. 84; Hanney, 1962, p. 11 (Port Herald).

Leptotyphlops nigricans (not Schlegel) Pitman, 1934, p. 293 (Broken Hill).

? Leptotyphlops emini (not Boulenger) Bogert, 1940, p. 14 (Mount Silinda).

Eighteen specimens examined from: RHODESIA. Chipinga; Mazoe (BM); Umtali; Umzilizwe River. ZAMBIA. Chakwenga River; Changwe; Lundazi; Petauke (BM); Siantamba. MOZAMBIQUE. 8 mls NE of Inhawinga; Xiluvo.

Literature records. RHODESIA. Changadzi River; Mount Silinda. ZAMBIA. Broken Hill; Luangwa Valley; Petauke. MALAWI. Port Herald. MOZAMBIQUE. Mozambique Island.

Description. Rostral moderate, nearly twice the width of the nasal, narrowing to a point posteriorly and reaching the level of the eyes, in broad contact with the supracoculars.

Coloration. Uniform black above and below.

Size. Largest (NMSR. 3095 - Siantamba)  $149 + 15 = 164$  mm.

Distribution. Uganda, Kenya, Tanganyika, Mozambique, Zambia, eastern Rhodesia, Transvaal, Orange Free State, and eastern Cape <sup>Natal</sup> Province.

#### LEPTOTYPHLOPS SCUTIFRONS (Peters)

Stenostoma scutifrons Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 621:

Sena, Mozambique, and 1882, p. 104, pl. xiv, fig. 4 and pl. xv, fig. 4; Bocage, 1896, p. 90.

Glaucania scutifrons Boulenger 1893, p. 68; Peracca, 1896, p. 2 (Kazungula); Chubb 1909a, p. 595 and 1909b, p. 35 (Bulawayo); Boulenger, 1910, p. 500 (Bulawayo; Matopos; Salisbury); Warner, 1910, p. 354 (Vlei Topan; Severelele - Kakia; Severelele - Koca); Boulenger, 1915, p. 198.

Glaucania distanti Boulenger, 1892, Reptilia and Batrachia in W. L. Distant, "A Naturalist in the Transvaal," p. 175, fig.: Pretoria, Transvaal and 1897, p. 800 (Fort Hill); Gough, 1908, p. 20 (M'moouve).

Leptotyphlops distanti Cott, 1935, p. 964 (Charre).

Leptotyphlops scutifrons FitzSimons, 1935b, p. 308 (Chukudu; Gamsbok; Mabeleapudi; Motlhatlogo; Maun); Broadley, 1959b, p. 10; FitzSimons, 1962, p. 86 (Ghansi); Wilson, 1965, p. 152.

Leptotyphlops conjuncta distanti Loveridge, 1953a, p. 248 (Fort Hill).

One hundred and twenty-eight specimens examined from: BECHUANA-  
LAND. Francistown; 10 mls S of Madinare; Makalamabedi; Kanye.  
RHODESIA. Balla Balla; Beithridge; Bembesi; Birchenough Bridge; Bulawayo; Burma Valley; Chipinda Pools; Chiredzi; Chishawasha; Chisumbanje; Essexvale; Fatima; Gatooma; 5 mls W of Gwaai Bridge; Gwelo; Haroni - Lusitu Confluence; Irisvale; 10 mls SE of Kapami; Lake Macilwaine; Lundi Bridge; Manyera Farm; Mount Hampden; Mpudzi Bridge; Rapis Hot Springs; Sabi - Lundi Confluence; Saffron Walden; Salisbury - 12 mls NE, 10 mls W and 25 mls WSW; Shabani; Shashi - Shashani Confluence; Stanmore; Untali; 15 mls WSW of Victoria Falls; Wankie National Park - Main Camp. ZAMBIA, Chipengali; Fort Jameson; Kalichero; 20 mls W of Katete. MOZAMBIQUE, Inchope; Mida - Lamago; Xiluvo.

Literature records. BECHUANALAND. Chukudu; Gamsbok; Ghansi; Mabeleapudi; Maun; M'mocurve; Motihatlogo; Severelela - Kakia; Severelela - Loca; Vlei Topan. RHODESIA. Bulawayo; Kazungula; Matopos; Salisbury. MALAWI. Fort Hill. MOZAMBIQUE. Charre; Sena.

Description. Rostral very large, more than three times the width of the nasal, sometimes practically covering the top of the head and extending back beyond the level of the eyes, in broad contact with the supracoculars; snout sometimes slightly hooked in profile (adults).

Coloration. Usually uniform black above and below, but reddish-brown in some Kalahari specimens (FitzSimons, 1935b).

Size. Largest (NMR. 1371 - Stanmore)  $228 + 13 = 241$  mm.

Discussion. L. distanti was placed in the synonymy of L. scutifrons by Loveridge (1933, p. 225), who was supported by FitzSimons at that time. Bogert (1940, p. 13) revived distanti as a race of L. conjuncta and was subsequently followed by Loveridge (1953a; 1957, p. 246) and Mertens (1955). FitzSimons (1962) regards L. distanti as a full species, sympatric with L. scutifrons and L. conjuncta, but not occurring north of Latitude  $22^{\circ}$  S.

I have compared the type of L. distanti with the specimen from Fort Hill recorded by Boulenger (1897) and they are similar, while five specimens from south-eastern Rhodesia also have very large rostrals and slightly hooked snouts. I consider these to be variants of L. scutifrons. Specimens from eastern Zambia show considerable variation in size of rostral, forming a gradient from typical scutifrons to typical conjuncta.

The systematics of the Leptotyphlops scutifrons - conjuncta group will never be clarified while diagnosis depends entirely on the proportions of the rostral. The number of scales in the median dorsal row and the number of subcaudal scales provide useful characters for taxonomic studies on the American species of Leptotyphlops (Klauber, 1940). The difficulty in counting



scales accurately on these small reptiles is the biggest obstacle to revisionary studies on the group, but Gans and Taub (1965) have recently found that in several East African species of Typhlops the number of vertebrae (taken off X-ray films) is a more stable character than dorsal scale count.

Counts of vertebrae may prove to be the Key to the systematics of the African Leptotyphlopidae.

Enemies. Specimens have been recovered from the stomachs of the following carnivores (number of Leptotyphlops in parentheses): Bat-eared Fox (Otocoryon megalotis) at Kanyu (1); Cape Foxes (Vulpes chama) at Kanyu (1) and Sehitwa (1); Black-backed Jackal (Canis mesomelas) at Kanyu (1); Genets (Genetta genetta) at Makalamabedi (2) and Sehitwa (1); Selous Mon-gooses (Paracynctis selousi) at Sehitwa (1) and Gwanda (1); Slander Mon-goose (Herpestes sanguineus) at Salisbury (3).

One was found in the stomach of a Psammophis s. sibilans from Xihuvo; they are readily eaten by captive Calamelaps u. molepis.

Distribution. Malawi and eastern Zambia, Mozambique, Rhodesia, Bechuanaland, northern South West Africa, Transvaal, Orange Free State, Natal and northern parts of Cape Province.

#### Family BOIDAE

#### Subfamily PYTHONINAE

#### Genus PYTHON Daudin

Python Daudin (part) 1803, Mag. Encycl. (March, An, 8), p. 434 and Hist. Nat. Rept., 5, p. 226. Type by subsequent designation: Coluber molurus Linnaeus.

#### PYTHON SEBAE (Gmelin)

Coluber Sebae Gmelin, 1789, Syst. Nat. ed. 13, 1, Part 3, p. 1118:

"America" (in error).

Python natalensis A. Smith, 1833, S. African Quart. Journ., 2, p. 64:

Natal, South Africa; Peters, 1854, p. 621 and 1882, p. 105 (Mozambique Island; Cabaceira; Boror); Bocage, 1882, p. 287 (Angoche) and 1896, p. 90.

Python sebae Boulenger, 1897, p. 800 (Kondowe to Karonga); and 1907a, p. 10 (Lukashashi River; Petauke); Chubb, 1909a, p. 595 (Fort Usher, Matopos; Springvale Farm; Syringa) and 1909b, p. 35 (Bulawayo); Boulenger, 1910, p. 500 (Salisbury); Peracca, 1910, p. 3, (Barotseland); Hewitt & Power, 1913, p. 161 (Okavango River; Baralong Farms; Forest Hill); Boulenger, 1915, p. 199; Power, 1927c, p. 409 (Lobatsi); Pitman, 1934, p. 293 (Broken Hill, etc.); Cott, 1935, p. 964 (M'Gaza); FitzSimons, 1935b, p. 309 (Metsimaklaba River; Maun; Kwaai); Mitchell, 1946, p. 42; Loveridge, 1953a, p. 247 (Chibotela; Chipoka); Vesey-FitzGerald, 1958, p. 35 (Abercorn); Broadley, 1959, p. 11; Broadley & Bitman, 1960, p. 438; Broadley, 1961b, p. 32; Manacas, 1961, p. 158 (Vila Paiva de Andrada); Broadley, 1962d, p. 826; FitzSimons, 1962, p. 93 (Lourenco Marques; Maputo); Johnson, 1962, p. 117 (61 Km S of Abercorn; Mpulungu); Wilson, 1965, p. 152 (Chipopera; Lundazi; Lukusuzi Game Reserve; Jumbe; Chipengali; Chikowa; Msoro; Katete; Petauke; Sayiri; Byika Plateau; Kalichero; Lusungazi).

Thirty-two specimens examined from: RHODESIA. Beithbridge; Bulawayo; Chishawasha; Chitara; Essentvale; Kapami; Kariba Lake (San-yati Island); Matopos; Mazoe; Odzi; Old Umtali; Rusape; Salisbury District; Triangle; Umtali. ZAMBIA. Abercorn (IRSNB); Chipopera; Fort Jameson; Kabompo; Kaputa (IRSNB). MOZAMBIQUE. Namaacha.

Literature records. BECHUANALAND. Baralong Farms; Forest Hill; Kwaai; Maun; Metsimklaba River; Okavango River. RHODESIA. Bulawayo; Fort Usher; Mtao Forest (T); Salisbury; Springvale Farm; Syringa. ZAMBIA. Abercorn and 61 Km. S; Broken Hill; Chikowa; Chipengali; Chipopera; Jumbe; Kalichero; Kasama; Katete; Lukashashi River; Lukusuzi Game Reserve; Lundazi; Lusungazi; Mpulungu; Msoro; Nyika Plateau; Petauke; Sayiri. MALAWI. Chibotela; Chikwawa; Chipoka; Chiromo; Chitala; Fort Johnston; Kondowe to Karonga; Lake Chilwa; Monkey Bay; Port Herald; Zomba. MOZAMBIQUE. Angoche; Boror; Cabaceira; Lourenco Marques; Maputo; Mozambique Island; M'Gaza; Vila Paiva de Andrada.

Variation. Midbody scale rows 69 - 93; ventrals 270 - 286; anal entire; subcaudals 63 - 81.

Size. No large specimens have been preserved.

Diet. Wilson (1965) records an adult ♂ bushbuck (Tragelaphus scriptus) eaten by a 15 foot python at Lusungazi, and a 13½ foot ♀ python killed at Jumbe after it had swallowed a 19 lb duiker (Sylvicapra grimmia); other



specimens had taken a guineafowl, a domestic rooster and a dog. A python killed at Salisbury contained a springhare (Pedestes cafer). Junor (in litt.) records that a 10 foot python captured at Kariba Lake disgorged an adult Grysbok ram (Raphicerus sharpei), other specimens were found while constricting leguans, an 8 foot python was killing a  $5\frac{1}{2}$  foot Varanus n. niloticus, and a 10 foot snake had killed a  $3\frac{1}{2}$  foot Varanus e. albigularis.

Parasites. Ticks (Amblyomma mitali and Aponomma exornatum) in the nostrils of an Umali snake (identified by Dr. G. Theiler).

Distribution. Savanna and forest areas of Africa south of the Sahara, absent from very arid areas and most of the Cape Province, Orange Free State and southern Transvaal. This species occurs at altitudes up to 6,000 feet on the Eastern Escarpment.

Family COLUBRIDAE

Subfamily COLUBRINAE

Genus LYCODONOMORPHUS Fitzinger

Lycodonmorphus Fitzinger, 1843, Syst. Rept. p. 27. Type by original designation: Coronella rufula Schlegel = Coluber rufulus Lichtenstein.

Ablabophis Boulenger, 1893, Cat. Snakes Brit. Mus., 1, p. 318. Type by monotypy: Coluber rufulus Lichtenstein.

Glypholytus Gunther, 1893, Proc. Zool. Soc. London, p. 629. Type by monotypy: G. bicolor Gunther.

LYCODONOMORPHUS BICOLOR (Gunther)

Glypholytus bicolor Gunther, 1894, Proc. Zool. Soc. London (1893), p. 629, fig. 1: Shores of Lake Tanganyika; Boulenger, 1896, p. 695, and 1915, p. 201.

Lycodonmorphus bicolor Loveridge, 1958, p. 9 (Mpulungu); Vesey-Fitzgerald, 1958, p. 36.

Six specimens examined from: ZAMBIA. Lake Tanganyika at Mpulungu.

Literature records. ZAMBIA. Mpulungu.

Variation. Pupil round; preocular 1; suboculars 0 - 2; postoculars 2; temporals 1 + 2 (rarely 1 + 3); upper labials 7, the fourth entering the orbit, or excluded by suboculars or contact between preocular and lower postocular; lower labials 8, the first 4 in contact with the anterior sublinguals; dorsals in 23 (rarely 25) rows on nape, 23 at midbody, 17 - 19 before the vent; ventrals 155 - 161 in ♂♂, 156 - 162 in ♀♀; anal entire; subcaudals 64 - 67 in ♂♂, 55 - 57 in ♀♀. Dentition - maxillary 18 - 19; dentary 20 (Gott 1935, from Parker MS).

Coloration. Glossy olive/<sup>brown</sup>to plumbeous above, yellowish - white below (including outer  $2\frac{1}{2}$  dorsal scale rows), usually a dark median line under the tail.

Size. Largest ♂ (NMSR. 1653 - Mpulungu)  $360 + 118 = 478$  mm. Largest ♀ (NMSR. 1652 - Mpulungu)  $518 + 121 = 639$  mm.

Breeding. The largest ♀, collected on 17th October, contained 5 eggs measuring  $26 \times 10$  mm.

Diet. This species feeds entirely on small fish.

Habitat. Spends the day in rock crevices and under stones along the lake shore, emerging at night to feed in the open lake.

Distribution. Endemic to Lake Tanganyika.

#### LYCODONOMORPHUS LELEUPI MLANJENSIS Loveridge

Lycodonomorphus rufulus mlanjensis Loveridge, 1953, Bull. Mus. Comp. Zool., 110, p. 253: Bas River, Mlanje Mountain, Malawi (also Cholo Mtn.; Zomba) and 1958, p. 16; Broadley, 1959 b, p. 13; Hanney, 1961, pp. 21, 23 (Blantyre); FitzSimons, 1962, p. 108; Broadley, 1962d, p. 827.

Twenty-one specimens examined from: RHODESIA. Bedza; Cashel; Fern Valley; Inyanga Tea Estates; Nyamaropa; Old Umtali. MALAWI. Blantyre; Zomba.

Literature records. RHODESIA. Macheke (T). MALAWI. Blantyre; Cholo Mtn.; Mlanje Mtn.; Zomba.

Variation. Pupil round to subelliptic; preoculars 1, rarely 2; postoculars 2, rarely 1; temporals 1 + 2; first labial usually separated from loreal; upper labials 8, the fourth and fifth entering the orbit; lower labials 8 the first/in contact with the anterior sublinguals; dorsals in



19 - 21 rows on nape, 21 at midbody, 17 before the vent; ventrals (D) 163 - 169 in ♂♂, 166 - 171 in ♀♀; anal entire; subcaudals 66 - 76 in ♂♂, 51 - 58 in ♀♀. Dentition - maxillary 22 - 25; palatine 11 - 14; pterygoid 25 - 33; dentary 25 - 30 (4 skulls).

Coloration. Glossy blackish-olive above, underside yellowish-white, including upper labials and outer  $1\frac{1}{2}$  dorsal scale rows, tail with a dark median line.

Size. Largest ♂ (MSR. 4358 - Cashel)  $580 + 173 = 753$  mm. Largest ♀ (UM. 10356 - Old Umtali)  $750 + 175 = 925$  mm.

Discussion. This form differs from sympatric L. rufulus in several characters, which are tabulated below:

Character	<u>L. l. mlanjensis</u>	<u>L. rufulus</u>
Pupil	Round to subelliptic	Vertical
Midbody scale rows	21	19
Dorsal colour	Blackish - olive	Olive brown
Colour of tail below	Yellow with a dark median stripe	Yellow infuscated with brown or uniform brown.

I have compared these specimens with two Lycodonomorphus l. leleupi from Lusanga, in the Upemba National Park, Katanga. They appear to be conspecific, the only difference being the ventral coloration - black mottled with cream in the typical form and cream, often with a few black spots posteriorly, in mlanjensis.

Breeding. The largest ♀ contained 9 eggs averaging  $25 \times 13$  mm in December.

Diet. A specimen was caught at Old Umtali while swallowing a small Barbel (Clarias gariepinus). These snakes feed readily on small fish and frogs (including Xenopus l. laevis) in captivity.

Habitat. At Old Umtali this species lives in dams and irrigation furrows and is sympatric with Lycodonomorphus rufulus.

Distribution. South-eastern Malawi and eastern Rhodesia.

#### LYCODONMORPHUS RUFULUS (Lichtenstein)

Coluber rufulus Lichtenstein, 1823, Verz. Dobl. Zool. Mus. Berlin, p. 105: South Africa.

Ablabophis rufulus Boulenger, 1893, p. 318 (Matabeleland); FitzSimons, 1939b, p. 21 (Vumba Mountain).

Lycodonomorphus rufulus rufulus FitzSimons, 1953a, p. 209 (Pungwe River Causeway); Loveridge, 1958, p. 19; Broadley, 1959b, p. 12 and 1962d, p. 826; FitzSimons, 1962, p. 106 (Lourenco Marques; Rikatla).

Forty-eight specimens examined from: RHODESIA. Bulawayo; Chimanimani Mtns.; Chinyamanda; Engwa; Gaeresi River; Glen Lorne; Gwelo; Haroni River at 1,200 feet; Inyanga National Park; Nyamziwa; Old Umtali; Silverstreams; Stapleford; Vumba Mtn. MOZAMBIQUE. Gorongosa Mtn.; Inhaca Island.

Literature records. RHODESIA. Pungwe River Causeway; Vumba Mtn. MOZAMBIQUE. Lourenco Marques; Rikatla.

Variation. Pupil vertical; preoculars 1, rarely 2; postoculars 2; temporals 1 + 2 (very rarely 1 + 1); upper labials 8, the fourth and fifth entering the orbit; lower labials 8 (rarely 7 or 9), the first 4 (rarely 3 or 5) in contact with the anterior sublinguals; dorsals in 19 rows on nape and at midbody, 17 before the vent; ventrals (D) 166 - 174 in ♂♂, 165 - 173 in ♀♀; anal entire; subcaudals 64 - 78 + in ♂♂, 53 - 64 in ♀♀. Dentition - maxillary 25; palatine 13 - 14; pterygoid 34; dentary 29 - 30 (2 skulls).

Coloration. Olive brown above, pinkish or yellowish white below, tail suffused with brown or uniform brown below.

Size. Largest ♂ (UM. 7346 - Bulawayo) 475 + 164 + = 639 mm. Largest ♀ (UM. 7211 - Old Umtali) 630 + 115 + = 745 mm.

Diet. A Vumba snake contained 3 Rana grayi rhodesiana and the same species was found in another Vumba snake by FitzSimons (1939b). An Engwa specimen contained 4 Arthroleptis x. xenodactyloides and one taken in a reedbed at night on Inhaca Island had eaten a Hyperolius tuberilinguis. Several other snakes contained unidentifiable Rana remains.

Habitat. Permanent streams, irrigation furrows, dams and marshes at altitudes over 3,500 feet (except in south Mozambique, where it occurs at sea level).

Distribution. South Africa (excluding the arid western and central areas) and southern Mozambique. Relict populations on the eastern highlands of Rhodesia (extending along the main watershed to Salisbury, Gwelo and Bulawayo) and on Gorongosa Mountain.



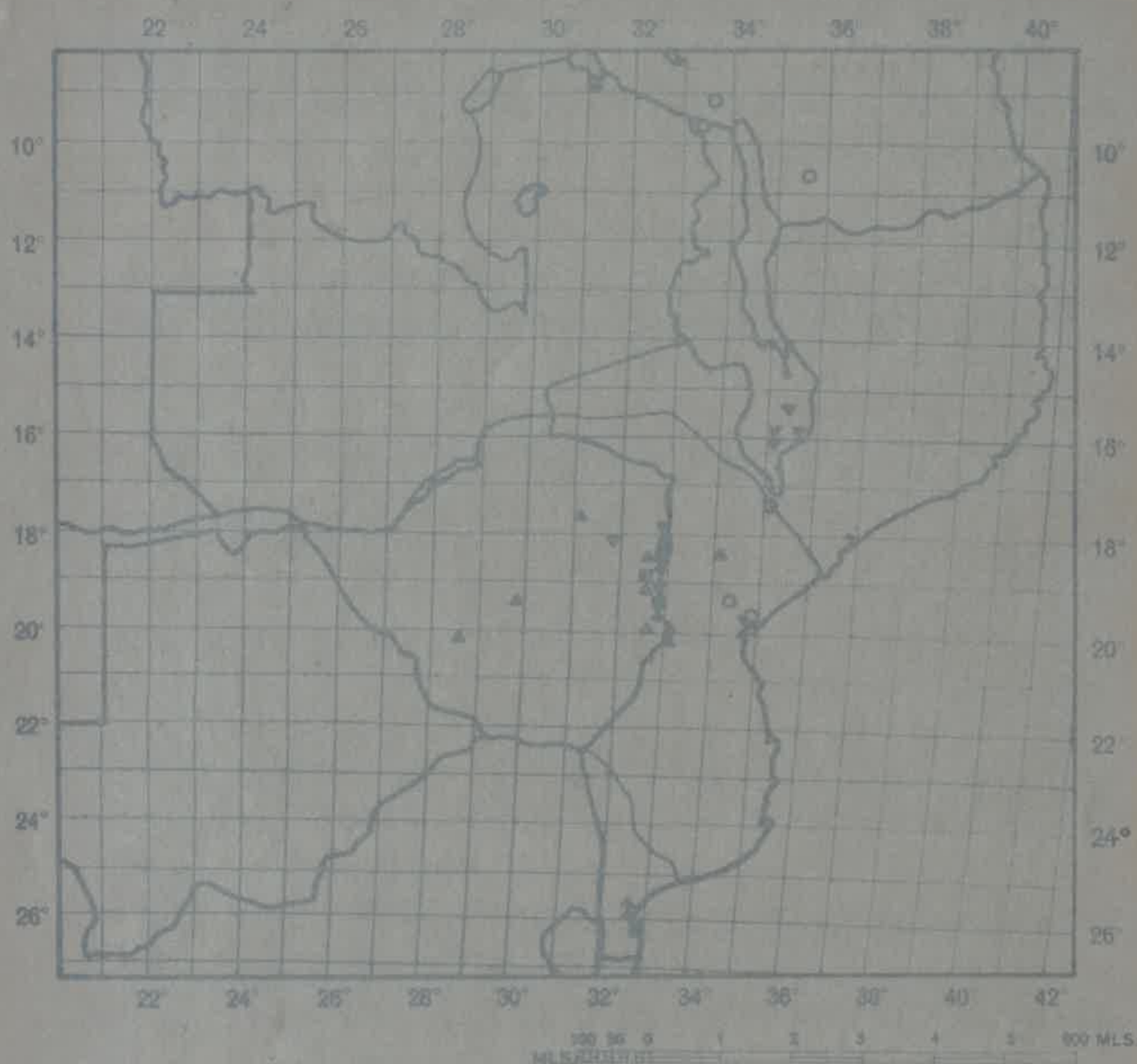


Fig. 10. Distribution of the genus *Lycodonomorphus*.

- *Lycodonomorphus bicolor* (Günther)
- ▼ *Lycodonomorphus leleupi* *slanjensis* n. sp.
- ▲ *Lycodonomorphus rufus* (Lichtenstein)
- *Lycodonomorphus l. slanjensis* and *L. rufus*
- *Lycodonomorphus whitlei whitlei* (Boulenger)

LYCODONOMORPHUS WHYTEI WHYTEI (Boulenger)

Glypholycus whytii Boulenger, 1897, <sup>Proc.</sup> Zool. Soc. London, pp. 800, 802, pl. xlvii, fig. 2: Fort Hill, Malawi.

Ahlabophis whytii Cott, 1935, p. 965 (Charre); Bogert, 1940, p. 19.

Lycodonomorphus rufulus whytii Loveridge, 1953a, p. 255, 1955, p. 182 and 1958, p. 17.

Six specimens examined from: MOZAMBIQUE. Beira and 8 mls NE; Lamego; Manga.

Literature records. MALAWI. Fort Hill. MOZAMBIQUE. Charre.

Variation. Pupil vertical; preocular 1; postoculars 2; temporals 1 + 2; upper labials 8 (rarely 9), the fourth and fifth (rarely the fifth and sixth) entering the orbit; lower labials 8, the first 4 - 5 in contact with the anterior sublinguals; dorsals with two apical pits, in 19 rows on nape and at midbody, 17 before the vent; ventrals (D) 165 - 173 in ♀♀; anal entire; subcaudals 37 - 46 in ♀♀. Dentition - maxillary 22; palatine 13; pterygoid 26; dentary 25 (one skull).

Coloration. Iridescent grey-brown to blackish above, yellow below, mental with two dark spots, first two lower labials each with a dark spot, tail with a dark median stripe.

Size. Largest ♀ (UM. 8956 - Beira) 575 + 85 = 660 mm.

Discussion. Loveridge (1953a) treated whytei as a race of L. rufulus, but FitzSimons (1964) established that it was a full species when he described L. whytei obscuriventris from the Kruger National Park, the latter is sympatric with L. rufulus. Apart from the short tail, L. w. whytei can be distinguished from L. rufulus by the symmetrical markings on the mental and anterior lower labials, its dorsal scales are more glossy than those of L. rufulus and the two apical pits better defined.

No males are known, but ♀♀ from Mozambique have only 37 - 39 subcaudals, compared with 46 - 47 for the three ♀♀ from north Malawi and S. W. Tanganyika. This species probably has a similar distribution to Atheris supercilialis and it should therefore occur in marshy areas along the shores of Lake Malawi, in the Shire Valley and around Lake Chilwa. Material from these areas may show that the variation in subcaudal counts is clinal, so it would be premature to give nomenclatural recognition to the Mozambique populations.

Habitat. Seasonal swamps north of Beira and on the Pungwe Flats.

Distribution. Northern Malawi and south-western Tanganyika (Rungwe; Songea) south through Mozambique to Beira.



## Genus BOAEDON Dumeril &amp; Bibron.

Boaedon Dumeril & Bibron, 1854, Erpet. Gen., 7, p. 357: Type by designation of Loveridge (1957): B. lineatum Dumeril & Bibron = Lycodon fuliginosus Boie.

Holuropholis Dumeril, 1856, Revue Mag. Zool. (2), 8, p. 465. Type by monotypy: H. olivaceus Dumeril.

## BOAEDON FULIGINOSUS FULIGINOSUS (Boie)

Lycodon fuliginosus Boie, 1827, Isis von Oken, 20, col. 551: "Java" (in error).

Boaedon Lineatum Dumeril & Bibron, 1854, Erpet. Gen., 7, p. 363: Gold Coast.

Lycodon geometricus (not Schlegel) Peters, 1854, p. 622 (Tete)

Boaedon quadrilineatum var. variagatum Jan, 1870, Icon. gen., liv, 36, pl. 11, fig. 4. (Mozambique).

Boaedon quadrilineatum Peters, 1882, p. 133 (Tete).

Boodon lineatus Gunther, 1864, p. 307 (Zambezi Expedition) and 1893, p. 555 (Shire Highlands); Boulenger, 1893, p. 332 (Blantyre; Zambezi; Delagoa Bay) and 1896, p. 616 (Zomba); Bocage, 1896, p. 91 (Mozambique; Quelimane); <sup>Boulenger,</sup> 1897, p. 801 (Kondowe to Karonge; Nyika Plateau; Fort Hill), 1902, p. 17 (Mashonaland) and 1907b, p. 486 (Beira); Roux, 1907, p. 76 (Rikatla); Chubb, 1909a, p. 595 (Bulawayo; Shangani River; Gwamayaya River) and 1909b, p. 35 (Empandene); Boulenger, 1910, p. 505 (Mazoe; Salisbury; Livingstone; Delagoa Bay); Peracca, 1910, p. 3 (Barotseland); Werner (part), 1910, p. 355 (Vlei Topan); Hewitt & Power, 1913, p. 161 (Marandellas; Francistown); Boulenger, 1915, p. 202; Angel, 1921, p. 42 (Lealui); FitzSimons, 1935b, p. 310 (Tituni; Kuke; Gomodimo; Van Zyl's Cutting); Cunha, 1935, p. 5 (Massangulo); Themido, 1941, p. 16;

Boodon quadrilineatus Pfeffer, 1893, p. 86 (Quelimane).

Boodon fuliginosus Cunha, 1935, p. 6 (Massangulo).

Ablabophis rufulus (not Lichtenstein) Cunha, 1935, p. 5 (Massangulo), see Loveridge, 1953a, p. 255.

Boaedon lineatus Loveridge, 1933, p. 232 (Nyamankoko); Pitman, 1934, p. 294 (Broken Hill); Cott, 1935, p. 965 (M'Gaza; Gaia; Charre; Fambani); FitzSimons, 1939b, p. 21 (Mount Silinda; Birchenough Bridge).

Boaedon lineatus lineatus Bogert, 1940, p. 21 (Mlanje; Karonga); Loveridge, 1953a, p. 256 (N'chisi Mtn.; Zomba Plateau; Likabula River; Misuku Mtns.; Nyika Plateau; Nchenachena; Vipya Plateau; Chitala River; Mtimbuka; Lake Malombe; Ruo River; Cholo Mtn.; Tete; Beira) and 1953c, p. 143



(Nchalo); FitzSimons & Brain, 1958b, p. 102; Manacas, 1959, p. 137 (Namacha; Mauele; Manhica; Vila Mousinho; Vila Paiva de Andrada); Hanney, 1961, p. 21 (Blantyre).

Boaedon fuliginosus fuliginosus Leveridge, 1957, p. 251; Broadley, 1958c, p. 197, illus.; Vesey FitzGerald, 1958, p. 38 (Abercorn; Mpulungu); Broadley, 1959, p. 14; Broadley & Pitman, 1960, p. 439; Johnsen, 1962, p. 118 (Kawambwa; Chingola; Ndola and 15 Km NW; 29 Km E of Chingola); Broadley, 1962d, p. 827; FitzSimons, 1962, p. 119 (Chishawasha; Guija; Inhaca Island; Lourenco Marques; Maputo; Odzi; Que Que; Quissico; Zumbo); Roux - Esteve & Guibe, 1965a, p. 397 and 1965b, p. 769; Wilson, 1965, p. 153.

Three hundred and four specimens examined from: CAPRIVI STRIP. Lake Ldambezi. RHODESIA. Battlefields; Bambesi; Birchenough Bridge; Bulawayo and 10 mls S; Cement; Chibakwe River Bridge; Chipinda Pools; Chipinga; Chinyamanda; Dorowa; Essexvale; Haroni River at 1,200 feet; Heany; Inyanga Tea Estates; Irisvale; Kapami and 5 mls SE; Kariba; Kariba - Charara Confluence; Khami; Kumalo; Lechard; 3 mls SE of Lupane; Marandellas; Matusadona Reserve; Mkota Reserve; Mtoko; Mount Hampden; Nelson South; Ngorima Reserve (E); Nuanetsi; Nyamashatu Bridge; Old Untali; Salisbury; Sawmills; Selukwe; Silverstreams; 20 mls N of Sinoia; Stapleford; Untali; 10 mls S and 13 mls WSW of Victoria Falls; Vumba Mtn.; West Sebungwe; Zambezi - Sebungwe Confluence. ZAMBIA. Abercorn (UM. & IRSNB); Balmoral Farm; Chikowa; Chilanga; Chipengali; Fort Jameson; Kabompo Boma; Kafue River; Kalabo; Kalichero; Kaniki; Kasempa; Kasusu; Kalomo; Luanshya; Lundazi; Lusaka; Livingstone; Machile; Mambwe (IRSNB); Maweni; Mfuwe; Moshi; Mpemba; Mporokoso (IRSNB); Msandile; Msoro; Mulupa (IRSNB); Mulanga; Mumbwa; Mwekera; Ndola; Nyika Plateau; Nyimba; Petauke Old Boma; Sakeji Stream; Sayiri; Solwezi. MALAWI. Blantyre; Lilongwe; Lujeri; Rumpi. MOZAMBIQUE. Dondo; Gorongosa Mountain; Inhope; Inhaca Island; Maforga; Magasso; Manga; Maringa; Morrumbala; Mozambique Island; Muda - Lago; Nharuchonga; Vila Bocage; Vila de Manica; 5 mls W of Tete; Xiluvo.

Literature records. BECHUANALAND. Francistown; Gomodimo; Kuke; Titumi; Van Zyl's Cutting; Vlei Topan. RHODESIA. Birchenough Bridge; Bulawayo; Chishawasha; Empandene; Gwamayaya River; Marandellas; Mazoe; Mount Silinda; Odzi; Que Que; Salisbury; Shangani River. ZAMBIA. Abercorn; Broken Hill; Chingola & 15 mls E; Kawambwa; Lealui; Livingstone; Mambwe (D); Mporokoso; Mpulungu; Ndola; Nyankolo. MALAWI. Blantyre; Chitala River; Cholo Mtn.; Fort Hill; Karonga; Kondowe to Karonga; Lake Malombe; Likakula River; Misuku Mtns.; Mlanje; Mtimbuka;



Nchalo; Nchenachena; Nchisi Mtn.; Nyika Plateau; Ruvo River; Vipya Plateau; Zomba; Zomba Plateau. MOZAMBIQUE. Beira; Gaia; Charre; Delagoa Bay; Fambani; Guija; Inhaca Island; Lourenco Marques; Manhica; Maputo; Massangulo; Mauele; M'Gaza; Mozambique Island; Namaacha; Quelimane; Quissico; Rikatia; Tete; Vila Mouzinho; Vila Paiva de Andrada; Zumbo.

**Variation.** Preoculars 1 - 2; postoculars 2 (rarely 1 or 3); temporals 1 + 2 (rarely 0 + 1, 1 + 1, 1 + 3 or 2 + 3); upper labials 8 (rarely 9), the fourth and fifth (rarely third, fourth and fifth, fifth and sixth, or fourth, fifth and sixth) entering the orbit; lower labials 8 - 10, the first 3 - 5 in contact with the anterior sublinguals; dorsals in 23 - 29 rows on nape, 23 - 33 at midbody, 17 - 21 before the vent; ventrals 191 - 216 in ♂♂, 211 - 232 in ♀♀; anal entire (very rarely divided); subcaudals 54 - 71 in ♂♂, 42 - 59 in ♀♀. Dentition - maxillary 6 + 14 to 16; palatine 7 - 8; pterygoid 21 - 23; dentary 21 - 24 (2 skulls).

**Coloration.** Dorsal coloration shows some geographical variation; snakes from Bechuanaland, Rhodesia, Mozambique, Malawi and the Eastern Province of Zambia are maroon, red-brown, pinkish or yellow-brown, but most snakes from the northern parts of Zambia are blackish and a beautiful olive green phase occurs in central Zambia (See Johnsen, 1962). A pale "V" marking on top of the head is usually well defined in juveniles, but faint or absent in adults. Juveniles usually have dark longitudinal stripes or rows of spots, these rarely persist in adults. Underside white, with a "mother-of-pearl" iridescence.

**Size.** Largest ♂ (TM. 21644 - Trelawney)  $634 + 136 = 770$  mm. Largest ♀ (UM. 1784 - Umtali)  $985 + 147 = 1132$  mm.

**Remarks.** Loveridge (1957) placed lineatus in the synonymy of B. fuliginosus and has been followed by most subsequent authors. Laurent (1960, p. 23) did not accept this move because Loveridge presented no evidence to support it, but Laurent did not cite any characters which would distinguish two sibling species. Roux-Estève and Guibe (1965a) have recently investigated the situation and concluded that lineatus cannot be distinguished from fuliginosus.

**Breeding.** The largest ♀ contained 14 eggs. Blaylock (in litt.) measured 7 eggs laid by a 29 inch ♀ on 9th November, they varied from  $37 \times 17$  to  $45 \times 19$  mm.

**Diet.** Young snakes feed largely on skinks, especially Mabuia striata, adults prey upon rats. Geckos are sometimes taken: a Hemidactylus had been eaten by a Chikowa snake and a Kalichero specimen contained a Pachydactylus bibroni. Loveridge (1953a) recovered a Hemidactylus mercatorius from a Kasumbadedza snake.



W. F. H. Ansell found a Mus triton in the stomach of a Nyika Plateau snake; Loveridge records the same species from a Nchisi specimen and a Lemiscomys griselda from a Likobula River snake.

Small snakes sometimes feed on frogs and remains of Rana spp. have been found in several stomachs.

Enemies. One was found in the stomach of a White-tailed Mongoose (Ichneumia albicauda). Wilson (1965) records one taken by a Lizard Buzzard (Harporhynchus monogrammicus).

Habitat. Widespread and common in savanna, but most plentiful in built-up areas where rats are abundant.

Distribution. All savanna areas of Africa south of the Sahara; absent from the rain forests and replaced in South West Africa by B. f. mentalis.

#### BOAEDON OLIVACEUS (Bibron)

Holurepholis olivaceus Dumeril, 1856, Revue Mag. Zool. (2), 8, p. 466: Gabon.

Boaedon olivaceus Vesey - Fitzgerald, 1958, p. 39 (Abercorn); Roux - Esteve & Guibe, 1956b, p. 762.

The only specimen recorded from ZAMBIA was collected at Abercorn by Bredo in 1942. It was deposited in the Institut Royal des Sciences Naturelles de Belgique (No. 4924) and has been identified by de Witte and checked by Pitman, who noted (in litt.) that it has 27 midbody scale rows; 199 ventrals; anal entire; subcaudals 44, single.

Distribution. Rain forests of central Africa from Guinea east to Uganda, south to Angola, the Congo and northern Zambia.

#### Genus LYCOPHIDIUM Fitzinger

Lycophidium Fitzinger, 1843, Syst. Rept., p. 27. Type by original designation: Lycodon horstookii Schlegel = L. capensis A. Smith.

#### LYCOPHIDIUM CAPENSE CAPENSE (A. Smith)

Lycodon capensis A. Smith, 1831, S. African Quart. Journ., 1, p. 18:

"Beyond Kurrichane, about 25° S Lat.", i.e. Rustenberg District, W. Transvaal.



Lycophidium capensis Peters, 1854, p. 622 (Tete).

Lycophidium horstockii Gunther, 1893, p. 555 (Shire Highlands).

Lycophidium capense Peters, 1882, p. 134; Boulenger, 1893, p. 339, and 1896, p. 616 (Zomba); Bocage, 1896, p. 91 (Zambezia); Boulenger, 1907a, p. 10 (Luangwa Valley; Alala Plateau), and 1907b, p. 486 (Beira); Roux, 1907, p. 76 (Rikatla); Gough, 1908, p. 23 (Palapye Road); Chubb, 1909a, p. 595 (Bulawayo; Matetsi), and 1909b, p. 35 (Livingstone); Boulenger, 1910, p. 505 (Mazoe; Salisbury); Hewitt & Power, 1913, p. 162 (Marandellas); Boulenger, 1915, p. 202; Cott, 1935, p. 966 (Gaia; Charre; Fambani); FitzSimons, 1937, p. 262; Themido, 1941, p. 16 (Palma).

Lycophidion capense capense Parker, 1933, p. 548 (key to genus); Pitman, 1934, p. 294 (Luangwa Valley); FitzSimons, 1939b, p. 21 (Chirinda Forest); Bogert, 1940, p. 30 (Mlanje); Loveridge, 1953a, p. 258 (Kota Kota; Cholo Mtn.); Broadley, 1959b, p. 15; Manacas, 1959, p. 139 (Vila Paiva de Andrada); Broadley & Pitman, 1960, p. 439; Hanney, 1961, p. 21 (Blantyre); Johnsen, 1962, p. 119 (Kaniki); Broadley, 1962d, p. 827; FitzSimons, 1962, p. 124 (Chishawasha; Guija; Inhambane; Lourenco Marques; Massangena; Maun; Trelawney).

Lycophidium capense capense FitzSimons, 1935b, p. 311 (Kabulabula; Kasane).

Lycophidion capense Vesey-FitzGerald, 1958, p. 39 (Abercorn).

One hundred and sixty-seven specimens examined from: RHODESIA. Bembesi; Binga; Birchenough Bridge; Bulawayo and 9 mls S and 25 mls N; Cement; Chimanimani Mountains; Chirinda Forest; Chishawasha; Chitoro River; Condo; Dett; Fatima; Fern Hill; Heany; Holderness Farm; Hunyani River, Salisbury; Inyanga Tea Estates; Irisvale; 10 mls SE of Kapami; Kariba; Kariba Lake; Lake Magikwane; Lunani; Lupane; Macheke; Makore Farm; Marandellas; Matopos; Mount Hampden; Norton; Nyamandhlovu; Odzi; Old Umtali; Rhodes Inyanga Estate; Sabi - Lundi Confluence; Salisbury; Sawmills; Selukwe; Sengwe Gorge; Silverstreams; Sinoia; Trelawney; Triangle; Turk Mine; Umtali; Wankie National Park; Westacre, ZAMBIA. Kalichero; Abercorn (IRSNB); Chikowa; Chilanga; Chipengali; Fort Jameson; Kaniki; Kasempa; Kasusu; Kalomo; Katete; Kitwe; Livingstone; Lundazi; Lusaka; Mambwe (IRSNB); Mporekoso (IRSNB); Msoro; Mweru-Wantipa (IRSNB); Nyika. MOZAMBIQUE. Gorongosa Mountain.

Literature records. BECHUANALAND. Kabulabula; Kasane; Maun; Palapye Road. RHODESIA. Bulawayo; Chishawasha; Chirinda Forest; Marandellas; Matetsi; Mazoe; Salisbury; Trelawney. ZAMBIA. Abercorn; Alala Plateau;



Kaniki; Idvingstone; Lununga Valley. MALAWI. Blantyre; Cholo Mtn.; Kota Kota; Mlanje; Zomba. MOZAMBIQUE. Beira; Caia; Charre; Fambani; Guija; Inhambane; Lourenco Marques; Massangena; Palma; Rikatla; Tete; Vila Paiva de Andrada.

Variation. Preocular 1; postoculars 2 (fused on one side of one snake); temporals 1 + 2 (very rarely 0 + 2 or 1 + 3); upper labials 8 (very rarely 7), the third, fourth and fifth (very rarely third and fourth or fourth and fifth only) entering the orbit; lower labials 8 (very rarely 7), the first 4 or 5 in contact with the anterior sublinguals; dorsals in 17 rows on nape and at midbody, 15 before the vent (17 - 19 - 17 in one snake from Inyanga Tea Estates); ventrals 165 - 199 in ♂♂, 172 - 202 in ♀♀; anal entire; subcaudals 31 - 47 in ♂♂, 24 - 35 in ♀♀. Dentition - maxillary 7 - 8 + 13 - 17; palatine 13 - 15; pterygoid 20; dentary 7 - 9 + 18 - 22 (4 skulls).

Coloration. Black to purplish brown above, each dorsal scale usually white tipped, head sometimes speckled with white (especially in N. W. Rhodesia); below uniform white or uniform steel-grey to brownish, more often white with dark blotches, more concentrated mesially.

Two snakes from Untali District had the snout salmon pink, but this colour does not extend posteriorly in a U - shaped marking as in L. c. uzunguensis Loveridge.

Size. Largest ♂ (UM. 4741 - Sabi Lundi Confluence) 310 + 50 = 360 mm. Largest ♀ (NMSR. 634 - Turk Mine) 440 + 43 = 483 mm.

Discussion. There is considerable geographical variation in ventral and subcaudal counts and the highest ventral counts are all from the Gwembe Trough (Kapami to Kariba). Laurent's revival of jacksoni Boulenger as a northern race is premature; the species is badly in need of revision on a continental basis.

Breeding. Three to seven eggs measuring about 22 x 10 mm are laid during November or December.

Diet. This species apparently feeds entirely on skinks, especially Mabuza striata and Mabuza varia. A Riopa sundevalli was found in a Binga snake and a specimen from Makore Farm contained a Scelotes a. arnoldi.

Enemies. A juvenile was found in the stomach of a Chilorhinophis g. gerardi from the Charama Plateau.

Habitat. Widespread in savanna, but absent from very arid regions and scarce on the Mozambique Plain, where it is largely replaced by Lycophidion semianmule.

Distribution. All savanna areas of Africa except for the western Cape Province; also Arabia.



## LYCOPHIDIUM CAPENSE MULTIMACULATUM Boettger

Lycophidium Capense nnt. multimaculata Boettger, 1888, Ber. Senckenberg Naturf. Ges. p. 67: Povo Namiao and Povo Netonna, near Banana, Lower Congo.

Lycophidium capense (not A. Smith) Monard, 1937, p. 117 (Kalukembe, Angola).  
Lycophidium capense multimaculatum Laurent, 1956, p. 115 (Congo locs.), and 1964c, p. 94 (Angola locs.).

Six specimens examined from: ZAMBIA. Kalabo; Mongu.

Variation. Preocular 1; postoculars 2; temporals 1 + 2; upper labials 8 (rarely 7), the third, fourth and fifth (rarely second, third and fourth) entering the orbit; lower labials 8, the first 4 - 5 in contact with the anterior sublinguals; dorsals in 17 rows on nape and at midbody, 15 before the vent; ventrals 164 - 168 in ♂♂, 172 in ♀♀; anal entire; subcaudals 29 - 37 in ♂♂, 24 in ♀♀. Dentition - maxillary 8 + 13; palatines 13; pterygoid 19; dentary 9 + 18 (one skull).

Coloration. Very variable. UM. 7915 is pale grey with two dorsal series of large blackish blotches, which are confluent mesially to form either broad crossbands or a zig-zag marking; head with light and dark marbling, white below with a dark median stripe, tail light brown. UM. 4831 and 6800 are light red-brown with darker transverse crossbands as above, similar to Monard's description (1937), a mid-ventral series of dark infuscations. UM. 7916, 10087 and 10727 are dark grey with very faint dorsal crossbands.

Size. Largest ♂ (UM. 7916 - Kalabo)  $220 + 35 = 225$  mm. ♀ (UM. 10727 - Mongu)  $280 + 28 = 308$  mm.

Discussion. Laurent (1956 and 1964c) distinguished this western race from eastern populations of Kivu, Rwanda and Burundi (which he calls jacksoni) on its lower ventral counts (167 - 180 in ♂♂ and 165 - 182 in ♀♀). The Barotseland specimens have low ventral counts, but they are just within the range of L. c. capense. Their dorsal markings are unlike anything found in eastern L. capense and they probably deserve nomenclatural recognition. The situation in Angola and northern South West Africa is complicated by the presence of Lycophidium hellmichi Laurent (1964c, p. 95), which has high ventral counts (206 - 214 in ♀♀). I have examined one ♀ from Karibib (UM. 5955), which has 209 ventrals and 32 subcaudals, it is mottled above in purplish brown and orange, with a double row of small dark dorsal spots, the lower flanks are cream, the ventrum cream with a dark median band. This snake measures 444 mm and the holotype was 471 mm, suggesting that this species averages larger than L. capense.

Distribution. Savannas of the southern Congo, Angola and Barotseland.



## LYCOPHIDION SEMIANNULE Peters

- Lycophidion semiannullis Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 622; Tete, Mozambique, and 1882, p. 135, pl. xvi, fig. 2.
- Lycophidion acutirostre Gunther, 1868, Ann. Mag. Nat. Hist., (4) 1, p. 427, pl. xix, fig. D; "Zanzibar", but probably from Mozambique (see Parker, 1949, p. 55 - footnote); Boulenger, 1893, p. 338.
- Lycophidion semiannullis Boulenger, 1893, p. 339 and 1910, p. 506; Loveridge, 1923d, p. 878 (Lumbo) and 1957, p. 253 (footnote 109).
- Lycophidion semiannulla Parker, 1933, p. 548 (Key to genus); FitzSimons, 1962, p. 127; Laurent, 1964a, p. 97 (Porto Amelia).
- Lycophidion acutirostre Mertens, 1937, p. 12 (Inhalinga).

Eleven specimens examined from: MOZAMBIQUE. Cabaceira Peninsula; Mida - Lamego.

Literature records. MOZAMBIQUE. Inhalinga; Lumbo; Porto Amelia. Tete.

Variation. Preocular 1; postoculars 2, rarely 1; temporals 1 + 2 (rarely 1 + 1 or 0 + 2); upper labials 6 - 8, the third and fourth, or third, fourth and fifth, entering the orbit; lower labials 6 - 7, the first 4 (rarely 5) in contact with the anterior sublinguals; dorsals in 17 rows on nape and at midbody, 15 before the vent; ventrals 130 - 162 in ♂♂; 140 - 166 in ♀♀; anal entire; subcaudals 27 - 31 in ♂♂, 18 - 24 in ♀♀. Dentition - maxillary 8 + 17; palatine 13; pterygoid 20; dentary 9 + 18 (one skull).

Coloration. Black or dark purplish brown above and below, a white band bordering top of head, lateral scales white-edged. The type had dark dorsal blotches.

Size. Largest ♂ (Type - Tete) 222 + 38 = 260 mm. Largest ♀ (UM. 8207 - Cabaceira Peninsula) 280 + 30 = 310 mm.

Discussion. In his Key to the genus Parker (1933, p. 548) distinguished semiannulla from capense and acutirostre on the alleged absence of apical pits, but single apical pits are present in all the specimens which I have examined.

Breeding. Two eggs in each of the Mida - Lamego females collected at the beginning of December.

Habitat. The Mida - Lamego series were trapped in an oil pipe-line trench crossing the seasonal swamps of the Pungwe Flats. The Cabaceira ♀ was caught at night in a grove of coconut palms between the beach and a mangrove swamp. In grass roots at Lumbo (Loveridge, 1923d).

Distribution. The Mozambique Plain, extending north to Porto Amelia and south to northern Zululand.



## Genus MEHELIA Csiki

Mehelya Csiki, 1903, Rovartani Lapok, p. 198, footnote. New name for Grobberia Poche (preoccupied). Type Heterolepis capensis A. Smith.

## MEHELIA CAPENSIS CAPENSIS (A. Smith)

Heterolepis capensis A. Smith, 1847, Illus. Zool. S. Africa, Rept., pl. lv: "Eastern Districts of Cape Colony".

Simocephalus capensis Boulenger, 1893, p. 345 (Delagoa Bay), and 1896, p. 617 (Zomba), also 1907b, p. 486 (Beira); Chubb, 1909a, p. 595 and 1909b, p. 35 (Bulawayo; Filabusi); Boulenger, 1910, p. 506 (Salisbury); Hewitt & Power, 1913, p. 162 (Mochudi); FitzSimons, 1937, p. 262.

Mehelya capensis capensis Loveridge, 1939, p. 142, also 1953a, p. 258 (Mtimbuka; Injeri River), and 1953c, p. 143 (6 mls S of Fort Johnston); Vesey-FitzGerald, 1958, p. 40 (Abercorn); Broadley, 1959b, p. 16; Manacas, 1959, p. 138 (Chibuto); Broadley & Pitman, 1960, p. 439; Broadley, 1961a, p. 72, illus. and 1962d, p. 828; FitzSimons, 1962, p. 130 (Lourenco Marques; Nampini; Trelawney); Wilson, 1965, p. 154.

Fifty-seven specimens examined from: RHODESIA. Bulawayo - also 11 & 14 mls N and 12 mls S; Cement; Chipinga; Eastlands Farm; Essexvale; Fern Valley; Glass Block; Heany; Holderness Farm; Irisvale; Karoi; 5 mls NW of Lupani; Mavuradona Mtns.; Mount Darwin; Mtao Forest; Norton; Odzi; Pounsley; Salisbury and 10 mls W; Selukwe; Sinoia; Tanganda Bridge; Taylor's Block Ranch; Untali; Victoria Falls (VFNP); Vumba Mtn.. ZAMBIA. Abercorn (IRSNB); Chikowa; Chipengali; Kafue National Park - Chunga and Kafue River; Kalabe; Kalichero; Livingstone; Lusaka; Mumbwa. MOZAMBIQUE. 5 mls SE of Ponte do Pungwe; 5 mls E of Vila Machado.

Literature records. BECHUANALAND. Mochudi. RHODESIA. Bulawayo; Filabusi; Nampini; Salisbury; Trelawney. ZAMBIA. Abercorn; MAIAWI. 6 mls S of Fort Johnston; Injeri; Mtimbuka; Zomba. MOZAMBIQUE. Beira; Chibuto; Delagoa Bay; Lourenco Marques.

Variation. Preocular 1 (very rarely 2); postoculars 1 - 2 (rarely absent); temporals 1 + 2 (rarely 1 + 3, 2 + 2 or 2 + 3); upper labials 7 (rarely 6 or 8), the third and fourth (rarely second and third) entering the orbit; lower labials 8 (rarely 7), the first 4 - 5 (rarely 3) in contact with the anterior sublinguals; dorsals in 15 - 17 rows on nape, 15



at midbody and before vent; ventrals 195 - 219 in ♂♂, 209 - 222 in ♀♀; anal entire; subcaudals 48 - 59 in ♂♂, 44 - 54 in ♀♀. Dentition - maxillary 8 + 14; palatine 13 - 14; pterygoid 25; dentary 8 + 17 - 18 (one skull).

Coloration. Purplish brown to black above, bicarinate vertebral scale row white; ivory white below, ends of ventrals dark.

Size. Largest ♂ (NMSR. 253 - Mumbwa) 1355 + 135 + = 1490 + mm. Largest ♀ (NMSR. 1769 - 14 mls N of Bulawayo) 1500 + 125 + = 1625 + mm.

Breeding. A 4 foot ♀, killed in a cattle pen at Irisvale on 15th October, contained 5 eggs measuring 55 x 20 mm.

Diet. This species feeds on toads (Bufo regularis; B. garmani), but also devours other snakes, especially small species like Boaedon f. fuliginosus; Crotaphopeltis h. hotamboeia and Causus spp. I found the remains of a Dispholidus t. typus in the stomach of one snake, Wilson recorded a 52" Dispholidus disgorged by a 5 foot Mehelya caught at Kalichero, and near Salisbury a 1490 mm ♀ was killed early one morning after she had fallen out of a tree while struggling to overcome an adult Boomslang. Wilson found a 3½ foot Psammophis s. sibilans in a Chipengali ♀ and I have two other records of this species being eaten. Loveridge (1953a) found the tail of a young Psammophis s. sudanensis in the stomach of a Mtimbuka snake and a Lujeri snake disgorged the tail of a Natriciteres. File snakes seem afraid of Cobras and will not eat small dead ones.

A specimen from Mtao forest apparently swallowed a subadult Causus rhombeatus head first and then engulfed a Crotaphopeltis h. hotamboeia which was swallowing the same night adder tail first! The tail of the Crotaphopeltis protruded from the mouth of the File Snake.

Lizards are sometimes taken. A Bulawayo snake had eaten an adult Agama cyanogaster and at Essexvale one was killed while swallowing a Mabuia striata.

Parasites. The exposed skin between the widely spaced dorsal scales of this species make it particularly vulnerable to ticks (Aponomma latum).

Habitat. Widespread in savanna.

Distribution. Eastern Africa from Tanganyika to Natal, west to Angola and eastern Bechuanaland.



## MEHELYA NYASSAE (Gunther)

Simocephalus nyassae Gunther, 1888, Ann. Mag. Nat. Hist. (6) 1, p. 328;

"Lake Nyasa", Malawi; Boulenger, 1893, p. 347, pl. xxiii, fig. 2, and 1910, p. 506 (Delagoa Bay); Loveridge, 1923d, p. 878 (Lumbo).

Heterolepis nyassae Bocage, 1896, p. 91.

Mehelya nyassae Loveridge, 1939, p. 148; Bogert, 1940, p. 27 (Mount Silinda); Loveridge, 1953a, p. 259 (Mtimbuka); Vesey-FitzGerald, 1958, p. 41; Broadley, 1959b, p. 18, pl. ii, and 1961a, p. 72, illus., also 1962d, p. 828; FitzSimons, 1962, p. 132 (Inhambane); Wilson, 1965, p. 155.

Twenty-four specimens examined from: BECHUANALAND. 88 mls SW of Panda-ma-Tenga. RHODESIA. Fatima; Hawling Farm; 10 mls SE of Kapami; 13 mls NW of Lupane; Mount Darwin; Sabi - Lundi Confluence; 20 mls N of Sinoia; Umtali; Victoria Falls. ZAMBIA. Kabompo; Kalabo; Kalichero; Livingstone; Msoro. MALAWI. Rumpi.

Literature records. RHODESIA. Mount Silinda. MALAWI. "Lake Nyasa"; Mtimbuka. MOZAMBIQUE. Inhambane; Lourenco Marques; Lumbo.

Variation. Preocular 1; postocular 1; temporals 1 + 2 (rarely 1 + 3); upper labials 7 (rarely 6), the third and fourth (rarely second and third, or third only) entering the orbit; lower labials 8, the first 5 in contact with the anterior sublinguals; dorsals in 17 rows on nape, 15 at midbody and before vent; ventrals 170 - 174 in ♂♂, 174 - 184 in ♀♀; anal entire; subcaudals 67 - 72 in ♂♂, 60 - 74 in ♀♀. Dentition - maxillary 8 + 18 (Bogert, 1940).

Coloration. Plumbeous or blackish above, brown below, posterior margins of ventrals lighter. Two Kalichero snakes have the chin and throat white.

Size. Largest ♂ (UM. 7398 - Hawling Farm) 410 + 122 = 532 mm. Largest ♀ (MSR. 1909 - Livingstone) 525 + 96 + = 621 + mm.

Breeding. Wilson (1965) found 6 eggs in a 441 mm Kalichero ♀.

Diet. Specimens from 10 mls SE of Kapami and Umtali each contained an Ablepharus wahlbergi; the Rumpi ♂ contained a Riopa sundevalli. Wilson (1965) found a Kassina senegalensis in one snake.

Enemies. A small ♀ was disgorged by an Atractaspis bibroni at Kabompo.

Habitat. The Lumbo specimen was in a termitarium (Loveridge, 1923d). Wilson (1965) found specimens in dambos in the Chipengali area. One was taken under a log lying in Kalahari sand near Dett. Although widely distributed in savanna, this species is nowhere common.

Distribution. Eastern Africa from Kenya south to Natal, west to Barotseland and eastern Bechuanaland.

Genus NATRICITERES Loveridge

Natriciteres Loveridge, 1953, Bull. Mus. Comp. Zool., 110, p. 248.

Type by original designation: Coronella olivacea Peters.

NATRICITERES VARIEGATA "SYLVATICA"

Coronella olivacea var. dumerilii (not Gunther, 1860) Gunther, 1894, p. 618 (Shire Highlands).

Tropidonotus olivaceus (not Peters) Boulenger (part), 1896, p. 604 (Zomba; Mlanje).

Tropidonotus fuliginoides (not Gunther) Cunha, 1935, p. 3 (Massangulo); Themido, 1941, p. 16.

Tropidonotus sp. Cunha, 1935, p. 4 (Massangulo).

Natrix olivaceus (not Peters) FitzSimons, 1939b, p. 20 (Chirinda Forest).

Natriciteres olivacea uluguruensis (not Loveridge, 1935) Loveridge 1953a, p. 252 (Cholo Mtn.; Massangulo), also 1953c, p. 143 (Tengadzi River) and 1958 (part), p. 37; Broadley, 1959b, p. 20; Manacas, 1959, p. 140 (Vila Paiva de Andrada); FitzSimons, 1962, p. 136 (part, exclude Trelawney).

Thirty-five specimens examined from: RHODESIA. Chirinda Forest (TM); Inyanga Tea Estates; Sabi Experimental Station; Silverstreams; Tilbury; Umtali; Vumba Mountain. MALAWI. Cholo Mountain (MOZ); Mkata Bay; Zomba (BM & TM). MOZAMBIQUE. Gorongosa Mountain (NM).

Literature records. RHODESIA. Chirinda Forest. MALAWI. Cholo Mtn.; Mlanje; Tangadzi River; Zomba. MOZAMBIQUE. Massangulo; Vila Paiva de Andrada.

Variation. Preocular 1 (rarely 2); postoculars 3 (rarely 2); temporals 1 + 2; upper labials 8 (rarely 7); the fourth and fifth (rarely third and fourth, or third, fourth and fifth) entering the orbit; lower labials 8 (rarely 9 or 10), the first four (rarely 3 or 5) in contact with the anterior sublinguals; dorsals in 17 rows anteriorly, reducing to 15 posteriorly by fusion of rows III & IV opposite ventrals 57 to 86 (i.e. approximately at midbody); ventrals (D) 129 - 143 in ♂♂, 132 - 141 in ♀♀; anal divided; subcaudals 64 - 81 in ♂♂, 60 - 69 in ♀♀. Dentition - maxillary 27 - 29; palatine 17 - 18; pterygoid 30 - 36; dentary 32 (3 skulls).



Coloration. Above olive-brown to blue-black, usually a dark dorsal band (sometimes maroon), edged by lines of light dashes, a yellow nuchal collar is well defined in two Mkata Bay specimens, but it is generally poorly defined or reduced to a pair of pale spots, labial sutures black, outer rows of dorsals and lateral edges of ventrals olive, grey, pale blue (when about to slough), violet or red; ventrum bright orange or yellow mesially.

Size. Largest ♂ (TM. 26493 - Chirinda Forest)  $265 + 103 = 368$  mm, Largest ♀ (Manacas, 1959 - Vila Paiva de Andrada)  $300 + 105 = 405$  mm.

Discussion. In his revisions of the genus Natriciteres Loveridge (1935a, 1953a, 1958) unfortunately attempted to separate forms on the basis of midbody scale count. This count is unreliable because in this genus the reduction in scale rows takes place usually just after midbody, but in some individuals or populations it occurs in advance of midbody. N. o. uluguruensis was based on populations found in the Uluguru and Usambara Mountains, in which the reduction from 19 to 17 scale rows usually takes place in advance of midbody. As these snakes do not otherwise differ significantly from the typical form, I regard uluguruensis as a synonym of N. olivacea.

Paratypes of uluguruensis from the Rungwe Mountains and other material from southern Tanganyika, Malawi, north Mozambique and eastern Rhodesia were all included by Loveridge (1953a, 1953c, 1958, etc) under N. o. uluguruensis, although he noted (1951, p. 188; 1958) the occurrence of occasional specimens with 15 scale rows at midbody (characteristic of his N. o. pembana of Pemba Island). I have examined most of these specimens and find that they all agree in having 17 scale rows anteriorly and 15 rows posteriorly, they also differ from N. olivacea in averaging fewer sublabials, smaller average size and the possession of at least a trace of a nuchal collar. These eastern snakes share the latter characters with N. variegata of West Africa. This form has 15 scale rows with no reduction posteriorly and appears to be typical of forest edge or forest savanna mosaic, as are the eastern snakes. The populations considered here constitute a race of N. variegata, provisionally called "sylvatica", and pembana Loveridge is an insular race distinguished by its low ventral counts (123 - 128), leaving N. olivacea as a monotypic species.

Breeding. A Vila Paiva de Andrada ♀, collected in October, contained 6 eggs varying in size from  $19.5 \times 5.5$  to  $8.5 \times 5$  mm (Manacas, 1959).

Habitat. Collected in open glades and clearings in Chirinda Forest (FitzSimons, 1939b). On Vumba Mountain and the Inyanga Tea Estates it is often found under stones and logs at the forest edge. This species is



typical of forest fringes and formerly forested areas, in this respect its presence on Vumba Mountain and absence from the Inyanga highlands are significant.

Distribution. Southern Tanganyika (Rungwe Mountain to Liwale), northern and central Mozambique, Malawi and eastern Rhodesia.

NATRICITERES VARIEGATA BIPOSTOCULARIS Broadley

Tropidonotus olivaceus (part) Boulenger, 1896, p. 604 (Fwambo).

Natriciteres olivacea uluguruensis (not Loveridge, 1935) Loveridge (part) 1958, p. 37 (Fwambo; Kalukumba).

Natriciteres olivacea uluguruensis (not Loveridge) Vesey-Fitzgerald, 1958, p. 41, (Abercorn); Broadley & Pitman, p. 439 (Abercorn).

Natriciteres olivacea bipostocularis Broadley, 1962, Occ. Pap. Nat. Mus. S. Rhod., 26B, p. 785: Chisanza, Abercorn, Zambia.

Twenty-two specimens examined from: ZAMBIA. Abercorn (IRSNB); Chisanza; Isoka.

Literature records. ZAMBIA. Abercorn; Fwambo.

Variation. Preocular 1 (rarely 2); postoculars 2; temporals 1 + 2; upper labials 8 (rarely 9), the fourth and fifth (rarely fifth and sixth) entering the orbit; lower labials 8 (rarely 9), the first four in contact with the anterior sublinguals; dorsals in 17 rows anteriorly, reducing to 15 posteriorly by fusion of rows III and IV (rarely II and III) opposite ventrals 59 - 85; ventrals (D) 132 - 138 in ♂♂, 136 - 140 in ♀♀; anal divided; subcaudals 65 - 78 in ♂♂, 64 - 70 in ♀♀.

Coloration. Grey brown above, with a darker dorsal band five scales wide, labials with black sutures, yellow below, ends of ventrals slate grey.

Size. Largest ♂ (V-F 12969 - Isoka) 255 + 100 = 355 mm. Largest ♀ (NMSR. 3524 - Holotype) 202 + 80 = 282 mm.

Discussion. This race is closely related to N. v. "sylvatica", but differs in having only two postoculars and no trace of a nuchal collar.

Distribution. Angola and northern Zambia, not yet recorded from Katanga.



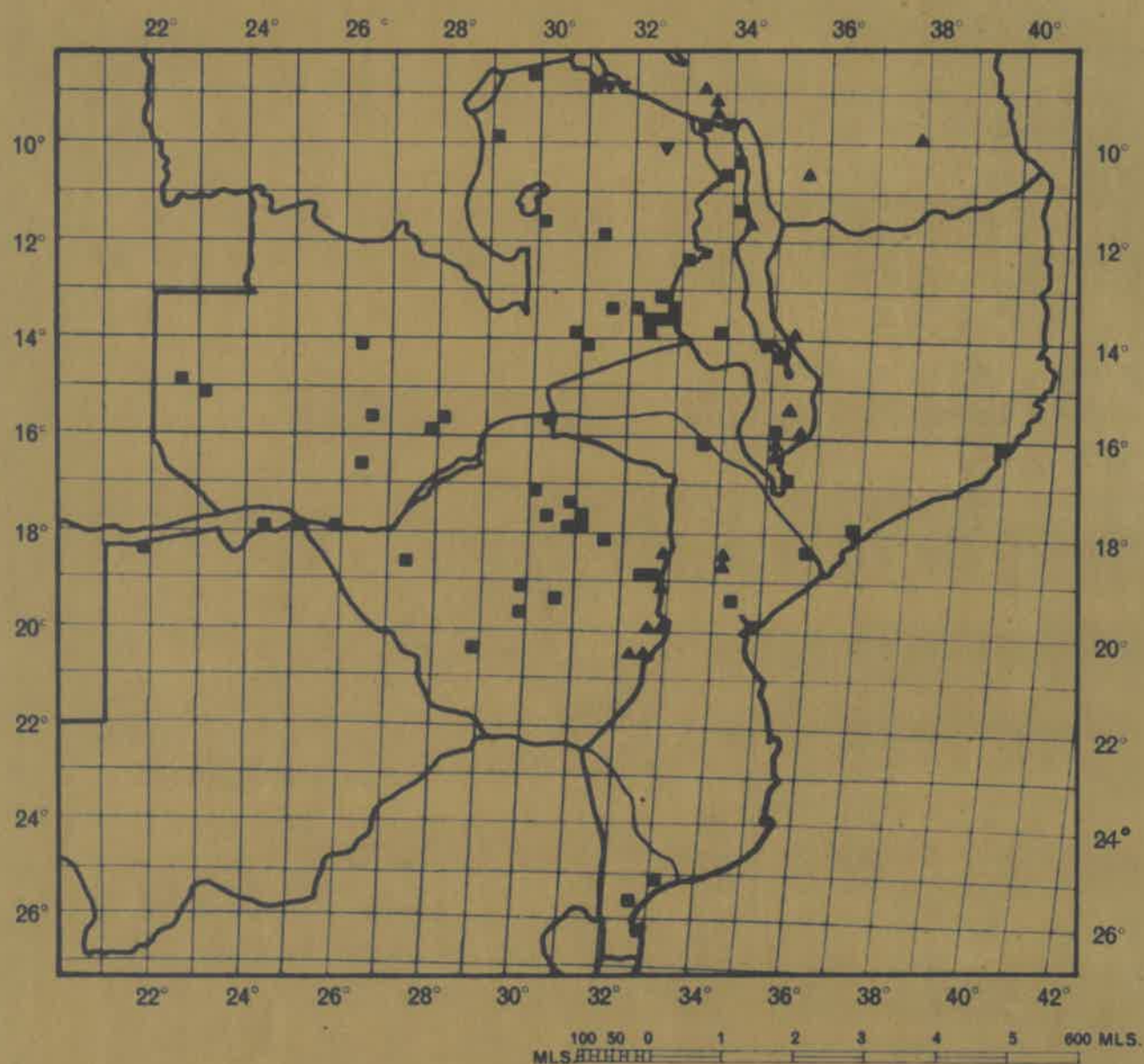


Fig. 11. Distribution of the genus *Natriciteres*

- Natriciteres olivacea* (Peters)
- Natriciteres variegata* "sylvatica"
- Natriciteres variegata bipostocularis* Broadley

## NATRICITERES OLIVACEA (Peters)

Coronella olivacea Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 622: Tete, Mozambique; Gunther, 1864, p. 307 (Qualimane); Bocage, 1882, p. 288 (Angoche); Peters (part) 1882, p. 114, pl. xvii, fig. 1 (Tete only) Pfeffer, 1893, p. 79 (Qualimane).

Tropidonotus olivaceus Boulenger, 1893, p. 227; Peracca, 1896, p. 2 (Kazungula); Boulenger, 1897, p. 800 (Nkata Bay to Ruarwe; Kondowe to Karonga; Nyika Plateau; Fort Hill) and 1907a, p. 10 (Petauke); Roux, 1907, p. 76 (Rikatla); Boulenger, 1910, p. 503 (Salisbury); Peracca, 1910, p. 3 (Barotseland) Boulenger, 1915, p. 201; Angel, 1921, p. 42 (Lealui).

Mizodon olivaceus Bocage, 1896, p. 91.

Natrix olivaceus Pitman, 1934, p. 293 (Nansenga River; Kafue Flats; Lake Bangweulu); Cott, 1935, p. 964 (Fambani).

Natrix olivacea uluguruensis Loveridge, 1935, Bull. Mus. Comp. Zool., 79, p. 7: Nyange, Uluguru Mountains, Tanganyika.

Natrix olivacea olivacea Loveridge, 1953a, p. 251 (Mtimbuka) and 1958, p. 29 (Abercorn; Mpulungu; Mweru - Wantipa); Vesey-FitzGerald, 1958, p. 41 (Mweru - Wantipa; Luangwa; Kawambwa); Broadley, 1959b, p. 18; Broadley & Pitman, 1960, p. 439; Hamney, 1961, p. 21 (Blantyre); Broadley, 1962d, p. 828; FitzSimons, 1962, p. 133 (Macia; Que Que); Wilson, 1965, p. 155.

Natrix olivacea uluguruensis FitzSimons (part), 1962, p. 136 (Trelawney).

One hundred and fourteen specimens examined from: BECHUANA-  
LAND. Shakawe (TM). CAPRIVI. Lake Liambezi. RHODESIA. Concession; Domboshawa; Driefontein (AM); Essexvale; Fatima; Glen Lorne; Hunyani River (Salisbury); Lake MacIlwaine; Marandellas (AM & UM); Odzi; Old Umtali; "Que Que" = Redcliff (TM); Salisbury (AM & UM); Selukwe; 20 mls N of Sinoia; Trelawney (TM); Victoria Falls; Warren Hills; Zambezi River opposite Feira. ZAMBIA. Bwalo; Chikowa; Chilanga; Chipengali; Chisya; Fort Jameson; Kafue Pilot Polder; Kalabo; Kalichero; Kaun-gashi River; Késa; Lake Chisi (PEM); Lundazi; Lusungazi; Luangwa - Mtikila Confluence; Mbanda; Mpika District (EM); Mweru - Wantipa (IRSND); Sayiri; Siantambo. MALAWI. Fort Hill (EM); Lilongwe; Monkey Bay; Nyika Plateau (EM); Port Herald. MOZAMBIQUE. Manga; Pungwe River, due E of Vila Machado.

Literature records. RHODESIA. Redcliff; Salisbury; Trelawney. ZAMBIA. Abercorn; Kafue Flats; Kawambwa; Kazungula; Lake Bangweulu;



Lealui; Luangwa; Mpulungu; Mweru - Wantipa; Nansenga River; Petaulke. MALAWI. Blantyre; Fort Hill; Kondowe to Karonga; Mtimbuka; Mlata Bay to Ruarwe; Nyika Plateau. MOZAMBIQUE. Angoche; Fambani; Macia; Quelimane; Rikatla; Tete.

Variation. Preocular 1 (very rarely 2); postoculars 3 (rarely 2); temporals 1 + 2 (very rarely 1 + 3); upper labials 8 (very rarely 7 or 9), the fourth and fifth (very rarely third, fourth and fifth, fourth only, or fourth, fifth and sixth) entering the orbit; lower labials 9 - 11 (rarely 8), the first 4 - 6 in contact with the anterior sublinguals; dorsals in 19 rows anteriorly, reducing to 17 posteriorly by fusion of rows III + IV (rarely IV + V) opposite ventrals 49 - 93; ventrals (D) 134 - 149 in ♂♂, 131 - 151 in ♀♀; anal divided; subcaudals 63 - 75 in ♂♂, 51 - 68 in ♀♀. Dentition - maxillary 25 - 27; palatine 15 - 18; pterygoid 28 - 34; dentary 30 - 35 (9 skulls).

Coloration. Pale brown, olive or blackish above, with a dorsal band five scales wide, which may be darker than the ground colour, but is frequently maroon; flanks sometimes streaked with maroon; labials yellow with black sutures; throat white; ventrals yellow, edged with slate grey, pale blue, olive, orange or red laterally.

Size. Largest ♂ (UM. 2973 - Keswa)  $360 + 108 + = 468$  mm. Largest ♀ (UM. 9458 - Mkanda)  $415 + 125 = 540$  mm.

Breeding. A 514 mm Kalichero ♀ contained 7 eggs measuring  $20 \times 8$  mm on 17th August. The number of eggs laid varies from one to seven, but is usually 5 - 7.

Diet. These snakes feed mainly on tadpoles and small frogs. A specimen from Mweru - Wantipa had gorged itself on small fish. Pitman (1934) records locust hoppers being taken.

Parasites. Cestodes and pentastomids in a Mtimbuka snake (Loveridge, 1953 a).

Habitat. Permanent swamps, marshes and streams in savanna.

Distribution. Savanna areas of Africa from the Sudan south to northern Bechuanaland, Rhodesia and Mozambique; in the west, extending to Guinea and Angola.

#### Genus LIMNOPHIS Gunther

Limnophis Gunther, 1865, Ann. Mag. Nat. Hist. (3), 15, p. 96. Type by monotypy: L. bicolor Gunther.



LIMNOPHIS BICOLOR BANGWEOLIGUS (Mertens)

Helicops bicolor (not Gunther) Boulenger, 1907a, p. 10 (Alala Plateau); Pitman, 1934, p. 293 (Lukulu Swamps).

Helicops bangweolicus Mertens, 1936, Zool. Anz., 114, p. 284: Nsombo, Lake Bangweulu, Zambia, and 1937, p. 12.

Limnophis bicolor (Not Gunther) Witta, 1953, p. 163 (Katanga localities); Vesey-FitzGerald, 1958, p. 37 (Mweru - Wantipa); Broadley & Pitman, 1960, p. 438; FitzSimons, 1962, p. 137 (Kasane).

Limnophis bicolor bangweolicus Mertens, 1963, p. 438; Laurent, 1964c, p. 100 (Angola localities).

Twenty-nine specimens examined from: BECHUANA LAND. Kasane (Chobe River). ZAMBIA. Abercorn (?; IRSNB); Alala Plateau (EM); Balovale (EM); Kalabo; Lake Chisi (IRSNB); Livingstone; Lukulu Swamps (EM); Mukupa (IRSNB); Mulilansolo; Mwandji; Mweru - Wantipa (IRSNB & UM).

Literature records. BECHUANA LAND. Kasane. ZAMBIA. Alala Plateau; Lukulu Swamps; Nsombo.

Variation. Preocular 1; postoculars 2 - 3; temporals 1 + 2 (rarely 1 + 1 or 1 + 3; upper labials 8 (rarely 9) the third and fourth (southern populations) or fourth and fifth (Mweru - Wantipa westwards) entering the orbit; lower labials 8 - 11, the first 5 (rarely 4 or 6) in contact with the anterior sublinguals; dorsals in 19 rows on nape and at midbody, usually reducing to 17 before the vent; ventrals 139 - 146 in ♂♂, 133 - 147 in ♀♀; anal divided; subcaudals 58 - 68 in ♂♂, 42 - 51 in ♀♀. Dentition - maxillary 24 - 25; palatine 12 - 14; pterygoid 25 - 28; dentary 29 - 30 (2 Kalabo skulls). Everted hemipenis simple, with undivided sulcus, covered with subequal spines from base to tip.

Coloration. Dark grey-brown above, with a pair of broad orange-brown dorso-lateral stripes, lateral edges of scales blackish, forming narrow black longitudinal lines, a pale streak on upper labials; scales of chin and throat edged with grey (see Laurent, 1964c, fig. 30), ventrum yellow, salmon pink or vermillion.

Size. Largest ♂ (UM. 4829 - Kalabo) 495 + 130 = 625 mm. Largest ♀ (EM. - Lukulu Swamps) 505 + 100 = 605 mm.

Remarks. Mertens (1963) and Laurent (1964c) have independently demonstrated that bangweolicus is a valid race. The skulls of two Kalabo snakes substantiate the difference in number of maxillary teeth, usually 22 - 25 in bangweolicus and 26 - 31 in typical bicolor. The hemipenis of bangweolicus does not appear to differ from that of the typical form, illustrated by Bogert (1940, fig. 4 B).



Diet. Small fish in a Kalabo snake; a six inch silurid fish was found in the stomach of a specimen from the Lukulu Swamps by Pitman (1934). This species may be entirely piscivorous.

Habitat. Permanent swamps.

Distribution. From Pweto, at the north end of Lake Mweru, south through western Zambia, southern Katanga and eastern Angola to the Chobe Swamps on the northern border of Bechuanaland.

### Genus PSEUDASPIS Fitzinger

Pseudaspis Fitzinger, 1843, Syst. Rept., p. 25. Type by original designation: Coluber canus Linnaeus.

### PSEUDASPIS CANA (Linnaeus)

Coluber canus Linnaeus, 1758, Syst. Nat. ed. 10, 1, p. 221: "In Indiis", i.e. Africa.

Ophirion anchietae Bocage, 1882, Journ. Sci. Lisboa, 8, p. 300: Caconda, Angola.

Pseudaspis cana Boulenger, 1896, p. 620 (Zomba; Chiradzulu); Gough, 1908, p. 23 (M'ncouve); Chubb, 1909a, p. 595 (Bulawayo) and 1909b, p. 35, (Killamey Mine); Boulenger, 1910, p. 506 (Mazoe; Salisbury); Werner, 1910, p. 356 (Koca; Kokong - Kang; Lemututu; Pitsani; Vlei Topan); Hewitt & Power, 1913, p. 162 (Ky Ky); Boulenger, 1915, p. 204; Pitman, 1934, p. 294 (Batoka country); FitzSimons, 1935b, p. 311 (Kaotwe; Sunnyside - Gembok; Sunnyside - Mabeleapudi; Mabeleapudi; Maun; Shaleshonto); Loveridge, 1953a, p. 263; FitzSimons & Brain, 1958b, p. 102; Vesey-FitzGerald, 1958, p. 48 (Abercorn; Solwezi); Broadley, 1959b, p. 30, pl. 11, and 1962d, p. 830; FitzSimons, 1962, p. 162 (Chishawasha; Guija; Lourenco Marques; Manhica; Maputo; Masieni; Quissico); Wilson, 1965, p. 157.

Seventy-two specimens examined from: BECHUANALAND. Debeeta; Francistown; 15 mls NE of Gomme; 100 mls E of Maun. RHODESIA. Baddeley; Beitbridge; Bromley; Bulawayo; Cleveland Dam; Dett; Gazuma Pan; Gwelo; Holderness Farm; Irisvale; Karoi; Marandellas; Melfort; Norton; Nyamandhlovu; Plumtree; Rhodes Inyanga Hotel; Salisbury; Sandown; Sawmills; Selborne Estates; Silverstreams; Sinoia; Tsetsera; Turk Mine. ZAMBIA. Chilanga; near Fort Manning; Kalomo; Kasusu; Katanda; Livingstone; Lusaka and 30 mls & 37 mls W; Nyika Rest House;

Siantamba; Solwezi; Zimba. MALAWI. Chelinda (Nyika Plateau).  
MOZAMBIQUE. 5 mls E of Vila de Manica.

Literature records. BECHUANALAND. Gembok; Kaotwe; Kekong - Kang; Koca; Ky Ky; Lehututu; Mabeleapudi; Maun; M'moouve; Pitsani; Shale-shonto; Sunnyside - Gembok; Sunnyside - Mabeleapudi; Vlei Topan. RHODESIA. Bulawayo; Chilimanzi (T); Chishawasha; Driefontein (T); Killarney Mine; Macheke (T); Mazoe; Salisbury; Triashill (T). ZAMBIA. Abercorn; Bataka Country; Solwezi. MALAWI. Chiradzulu; Zomba. MOZAMBIQUE. Guija; Lourenco Marques; Manhica; Maputo; Masieni; Quissico.

Variation. Preocular 1 (rarely 2); postoculars 3 (rarely 2 or 4); temporals 2 + 3, 2 + 4, 2 + 5, 3 + 3, 3 + 4, 3 + 5 (rarely 4 + 5); upper labials 7 (rarely 6 or 8), the fourth (rarely third, or fourth and fifth) entering the orbit; lower labials 10 - 13, the first 4 - 7 in contact with the anterior sublinguals; dorsals in 25 - 29 rows on nape and at midbody, reducing to 17 - 21 before the vent; ventrals 178 - 198 in ♂♂, 198 - 216 in ♀♀; anal divided (rarely entire); subcaudals 57 - 68 in ♂♂, 44 - 58 in ♀♀. Dentition - maxillary 13; palatine 7; pterygoid 6 - 7; dentary 15 (1 skull).

Coloration. Light grey or brown above, scales dark tipped; yellow below. Juveniles light red-brown above with a complex pattern of dark brown and white spots and blotches, often including a zig-zag line down the middle of the back; white below with darker markings. Some adults partially retain juvenile markings, but they are completely retained by a 1410 mm ♀ from Livingstone.

Size. Largest ♂ (UM. 6639 - Chelinda, Nyika)  $1083 + 267 = 1350$  mm. Largest ♀ (NMSR. 1901 - Livingstone)  $1230 + 180 = 1410$  mm.

Discussion. Laurent (1956, p. 141) revived Pseudaspis cana anchietae (Bocage) because he found that his Congo material had lower average mid-body and subcaudal scale counts than South African material recorded in the literature. Analysis of the data for material from south-east and southern Africa (the latter kindly supplied by Dr. V. F. M. FitzSimons) provides no grounds for the recognition of a northern race, see Table 6 below.



Region and source of data	N	Midbody scale rows				Subcaudals			
		Range	Mean			Range	Mean		
			88	99			88	99	
Central Africa (Laurent)		25-29	25.9	26.7		50-62	56.8	36-47	44.0
Zambia (Broadley)	21	25-29	26.7	27.3		57-64	60.2	46-55	48.9
Rhodesia, Bechuanaland, Central Mozambique (Broadley)	42	25-29	26.4	27.2		57-68	62.0	50-58	53.0
Transvaal, Swaziland (Fitz-Simons)	21	25-31	26.7	27.4		56-67	61.5	44-57	52.4
S.W.A. & Kalahari (Fitz-Simons)	9	25-27	26.0	26.7		57-65	61.0	49-58	54.6
Cape Province, O.F.S. and Natal (Fitz-Simons)	7	27-29	27.7	27.5		56-60	58.0	44-51	46.5

Table 6. Geographical variation in midbody scale rows and subcaudals for Pseudaspis cana.

Breeding. A 987 mm ♀ from Marandellas contained 15 eggs on 11th October. New-born young measure just over 200 mm.

Diet. An adult Cryptomys was found in the stomach of a Siantambo specimen; rodent fur was found in several other stomachs. A juvenile from Nyamandhlovu contained a shrew (Crocidura sp.).

Enemies. The Nyamandhlovu juvenile was being swallowed by a cobra (probably Haje haje) when found (D. Young, pers. comm).

Habitat. Widespread in savanna, but most plentiful in the Kalahari and grasslands of eastern Rhodesia and western Zambia. A specimen was killed at 7,000 feet on Himalaya Mountain, south of Umali.

Distribution. Southern Africa, extending north to Angola, Katanga and the highlands of East Africa.

#### Genus DUBERRIA Fitzinger

Duberria Fitzinger (part), 1826, Neue Class. Rept., pp. 29, 55. Type by tautonymy: Coluber aretiiventris Baudin = Coluber Duberria Herren = Coluber lutrix Linnaeus

#### DUBERRIA LUTRIX LUTRIX (Linnaeus)

Coluber lutrix Linnaeus, 1758, Syst. Nat. ed. 10, 1, p. 216: "In Indiis", i.e. South Africa.

Homalosoma lutrix Roux, 1907, p. 77 (Rikatis).

Duberria lutrix lutrix FitzSimons, 1962, p. 167 (Inhaca Island).

No local specimens examined.

Literature records. MOZAMBIQUE. Inhaca Island; Rikatia.

Variation. (after FitzSimons, 1962). Loreal usually present; preocular 1; postoculars 2 (rarely 1); temporals 1 + 2 (very rarely 1 + 1 or 1 + 3); upper labials usually 6, the third and fourth entering the orbit; lower labials usually 6, the first 3 in contact with the anterior sublinguals; dorsals in 15 rows; ventrals 118 - 144; anal entire; subcaudals 34 - 51 in ♂♂, 24 - 34 in ♀♀ (transposed in original).

Coloration. Reddish brown to olive above, with or without a narrow black vertebral line (usually interrupted), flanks usually darker and sharply demarcated by a dorso-lateral series of minute black dots; yellow or white below, the outer edges of the ventrals spotted with black.

Distribution. The well-watered southern and eastern parts of South Africa, extending into southern Mozambique.

#### DUBERRIA LUTRIX RHODESIANA Broadley

Duberria lutrix lutrix (not Linnaeus) FitzSimons, 1939, p. 21 ("Chirinda Forest" = Vumba Mountain); Loveridge, 1944, p. 144; FitzSimons, 1958a, p. 209 (Nyanziwa).

Duberria lutrix rhodesiana Broadley, 1958, Occ. Pap. Nat. Mus. S. Rhod., 22B, p. 215; Chishawasha, near Salisbury, Rhodesia, also 1959b, p. 31, and 1962d, p. 830; FitzSimons, 1962, p. 169.

Duberria lutrix (not Linnaeus) Turnbull-Kemp, 1960, p. 6.

Ninety-six specimens examined from: RHODESIA. Bridal Veil Falls; Chimanimani Mtns.; Chishawasha; Darwendale; Engwa; Haroni-Lusitu Confluence; Imbeza; Inyanga National Park; Inyanga Tea Estates; Melfort; 8 mls SW of Melsetter; Mount Hampden; Pungwe Gorge; Saffron Walden; Salisbury and 10 mls W; Sanyatwe; Selborne Estates; Silverstreams; Stapleford; Thorn Park; Tilbury; Tsetsera; Tynwald; Untali; Vumba Mtn.; Wiltshire Estates. MOZAMBIQUE. Gorongosa Mtn.

Literature records. RHODESIA. Chishawasha; Nyanziwa; Vumba Mtn.

Variation. Loreal usually present; preocular 1 (very rarely 2); postoculars usually 1, rarely 2, but specimens from Melsetter District and Gorongosa Mountain usually have 2; temporals 1 + 2 (rarely 1 + 1 or 2 + 1);



upper labials 6 (rarely 5 or 7), the third and fourth (rarely second, third and fourth, second and third or fourth and fifth) entering the orbit; lower labials 6 (rarely 5 or 7), the first 3 (rarely 2 or 4) in contact with the anterior sublinguals; dorsals in 15 rows without reduction; ventrals 118 - 131 in ♂♂, 126 - 139 in ♀♀; anal entire; subcaudals 30 - 39 in ♂♂, 21 - 31 in ♀♀.

Coloration. Olive brown to plumbeous above, often with a narrow black vertebral line, bases of lateral scales bluish white giving a mottled effect. Bluish white below, with irregular black blotches at the base of each ventral, forming two parallel longitudinal rows.

Size. Largest ♂ (UM. 7594 - Tilbury)  $240 + 63 = 303$  mm. Largest ♀ (UM. 8656 - Inyanga Tea Estates)  $345 + 44 = 389$  mm.

Discussion. The postocular character on which this race was based now proves unreliable in some populations, but it is still distinguishable on coloration, markings and lower average subcaudal counts. D. l. rhodesiana is well isolated from the typical form by the Atid Limpopo Valley.

Breeding. About 7 - 9 young are born in December, a new-born ♂ paratype measured  $79 + 15 = 95$  mm.

Diet. Slugs; a pair of Umtali paratypes devoured six new-born young in captivity.

Enemies. An Imbeza snake was disgorged by a Naja n. mossambica. Turnbull-Kemp (1960) found slug-eaters in the stomachs of trout at Inyanga.

Habitat. Very common in montane grassland and montane forest, in some areas (Inyanga highlands, Vumba Mountain, Melssetter District) it is the commonest species of snake.

Distribution. The eastern Highlands of Rhodesia, extending westwards along the main watershed to Salisbury; the Gorongosa Mountain populations are probably isolated.

Chubb's (1909b) Bulawayo record is not supported by material in the National Museum and has been rejected (Broadley, 1958d). Matabeleland is too dry for this species.

## DUBERRIA LUTRIX SHIRANA (Boulenger)

Homalosoma lutrix (not Linnaeus) Gunther, 1893, p. 555 (Shire Highlands).

Homalosoma shiranum Boulenger, 1894, Cat. Snakes Brit. Mus., 2, p. 276, pl. xiii, fig. 1: Shire Highlands, Malawi.

Duberria lutrix shiranum Loveridge, 1933, p. 241 (Tanganyika localities); Bogert, 1940, p. 39 (Rungwe Mtn.).

Duberria lutrix shiranum Loveridge, 1942, p. 281 (Matengo Highlands), also 1944e, p. 142, and 1953a, p. 264 (Lichenya Plateau; Zomba Plateau; Nyika Plateau); Broadley & Pitman, 1960, p. 442; Wilson, 1965, p. 157.

Eleven specimens examined from: ZAMBIA. Abercorn (IRSNB); Nyika Plateau. MALAWI. Nyika Plateau (Buna Hill; Chelinda); Zomba Plateau.

Literature records. MALAWI. Lichenya Plateau; Nyika Plateau; Zomba Plateau.

Variation. No loreal; preocular 1 (rarely 2); postoculars 1 (rarely 2); temporals 1 + 2 (rarely 1 + 1); upper labials 6, the third and fourth (rarely second, third and fourth) entering the orbit; lower labials 6 (rarely 5); the first 3 in contact with the anterior sublinguals; dorsals in 15 rows; ventrals 124 - 139 in ♂♂, 133 - 142 in ♀♀; anal entire; subcaudals 37 - 44 in ♂♂, 24 - 34 in ♀♀.

Coloration. Olive brown to plumbeous above, usually with a black vertebral hair-line; below, yellowish mesially, plumbeous laterally, sometimes almost entirely dark.

Size. Largest ♂ (UM. 4130 - Zomba Plateau) 280 + 63 = 343 mm. Largest ♀ (UM. 6593 - Nyika Plateau) 316 + 52 = 368 mm.

Breeding. Loveridge (1953a) records 8 - 14 ova or embryos in two Malawi ♀♀.

Habitat. Montane grassland.

Distribution. Highlands bordering Lake Nyasa, i.e. south-western Tanganyika, Malawi, north-eastern Zambia (probably also north - western Mozambique).

## DUBERRIA VARIEGATA (Peters)

Homalosoma variegatum Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 622: Inhambane, Mozambique, and 1882, p. 107, pl. xvi, fig. 1; Boulenger, 1894a, p. 276 (Delagoa Bay); Bocage, 1896, p. 93 (Lourenco Marques); Boulenger, 1910, p. 509.



Duberria variegata Loveridge, 1944e, p. 147; FitzSimons, 1962, p. 166.

Five specimens examined from: MOZAMBIQUE. Inhaca Island (EBM & UM).

Literature records. MOZAMBIQUE. Delagoa Bay; Inhambane; Lourenco Marques.

Variation. Loreal present; preocular 1 (rarely 2); postoculars 2 - 3 (rarely 1); temporals 1 + 2; upper labials 6 or 7, the third and fourth or fourth and fifth entering the orbit; lower labials 6, the first 3 in contact with the anterior sublinguals; dorsals in 15 rows; ventrals 97 - 101 in ♂♂, 103 - 110 in ♀♀; anal entire; subcaudals 33 - 36 in ♂♂, 24 - 27 in ♀♀.

Coloration. Above pale olive with irregular dark blotches or plumbeous with white mottling; below cream with black infuscations or plumbeous with white mottling.

Size. Largest ♂ (SAM. 1659 - Delagoa Bay)  $176 + 50 = 226$  mm. Largest ♀ (ZMB - type)  $280 + 45 = 325$  mm.

Distribution. Southern Mozambique and Zululand.

#### Genus MEIZODON Fischer

Meizodon Fischer, 1856, Abhand. Naturw. Ver. Hamburg, 2, p. 112. Type by monotypy: M. regularis Fischer = Calamaria coronata Schlegel.

#### MEIZODON SEMIORNATUS SEMIORNATUS (Peters)

Coronella semiornata Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 622; Tate, Mozambique and 1882, p. 116, pl. xvii, fig. 2; Boulenger, 1894a, p. 359 (Lake Nyasa); Bocage, 1896, p. 92; Boulenger, 1907a, p. 11 (Luangwa River near Feira) and 1915, p. 207; Pitman, 1934 p. 295.

Coronella semiornata var. mossambicae Cott, 1935, Proc. Zool. Soc. London (1934), p. 967: Fambani (also Charre), Mozambique.

Meizodon semiornata Loveridge, 1953a, p. 263; Vesey-FitzGerald, 1958, p. 42; Hamley, 1962, p. 11 (Mlolo).

Meizodon semiornatus semiornatus Loveridge, 1957, p. 258; Broadley, 1959b, p. 21; FitzSimons, 1962, p. 138 (Beira); Wilson, 1965, p. 155.

Twenty-four specimens examined from: RHODESIA. Kariba; Kariba Lake - Sanyati Confluence; Que Que; Sebungwe District; Zambezi

River opposite Feira. ZAMBIA. Abercorn (IRSNB); Chikowa; Chilanga; Chipengali; Kafue River (USNM); Kasusu; Lusungazi. MALAWI. Mlolo. MOZAMBIQUE. Mada - Lamago.

Literature Records. ZAMBIA. Luangwa River near Feira. MALAWI. "Lake Nyasa"; Mlolo. MOZAMBIQUE. Beira; Charre; Fambani; Tete.

Variation. Preocular 1; postoculars 2 (rarely 1 or 3); temporals 2 + 2 (rarely 1 + 2, 2 + 1 or 2 + 3); upper labials 8 (rarely 7), the fourth and fifth (rarely fourth only) entering the orbit; lower labials 9 - 10, the first 5 (rarely 4) in contact with the anterior sublinguals; dorsals in 21 rows on nape and at midbody, reducing to 17 - 19 rows before the vent; ventrals 169 - 182 in ♂♂, 180 - 197 in ♀♀; anal divided (rarely entire); subcaudals 75 - 88 in ♂♂, 71 - 84 in ♀♀.

Coloration. Blue-grey or dark olive above, with irregular black crossbands on the anterior portion of the body; throat white, otherwise plumbeous below; pre- and postoculars and the labials immediately below them usually yellow.

Size. Largest ♂ (NMM. 116 - Mlolo) 417 + 81 + = 498+ mm. Largest ♀ (LMM. 5755 - Lourenco Marques) 509 + 152 = 661 mm.

Breeding. A 505 mm ♀ from Mlolo laid 3 eggs measuring 35 x 10 to 29 x 10 mm on 9th February.

Diet. A Mada - Lamago juvenile contained a Phrynobatrachus u. mababiensis.

Enemies. The record from the south bank of the Zambezi opposite Feira is based on the posterior half of a large ♂ (tail 142 mm) recovered from the stomach of a Lizard Buzzard (Kaupifalco monogrammicus).

Habitat. This species frequents marshy regions and waterside localities.

Distribution. Eastern Africa, from Uganda and Kenya south to Swaziland and Zululand, reaching its western limit in the Kafue Flats - Kariba Lake area.

#### Genus PHILOTHAMNUS A. Smith

Philothamnus A. Smith, 1847, Ill. Zool. S. Africa, footnote to text for pl. lix. Type by monotypy: Dendrophis (Philothamnus) semivariegata A. Smith.

Chlorophis Hallowell, 1857, Proc. Acad. Nat. Sci. Philadelphia, p. 53.

Type by monotypy: C. heterodermus Hallowell.



Loveridge (1951, p. 189) placed Chlorophis in the synonymy of Philothamnus and has been followed by most subsequent workers. In his generic revision, Loveridge (1958) treated Chlorophis as a subgenus, distinguished by its smooth subcaudals. In a review of Philothamnus natalensis (Broadley, 1966, in press), I have shown that there are two races, distinguished by the presence or absence of keels on the subcaudals, indicating that this character is of importance only at the subspecific level.

Mertens (1955, p. 91) gave Chlorophis generic rank and drew attention (p. 93) to the throat display of Philothamnus s. semivariatus (in which the throat and neck are inflated as in Dispholidus typus) which he had apparently not seen exhibited by Chlorophis. However, this throat display is shown equally well by an angry Philothamnus i. irregularis, although not observed in either P. hoplogaster or P. ornatus.

Laurent (1964c, p. 103) provided the following key to the two "genera":

Frontal little elongated, feebly narrowed towards the rear.  
Habits semi-aquatic. Diet chiefly amphibians. Forests and savannas ..... Chlorophis Hallowell

Frontal very elongated, strongly narrowed towards the rear.  
Habits terrestrial and arboreal. Diet chiefly reptiles.  
Savannas ..... Philothamnus Smith

In view of the intraspecific variation in shape and proportions of the frontal, especially in P. semivariatus, I do not consider this to be a character of generic importance. With regard to ecology, P. semivariatus certainly occurs in drier savanna than the other species and consequently feeds largely on lizards, but it is also frequently found with P. hoplogaster, P. i. irregularis and P. n. natalensis in waterside habitats and it does then include amphibians in its diet. On the other hand, species of Chlorophis (sensu Laurent) often occur well away from water, particularly on forest fringes, and these forms do eat lizards, including chameleons (both Chamaeleo and Brookesia). There is no clear-cut distinction between the two groups and the separation of Philothamnus as a monotypic genus cannot be accepted.

#### PHILOTHAMNUS HOPLOGASTER (Gunther)

Ahaetulla hoplogaster Gunther, 1863, Ann. Mag. Nat. Hist. (3), 11, p. 236:

"Port Natal" = Durban, South Africa.



Philothamnus neglectus Peters, 1866, Monatsb. Akad. Wiss. Berlin, p. 890; Praso Boror, Mozambique, and 1882, p. 130, pl. xix A, fig. 2; Pfeffer (part) 1893, p. 84 (Quelimane); Bocage, 1896, p. 92 (Beira; Lourenco Marques).

Abaetulla neglecta Gunther, 1894, pp. 618, 620 (Zomba; Mlanje).

Chlorophis neglectus Boulenger (part) 1894a, p. 94 and 1896, p. 631; Peracca, 1896, p. 2 (Kazungula); Boulenger, 1907a, p. 10 (Luangwa River; Mterize River), and 1910, p. 507 (Salisbury); Peracca, 1910, p. 4 (Barotseland); Boulenger, 1915, p. 205; Pitman, 1934, p. 294 (Namwala District; Lukulu Swamps); Cott, 1935, p. 966 (Fambani; Charre; Caia); Themido, 1941, p. 16.

Chlorophis natalensis (not A. Smith) Boulenger, 1902, p. 17 (Salisbury) and 1910, p. 507 (part - Kafue River record only).

Chlorophis hoplogaster Boulenger, 1907b, p. 486 (Beira), and 1910, p. 507 (part); Hewitt & Power, 1913, p. 162 (Eldorado); Boulenger, 1915, p. 205; Pitman, 1934, p. 294 (Munyamadzi River); Cott, 1935, p. 966 (Fambani); FitzSimons, 1939b, p. 22 (Vumba Mtn.; Chirinda Forest); Bogert, 1940, p. 54 (Karonga).

Philothamnus hoplogaster Loveridge, 1953a, p. 260 (Misuku Mtns.; Nchena-chona; Nchisi Mtn.; Chitala River; Chowe; Zomba Mtn.; Cholo Mtn.; Ruo River), and 1953c, p. 143 (Fort Johnston; Ruo Gorge; Zomba); Broadley, 1957a, p. 53; Loveridge, 1958, p. 70 (Jeowesa; Blantyre; Boroma; Broken Hill; Lungasa; Luapula River; Macubu; Upper Zambezi River; Victoria Falls); Vesey-FitzGerald, 1958, p. 44 (Abercorn); Broadley, 1959b, p. 21 and 1959d, p. 311; Manacas, 1959, p. 143 (Vila Paiva de Andrada; Mambone); Broadley & Pitman, 1960, p. 440; Hanney, 1961, p. 21 (Blantyre); Broadley, 1962d, p. 828; FitzSimons, 1962, p. 147 (Chishawasha; Guija; Lourenco Marques; Masieni; Ramaquatane; Trelawney); Johnsen, 1962, p. 120 (Kawambwa); Wilson, 1965, p. 156.

One hundred and fifty-two specimens examined from: RHODESIA.

Atlantica; Bulawayo; Chibwe; Chimanimani Mountains (Dead Cow Camp); Chirinda Forest; Fern Valley; Haroni - Lusitu Confluence; Inyanga Tea Estates; Kariba Lake; <sup>Sanyati</sup> Kyle Dam; Lumane; Mana Pools; Mount Darwin; 4 mls W of Mtoke; Norton; Odzi; Old Umtali; Sabi - Lundi Confluence; Salisbury; Selukwe; Sengwe Gorge; Silverstreams; Thorn Park; Tilbury; Umtali; Umvumvumu River; Zana Farm. ZAMBIA. Abercorn; Chikwa; Chilanga; Chingola; Chipengali; Fort Jameson; Isombo Stream; Kabompo; Kafulafuta; Kalichero; Kalomo; Kasama; Kasempa; Kasusu; Kaungashi; ~~Kawambwa~~; Lundazi; Lusaka; Machile Forest Station; Mambwe; Mlenbo River; Mporokoso; Msoro; Mtikila; Nahunwe (Kariba Lake); Ndola; Ngoma; Solwezi; Tandalwe. MALAWI. Injeri Estate. MOZAMBIQUE. Beira; Chimonzo; Dondo; Gorongosa Mountain; Inchope; Mafora; Massangena; Mudalamago; Vila de Manica; Xiluvo.



Literature records. RHODESIA. Chirinda Forest; Chishawasha; Driefontein; Eldorado; Mazoe (BM); Ramagubane; Salisbury; Tre-lawney; Vumba Mountain. ZAMBIA. Abercorn; Broken Hill; Kafue River; Kawambwa; Kazungula; Luangwa River; Luapula River; Lukulu Swamp; Lungasa; Macubu; Mterize River; Munyamadzi River; Namwala District; Victoria Falls. MALAWI. Blantyre; Chitala River; Cholo Mountain; Chowe; Fort Johnston; Karonga; Misuku Mountains; Mlanje Mountain; Nchenachena; Nchisi Mountain; Ruo Gorge; Zomba; Zomba Mountain. MOZAMBIQUE. Beira; Boroma; Boror; Caia; Charre; Fambani; Guija; Jeevesa; Lourenco Marques; Mambone; Masieni; Quelimane; Vila Paiva de Andrada.

Variation. Preocular 1 (very rarely 2); postoculars 2 (very rarely 1 or 3); temporals 1 + 1 (rarely 1 + 2, 2 + 1, 0 + 1; both temporals fused with labials in a Maforga snake); upper labials 8 (rarely 7 or 9), the fourth and fifth (rarely third and fourth, third, fourth and fifth, fourth, fifth and sixth, or fifth and sixth) entering the orbit; lower labials 8 - 12, the first 4 - 6 in contact with the anterior sublinguals; dorsals in 15 rows on nape and at midbody, 11 before the vent (rarely reducing to 13 in advance of midbody); ventrals (D) 144 - 162 in ♂♂, 145 - 167 in ♀♀; anal divided; subcaudals smooth, 84 - 101 in ♂♂, 74 - 98 in ♀♀. Dentition - maxillary 24 - 27; palatine 16 - 21; pterygoid 27 - 34; dentary 29 - 31 (6 skulls).

Coloration. Above, emerald green, blue-green, or olive (rarely bronze), sometimes with a series of black blotches on the nape; white below.

Size. Largest ♂ (MCZ. 51101 - Misuku Mtns.) 500 + 220 = 720 mm. Largest ♀ (BM. 02.2.12.87 - Mazoe) 685 + 260 = 945 mm.

Breeding. A 585 mm Chipengali ♀ contained 4 eggs measuring 23 x 8 to 18 x 5 mm on 28th February; a 649 + mm Fort Johnston ♀ held 7 eggs of 24 x 9 mm on 17th November. Wilson (1965) records 4 - 8 eggs in ♀♀ from eastern Zambia.

Diet. Small frogs (*Rana* sp.) in several stomachs; a *Phrynobatrachus* n. *maabiansis* in a Chipengali snake; *Arthroleptis stenodactylus* in two Vila de Manica snakes; *Hyperolius tuberilinguis* and *Afraxalus b. brachy-onemis* in two Xiluvo snakes. FitzSimons (1939b) noted that a Chirinda Forest snake contained a *Lygodactylus c. capensis* and an *Arthroleptis stenodactylus*. Wilson (1965) records that captive snakes feed readily on frogs and an occasional gecko. I have seen a *Mabuia varia* eaten by a captive snake.

Enemies. At Irisvale a *Naja nigricollis mossambica* disgorged the tail of a *Philothamnus hoplogaster* after capture.

Habitat. Vleis, marshes and streams, also forest fringes. Abundant in Borassus-Palm Forest at the Zambezi Mouth (Cott, 1935).

Distribution. Eastern Africa, from Tanganyika to the eastern Cape Province, extending west to Katanga and Zambia.

PHILOTHAMNUS ORNATUS Bocage

Philothamnus ornatus Bocage, 1872, Journ. Sci. Lisboa, 4, p. 80: Huilla, Angola (restricted by Bogert, 1940), and 1895, p. 93, pl. xii, figs. 1, 1a - c; Broadley, 1959b, p. 22 and 1959d, p. 311, fig. 2; Broadley & Pitman, 1960, p. 440; Broadley, 1962d, p. 829; FitzSimons, 1962, p. 146.

Chlorophis ornatus Angel, 1921, p. 42 (Lealui).

Philothamnus irregularis ornatus Loveridge, 1958, p. 82.

Twenty specimens examined from: RHODESIA. Marandellas; Marandellas - Macheke; Salisbury and 10 mls W; Waddilove Mission (Wedza). ZAMBIA. Abercorn (IRSNB); Balovale District (1323 Aa); Kawambwa (IRSNB); Mambwe (IRSNB); Mporokoso (IRSNB); Mweru - Wantipa (IRSNB).

Literature records. ZAMBIA. Lealui.

Variation. Preocular 1; postoculars 2 (rarely 3); temporals 1 + 1 (rarely 1 + 2 or 2 + 1); upper labials 8 (rarely 9 or 10), the third, fourth and fifth (rarely fourth, fifth and sixth, or fourth and fifth) entering the orbit; lower labials 9 - 11, the first 4 - 6 in contact with the anterior sublinguals; dorsals in 15 rows on nape and at midbody, 11 before the vent; ventrals 147 - 159 in ♂♂, 153 - 174 in ♀♀; anal divided; subcaudals smooth, 96 - 104 in ♂♂, 86 - 101 in ♀♀. Dentition - maxillary 27 - 30; palatine 18; pterygoid 32 - 35; dentary 32 - 33 (2 skulls).

Coloration. Emerald green above, with a red-brown or blackish dorsal stripe three scales wide, narrowly bordered with yellow, the anterior dorsal scales are black-edged; labials and underside white with a bronze tint.

Size. Largest ♂ (NMSR. 621 - Salisbury) 420 + 179 = 599 mm. Largest ♀ (IRSNB - Mambwe) 550 + 227 = 777 mm.

Diet. A 748 mm ♀ from 10 mls west of Salisbury contained a Rana angolensis. A Mambwe snake had the remains of a Rana in her stomach.

Distribution. Plateau areas of Angola, northern and western Zambia and apparently isolated populations in north-eastern Rhodesia.



PHILOTHAMNUS HETEROLEPIDOTUS (Gunther)

Ahaetulla heterolepidota Gunther, 1863, Ann. Mag. Nat. Hist. (3) 11, p. 286: Africa.

Philothamnus heterolepidotus Pfeffer, 1893, p. 82 (Quelimane); Bocage, 1896, p. 100; Broadley, 1959d, p. 312; Broadley & Pitman, 1960, p. 441.

Chlorophis heterolepidotus Pitman, 1934, p. 294 (but no material).

Philothamnus irregularis (not Leach) Vesey-FitzGerald (part) 1958, p. 91, photo 10 (Mporokoso specimen).

Six specimens examined from: ZAMBIA. Abercorn (IRSNB); Checha (IRSNB); Lake Chisi (IRSNB); Mporokoso.

Literature records. MOZAMBIQUE. Quelimane (Njama Kette).

Variation. Preocular 1; postoculars 2; temporals 1 + 1; upper labials 9 (rarely 8 or 10), the fourth, fifth and sixth (rarely third, fourth and fifth, or fifth, sixth and seventh) entering the orbit; lower labials 9 - 10, the first 5 in contact with the anterior sublinguals; dorsals in 15 rows on nape and at midbody, 11 before the vent; ventrals 179 - 186; anal divided; subcaudals smooth, 115 - 119.

Coloration. Emerald green above, white below.

Size. Largest ♂ (NMR. 3184 - Mporokoso) 511 + 254 = 765 + mm.  
Largest ♀ (IRSNB - Abercorn) 500 + 245 = 745 mm.

Distribution. This species is associated with the fringes of the lowland forests and gallery forest extending along the rivers; it extends from Togoland to the Sudan, south to Tanganyika and northern Mozambique, west through northern Zambia and Katanga to Angola.

PHILOTHAMNUS IRREGULARIS IRREGULARIS (Leach)

Coluber irregularis Leach, 1819, in Bowdich Miss. Ashantee, App. p. 494:

"Fantee" = Fanti, Ghana.

Ahaetulla irregularis Gunther, 1864, p. 307 (Zambezi Expedition), and 1893, p. 555 (Shire Highlands).

Ahaetulla shirana Gunther, 1893, Ann. Mag. Nat. Hist., (6) 1, p. 326: Blantyre Mission, Shire River, Malawi.

Chlorophis irregularis Boulenger, 1894a, p. 96 and 1896, p. 631 (Mandala = Blantyre); Peracca, 1896, p. 2 (Kazungula); Boulenger, 1897, p. 801 (Kondowe to Karonga; Nyika Plateau; Fort Hill); Chubb, 1909a, p. 595 (Victoria Falls), and 1909b, p. 35 (Selukwe); Boulenger, 1910,

p. 508 (Mazoe; Salisbury), and 1915, p. 205; Angel, 1921, p. 42, (Lealui); Pitman, 1934, p. 294 (Mumbwa); Cott, 1935, p. 966 (Charre; Fambani); FitzSimons, 1939b, p. 22 (Chirinda Forest); Bogert, 1940, p. 53 (Mianje; Mt. Silinda).

Philothamnus Guntheri Pfeffer, 1893, Jahrb. Hamburg Wiss. Anst., 10, p. 85, pl. i, figs 3 - 5: Quelimane, Mozambique.

Philothamnus irregularis Bocage, 1896, p. 92; Vesey-FitzGerald, 1958, p. 45 (Abercorn; Chiengi; Mweru - Wantipa).

Philothamnus irregularis var. Guntheri Bocage, 1896, p. 92 (Boror).

Chlorophis emini Gunther. Peracca, 1910, p. 4 (Barotseland).

Chlorophis vermayi FitzSimons, 1932, Ann. Tvl. Mus., 16, p. 38 and 1935b, p. 312, fig. 1: Maun, on the Thamalakane River, Bechuanaland.

Philothamnus irregularis irregularis Loveridge, 1953a, p. 261 (Nchisi Mtn.; Cholo Mtn.; Likabula River; Misuku Mtns.; Nchenachena; Mtimbuka; Chiradzulu Mtn.; Limbe; Ruo River); Broadley, 1957a, p. 53, illus.; Loveridge, 1958, p. 85 (Chishawasha; Umtali); Broadley, 1959b, p. 23 and 1959d, p. 312; Broadley & Pitman, 1960, p. 441; Hamney, 1961, p. 21 (Blantyre); Broadley, 1962d, p. 829; FitzSimons, 1962, p. 144 (Lourenco Marques; Que Que; Rikatla); Wilson, 1965, p. 156.

Chlorophis irregularis shirani Laurent, 1964a, p. 103.

One hundred and five specimens examined from: BECHUANALAND. Shakawe. RHODESIA. Atlantica; Birchenough Bridge; Chishawasha; Domboshawa; Haroni - Lusitu Confluence; Imbeza; Iryanga Tea Estates; Lower Pungwe River; Manga Reserve; Marandellas; Mtoroshanga; Rhodes Iryanga Estate; Ruarwe; Salisbury; Selukwe; Silverstreams; Sincia; Tandaai; Toronto; Umtali; Umzilizwe River; Vumba Mountain; Victoria Falls. ZAMBIA. Abercorn; Kabompo; Kalabo; Kalichero; Kasempa Boma; Ndola. MOZAMBIQUE. Amatengas; Braganca (USAM); Macuti; Maforga; Nabaumana River; Vila de Manica.

Literature record. BECHUANALAND. Maun. RHODESIA. Chirinda Forest; Chishawasha; Mazoe; Mount Silinda; Que Que; Salisbury; Selukwe; Umtali; Victoria Falls. ZAMBIA. Abercorn; Chiengi; Kazungula; Lealui; Mumbwa; Mweru - Wantipa. MALAWI. Blantyre; Chiradzulu Mtn.; Cholo Mtn.; Fort Hill; Kondowe to Karonga; Limbe; Misuku Mtns.; Mianje Mtn.; Mtimbuka; Nchenachena; Nyika Plateau; Ruo River; Shire Valley. MOZAMBIQUE. Boror; Charre; Fambani; Lourenco Marques; Quelimane; Rikatla.



Variation. Preocular 1; postoculars 2 (very rarely 3); temporals 1+1 or 1+2 (rarely 1+0 or 2+2); upper labials 9 (rarely 8 or 10), the fourth, fifth and sixth (rarely third, fourth and fifth, fourth and fifth only, or fifth, sixth and seventh) entering the orbit; lower labials 10 (rarely 9 or 11), the first 5 (rarely 4 or 6) in contact with the anterior sublinguals; dorsals in 15 rows on nape and at midbody, 11 before the vent; ventrals (D) 151 - 161 in ♂♂, 155 - 168 in ♀♀; anal divided (very rarely entire); subcaudals smooth, 107 - 116 in ♂♂, 98 - 109 in ♀♀. Dentition - maxillary 25 - 28; palatine 16 - 19; pterygoid 27 - 33; dentary 26 - 30 (6 skulls).

Coloration. Emerald green above, interstitial skin black, and dorsal scales black-edged anteriorly; pale green or yellow-green below.

Size. Largest ♂ (UM. 9902 - Tandaai) 730 + 324 = 1054 mm. Largest ♀ (TM. 16223 - Mount Silinda) 808 + 338 = 1146 mm. A ♀ with a truncated tail (NMSR. 736 - Umzilizwe River) measured 898 mm from snout to vent.

Discussion. Laurent (1964) considers the populations of Angola, Katanga, Rhodesia and Malawi to be subspecifically distinct from Kivu populations, which he regards as typical irregularis. For these southern snakes he revived the name shiramus Gunther, 1888, although angolensis Bocage, 1882, has priority. He distinguishes shiramus on lower ventral and subcaudal counts, but his conclusions are not supported by the data derived from the present series, as shown in Table 7 below:

	LAURENT						BROADLEY		
	<u>irregularis</u> (Kivu)			<u>shiramus</u>			South-East Africa		
	N	Range	Mean	N	Range	Mean	N	Range	Mean
VENTRAIS	♂♂ 42	151-167	158.2	12 146-164	153.9	29 151-161	156.7		
	♀♀ 64	157-174	164.1	23 149-170	157.2	34 155-168	161.9		
SUBCAUDALS	♂♂ 25	111-124	116.3	8 101-117	106.9	19 107-116	112.1		
	♀♀ 46	99-116	104.7	22 81-114	97.4	19 98-107	102.6		

Table 7. Geographical variation in ventral and subcaudal counts for Philothamnus 1. irregularis.

I agree with Loveridge (1958, p. 94) that the increase in average ventral and subcaudal counts from south to north-west is too gradual to allow the satisfactory delimitation of races.

Breeding. A 901 mm ♀ from Old Umtali contained 7 eggs, measuring 22 x 8 mm on 24th August. A 1050 mm ♀ from Mlanje contained 12 eggs averaging 20 x 8 mm (Bogert, 1940). In the Misuku Mountains one ♀ held 11 eggs measuring about 15 x 11 mm on 30th September, another held 7 eggs measuring 30 x 12 mm on 9th October (Loveridge, 1953a).

Diet. A 965 mm Vila de Manica ♀ contained a Bufo regularis and Fitz-Simons (1939b) found an adult toad of the same species in a 1030 mm Chirinda Forest ♀. Loveridge (1953a) found two Ptychadena oxyrhynchus in two Cholo snakes and the remains of a Hyperolius in a Mtimbuka specimen. Captive snakes feed readily on frogs (Rana spp; Ptychadena spp.; Phrynobatrachus natalensis; Hyperolius spp.) and toads (Bufo regularis, B. pusillus; B. carens). Subadult Chamaeleo d. dilepis are sometimes eaten, one took a Pigmy Mouse (Mus minutoides).

Behaviour. Unlike P. hoplogaster, this species inflates its throat like a Boomslang when annoyed, striking fiercely if further provoked.

Habitat. Well wooded stream banks and reedbeds - often present in large numbers in suitable situations.

Distribution. Savannas, swamps and forest fringes from Senegal east to the Sudan, south through Uganda, Tanganyika and Mozambique to Zululand, west through Rhodesia and northern Bechuanaland to Angola. Relict populations exist on the highlands of South West Africa. Replaced in north-eastern Africa and Kenya by P. i. battersbyi Loveridge.

#### PHILOTHAMNUS NATALENSIS NATALENSIS (A. Smith)

Dendrophis (Philothamnus) natalensis A. Smith, 1840, Ill. Zool. S. Africa,

Rept., pl. Lxiv, figs. 1 - 3: "Port Natal" = Durban, South Africa.

? Dendrophis subcarinatus Jan, 1869, Icon. Gen. 32, pl. ii, fig. 2:

Mozambique; Boulenger, 1894a, p. 91 (footnote).

Chlorophis natalensis FitzSimons, 1937, p. 262.

Philothamnus natalensis FitzSimons (part), 1962, p. 150 (Inhaca Island; Lourenco Marques).

Philothamnus natalensis natalensis Broadley, 1966 (in press).

Fourteen specimens examined from: RHODESIA. Sabi - Lundi Confluence. MOZAMBIQUE. Beira; Chimanzo (TM); Dondo; Inhaca Island (EBM; TM; UM); Manga; 5 mls E of Mapulanguene (TM); Masieni; Kiluvo.

Literature records. MOZAMBIQUE. Inhaca Island; Lourenco Marques.



Variation. Preocular one; postoculars 2 (rarely 3); temporals 2 + 2 (rarely 1 + 2 + 2 or 2 + 1 + 2); upper labials 8 or 9, the fourth and fifth, or fifth and sixth (rarely fourth, fifth and sixth) entering the orbit; lower labials 9 - 11, the first 4 - 6 in contact with the anterior sublinguals; dorsals in 15 rows on nape and at midbody, 11 before the vent; posterior dorsals and subcaudals feebly keeled; ventrals 164 - 172 in ♂♂, 164 - 182 in ♀♀; anal divided; subcaudals (strongly keeled) 116 - 127 in ♂♂, 108 - 118 in ♀♀. Dentition - maxillary 19 - 23; palatine 13 - 16; pterygoid 23 - 30; dentary 18 (3 skulls).

Coloration. Specimens from Inhaca Island are uniform emerald green above, pale green below. Snakes from mainland Mozambique are pale green, the juveniles have black crossbars on the anterior third of the body, but these markings are hardly discernible on large adults.

Size. Largest ♂ (TM. 29436 - 5 mls E of Mapulanguene) 645 + 357 = 1002 mm; Largest ♀ (UM. 4744 - Sabi - Lundi Confluence) 625 + 297 = 922 mm.

Discussion. When Sir Andrew Smith described Philothamnus natalensis in 1840, he stated that the subcaudals were more strongly keeled than the ventrals, but for the next hundred years almost all the snakes assigned to this species had smooth subcaudals and Boulenger (1894a, p. 92) stated that the subcaudals were not keeled in the genus Chlorophis. Fitz-Simons (1937, p. 262) was unable to trace the type of natalensis and the only "Port Natal" specimen in the British Museum has smooth subcaudals.

After examining all the available material, I have found (Broadley, 1966) that typical P. natalensis is restricted to the Mozambique Plain below 1,000 feet and reaches its southern limit at Durban, the type locality. On the escarpment and plateau areas of the Transvaal and Natal occurs a race with smooth subcaudals, which intergrades with the typical form in a narrow zone extending from Durban to north Zululand and probably into the Kruger National Park. The western race also occurs in coastal areas of the eastern and southern Cape Province.

The two races of P. natalensis are in many respects intermediate between P. irregularis and P. semivariegatus, but on the whole closer to the latter, particularly with regard to dentition. The ecological data at present available suggest that P. n. natalensis is a "tree snake" rather than a "water snake".

Habitat. At Beira it was taken in secondary growth scrub (formerly coastal forest) between the beach and a freshwater swamp, here it is

sympatric with Philothamnus hoplogaster, P. i. irregularis and P. s. semivariegatus. It occurs in woodland at Dondo and Xiluvo. This is the only species of Philothamnus so far recorded on Inhaca Island.

Distribution. The Mozambique Plain from Xiluvo and Beira south to Durban, extending west to south-eastern Rhodesia and north-eastern Transvaal (Kruger National Park), but not found above 1,000 feet.

PHILOTHAMNUS SEMIVARIEGATUS SEMIVARIEGATUS (A. Smith)

Dendrophis (Philothamnus) semivariegata A. Smith, 1847, Ill. Zool. S.

Africa, pls. lix, lx, lxiv, figs. 1a & b: Bushman Flat, Cape Province (restricted by Bogert, 1940, p. 56).

Ahaetulla semivariegata Gunther, 1864, p. 307 (Shire Valley).

Philothamnus punctatus Peters, 1866, Monatsb. Akad. Wiss. Berlin, p. 889;

Zanzibar Coast, Tanganyika, and 1882, p. 129, pl. xix A, fig. 1 (Caba-ceira; Boror; Querimba Islands); Bocage, 1882, p. 289 (Angoche);

Pfeffer, 1893, p. 83 (Quelimane); Bocage, 1896, p. 92 (Boror; Sofala).

Dendrophis melanostigma Jan, 1869, Icon. Gen. Ophidiens, 32, pl. ii, fig.

3: Mozambique.

Philothamnus semivariegatus Boulenger, 1894a, p. 99 (Palapye; Blantyre;

Lake Nyasa; Mozambique), and 1896, p. 631 (Upper Shire River); Per-

acca, 1896, p. 2 (Kazungula); Boulenger, 1897, p. 801 (Kondowe to Kar-

onga; Nyika Plateau; Fort Hill), 1902, p. 17 (Mashonaland), 1907a,

p. 10 (Petauke) and 1907b, p. 486 (Beira); Gough, 1908, p. 24 (Serowe);

Boulenger, 1910, p. 508 (Salisbury; Livingstone; Delagoa Bay); Hewitt

& Power, 1913, p. 162 (Eldorado; Francistown); Boulenger, 1915, p. 206;

Loveridge, 1923, p. 879 (Lumbo); Power, 1927c, p. 109 (Lobatsi); Cott,

1935, p. 967 (M'Gaza; Charre; Fambani); FitzSimons, 1937, p. 262.

Philothamnus semivariegatus semivariegatus Pitman, 1934, p. 295 (Broken

Hill; Lukulu Swamps; Luangwa River in Serenje District); Fitz-

Simons, 1935b, p. 313 (Matsimaklaha River; Gaberones; Maun; Tsotso-

roga); Mertens, 1937, p. 13 (Inhaminga); FitzSimons, 1939b, p. 22

(Devuli River Bridge); Loveridge, 1953a, p. 262, pl. iv, fig. 1 (Lika-

bula River; Misuku Mtns.; Chitala River; Tete), and 1958, p. 105

(Chifumbazi; Lukungui; Mpika; Essexvale; Umtali; Victoria Falls);

Vesey-FitzGerald, 1958, p. 43 (Abercorn); Broadley, 1959b, p. 24, and

1959d, p. 313; Manacas, 1959, p. 144 (Chibuto; Villa Paiva de Andrada;

Mambone); Broadley & Pitman, 1960, p. 442; Broadley, 1962d, p. 829;

FitzSimons, 1962, p. 140 (Chishawasha; Guija; Maputo; Masieni; Mazoe;

Que<sup>Que</sup>/ Rikatla); Wilson, 1965, p. 156.

Philothamnus variegatus (lapsus) Peracca, 1896, p. 2. (Kazungula).



One hundred and eight specimens examined from: BECHUANALAND. Kwebe Hills; Okovango. CAPRIVI. Lake Ldambezi. RHODESIA. Beithbridge; Bembesi; Bulawayo; Chipinda Pools; Dorowa; Empandene; Essexvale; Fatima; Fern Valley; Gondorowe Gorge; Hot Springs; Inyanga Tea Estates; Kapami and 6 mls SE; Kariba; Kariba Lake - Bumi and Mwenda Confluences; Khami Dam; Malapati Drift; Marandellas; Matopos South; Mohem Mine; Ncema Dam; Odzi; Old Umtali; Plumtree; Ruware; Sabi - lund and Makuni Confluences; Salisbury; Sengwe Gorge; Selukwe; Silverstreams; Tuli; Umtali; Vumba Mountain; Wankie; Zambezi - Chewore and Selungwe Confluences; Zewa. ZAMBIA. Abercorn (IRSNB; UM); Chikowa; Chipengali; Fort Jameson; Fort Rosebery; Kalichero; Kaputa (IRSNB); Kasempa; Katete; Kaungashi; Livingstone; Imdazi; Lusaka; Lusungazi; Machile; Mfuwe; Msoro; Mukupa (IRSNB); Malanga; Mweru - Wantipa (IRSNB); Sayiri; Siantamba. MOZAMBIQUE. Chinizina; Chiramba; Dondo; Gumba; Manga; Matara; Ponte do Pungwe; Xiluvo.

Literature records. BECHUANALAND. Francistown; Gaberones; Lobatsi; Maun; Metsimaklaba River; Palapye; Serowe; Tsotsoroga. RHODESIA. Chishawasha; Devuli Bridge; Eldorado; Essenvale; Macheke (T); Mazoe; Que Que; Salisbury; Umtali; Victoria Falls. ZAMBIA. Abercorn; Broken Hill; Kazungula; Livingstone; Lunagwa River (Serenje District); Lukulu Swamps. MALAWI. Blantyre; Chitala River; Fort Hill; Karonga-Kondowe; Likabula River; Misuku Mts.; Nyika Plateau; Shire Valley. MOZAMBIQUE. Angoche; Beira; Boror; Cabaceira; Charre; Chibuto; Chifumbazi; Delagoa Bay; Fambani; Guija; Inhaminga; Kasumbadedza; Lukungui; Lumbo; Mambone; Maputo; Masieni; M'Gaza; Quelimane; Querimba Islands; Rikatla; Sofala; Vila Paiva de Andrada.

Variation. Preocular 1 (rarely 2); postoculars 2 (rarely 1 or 3); temporals 2 + 2 (rarely 1 + 1, 1 + 2, or 2 + 1); upper labials 9 (rarely 10), the fourth, fifth and sixth (rarely fourth and fifth, or fifth and sixth only, or fifth, sixth and seventh) entering the orbit; lower labials 9 - 11 (rarely 12), the first 4 - 6 in contact with the anterior sublinguals; dorsals in 15 rows on nape and at midbody, 11 before the vent; ventrals 178 - 201 in ♂♂, 177 - 198 in ♀♀; anal divided; subcaudals 125 - 155 in ♂♂, 122 - 149 in ♀♀. Dentition - maxillary 16 - 23; palatine 10 - 15; pterygoid 20 - 27; dentary 18 - 24. (5 skulls).

Coloration. Usually blue-green anteriorly with irregular black cross-bands and blotches, becoming uniform mauve or bronze posteriorly; below, chin white, throat white or bright yellow, belly cream or pale mauve. Some specimens from northern Zambia (Kasempa to Abercorn) are uniform green above, this phase is common in Tanganyika and Kenya.

Size. Largest ♂ (NBSR. 5403 - Kariba Lake - Buni Confluence) 760 + 340 = 1100 mm. Largest ♀ (UM. 8726 - Sabi - Lundi Confluence) 845 + 350 = 1195 mm.

Discussion. Loveridge (1953, p. 114) examined no specimens with undamaged tails that had less than 126 subcaudals, but most of his material was from East Africa. Mozambique snakes agree with Tanganyika specimens in their high subcaudal counts (141 - 153), but in the south-western part of its wide range this species has much lower counts. FitzSimons (1962) accepts a minimum subcaudal count of 121.

Breeding. A 1108 mm ♀ from Umshagashe River laid 8 eggs measuring 26 x 10 mm on 26th January. A Misuku Mtns. ♀ held 5 eggs measuring 41 x 12 mm on 14th October (Loveridge, 1953a). Three Mozambique snakes, collected in early October, each contained 5 eggs varying in size from 15.5 x 7 to 40 x 8 mm (Manacas, 1959).

Diet. An Abercorn snake contained a Mabuia sibilatrix. Tails of two adult Pachydactylus bibroni in a Tete snake (Loveridge, 1953a). A Chikwa snake contained two frogs (Rana undet.) (Wilson, 1965). Captive specimens feed readily on geckos (especially Lygodactylus and Hemidactylus) and small frogs.

Habitat. Widespread in savanna, occurring in swamps and along streams, but also in dry thornbush.

Distribution. Savannas south of the Sahara, extending from Gambia east to Eritrea, south to the eastern Cape Province; absent from the Somali and South-west Arid regions. The typical form is replaced in the western savanna (Lower Congo-Angola) by P. s. dorsalis, while two other races occur on islands in the Gulf of Guinea.

#### Genus SCAPHIOPHIS Peters

Scaphiophis Peters, 1870, Monatsb. Akad. Wiss. Berlin, p. 644. Type by monotypy: S. albopunctatus Peters.

#### SCAPHIOPHIS ALBOPUNCTATUS ALBOPUNCTATUS Peters

Scaphiophis albopunctatus Peters, 1870, Monatsb. Akad. Wiss. Berlin, p. 645, pl. 1, fig. 4; Kita, French West Africa; Pitman, 1934, p. 295; Vesey-FitzGerald, 1958, p. 46.



Scaphiophis albopunctatus albopunctatus Broadley & Pitman, 1960. p. 442.

Five specimens examined from: ZAMBIA. Abercorn (IRSNB); Mukupa (IRSNB). There are another 26 specimens in the Institute Royal des Sciences Naturelles de Belgique from Abercorn (18), Kaputa (1), Mweru - Wantipa (6) and Bulaya (1).

Variation. Preoculars 1 - 2; suboculars 3; postoculars 2; temporals 4; upper labials 5, excluded from orbit; lower labials 8, the first 3 in contact with the anterior sublinguals, midbody scale rows 21 (22 in one); ventrals 171 in ♂, 198 - 204 in ♀♀; anal divided; subcaudals 67 in ♂, 55 - 59 in ♀♀. Teeth very small, subequal.

Coloration. Grey above, juveniles with irregular white spots; white below. Interior of mouth blue-black.

Size. Largest ♀ (IRSNB - Abercorn)  $870 + 162 = 1032$  mm.

Remarks. Vesey-FitzGerald (1958) has never taken this species at Abercorn, although familiar with it in the Rukwa Valley. It is probable that Brede's specimens came from west of Abercorn at a lower altitude.

Distribution. Kenya and Tanganyika, west through northern Zambia, the Congo and Uganda to Mali.

#### Gemma PROSYMNA Gray

Prosymna Gray, 1849, Cat. Snakes Brit. Mus., p. 80. Type by monotypy:

Calamaria meleagris Reinhardt.

#### PROSYMNA BIVITTATA Werner

Prosymna sundevallii var. bivittata Werner, 1903, Abhand. Bayer. Akad. Wiss., 22, p. 381: South West Africa.

Prosymna sundevallii bivittata Loveridge, 1958, p. 136 (Essexvale).

Prosymna sundevallii sundevallii (not A. Smith) Broadley, 1959b, p. 27, pl. 3; FitzSimons, 1962 (part), p. 153, pl. xix.

Prosymna bivittata Broadley, 1965c, p. 3.

Ten specimens examined from: BECHUANALAND. Gaberones (TM); Kanyu; Tierpub (TM). RHODESIA. Bambesi; 8 mls. S of Bulawayo; Essexvale; Heany.

Literature record. RHODESIA. Essexvale.

Variation. Internasals widely separated; preocular 1; postoculars 2 (rarely 1); temporals 1 + 2, 2 + 2 or 2 + 3; upper labials 6, the third and fourth entering the orbit; lower labials 8 (rarely 7), the first 3 in contact with the anterior sublinguals; dorsals in 17 - 21 rows on nape, 15 at midbody and before the vent; ventrals 154 - 165 in ♂♂, 171 - 180 in ♀♀; anal entire; subcaudals 25 - 28 in ♂♂, 23 - 24 in ♀♀.

Coloration. Head pale with a dark interocular bar or dark with pale spots on frontal and parietals; a pale dorsal band four scales wide is usually broken up by dark flecks; a pair of chocolate-brown or red-brown lateral bands may be largely obscured by light flecks; outer  $1\frac{1}{2}$  to  $2\frac{1}{2}$  scale rows and ventrum white.

Size. Largest ♂ (AMNH - Bembesi)  $274 + 33 = 307$  mm. Largest ♀ (NMSR. 635 - Essexvale)  $311 + 27 = 338$  mm.

Remarks. Elsewhere (Broadley, 1965c) I have shown that P. bivittata is a good species, sympatric with P. s. sundevalli in the central Transvaal and with P. s. lineata in Rhodesia and the eastern Transvaal.

Enemies. One fragmentary specimen was recovered from the stomach of a jackal (Canis mesomelas) at Kanyu.

Distribution. South West Africa, Bechuanaland, western Rhodesia, western, northern and eastern Transvaal, probably southern Mozambique and Zululand. (See map in Broadley, 1965c).

#### PROSYMA SUNDEVALLI LINEATA (Peters)

Temnorhynchus lineatus Peters, 1871, Monatsb. Akad. Wiss. Berlin, p. 568:

Matlale, Gazaland, Mozambique.

Temnorhynchus frontalis (Not Peters) Bocage (part), 1882, p. 288 (Angoche).

Prosymma sundevalli (sic) (not A. Smith) Bocage, 1896, p. 92.

Prosymma lineata Loveridge, 1953a, p. 264 (Kasumbadodza), and 1958, p. 138 (Plumtree; Selukwe); Broadley, 1959b, p. 28, pl. 3; FitzSimons, 1962, p. 152 (Lourenco Marques).

Prosymma sundevalli lineata Broadley, 1965c, p. 5.

Twenty-two specimens examined from: BECHUANALAND. Tsessebe (AM). RHODESIA. Balla Balla; Bulawayo; Fern Valley; Irisvale; 6 mls SE of Kapami; 11 mls NW of Lupane; Lusulu; Malimbasinbi; Matopos South; Mount Darwin; 25 mls N of Mtoko; Plumtree; Salisbury (BM; NMSR); Selukwe; Shavanoe River; Umtali (AM); Wankie National Park - Main Camp.



Literature records. RHODESIA. Plumtree; Selukwe. MOZAMBIQUE. Angecho; Kasumbadedza; Lourenco Marques; Matlale.

Variation. Internasals in contact; preocular 1; postoculars 2 (rarely 1 or 3); temporals 1 + 2, 2 + 2 or 2 + 3; upper labials 6, the third and fourth (rarely second also) entering the orbit; lower labials 8 (rarely 6 or 7), the first 3 in contact with the anterior sublinguals; dorsals in 19 - 21 (15 in one) rows on the nape, 15 at midbody and before the vent; ventrals 139 - 153 in ♂♂, 156 - 168 in ♀♀; anal entire; subcaudals 22 - 27 in ♂♂, 18 - 23 in ♀♀.

Coloration. Pale to dark brown above, head usually pale, with a dark spot on the fronto-parietal suture, a dull orange blotch on the frontal, a dark interocular bar and a large dark blotch on the nape; back usually with series of short longitudinal streaks. Some north-eastern specimens have a dorsal series of large dark blotches, separated by whitish scales. In striated specimens the dark coloration is largely restricted to the edges of the scales, the centres being lighter or bearing a light spot; white below.

Size. Largest ♂ (NMSR. 3880 - 11 mls NW of Lupane) 235 + 30 = 265 mm. Largest ♀ (UM. 1719 - Matopos South) 290 + 25 = 315 mm.

Enemies. Loveridge (1958) recovered his Kasumbadedza (Tete) specimen from the stomach of a Genet (*Genetta tigrina*).

Habitat. Usually found in sandy soil.

Distribution. Mozambique and Zululand, extending west through Rhodesia and the eastern and northern Transvaal to eastern Bechuanaland. (See map in Broadley, 1965c).

#### PROSYMMA ANGOLENSIS Boulenger

Prosymma frontalis (not Peters) Bocage, 1895, p. 98, pl. xi, fig. 2.

Prosymma angolensis Boulenger, 1915, Proc. Zool. Soc. London, p. 208

(based on Bocage, 1895): Huilla, Angola (restricted by Loveridge, 1958, p. 149).

One specimen examined from: ZAMBIA. Kalabo.

Description. A single internasal; preocular 1; postoculars 2; temporals 1 + 2; upper labials 6, the third and fourth entering the orbit; lower labials 7, the first 3 in contact with the anterior sublinguals; dorsals in 17 rows on nape, 15 at midbody and before the vent; a ♂ with 121 ventrals; anal entire; 26 subcaudals.

Coloration. Pale buff above, each scale dark edged; a broad chocolate-brown band on nape, with a triangular projection forward onto the frontal, a paired series of large chocolate-brown dorsal blotches, which are confluent, tending to form irregular cross-bands in places; cream below.

Size. ♂ (UM. 10096 - Kalabo)  $175 + 26 = 201$  mm.

Discussion. This specimen has a much lower ventral count than has previously been recorded for the species, Loveridge (1958, p. 150) gives a range of 145 - 163. Only further material from Barotseland can show whether this is merely an aberrant individual.

Distribution. North-eastern South West Africa, southern Angola and Barotseland.

#### PROSYMNA JANI Bianconi

Prosymna Jani Bianconi, 1862, Mem. Accad. Sci. Bologna (2), 1, p. 470, pl. i: Inhambane, Mozambique; Jan, 1876, pl. ii, fig. 1; Peters, 1882, p. 106; Bocage, 1896, p. 100.

Prosymna jani Boulenger, 1894a, p. 249, and 1910, p. 509; Loveridge, 1958, p. 165; FitzSimons, 1962, p. 156 (Guija; Inhaca Island; Lourenco Marques).

Two specimens examined from: MOZAMBIQUE. Inhaca Island (EBM).

Literature records. MOZAMBIQUE. Guija; Inhaca Island; Inhambane; Lourenco Marques.

Variation. Internasal single; preocular 1; postoculars 2 - 3; temporals 1 + 2; upper labials 6, the third and fourth entering the orbit; lower labials 8, the first 4 in contact with the anterior sublinguals; dorsals keeled, in 17 rows anteriorly, 15 posteriorly; ventrals 113 - 129 (121 - 125 in 2 ♀♀ examined); anal entire; subcaudals 27 - 39 (27 - 29 in 2 ♀♀ examined).

Coloration. Light red-brown to buff above, with dark brown or black markings; a dark blotch on the nape has a forward projection reaching the frontal and lateral extensions which pass through the eyes and meet on the prefrontal/frontal suture, two dorsal series of dark blotches are confluent on the neck, forming cross-bands; uniform cream below.

Size. Largest ♂ (LMM - Guija)  $182 + 39 = 222$  mm. Largest ♀ (ERM - Inhaca Island)  $225 + 37 = 262$  mm.



Habitat. Coastal alluvium.

Distribution. Southern Mozambique and northern Zululand.

PROSYMA AMBIGUA AMBIGUA Bocage

Prosymna ambiguus Bocage, 1873, Journ. Sci. Lisboa, 4, p. 218: Duque de Braganca, Angola.

Ligonirostra Stuhlmanni Pfeffer, 1893, Jahrb. Hamburg Wiss. Anst., 10, p. 78, pl. i, figs 8 - 10: Usambara, Tanganyika.

Prosymna ambigua Boulenger, 1894a, p. 248 (Shire Valley), also 1902, p. 17 (Mazoe), 1907a, p. 11 ("Mtala Country"), 1910, p. 509 and 1915, p. 208; Loveridge, 1923, p. 880 (Lumbo); Pitman, 1934, p. 295; Hanney, 1962, p. 11 (Blantyre).

Prosymna Vassei Mocquard, 1906, Bull. Mus. Hist. Nat. (Paris), 12, p. 250: Mozambique.

Prosymna variabilis Werner, 1909, Jahres. Ver. Nat. Wurttemberg, 65, p. 57: Moshi, Tanganyika.

Stenorhaddium temporale Werner, 1909, Jahres. Ver. Nat. Wurttemberg, 65, p. 60: "East Africa".

Prosymna transvaalensis Hewitt, 1910, Ann. Tvl. Mus., 2, p. 73: Tzaneen, N. Transvaal, South Africa.

Prosymna ambigua stuhlmanni Loveridge, 1953a, p. 265 (Mtimbuka; Kasumbadedza) and 1958, p. 160 (Abercorn; Imbeza; Salisbury); Vesey-FitzGerald, 1958, p. 47 (Abercorn); Broadley, 1959b, p. 29; Broadley & Pitman, 1960, p. 442; FitzSimons, 1962, p. 157 (Bulawayo; Guija; Inhambane); Laurent, 1964c, p. 108 (Porto Amelia); Wilson, 1965, p. 157.

Prosymna ambigua urundiensis Laurent, 1953, Bull. Cercle Zool. Congolais, 21, p. 23: Nyanza, Lake Tanganyika, Burundi, and 1954a, p. 56.

Thirty-six specimens examined from: RHODESIA. Bulawayo; Chipinga; Imbeza; Kariba Lake; Lake MacIlwaine; Mazoe (BM); Triangle; Umtali. ZAMBIA. Abercorn; Chikowa; Feira; Kalichero; Msoro. MOZAMBIQUE. Muda-Iamago.

Literature records. RHODESIA. Bulawayo; Imbeza; Mazoe; Odzi (BM); Salisbury. ZAMBIA. Abercorn; Mtala Country. MALAWI. Blantyre; Mtimbuka; Shire Valley. MOZAMBIQUE. Guija; Inhambane; Kasumbadedza; Lumbo; Porto Amelia.

Variation. Internasal single; preocular 1; postoculars 1 - 2; temporals 6 (rarely 5), the third and fourth (rarely second and third, or second, third and fourth) entering the orbit; lower labials 3 (rarely 7 or 9), the first three (rarely 4) in contact with the anterior sublinguals; dorsals

in 15 - 19 rows on nape, 15 at midbody and before the vent; ventrals 130 - 151 in ♂♂, 143 - 166 in ♀♀; anal entire; subcaudals 27 - 34 in ♂♂, 20 - 27 in ♀♀.

Coloration. Plumbeous above, each scale with a blue-grey centre, sometimes a dorso-lateral series of minute white spots, rostral yellow; below, white, with or without dark brown or grey mottling or infuscations, or uniform plumbeous, chin usually white.

Size. Largest ♂ (IRSNB - Abercorn)  $210 + 42 = 252$  mm. Largest ♀ (MZ. 54082 - Abercorn)  $293 + 30 = 323$  mm.

Discussion. FitzSimons (1962) has synonymised transvaalensis with stuhlmanni, and by including two Bulawayo ♀♀ with 160 - 162 ventrals (Broadley, 1959b) has extended the upper limit for ♀♀ ventrals from 155 to 162. Females from Bulawayo and Kalichero subsequently collected have 166 ventrals and a Bulawayo male has 151.

Laurent (1954a, p. 52) and Loveridge (1958) have shown that typical P. ambigua (sensu strictu) may have either 17 or 15 scale rows at midbody, so this character cannot be used to distinguish stuhlmanni from typical ambigua as suggested by FitzSimons (1962). Loveridge's Key (1958) fails to separate them on morphological characters, geographical origin of the specimen being the only criterion. Comparison of ventral and subcaudal counts for the two forms (Table 8 below) shows that they overlap completely. Abercorn material connects the eastern (stuhlmanni) and western (ambigua) populations, so stuhlmanni must be synonymised. P. a. urundiensis, based on a single ♂ with 152 ventrals, certainly does not warrant recognition. P. a. bocagei and P. a. brevis are doubtfully distinct, but P. a. ruspolti is probably a valid race endemic to the Somali Arid. P. a. ornatissima is readily distinguished by its striking coloration (Barbour & Loveridge, 1928, pl. 11, fig. 2), but its relict distribution suggests that it may be a full species, surrounded by P. a. ambigua at lower altitudes.

RACE	VENTRALS		SUBCAUDALS	
	♂♂	♀♀	♂♂	♀♀
<u>ambigua</u>	129 - 140	145 - 154	26 - 34	19 - 24
<u>stuhlmanni</u>	127 - 151	144 - 166	29 - 34	19 - 28
<u>urundiensis</u>	152		32	
<u>bocagei</u>	139 - 148	161 - 168	27 - 32	17 - 21
<u>brevis</u>	127 - 136	140 - 146	25 - 30	15 - 17
<u>ruspolii</u>	130 - 136	143 - 154	32 - 37	23
<u>ornatissima</u>	127 - 132	150	35 - 40	27

Table 8. Variation in ventral and subcaudal counts for the races of Prosymna ambigua (modified from Loveridge, 1958, p. 133).



Breeding. Females collected during December - February often contain 3 or 4 eggs.

Diet. A Mtimbuka snake contained a young gecko - Hemidactylus sp. (Loveridge, 1953a).

Distribution. Eastern Africa from southern Kenya to Zululand, extending west through northern Zambia and the Congo to Angola.

Genus AMPLORHINUS A. Smith

Amplorhinus A. Smith, 1847, Ill. Zool. S. Africa, Rept. Type by monotypy:  
A. multimaculatus A. Smith.

AMPLORHINUS MULTIMACULATUS A. Smith

Amplorhinus multimaculatus A. Smith, 1847, Ill. Zool. S. Africa, Rept., pl. lvii: Cape Colony, South Africa; FitzSimons, 1937, p. 262, and 1953a, p. 209 (Nyanziwa; Pungwe River Causeway); Broadley, 1959b, p. 42 and 1962d, p. 833; FitzSimons, 1962, p. 193.

Ten specimens examined from: RHODESIA. Chimanimani Mountains; Inyangani Mountain; Sheba; Stapleford; Tsetsera; World's View, Inyanga.

Literature records. RHODESIA. Nyanziwa; Pungwe Causeway.

Variation. Preocular 1; postoculars 2; temporals 2 + 2 (rarely 2 + 3); upper labials 8 (rarely 7), the fourth and fifth (rarely third and fourth) entering the orbit; lower labials 8 - 10, the first 4 - 5 in contact with the anterior sublinguals; dorsals in 17 rows on nape and at midbody, 15 before the vent; ventrals 139 - 142 in ♂♂, 140 - 152 in ♀♀; anal entire; subcaudals 72 - 80 in ♂♂, 58 - 62 in ♀♀, the first 4 - 12 single, the rest paired (rarely the first 1 - 2 also paired).

Coloration. Dark green to olive brown above, with a pale dorso-lateral stripe, which is flanked by longitudinal series of irregular dark spots, some scales edged with greenish white, upper labials each with a pale spot; plumbeous below, chin suffused with cream.

Size. Largest ♂ (UM. 8422 - Tsetsera) 420 + 177 = 597 mm. Largest ♀ (UM. 8421 - Tsetsera) 390 + 122 = 512 mm.

Breeding. The largest ♀ contains 6 eggs; a 475 mm ♀ from Tsetsera contains 5 eggs.

Habitat. Montane grassland from about 5,500 feet to the summit of Inyangani at 8,514 feet.

Distribution. Occurs at sea level in the south-western Cape Province, extending along the escarpment to the eastern Cape and north to the Natal and Transvaal Drakensberg. Relict populations occur on the eastern highlands of Rhodesia.

Genus *BOIGA* Fitzinger

Boiga Fitzinger (part) 1826, Neue Class. Rept., pp. 29, 60. Type by subsequent designation; Coluber irregularis Merrem.

*BOIGA BLANDINGI* (Hallowell)

Dipsas Blandingi Hallowell, 1844, <sup>P</sup>roc. Acad. Nat. Sci. Philadelphia, p. 170; Liberia.

The only record from ZAMBIA is a specimen collected at Mporokoso by Bredo in 1946 and deposited in the Institut Royal des Sciences Naturelles de Belgique. Identified by de Witte and checked by Pitman.

Description. ♂ Midbody scale rows 23; ventrals 254; anal entire; subcaudals 128 +. I have checked the dentition on the skull of a Uganda specimen, which has: maxillary 11 + III; palatine 8; pterygoid 13; dentary 18 - 19.

Habitat. Equatorial evergreen forest.

Distribution. Guinea, east to Uganda, south through the Congo to Angola and northern Zambia.

Genus *CROTAPHOPELTIS* Fitzinger

Crotaphopeltis Fitzinger, 1843, Syst. Rept., p. 27. Type by original designation: Coronella rufescens Schlegel = Coronella hotamboeia Laurenti.

*CROTAPHOPELTIS HOTAMBOEIA* (Laurenti)

Coronella hotamboeia Laurenti, 1768, Syn. Rept., p. 85: "India orientali" = Africa.

Coronella rufescens Gmelin, 1789, Syst. Nat., ed. 13, 1, p. 1094 (based on Seba, Thesaurus, 1, pl. xxxiii, fig. 6: No locality.



Coluber bicolor Leach, 1833, in Bowdich, Miss. Ashantee, p. 493: "Fantee"  
= Fanti, Ashanti, Ghana.

Crotaphopeltis refescens Peters, 1854, p. 624 (Tete); Bocage, 1882, p. 289  
(Angoché); Pfeffer, 1893, p. 87 (Quelimane); Bocage, 1896, p. 94  
(Mozambique Island; Sofala; Macequese - Save).

Lepidodira rufescens Gunther, 1864, p. 307 (Zambesi Expedition), and 1893,  
p. 555 (Shire Highlands).

Crotaphopeltis hitamboeja Peters, 1882, p. 126 (Mainland opposite Mozam-  
bique Island; Tete).

Lepidodira hotamboeja Boulenger, 1896, p. 89 (Zomba), also 1897, p. 80  
(Kondowe to Karonga; Nyika District and Plateau; Fort Hill), 1907a,  
p. 11 (Mterize River; Feira District), and 1907b, p. 487 (Beira);  
Roux, 1907, p. 77 (Rikatla); Chubb, 1909a, p. 596 (Mazeppa Mine), and  
1909b, p. 35 (Syringa); Boulenger, 1910, p. 510 (Salisbury; Delagoa  
Bay); Peracca, 1910, p. 4 (Barotseland); Hewitt & Power, 1913, p. 163  
(Eldorado); Boulenger, 1915, p. 210; Themido, 1941, p. 17 (Massangulo).

Crotaphopeltis hotamboeja hotamboeja Pitman, 1934, p. 296 (Machili River;  
Broken Hill; Lukulu Swamps); Gott, 1935, p. 968 (Gaia; Charre; M'Gaza;  
Mutarara; Fambani); FitzSimons, 1939b, p. 22 (Mount Silinda); Bogert,  
1940, p. 62 (Mlanje; Karonga); Loveridge, 1953a, p. 268 (Vipya Plateau)  
Chitola River; Cholo Mtn.; Ruw River), and 1953c, p. 144 (Fort Johnston);  
FitzSimons, 1957, p. 339 (Victoria Falls); Vesey-FitzGerald, 1958, p. 51,  
(Abercorn); Broadley, 1959, p. 33; Manacas, 1959, p. 145 (Maule; Porto  
Henrique; Vila Paiva de Andrada; Sao Martinho; Mambone); Broadley &  
Pitman, 1960, p. 443; Henney, 1961, p. 21 (Blantyre); Broadley, 1962d,  
p. 830; FitzSimons, 1962, p. 187 (Chishawasha; Inhaca Island; Lourenco  
Marques; Marandellas; Maputo; Que Que; Trelawney; Umvuma); Johnsen,  
1962, p. 121 (Kawambwa; Lunga River, Kasempa District); Wilson, 1965,  
p. 158.

Two hundred and eighty-nine specimens examined from: RHODESIA.  
Antelope Road; Balla Balla; Birchenough Bridge; Bomponi Farm; Bulawayo  
and 10 mls S; Chimanimani Mountains; Chipinda Pools; Dett; Esservale;  
Fairfield; Fern Valley; Gatooma; Glendale; Haroni - Lusitu Confluence;  
Inyanga Tea Estates; Inyangani Mountain; Kapani; Kariba Lake - Charara  
and Sanyati Confluences; Kyle Dam; Lake MacIlwaine; 13 mls NW of Lupane;  
Macheke; Makore Farm; Matetsi River Bridge; Matopos South; Matusadona  
Reserve; Mazeppa Mine; Mtarazi Bridge; Murambene; Odzi; Plumtree;  
Pungwe Bridge; Ruware; Sabi - Odzi Confluence; Salisbury; Selukwe;  
Silverstreams; Sinoia; 12 mls ESE of Sipolilo; Triangle; Tuli Reservoir;  
Umtali; Umzilizwe River; Victoria Falls; Wankie National Park - Main Camp;  
Wedza; Westacre. ZAMBIA. Abercorn; Broken Hill; Chikowa; Chilanga;

Chipengali; Fort Jameson; Fort Rosebery District; Kabendwe; Kabompo; Kalabo; Kalichero; Kaniki; Kaputa; Kasama; Kasempa; Kasusu; Katanda; Katete; Kaungashi; Kitwe; Lochinvar; Lundazi; Lusaka; Lusungazi; Machile Forest Station; Mambwe; Msoro; Mulupa; Mumbwa; Mwekera; Mweru - Wantipa; Ndola; Nyimba; Pendela River; Petauke Old Boma; Sayiri; Siantamba; Victoria Falls; <sup>Zongwe River</sup> / MALAWI. Blantyre; Mpatamanga Gorge; Ruo Gorge; Zomba. MOZAMBIQUE. Chiniziua; 15 mls E of Covane; 12 mls S of Eregu; Gumba; Guro; Inchope; Inhaca Island; Maforga; Manga; 4 mls S of Mwanza; Mida - Lamago; Namula; Quedas do Revue; 20 mls ENE of Tete; Vila de Manica; Xiluvo; 10 mls SW of Zohue.

Literature records. RHODESIA. Chishawasha; Driefontein (T); Eldorado; Marandellas; Mazeppa Mine; Mount Silinda; Que Que; Salisbury; Syringa; Trelawney; Umvuma; Victoria Falls. ZAMBIA. Abercorn; Broken Hill; Chinsali (B); Feira District; Kawambwa; Lunga River, Kasempa District; Lukulu Swamps; Machili River; Mterize River. MALAWI. Blantyre; Chitala River; Cholo Mtn.; Fort Hill; Fort Johnston; Karonga; Kondowe to Karonga; Mlanje; Nyika District & Plateau; Ruo River; Vipya Plateau; Zomba. MOZAMBIQUE. Angoche; Beira; Caia; Charre; Delagoa Bay; Fambani; Inhaca Island; Laurence Marques; Macequece - Save; Mambone; Maputo; Massangulo; Mauele; M'Gaza; Mozambique Island and mainland opposite; Mutarara; Porto Henrique; Quelimane; Rikatla; Sao Martinho; Sofala; Tete; Vila Paiva de Andrada.

Variation. Preocular 1 (rarely 2); postoculars 2 (rarely 1 or 3); temporals 1 + 2 (rarely 1 + 1 or 2 + 2); upper labials 8 (rarely 7, 9 or 10), the third, fourth and fifth (rarely third and fourth, fourth and fifth, fifth and sixth, or fourth, fifth and sixth) entering the orbit; lower labials 8 - 11, the first 4 - 6 in contact with the anterior sublinguals; dorsals in 17 - 19 rows on nape, 19 (rarely 17 or 21) at midbody, 15 before the vent; ventrals 148 - 173 in ♂♂, 146 - 169 in ♀♀; anal entire; subcaudals 34 - 49 in ♂♂, 26 - 40 in ♀♀. Dentition - maxillary 13 - 15 + II + 1; palatine 10 - 11; pte rygoid 19 - 23; dentary 21 - 25 (4 skulls).

Coloration. Pale olive brown; plumbeous, or dark purplish brown above, temporal region iridescent blue-black, upper labials white to dark brown, dorsum sometimes covered with minute white spots, which may tend to form transverse lines (especially in juveniles); white below. Iris of eye grey or brown, red in some snakes from Chipinga District.

Size. Largest ♂ (UM. 7338 - Bulawayo) 595 + 100 = 695 mm. Largest ♀ (NMR. 3459 - 10 mls S of Bulawayo) 600 + 82 = 682 mm.



Remarks. I agree with Gans & Laurent (1965, p. 65) that recognition of subspecies should await a review of the species as a whole. There is certainly striking geographical variation in ventral and subcaudal counts, which show a clinal increase from south to north, this is partially masked by local ecoclines, populations at high altitudes having lower average counts than neighbouring populations at low altitudes. The use of upper labial coloration as a taxonomic character presents difficulties, for the red coloration found in south-eastern populations rapidly fades after preservation and I am not sure whether snakes from southern Mozambique are red-lipped in life or not.

Breeding. A 540 mm Mwekera ♀ contained 11 eggs measuring 23 x 12 mm on 18th December. A Chitala River ♀ contained 10 eggs measuring 15 x 8 mm on 18th December (Loveridge, 1953a). A Porto Henrique ♀ held 5 eggs varying from 23 x 6 to 16.5 x 4.5 mm on 27th October and a Vila Paiva de Andrada ♀ held 17 eggs averaging 12 x 3.5 mm at the end of September (Manacas, 1959).

Diet. Stomachs with recognisable food invariably contained amphibians - Bufo regularis; Bufo pusillus; Bufo carens; Breviceps m. adspersus; Breviceps m. poweri; Pyxicephalus d. cryptotis; Rana sp.; Arthroleptis stenodactylus. FitzSimons (1939b) found an Arthroleptis stenodactylus in the stomach of a Mount Silinda snake. Loveridge (1953a) found Bufo carens, Breviceps m. mossambicus and Rana angolensis in stomachs of Malawi snakes. I have seen Kassina senegalensis and small Xenopus l. laevis eaten by captive snakes.

Enemies. Specimens were found in the stomachs of two Miodon c. christyi from Solwezi and Kasempa, another had been eaten by a Naja n. crawshayi at Kabompo and a juvenile was found in the stomach of a Pyxicephalus adspersus at Salisbury. Wilson (1965) records one killed by a Lizard Buzzard (Kaupifalco monogrammicus).

Habitat. Widespread in savanna, but absent from the Kalahari. Although essentially a terrestrial snake, several specimens were found hunting Hyperolius swynnertoni in small shrubs along the Umzilizwe River.

Distribution. Savannas of Africa south of the Sahara, from Senegal to Kenya and south to Cape Town, absent from arid regions.

## CROTAPHOPELTIS TORNIERI (Werner)

Leptodira tornieri Werner, 1908, Sitzb. Akad. Wiss. Wien (1907), 116,

Abt. 1, p. 1876: Usambara Mountains, Tanganyika.

Crotaphopeltis hotamboeia tornieri Loveridge, 1953a, p. 269 (Misuku Mtns.).

No specimens examined.

Literature records. MALAWI. Misuku Mountains.

Variation. Preoculars 2; postoculars 2 - 3; temporals 1 + 2; upper labials 8 - 9, the fourth and fifth (rarely fourth, fifth and sixth) entering the orbit; lower labials 8 - 10, the first 4 - 5 in contact with anterior sublinguals; midbody scale rows 17; ventrals 156 - 168; anal entire; subcaudals 36 - 48 (after Loveridge, 1953a).

Size. Largest ♂ (MCZ. 51151 - 2 - Misuku Mtns.)  $260 + 42 = 302$  mm. Largest ♀ (MCZ. 51153 - Misuku Mtns.)  $330 + 50 = 380$  mm.

Remarks. The occurrence of isolated populations of this montane forest dwelling form, surrounded by typical C. hotamboeia in savanna, strongly suggests that this snake is specifically distinct.

Diet. Three specimens contained a Hyperolius puncticulatus, an Arthroleptis stenodactylus and a Phrynobatrachus u. ukingensis (Loveridge, 1953a).

Habitat. Evergreen montane forest.

Distribution. Usambara and Uluguru Mountains, Tanganyika, south to Misuku Mountains, northern Malawi.

## Genus CHAMAETORTUS Gunther

Chamaetortus Gunther, 1864, Proc. Zool. Soc. London, p. 310. Type by monotypy: C. aulicus Gunther

## CHAMAETORTUS AULICUS AULICUS Gunther

Chamaetortus aulicus Gunther, 1864, Proc. Zool. Soc. London, p. 310:

Zambezi River; Peters, 1882, p. 128; Boulenger, 1896, p. 98; Roux, 1907, p. 77 (Rikatla); Boulenger, 1907b, p. 487 (Beira), and 1910, p. 511; Pitman, 1934, p. 296 (but no material); Manacas, 1959, p. 147, (Ghibito).



Chamaetortus sulicus sulicus Broadley, 1959b, p. 35, and 1962d, p. 831; FitzSimons, 1962, p. 191 (Delagoa Bay; Lourenco Marques; Magde; Maputo).

Four specimens examined from: RHODESIA. Birchenough Bridge; Malapati Drift; Ruware.

Literature records. MOZAMBIQUE. Beira; Chibuto; Delagoa Bay; Lourenco Marques; Magde; Maputo; Rikatla; Zambezi River.

Variation. Preocular 1, the loreal bordering the eye below it; postocular 2; temporals 1 + 1; upper labials 7 - 8, the third, fourth and fifth (rarely third and fourth only) entering the orbit; lower labials 8 - 10, the first 5 (rarely 3 or 4) in contact with the anterior sublinguals; dorsals in 17 rows on nape and at midbody, 13 (rarely 15) before the vent; ventrals 184 - 192 in ♂♂, 172 - 195 in ♀♀; anal entire; subcaudals 85 - 87 in ♂♂, 78 - 81 in ♀♀. Dentition - maxillary I + II + 1; palatine 11; pterygoid 22; dentary 18 (one skull).

Coloration. Red-brown above, head marbled with white, body with white crossbars; below, creamy-white with some red-brown lateral speckling.

Size. Largest ♂ (TM. 25045 - Maputo) 436 + 155 = 591 mm. Largest ♀ (Manacus, 1959 - Chibuto) 395 + 105 = 500 mm. The "half-grown" type, probably ♀, measured 430 + 160 = 590 mm.

Habitat. The Rhodesian specimens were taken in riverine forest below 2,000 feet. The Ruware snake fell out of a thatched roof.

Distribution. East African lowlands from Kenya to Zululani, extending west to south-eastern Rhodesia and north-eastern Transvaal.

#### Genus DIPSADOBOA Gunther

Dipsadoboa Gunther (part), 1858, Cat. Snakes Brit. Mus., p. 182. Type by subsequent designation: D. unicolor Gunther.

#### DIPSADOBOA SHREVEI (Loveridge)

Grotaphopeltis shrevei Loveridge, 1932, Proc. Biol. Soc. Washington, 45, p. 83: Missao di Dondi, Bella Vista, Angola.

Dipsadoboa shrevei Laurent, 1951b, p. 211 (generic key); Vesey-FitzGerald, 1958, p. 53 (Abercorn); Broadley & Pitman, 1960, p. 442; Johnson, 1962, p. 122 (Kaniki).

Grotaphopeltis werneri shrevei (sic) Loveridge, 1959, p. 39.

Ten specimens examined from: ZAMBIA. Abercorn (IRSNB); Kabompo; Kaniki; Kasempa; Kitwe; Mambwe (IRSNB); Mwambeshi. Also recorded from Luanshya (Liverpool Museum, identified by Pitman); Ndola (Abrahams) and Serenje (MCZ).

Literature records. ZAMBIA. Abercorn; Kaniki.

Variation. Preocular 1; postoculars 2; temporals 1 + 2 (rarely 1 + 1); upper labials 7 - 9, the third, fourth and fifth (rarely second, third and fourth, third and fourth, or third, fourth, fifth and sixth) entering the orbit; lower labials 7 - 11, the first 4 - 5 in contact with the anterior sublinguals; dorsals in 19 rows on nape and at midbody, 15 before the vent; ventrals 200 - 206 in ♂♂, 203 - 215 in ♀♀; anal entire (rarely divided); subcaudals 72 - 82 in ♂♂, 77 - 86 in ♀♀. Dentition - maxillary 13 + II + 0 - 1; palatine 10 - 11; pterygoid 21 - 22; dentary 16 - 18 (2 skulls).

Coloration. Pale grey-brown, plumbeous or blue-black above, paler below, throat sometimes white.

Size. Largest ♂ (IRSNB - Mambwe) 820 + 217 = 1037 mm. Largest ♀ (NMR. 4043 - Kitwe) 790 + 192 = 982 mm.

Discussion. Loveridge regarded this tree-snake as a Crotaphopeltis, but it seems to be a Dipsadoboa which has moved into a savanna habitat, showing striking similarities to Telescopus semiamulatus in overall morphology and ecology. The dentition of D. shrevei is intermediate between that of the rain-forest species of Dipsadoboa and Telescopus semiamulatus. Bogert (1940, pp. 63 - 65) examined the maxillary dentition of Dipsadoboa unicolor, D. elongata and D. duchesneii and found 17 - 21 solid teeth, followed after a gap by two grooved fangs and a small vestigial tooth. In the two D. shrevei skulls examined there are 13 large teeth, followed by two fangs, in a Ndola snake there is no sign of a tooth socket behind the fangs, but there are small empty sockets posterior to the fangs in a Kitwe snake. In Telescopus s. semiamulatus there are 10 - 11 large teeth followed by two fangs with no trace of a vestigial posterior tooth. The differences in dentition between closely related species seem to be correlated with diet, those forms which feed mainly on amphibians have many small teeth, those preying upon lizards have fewer, but larger teeth.

Loveridge (1959) considered shrevei to be a race of D. werneri Boulenger of north-eastern Tanganyika. The latter is only known from two specimens from the Usambara Mountains and Tanga with 219 - 225 ventrals. This may be another forest species more closely related to D. duchesneii than to D. shrevei.



Diet. The big Mambwe snake contained an adult Chamaeleo d. dilepis.

Habitat. Savanna woodland. This snake is nocturnal, partially arboreal, partially terrestrial. Vesey-FitzGerald found a juvenile in a bunch of bananas at Abercorn.

Distribution. Angola, western and northern Zambia, southern and south-eastern Congo and southern Tanganyika (Rondo Plateau).

Genus TELESCOPUS Wagler

Telescopus Wagler, 1830, Mat. Syst. Amphib., p. 182. Type by monotypy: Coluber on pl. v., figs. 11 - 13, in Savigny's Suppl. to Geoffroy, 1812, Deser. Egypte.

TELESCOPUS SEMIANNULATUS SEMIANNULATUS A. Smith

Telescopus semianmulatus A. Smith, 1849, Illus. Zool. S. Africa, Rept., pl. lxxii: "South Africa" (by inference); Peters, 1854, p. 624 (Cabaceira), and 1882, p. 127; Vesey - FitzGerald, 1958, p. 50 (Abercorn).

Grotaphopeltis semianmulatus Bocage, 1896, p. 100.

Tarbophis semianmulatus Boulenger, 1896, p. 51 (Lake Nyasa); Peracca, 1896, p. 2 (Kazungula); Boulenger 1897, p. 801 (Nkata Bay to Ruarwe; Kondowe to Karonga; Nyika Plateau), and 1907a, p. 11 (Petauke); Gough, 1908, p. 26 (Serowe); Chubb, 1909a, p. 596 and 1909b, p. 35 (Bulawayo); Boulenger, 1910, p. 510 (Sesheke; Delagoa Bay); Peracca, 1910, p. 4 (Barotseland); Boulenger, 1915, p. 210; Angel, 1921, p. 42 (Lealui); Loveridge, 1923, p. 881 (Lumbo); Pitman, 1934, p. 295 (Hammala; Broken Hill; Mpika; Serenje District; Inangwa Valley); Cott, 1935, p. 968 (Caia); FitzSimons, 1935b, p. 314 (Damara Pan; Maun), and 1937, p. 262; Bogert, 1940, p. 68 (Serowe; Lumbo).

Telescopus semianmulatus semianmulatus Loveridge, 1953a, p. 267 (Tete); Broadley, 1959b, p. 32; Hanney, 1961, p. 21 (Blantyre); Broadley, 1962d, p. 830; FitzSimons, 1962, p. 184 (Gaberones; Livingstone; Maputo; Penhalonga); Johnsen, 1962, p. 121; Wilson, 1965, p. 158.

Tarbophis semianmulatus semianmulatus FitzSimons & Brain, 1958b, p. 103.

Ninety-nine specimens examined from: BECHUANALAND. Sekhuma Pan. RHODESIA. Birchenough Bridge; Bulawayo; Freda Mine; Hot Springs; Kariba; Lupane and 7 mls SE; Mpudzi Bridge; Nyamandhlovu; Old Umtali; Ruonya River Drift; Rapisi Hot Springs; Rusape; Sawmills; Sinoia; Tanganda River Bridge; Tjolotjo; Toronto; Umtali; Valindre; Victoria Falls; Wankie National Park - Main Camp; Westacre; West Sebungwe; Zambezi River; Zewa. ZAMBIA. Abercorn; Chilanga; Chipengali; Chongwe;

Fort Jameson; Fort Rosebery; Gwembe; Jumbe; Kabompo; Kalabo; Kalichero; Katete; Lundazi; Msandila; Sayiri. MALAWI. Mpatamanga; Rumpi. MOZAMBIQUE. Vila Machado(USNM).

Literature records. BECHUANALAND. Damara Pan; Gaberones; Maun; Serowe. RHODESIA. Balla Balla (BM); Bulawayo; Empandene (T); Musami (T); Penbolonga. ZAMBIA. Abercorn; Bracken Hill; Bulaya (B); Kazungula; Lealui; Livingstone; Luangwa Valley; Mpika; Mambala; Msana (B); Petauke; Serenje District; Sesheke. MALAWI. Blantyre; Kondowe to Karonga; Mkata Bay to Ruarwe; Nyika Plateau. MOZAMBIQUE. Cabaceira; Gaia; Delagoa Bay; Iambo; Maputo; Tete.

Variation. Preocular 1 (very rarely 2); postoculars 2 (rarely 1 or 3); temporals 2 + 2 or 2 + 3 (rarely 2 + 1, 2 + 4, 3 + 2, 3 + 3); upper labials 8 (rarely 7, 9 or 10), the third, fourth and fifth (rarely third and fourth, fourth and fifth, or fourth, fifth and sixth) entering the orbit; lower labials 10 - 13, the first 3 - 6 in contact with the anterior sublinguals; dorsals in 19 rows on nape and at midbody, 13 before the vent; ventrals 193 - 226 in ♂♂, 216 - 241 in ♀♀; anal divided (rarely entire); subcaudals 60 - 75 in ♂♂, 57 - 73 in ♀♀. Dentition - maxillary 10 - 11 + II; palatine 6 - 8; pterygoid 13 - 16; dentary 15 - 17 (2 skulls).

Coloration. Bright orange, salmon pink or cream above, with about 24 - 47 black blotches, broader than long, extending from nape onto tail; pale orange or cream below.

Size. Largest ♂ (UM. 22 - Umtali) 705 + 125 = 830 mm. Largest ♀ (UM. 7374 - Umtali) 865 + 150 = 1015 mm.

Breeding. The largest ♀ contained 20 eggs. An 852 mm Tete ♀ held 10 eggs measuring 28 x 10 mm on 24th January (Loveridge, 1953a). Wilson (1965) records clutches of 8 to 12 eggs laid by captive ♀♀ in late October and early November.

Diet. This species seems to feed largely on lizards, the following species have been found in Tiger Snake stomachs: Pachydactylus p. punctatus (Tjolotjo and West Sebungwe); Agama hispida (Kabompo); Agama cyanogaster (juv.) and Mabuia striata (Toronto); Chamaeleo d. dilepis (Bulawayo; Victoria Falls; Msoro; Rumpi); Mabuia striata (Hot Springs). Another Rumpi snake had swallowed a bat (Myotis thebaica).

Loveridge (1953a) found a Pachydactylus bibroni in the stomach of his Tete specimen. Wilson (1965) found the feathers of a young bird and a Chamaeleo d. dilepis in the stomach of a Msandile snake, and another chameleon in a Msoro snake. His captive snakes fed largely on geckos, mice and young birds.



Enemies. Wilson (1965) records a 2½ foot Tiger Snake disgorged by a Psemmophis s. sibilans.

Habitat. Widespread in savanna, but most plentiful at low altitudes. In Wankie District specimens were found under the loose bark on dead trees. FitzSimons (1935b) found one inside an old weaver bird's nest at Damara Pan. I have found this snake under flakes of granite at Umtali and Mpata-manga Gorge, in the first instance the crevice was shared with several Afroedura t. transvaalica. Most specimens are found after sunset, when they emerge from their refuges to hunt.

Distribution. Kenya south to Natal, west to the Congo, Angola, north-eastern South West Africa and northern Cape Province.

#### Genus DISPHOLIDUS Duvernoy

Dispholidus Duvernoy, 1832, Ann. Sci. Nat (Paris), 26, p. 150. Type by monotypy: D. lelandii Duvernoy = Bucephalus typus A. Smith.

#### DISPHOLIDUS TYPUS TYPUS (A. Smith)

Bucephalus typus A. Smith, 1829, Zool. Journ., 4, p. 441: Old Latakoo, northern Cape Province, South Africa.

Dendrophis pseudo-dipsas Bianconi, 1849, Nuovi. Ann. Sci. Nat., (2), 10, p. 108, pl. iv, fig. 2, and 1850, Spec. Zool. Mosamb., p. 40, pl. iv, fig. 2: Mozambique.

Bucephalus capensis Peters, 1854, p. 623 (Cabaceira; Tete; Boror); Gunther, 1864, p. 307 (Zambezi Expedition)†

Bucephalus capensis var. viridis Bocage, 1882, p. 289 (Angoche), and 1896, p. 94 (Umpungoana, Manica).

Bucephalus typus Peters, 1882, p. 132; Pfeffer, 1893, p. 86 (Quelimane).

Dispholidus typus Boulenger, 1896, p. 187 (Zomba), also 1897, p. 801

(Nyika Plateau) 1902, p. 18 (Mazoe), 1907a, p. 12 (Petauke), and 1907b, p. 487 (Goguno; Beira); Gough, 1908, p. 32 (Salisbury); Chubb, 1909a, p. 596 (Bulawayo), and 1909b, p. 36 (Empandene); Boulenger, 1910, p. 515 (Delagoa Bay; Salisbury; Mazoe; Shangani District); Werner, 1910, p. 363 (Gumma; Ku - Gu - Di); Hewitt & Power, 1913, p. 164 (Francistown); Boulenger, 1915, p. 213; Angel, 1921, p. 42 (Lealui); Loveridge, 1923d, p. 888 (Iumbo); Pitman, 1934, p. 297 (Mazabuka; Namwala; Choma; Livingstone; Broken Hill); Cott, 1935, p. 970 ,

(Fambani); FitzSimons, 1935b, p. 320 (Gomodimo; Kaotwe; Okwa River-Damara Pan; Mabeleapudi; Maun), and 1937a, p. 263; Mertens (part), 1937, p. 14 (Inhaminga); FitzSimons, 1939b, p. 23 (Chirinda Forest); Bogert, (part) 1940, p. 68 (Mzimba); Mitchell, 1946, p. 42; Love-ridge, 1953a, p. 281 (Kasungu; Chibotela; Misuku Mtns.; Nohenaachena; Mzimba; Nohisi Mtn.; Chitala River; Mtimbuka; Chole Mtn.; Boroma), and 1953c, p. 144 (Zomba); Broadley, 1959b, p. 35; Manacas, 1959, p. 148 (Chibuto; Manhica); Hanney, 1961, p. 21 (Blantyre); FitzSimons, 1962, p. 196 (Chishawasha; Eldorado; Hunyani; Maputo; Que Que; Ramaquabane; Rikatla; Trelawney).

Thrasops jacksoni mossambicus Mertens, 1937, Abhand. Senck. Naturf.

Gess., No. 435, p. 13: Cheringoma Farm, Inhaminga, Mozambique.

Dispholidus typus typus Broadley, 1962 b, p. 109, illus., and 1962d, p. 831; Wilson, 1965, p. 159.

Two hundred and thirty-nine specimens examined from: **BESCHUANALAND.**

**LAND.** Lake Dow; Okevango; Tanaflupi. **GAPRIVI.** Lake Liambezi.

**RHODESIA.** Balla Balla; Beitbridge; Binga; Birchenough Bridge; Bromley; Bulawayo and 9 mls S; Burma; Chimanimani Mtns.; Chirinda Forest; Dadaya; Domboshawa; Dorowa; Essexvale; Fatima; Gatooma; Gungunyana; Heany; Henderson Research Station; Honda Escarpment; Inyanga Tea Estates; Irisvale; Kapami, 3 mls NW and 6 mls SE; Lake MacIlwaine; Lukosi; 10 mls NW of Lupane; Malimbasinbi; Malonga River Bridge; Marandellas; Melfort; Mount Hampden; Mount Silinda; Mtoke; Norton; Nyamandhlovu; Nyaratedzi River; Odzi; Old Untali; Patterson Farm; Penhalonga; Que Que; Rhodes Inyanga Estate; Salisbury and 10 mls W; Sanyati Island; Selukwe; Shashi - Shashani Confluence; Silverstreams; Tilbury; Trelawney; Turk Mine; Tynwald; Untali; Victoria Falls; Vlei Plaats; Vumba Mountain. **ZAMBIA.** Chikowa; Chipengali; Fort Jameson; Kacholola; Kalichero; Kalomo; Kasusu; Katanda; Katete; Kaungashi; Livingstone; Lukonkola; Lundazi; Lusaka; Machile Forest Station; Mazabuka; Milanga; Mumbwa; Sayiri; Sinazongwe. **MALAWI.** Blantyre; Chitala; Dedza; Mwanza; Rumpi. **MOZAMBIQUE.** Inchope; Mafora; 8 mls SSE of Vila Gouveia.

Literature records. **BESCHUANALAND.** Francistown; Gemma; Gomodimo;

Kaotwe; Ku - Gu - Di; Mabeleapudi; Maun; Okwa River - Damara Pan.

**RHODESIA.** Bulawayo; Chirinda Forest; Chishawasha; Eldorado; Empandene; Hunyani; Mazoe; Que Que; Ramaquabane; Salisbury; Shangani District; Trelawney. **ZAMBIA.** Broken Hill; Choma; Lealui; Livingstone; Mazabuka; Namala; Petauke. **MALAWI.** Blantyre; Chibotela;



Chitala River; Cholo Mtn.; Kasungu; Misuku Mtns.; Mtimbuka; Mzimba; Nchenachena; Nchisi Mtn.; Nyika Plateau; Zomba. MOZAMBIQUE. Angoche; Beira; Borema; Boror; Cabaceira; Chibuto; Coguno; Delagoa Bay; Fambani; Inhanga; Lumbo; Manhica; Maputo; Quelimane; Rikatla; Tete; Umpungwana.

Variation. Pupil of eye varies from round to horizontally pear-shaped; preocular 1; postoculars 3 (rarely 2 or 4); temporals 1 + 2 (rarely 1 + 1, 1 + 3, 2 + 2, 2 + 3, 3 + 3); upper labials usually 7, frequently 8 (rarely 4 or 6), the third and fourth, or fourth and fifth (rarely third or fourth only) entering the orbit; lower labials 8 - 11, the first 3 - 6 in contact with the anterior sublinguals; dorsals in 21 - 23 rows on neck, 19 (rarely 17 or 21) at midbody, 11 - 13 before the vent; ventrals 163 - 191 in ♂♂, 176 - 202 in ♀♀; anal divided; subcaudals 110 - 136 in ♂♂, 104 - 127 in ♀♀. Dentition - maxillary 4 - 6 + III; palatine 13 - 16; pterygoid 17 - 19; dentary 22 (2 skulls).

Coloration. (a) Yellow-green above, yellow or pale green below, uniform or with dorsal scales and ventrals black-edged (most adult ♂♂, a few adult ♀♀). (b) Uniform olive green above, pale blue below (occasional adult ♂♂). (c) Uniform olive, brown or grey above, dirty white below (most adult ♀♀, a few adult ♂♂). (d). Grey or blackish above, scattered vertical pairs of dorsal scales with pale blue spots at the tip (exposed only when the body is inflated in anger), labials and chin white; whitish below, heavily stippled with maroon or grey-brown (juveniles and sub-adults). In juveniles the iris is emerald green, becoming yellow-green in sub-adults and grey or brown in adults.

Size. Largest ♂ (MSR. 3947 - Mtoko) 1290 + 530 = 1820 mm. Largest ♀ (UM. 1877 - Lake Liambezi) 1370 + 370 + = 1740 + mm.

Breeding. A 1237 mm Kapani ♀ contained 5 eggs measuring 22 x 12 mm on 5th May. A 1555 mm Mwanza ♀ contained 16 eggs measuring 38 x 17 mm on 9th May. In August a Kasungu ♂ held 14 eggs of 40 x 16 mm (Loveridge, 1953a). Wilson (1965) notes that captive ♀♀ laid in late July and early August.

Diet. The staple diet of this species is Chamaeleo d. dilepis, supplemented by fledgling birds and eggs. A Binga ♀ contained a subadult Pyxicephalus adspersus, but few others held amphibian remains. Manacas (1959) found two Chiricantis in a Mozambique snake.

Enemies. I have three records of this tree snake being eaten by Mohelya c. capensis and Wilson (1965) records one eaten by a Psammophis s. sibilans.

Habitat. Widespread and common in savanna and forest fringes, I have collected it at Benbesi in open grassland with widely scattered bushes.

Distribution. Savannas of eastern and southern Africa, absent from the South West Arid.



## DISPHOLIDUS TYPUS KIVUENSIS Laurent

Dispholidus typus kivuensis Laurent, 1955, Revue Zool. Bot. Afr., 51, p. 127: Uvira, Lake Tanganyika, Kivu, Congo, and 1956, p. 222, Fig. 34 (Abercorn); Broadley & Pitman, 1960, p. 443.

Dispholidus typus (not A. Smith) Vesey-Fitz-Gerald, 1958, p. 54 (Abercorn; Kasama).

Fourteen specimens examined from: ZAMBIA. Abercorn; Chilongwelo.

Literature records. ZAMBIA. Abercorn; Mambwe (B).

Variation. Preocular 1; postoculars 2; temporals 1 + 2 (rarely 1 + 3); upper labials 7, the third and fourth entering the orbit; lower labials 8 - 11, the first 3 - 5 in contact with the anterior sublinguals; dorsals in 23 - 19 - 13 rows; ventrals 171 - 184 in ♂♂, 179 - 184 in ♀♀; anal divided; subcaudals 100 - 110 in ♂♂, 90 - 104 in ♀♀. Dentition - maxillary 5 + III; palatine 18; pterygoid 20; dentary 23 (one skull).

Coloration. Males green, uniform, or the head shields variegated with black and the dorsals, ventrals and subcaudals margined with black. Females brown, paler below.

Size. Largest ♂ (MSR. 1571 - Abercorn) 1020 + 330 = 1350 mm.  
Largest ♀ (MSR. 1568 - Abercorn) 1005 + 322 = 1327 mm.

Remarks. Although Abercorn is the southern limit of kivuensis, local specimens agree very well with topotypic material, for which Laurent (1960, p. 53) gives subcaudals 97 - 116 in ♂♂ and 94 - 107 in ♀♀.

Distribution. The Rift Valley from Ruwenzori to the southern tip of Lake Tanganyika, also extends east through Uganda to western Kenya (two ♂♂ with 104 - 108 subcaudals from Eldoret and Subukia examined at the National Museum of Kenya, Nairobi).

## DISPHOLIDUS TYPUS PUNCTATUS Laurent

Dispholidus typus (part) Mertens, 1937, p. 14 (Nsembo).

Dispholidus typus punctatus Laurent, 1955, Revue Zool. Bot. Afr., 51, p. 129: Dundo, Angola, and 1956, p. 225, fig. 34 (kivuensis x punctatus intergrades from Mporokoso and Kasama); Johnson, 1962, p. 122 (Ndola; Kawambwa; 45 Km N of Kasempa).



Twenty-nine specimens examined from: ZAMBIA. Fort Rosebery; Kabompo; Kaniki; Kasempa and 40 mls NW; Kawambwa (ZMD); Kitwe.

Literature records. ZAMBIA. Bulaya (B); 45 Km. N of Kasempa; Kawambwa; Ndola; Naama (B); Nsombo.

Variation. Preocular 1; postoculars 3 (rarely 2 or 4); temporals 1 + 2 (rarely 1 + 1 or 2 + 3); upper labials 7 (rarely 6 or 8), the third and fourth (rarely third only, third, fourth and fifth, or fourth and fifth) entering the orbit; lower labials 8 - 12, the first 3 - 5 in contact with the anterior sublinguals; dorsals in 23 rows on nape, 19 (rarely 17 or 21) at midbody, 13 before the vent; ventrals 171 - 183 in ♂♂, 171 - 190 in ♀♀; anal divided (rarely entire); subcaudals 107 - 117 in ♂♂, 100 - 109 in ♀♀. Dentition - maxillary 4 - 6 + III; palatine 13 - 15; pterygoid 17 - 21; dentary 22 (2 skulls).

Coloration. Males black above, each head shield and each dorsal scale with a bright yellow spot; violet below, ventrals and subcaudals edged with black. Females red-brown above, paler below.

Size. Largest ♂ (NMSR. 49 - Kasempa) 1120 + 330 + = 1450 + mm.  
Largest ♀ (NMSR. 1350 - 40 mls NW of Kasempa) 1140 + 380 = 1520 mm.

Remarks. This race intergrades with kivuensis in the Mporekoso - Kasama area (Laurent, 1956) and males from Kitwe and Ndola are green and black, probably due to introgression with P. t. typus.

Diet. A Fort Rosebery ♂ contained an Agama hispidus and amphibian remains.

Distribution. Angola and the lower Congo, east to Lake Tanganyika and north-western Zambia.

#### Genus THELOTORNIS A. Smith

Thelotornis A. Smith, 1849, Illus. Zool. S. Africa Rept. App. p. 19.

Type by monotypy: T. capensis A. Smith.

#### THELOTORNIS KIRTLANDI CAPENSIS A. Smith

Thelotornis capensis A. Smith, 1849, Illus. Zool. S. Africa, Rept. App. p. 19: "Kaffirland and the country towards Port Natal (= Durban)".

Oxybelis Lecomtei (not Dumeril & Bibron) Peters (part) 1854, p. 623 (Cabaceira; Querimba Islands; Sena).

Thelotornis kirtlandii (not Hallowell) Peters (part) 1882, p. 131, pl. xix, fig. 2 (Mozambique Island); Boulenger (part) 1896, p. 185 (Mandala; Lake Nyasa; Zomba; Mlanje), and 1897, p. 801 (Nyika Plateau); Gough, 1908, p. 32 (M'mocouve); Chubb (part), 1909a, p. 596 and 1909b, p. 36 (Empandene); Boulenger (part) 1910, p. 515, (Delagoa Bay); Sternfeld, 1910, p. 31 (Lake Nyasa; Chifumbazi; Maputa); Hewitt & Power (part), 1913, p. 164 (Francistown); Loveridge, 1923d, p. 887 (Lumbo); Cott, 1935, p. 969 (M'Gaza; Fambani); Cunha, 1935, p. 11 (Massangulo); FitzSimons, 1937, p. 274, and 1939b, p. 23 (Chirinda Forest); Themido, 1941, p. 17; Vesey - Fitzgerald (part) 1958, p. 55 (Abercorn).

Drylophis kirtlandii Pfeffer, 1893, p. 86 (Quelimane); Bocage, 1896, p. 94 (Cabaceira; Manica; Boror).

Drylophis kirtlandii var. mossambicana Bocage, 1895, Herp. Angola & Congo, p. 119; Manica, Mozambique.

Thelotornis kirtlandii capensis Mertens, 1937, p. 14 (Inhamitanga); Loveridge, 1944a, p. 154 (part) and 1953a, p. 279 (Likabula River; Misuku Mtns.; Chowe; Cholo Mtn.); Broadley, 1957c, p. 297, pls., and 1959b, p. 38; Broadley & Pitman, 1960, p. 443; Hanney, 1961, p. 21 (Blantyre); Broadley, 1962d, p. 838; FitzSimons, 1962, p. 201 (Guija; Inhaca Island; Lobatsi; Lourenco Marques; Mahalapisi; Maputo; Ramaquabane; Serowe).

Thelotornis capensis Bogert, 1940, p. 70, fig. 11 (Mlanje).

Eighty-seven specimens examined from: RHODESIA. Balla Balla; Birchenough Bridge; Chipinda Pools; Chipinga; Chiredzi; Chirinda Forest; Gwanda; Inyanga Tea Estates; Irisvale; Pungwe River @ 2,400 feet; Lumane; Manga Reserve; Maranke Reserve; Ngorima Reserve (E); Odzi; Orkney Farm; Salisbury; Selukwe; Sinkukwe; Stapleford; Tuli; Umtali and 10 mls S; Vumba Mountain. ZAMBIA. Abercorn. MALAWI. Blantyre; Cholo; Injeri; Zomba. MOZAMBIQUE. Dondo; Goonda; Manga; Mavus; Mitucus Mountain; Xiluvo.

Literature records. BECHUANALAND. Francistown; Lobatsi; Mahalapye; M'mocouve; Serowe. RHODESIA. Chirinda Forest; Empandene; Ramaquabane. ZAMBIA. Abercorn. MALAWI. Blantyre; Cholo Mountain; Chowe; Lake Nyasa; Likabula River; Mandala; Misuku Mountains; Mlanje; Nyika Plateau; Zomba. MOZAMBIQUE. Boror; Cabaceira; Chifumbazi; Delagoa Bay; Fambani; Guija; Inhaca Island; Inhamitanga; Lourenco Marques; Lumbo; Manica; Mapata; Maputo; Massangulo; M'Gaza; Mozambique Island; Quelimane; Querimba Islands; Sena (?).



Variation. Preocular 1; postoculars 3 (rarely 2 or 4); temporals 1 + 2 (rarely 1 + 1 or 1 + 3); upper labials 8 (rarely 7 or 9), the fourth and fifth (rarely third and fourth or fifth and sixth) entering the orbit; lower labials 9 - 13, the first 4 - 5 (rarely 3) in contact with the anterior sublinguals; dorsals in 19 - 21 rows on nape, 19 (rarely 17) at midbody, 11 - 13 before the vent; ventrals 146 - 164 in ♂♂, 152 - 164 in ♀♀; anal divided; subcaudals 130 - 166 in ♂♂, 120 - 148 in ♀♀. Dentition - maxillary II + III; palatine 11 - 12; pterygoid 18; dentary 20 (one skull).

Coloration. Top of head green, often uniform in specimens from eastern Rhodesia and Mozambique, but otherwise speckled with pink and black, these markings may form a "Y" with the stem lying along the interparietal suture and the arms on the supraoculars; a pink lateral band extends from the snout through the eye to the back of the head, this may be heavily stippled with dark brown, or the temporals may be margined with black; upper labials white with a dark streak extending diagonally back from eye to lip; body grey or grey-brown, with diagonal transverse series of whitish blotches, the flanks with touches of pink or orange and black; one or two black blotches on each side of the neck; chin white, lower labials heavily speckled with black, ventrum pinkish-white, heavily mottled with dark grey.

Size. Largest ♂ (NMSR. 4157 - Umtali)  $895 + 510 = 1405$  mm. Largest ♀ (NMSR. 4154 - Umtali)  $860 + 470 = 1330$  mm.

Discussion. Bogert (1940), with limited material available, concluded that capensis was specifically distinct from typical T. kirtlandi of the equatorial rain forests. Loveridge (1944), revising the genus, pointed out that intermediates between the two forms occur in Tanganyika. Witte (1953) and Laurent (1956 and 1964a) have shown that T. k. kirtlandi and T. k. oatesi co-exist without intergradation in Katanga and Angola, and they consequently treat capensis as a full species with oatesi a subspecies of it. It appears that the three forms make a stepped cline, i.e. kirtlandi - capensis - oatesi, but that the terminal forms in the cline are reproductively isolated.

Breeding. Two ♀♀ collected in Matipa Forest on 8th October each contained 8 eggs measuring  $32 \times 17$  mm and  $35 \times 14$  mm respectively (Loveridge, 1953a).

Diet. An Irisvale snake was swallowing a subadult Agama cyanogaster when captured. A young Birchenough Bridge snake contained a Lygodactylus c. capensis. An Umtali ♀ contained a Breviceps n. adspersus. Five snakes collected on Mitucue Mountain in November all contained food, i.e.

(1) Rana sp. (2) Phrynobatrachus sp. (3) Agama kirkii ♀ and Breviceps m. mossambicus. (4) 2 Arthroleptis stenodactylus and other amphibian remains. (5) Arthroleptis xenodactyloides and other amphibians remains. A specimen captured in a reedbed beside the Umzilizwe River (Mount Silinda) disgorged a Banana Bat (Pipistrellus nanus) and its faeces were full of the chitinous heads of harvester termites.

Loveridge (1953a) found chameleons in five Malawi snakes (3 Chamaeleo d. dilepis; 2 Brookesia nchisiensis); a Chowe snake held the tail of a Cordylus t. tropidosternum; at Cholo one contained a Lygodactylus a. angularis, another a Mabuza varia, two held Philothamnus l. irregularis, four had eaten Ptychadena oxyrhynchus and three Breviceps mossambicus, only one contained the remains of a bird. FitzSimons (1939b) found a Nucras t. ornata and a Mabuza varia in the stomach of a Chirinda Forest snake.

Captive snakes feed readily on smaller snakes, chameleons and other lizards, birds and their eggs, one took a shrew (Crocidura sp.)

Habitat. Widespread in savanna and forest, but usually found in low trees and bushes.

Distribution. Tanganyika south to Natal, west through south-eastern Rhodesia and the Transvaal to eastern Bechuanaland. Relict populations are found in northern South West Africa.

#### THELOTORNIS KIRTLANDI OATESI Gunther

Oxybelis Lecontei (not Dumeril & Bihron) Peters (part) 1854, p. 623 (Tete).

Dryophis Oatesii Gunther, 1881, in Oates, Matabeleland and the Victoria Falls, App. p. 330, Col. Pl. D: Victoria Falls, Rhodesia (restricted by Broadley, 1962d) and 1894, p. 618 (Fort Johnston).

Thelotornis kirtlandii (not Hallowell) Peters (part) 1882, p. 131 (Tete); Boulenger (part) 1896, p. 185 (Matabeleland) and 1907a, p. 11 (Luangwa Valley; Feira District; Petauke); Chubb (part) 1909a, p. 596 and 1909b, p. 36 (Balawayo; Khami River); Boulenger (part), 1910, p. 515, (Zambezi); Peracca, 1910, p. 4 (Barotseland); Hewitt & Power (part), 1913, p. 164 (Eldorado); Boulenger (part), 1915, p. 213; Angel, 1921, p. 42 (Lealui); Pitman, 1934, p. 297 (Mwengwa; Mpika; Serenje; Luangwa Valley; Mumbwa; Namwala); Vesey - FitzGerald, (part), 1958, p. 55 (Mpika).

Dryophis kirtlandii var. Oatesi Bocage, 1895, p. 120.

Thelotornis kirtlandii capensis (part) Loveridge, 1944e, p. 154.



Thelotornis kirtlandii oatesi Loveridge, 1953a, p. 277 (Kasungu; Mtimbuka); Laurent, 1956, p. 231, fig. 35; Broadley, 1959b, p. 37 and 1962d, p. 882; FitzSimons, 1962, p. 205 (Beatrice Mine; Livingstone; Mazoe; Nampini; Trelawney); Wilson, 1965, p. 160.

Thelotornis capensis (not A. Smith) Johnsen, 1962, p. 123 (Ndola; Kawambwa).

One hundred and twenty-seven specimens examined from: BECHUANA-  
LAND. Tlofupf. RHODESIA. Bulawayo; Donnington Farm; Gatooma; 10  
mls N of Gwelo; Kapami and 6 mls SE; Kariba; Kariba Lake - Buni Conflu-  
ence; Karoi; Khami Dam; Malimbasingi; Maranka Reserve; Matopos; Mrewa;  
Mtoroshanga; Salisbury; Sanyati - Zambezi Confluence; Selukwe; Turk Mine;  
Wankie National Park - Main Camp. ZAMBIA. Chilanga; Chipengali; Dun-  
dumwenzi; Fort Jameson; Kabompo; Kacholola; Kafue River; Kalabo; Kali-  
chero; Kalomo; Kasusu; Katanda; Kaungashi; Livingstone; Lower Lush-  
wishi River; Luangwa Valley; Lusaka; Lusaka East; Machile; Mpika;  
Msandile; Sayiri; Sernahe; Siantamba.

Literature records. RHODESIA. Beatrice Mine; Bulawayo; Eldorado;  
Khami River; Mazoe; Nampini; Trelawney; Victoria Falls;  
Zambezi River. ZAMBIA. Bulaye (B); Feira District; Kawambwa; Lealui;  
Livingstone; Luangwa Valley; Mushi (B); Mpika; Mushiwa; Mwenja; Nam-  
wala; Ndola; Petauke; Serenje. MALAWI. Fort Johnston; Kasungu;  
Mtimbuka. MOZAMBIQUE. Luangwa Valley; Tete.

Variation. Preocular 1; postoculars 3 (rarely 2 or 4); temporals  
1 + 2 (rarely 1 + 1); upper labials 8 (rarely 7), the fourth and fifth  
(rarely third and fourth, fourth or fifth only, fourth, fifth and sixth,  
or fifth and sixth) entering the orbit; lower labials 9 - 13, the first 4  
- 5 (rarely 3) in contact with the anterior sublinguals; dorsals in 19 rows  
at midbody; ventrals 160 - 175 in ♂♂, 160 - 176 in ♀♀; anal divided; sub-  
caudals 132 - 159 in ♂♂, 130 - 152 in ♀♀. Dentition - maxillary 12 + III;  
palatine 11 - 12; Pterygoid 19; dentary 19 (one skull).

Coloration. As in T. k. capensis except that a black and pink speckled  
"Y" on the head is invariably present and the temporals are always pink  
edged with black.

Size. Largest ♂ (NMR. 3828 - Mtoroshanga) 1062 + 620 = 1682 mm.  
Largest ♀ (NMR. 4094 - Mtoroshanga) 980 + 545 = 1525 mm.

Discussion. When Loveridge (1953a) revived oatesi he unfortunately  
listed the speckled "Y" head marking as a diagnostic character, but as I  
have previously (1959b, p. 39) pointed out, this marking is found in topo-  
typic capensis from Zululand, while many Mozambique and eastern Rhodesian  
snakes are devoid of head markings. T. k. oatesi can only be distinguished  
on the higher ventral counts it is a more robust snake than either typical  
kirtlandi or capensis and it averages larger.

I cannot agree with Loveridge (1953a) and FitzSimons (1962) that oatesi is intermediate between capensis and kirtlandi of West Africa. T. k. oatesi is a savanna form, T. k. kirtlandi an evergreen forest form and T. k. capensis a variable intermediate form which can occupy either habitat.

**Breeding.** Wilson (1965) recorded 4 - 6 eggs in each of ten ♀♀ killed between September and December inclusive. Three captive snakes each laid 5 eggs between 13th November and 11th December at Kalichero, four of these eggs hatched on 18th February.

**Diet.** A Matopos snake contained a young Gerrhosaurus v. validus, and a Salisbury snake had eaten an Agama cyanogaster. Wilson (1965) recorded a large Chamaeleo d. dilepis disgorged by one snake; he found the following in stomachs: Agama sp.; adult Gerrhosaurus nigrolineatus; Rana sp.; Braviceps m. poweri. Loveridge (1953a) found a Mabuia varia in one snake and a Phrynobatrachus acridoides in another.

**Enemies.** A 1260 mm specimen was disgorged by a large Psammophis s. sibilans, which habitually devours Vine Snakes in captivity (Wilson, 1965).

**Habitat.** Widespread in savanna, especially in mopane woodland at low altitudes.

**Distribution.** Angola, Katanga, Zambia (except Abercorn), the Malawi Trough, north-eastern Bechuanaland, north-western and northern Rhodesia, western Mozambique.

Genus HEMIRHAGERRHIS Boettger

Hemirhagerrhis Boettger, 1893, Zool. Anz., 16, p. 129. Type by monotypy: H. kelleri Boettger.

HEMIRHAGERRHIS NOTOTAENIA NOTOTAENIA (Gunther)

Coronella nototaenia Gunther, 1864, Proc. Zool. Soc. London, p. 309, pl. xxvi, fig. 1; Rios de Sena, Mozambique.

Tachymenis nototaenia Peters, 1882, p. 118.

Psammophylax nototaenia Bocage, 1896, p. 100.

Amplorhinus nototaenia Boulenger, 1896, p. 125 (Cape Maclear; Lake Nyasa), also 1897, p. 801 (Nyika Plateau; Fort Hill), and 1915, p. 211; Loveridge, 1933, p. 250 (Nyankolo); Pitman, 1934, p. 296 (Namwala District; Kapamba and Munyamadzi Rivers); FitzSimons, 1935b, p. 314 (Tsotsoroga; Kabulabula).



Amplorhinus Guntheri Mocquard, 1906, Bull. Mus. Hist. Nat. (Paris), 12, p. 251: Lake Ngami, Bechuanaland.

Hemirhamphys nototaenia nototaenia Bogert, 1940, p. 73; Loveridge, 1953a, p. 269; Vesey - Fitzgerald, 1958, p. 57 (Abercorn; Mweru - Wantipa); Broadley, 1959b, p. 41; Broadley & Pitman, 1960, p. 443; Broadley, 1962d, p. 832; FitzSimons, 1962, p. 206; Johnson, 1962, p. 123 (Ndola); Wilson, 1965, p. 161.

Fifty-four specimens examined from: BECHUANALAND. Francistown. RHODESIA. Beitbridge; Birchenough Bridge; Chiredzi; 40 mls NE of Chirundu; Condo; Devon Farm; Dorowa; Fishan; Kapami; Kariba; Kariba Lake - Charara and Sanyati Confluences; Malapati Drift; Mana Pools; Matetsi; Mount Darwin; Murambene; Ruware; Shashi - Shashani Confluence; Tivuli Spring; Tuli. ZAMBIA. Abercorn; Kabompo; Kalichero; Kaniki; Kasusu; Lochiwar; Lubunga Pontoon; Lundazi; Lusaka East; Mporokoso; Mukupa (IRSNB); Mfuwe; Siantamba; Simamba; Rukuzi Dam. MOZAMBIQUE. Maforga; Matambanhe; Xiluvo.

Literature records. BECHUANALAND. Kabulubula; Lake Ngami; Tsotso-roga. ZAMBIA. Abercorn; Balaya (B); Kapamba River; Mpulungu; Munyamazi River; Mweru - Wantipa; Namwala District; Ndola; Nsama (B). MALAWI. Cape Maclear; Fort Hill; Lake Nyasa; Nyika Plateau. MOZAMBIQUE. Sena.

Variation. Preocular 1; postoculars 2; temporals 1 + 2 (rarely 1 + 3, 2 + 2 or 2 + 3); upper labials 8 (rarely 7 or 9), the fourth and fifth (rarely third and fourth or fifth and sixth) entering the orbit; lower labials 8 - 10, the first 4 or 5 in contact with the anterior sublinguals; dorsals in 17 rows on nape and at midbody, 13 before the vent; ventrals 161 - 176 in ♂♂, 164 - 182 in ♀♀; anal divided; subcaudals 72 - 86 in ♂♂, 69 - 81 in ♀♀.

Coloration. Dark grey or grey-brown above, top of head black, continuing as a vertebral stripe about three scales wide, black on the neck, but less well defined posteriorly, a row of black spots merges with the vertebral stripe on either side, these may be opposed (forming cross-bars) or alternated (forming a zig-zag); on the head a dark lateral streak passes through the eye; below, dirty white heavily mottled with grey.

Size. Largest ♂ (TM. 14696 - Kabulubula) 270 + 95 = 365 mm. Largest ♀ (NMR. 3586 - Kariba Lake) 305 + 94 = 399 mm.

Breeding. A 333 mm Simamba ♀ contained 4 eggs measuring 18 x 5 mm on 20th August; a 375 mm Kasusu ♀ held 5 eggs measuring 14 x 3.5 mm on 10th July.

Diet. One snake from Kariba Lake contained a Pachydactylus p. punctatus; a Lundazi snake held a very small Mabuya striata; a Metambanhe snake held a Lygodactylus c. capensis. In captivity a Kapani snake ate young Mabuya striata in preference to Lygodactylus.

Enemies. An Agama cyanogaster collected by Bredo at Mweru - Wantipa had an adult Hemirhagerthis in its mouth.

Habitat. Widespread in savanna, but most plentiful in Mopane bush in the big river valleys.

Distribution. Eastern Africa from the Sudan south to Mozambique and the north-eastern Transvaal, west to the Congo, Zambia and northern Bechuanaland. Replaced by H. n. viperinus in Angola and South West Africa.

#### Genus PSAMMOPHYLAX Fitzinger

Psammophylax Fitzinger, 1843, Syst. Rept. p. 26. Type by original designation: Coluber rhombeatus Linnaeus.

Trimerorhinus A. Smith, 1847, Illus. Zool. S. Africa, Rept. text to pl. Lvi. Type by monotypy: Coluber rhombeatus Linnaeus

#### PSAMMOPHYLAX TRITAENIATUS TRITAENIATUS (Gunther)

Rhagerthis tritaeniatum Gunther, 1863, Ann. Mag. Nat. Hist., (4) 1, p. 423, pl. xix, fig. H: South-eastern Africa.

Coronella tritaeniata Gunther, 1881, p. 329, pl. C and 1889, p. 336, pl. iii (Matabeleland).

Psammophylax tritaeniatum Peters, 1882, p. 119; Broadley, 1956, p. 215, illus.

Trimerorhinus tritaeniatum Boulenger (part) 1896, p. 139 (exclude Zomba, Chiradzulu and Fwambo localities); Peracca, 1896, p. 2 (Kazungula); Boulenger, 1902, p. 17 (Mazoe); Gough, 1908, p. 28 (Bechuanaland); Chubb, 1909a, p. 596 (Balawayo) and 1909b, p. 35 (Empandene); Boulenger, 1910, p. 512 (Salisbury); Hewitt & Power, 1913, p. 163 (Bembesi); Power, 1927c, p. 410, (Lobatsi).

Trimerorhinus rhombeatus (not Linnaeus) Boulenger (part), 1915, p. 211.

Trimerorhinus tritaeniatum tritaeniatum Pitman (part), 1934, p. 296 (Mamala; Broken Hill); FitzSimons, 1935b, p. 315 (Gaberones; Goha Hills; Makarikari).

Psammophylax tritaeniatum tritaeniatum Broadley, 1959b, p. 42; Manacas, 1959, p. 149 (Metengo - Balama); FitzSimons, 1962, p. 213 (Chishawasha; Eldorado; Khami; Marandellas; Que Que; Shangani; Sinoia; Victoria Falls).



One hundred and two specimens examined from: BECHUANALAND. Mabate. RHODESIA. Bambesi; Bikita; Bulawayo; Cement; Eagles Nest; Essexvale; Fern Valley; Glass Block; Helvetia; 7 mls E of Marandellas; Mount Hampden; Nyamandhlovu; Odzi; Old Untali; 3 mls W of Penhalonga; Plumtree; Sabi - Lundi Confluence; Salisbury and 10 mls W; Selukwe; Sincia; Tarka; Ungusa River; Untali; Wankie National Park; West Nicholson. ZAMBIA. Changa; Isoka; Kasusu; Lochinvar; Lusaka; 15 mls SE of Mazabuka; Nahourwe (Kariba Lake); Ndola; Siantamba. MOZAMBIQUE. Vila de Manica; Vila Pery (USNM).

Literature records. BECHUANALAND. Gaberones; Goba Hills; Lobatsi; Makarikari. RHODESIA. Bambesi; Bulawayo; Chishawasha; Driefontein; Eldorado; Espanhene; Khani; Macheke (T); Marandellas; Mazoe; Mount Silinda (BM); Que Que; Salisbury; Shangani; Sincia; Victoria Falls; ZAMBIA. Broken Hill; Kazungula; Namwala. MOZAMBIQUE. Metengo - Balama. Sweeney (in litt.) collected five specimens in the Chiromo - Port Herald region of MALAWI.

Variation. Preocular 1 (rarely 2); postoculars 2 (rarely 3); temporals 2 + 3 (rarely 1 + 2, 1 + 3, 2 + 2, 2 + 4); upper labials 8 (rarely 7 or 9), the fourth and fifth (rarely third and fourth, fourth only or fifth and sixth) entering the orbit; lower labials 9 - 12, the first 4 - 6 in contact with the anterior sublinguals; dorsals in 17 - 17 - 13 rows; ventrals 145 - 167 in ♂♂, 149 - 174 in ♀♀; anal divided; subcaudals 53 - 65 in ♂♂, 54 - 66 in ♀♀. Dentition - maxillary 10 - 11 + II; palatine 9; pterygoid 20 - 22; dentary 18 - 19 (3 skulls).

Coloration. Top of head light brown; vertebral scale row dark brown, superior halves of the rows bordering it black, forming a sharp-edged vertebral stripe two scales wide, this is flanked by a pale brown, grey or yellowish stripe, three scales wide, then a dark brown, black-edged lateral stripe three scales wide, which commences on the snout and passes through the eye, outer one and a half scale rows white, with a broken pink or orange line running through the outer row; upper labials, chin and throat white; ventrum white, cream or lemon yellow, with some salmon or pink flecking at the ends of the ventrals.

Size. Largest ♂ (UM. 8476 - Salisbury) 670 + 159 = 829 mm. Largest ♀ (NMBR. 2983 - Salisbury) 734 + 151 = 885 mm.

Breeding. A 728 mm ♀ from West Nicholson laid 4 eggs in captivity between 27th and 30th November, then died with 10 eggs still in her oviducts. A 745 mm ♀ from west of Salisbury contained 18 eggs.

Diet. Large specimens frequently contain rats or rodent fur, smaller ones prey on skinks (Mabuya striata; M. varia) and frogs. One captive snake ate a juvenile Chamaeleo d. dilepis.

Habitat. Widespread in savanna, but particularly common on the Rhodesian Plateau between 4,000 and 5,000 feet, especially in grassland. Absent from montane grassland above 6,000 feet, where it is replaced by Aunlorhinus multimaculatus and Psammophis orificifer.

Distribution. Tanganyika south to Natal, Orange Free State and northern Cape Province, west through Rhodesia and southern Zambia to Katanga, Angola and northern South West Africa.

PSAMMOPHYLAX TRITAENIATUS FITZGERALDI Broadley

Trimerorhinus tritaeniatus (not Gunther) Boulenger (Part) 1896, p. 139 (Zomba; Chiredzulu; Fwambo) and 1897, p. 801 (Kondowe to Karonga; "Nyika Plateau"; Fort Hill).

Trimerorhinus tritaeniatus tritaeniatus (not Gunther) Pitman (part), 1934, p. 296 (Lukulu Swamps; Mpika).

Cerastes tritaeniatus tritaeniatus (not Gunther) Bogert (part), 1940, p. 77, (Karonga).

Psammophylax tritaeniatus tritaeniatus (not Gunther) Loveridge, 1953a, p. 270 (Kasungu; Nchisi Mtn.); Hamney, 1961, p. 21 (Blantyre).

Psammophylax tritaeniatus (not Gunther) Vesey - FitzGerald, 1958, p. 58 (Abercorn).

Psammophylax tritaeniatus fitzgeraldi Broadley, 1960, Occ. Pap. Nat. Mus. S. Rhod., p. 431: Mwambeshi Farm, Abercorn, Zambia; Broadley & Pitman, 1960, p. 444.

Psammophylax tritaeniatus tritaeniatus x fitzgeraldi Wilson, 1965, p. 161 (intergrades).

Forty-six specimens examined from: ZAMBIA. Abercorn; Chilongwelo; Chipengali \*; Fort Jameson \*; Kabompe; Kacholola; Kalichero \*; Kasempa; Lundazi \*; Msandile \*; Msoro; Mwambeshi.  
Fwambo;

Literature records. ZAMBIA. Abercorn; Lukulu Swamps; Mpika; Mporekoso (B). MALAWI. Blantyre; Chiredzulu; Fort Hill; Kasungu; Karonga; Kondowe to Karonga; Nchisi Mountain; "Nyika Plateau" \*; Zomba \*.

\* denotes specimens showing signs of intergradation with typical P. tritaeniatus.



Variation. Preocular 1; postoculars 2 (rarely 3); temporals 2 + 3 (rarely 2 + 4; very rarely 1 + 2, 1 + 3, 3 + 4, 3 + 5); upper labials 8 (rarely 7 or 9), the fourth and fifth entering the orbit; lower labials 9 - 11, the first 4 or 5 in contact with the anterior sublinguals; dorsals in 17 - 17 - 13 rows; ventrals 149 - 165 in ♂♂, 150 - 167 in ♀♀; anal divided; subcaudals 53 - 65 in ♂♂, 53 - 62 in ♀♀. Dentition - maxillary 10 + II; palatine 9; pterygoid 21 - 23; dentary 18 (one skull).

Coloration. Similar to the typical form except that the vertebral stripe is absent, or reduced to a short streak on the nape, the dark lateral stripes may also be poorly defined or absent. Abercorn snakes are usually uniform grey above with no trace of dark stripes.

Size. Largest ♂ (UM. 843 - Fort Jameson) 635 + 138 = 773 mm. Largest ♀ (NMSR. 3190 - Abercorn) 570 + 135 = 705 mm.

Discussion. This form occupies an intermediate position between P. t. tritaeniatatus of the savanna and P. v. variabilis of the montane grassland, but although it intergrades freely with the former it is apparently sympatric with variabilis at Zomba with no sign of intergradation. UM. 3105 from Chipengali has the three distinct stripes of typical tritaeniatatus and a single anterior temporal like variabilis, but it is presumably aberrant, for I have a normal P. t. fitzgeraldi from the same locality.

Distribution. This form has a discontinuous distribution in Zambia and Malawi, occupying the following areas: (a) the Lake Mweru Basin, extending east to Fwambo and Mpika. (b) The Kabompo - Kasempa area. (c) The Eastern Province, where it intergrades extensively with the typical form. (d) Malawi, except the Shire Valley, which is occupied by typical tritaeniatatus. The latter may extend north along the shores of Lake Malawi, which would account for the numerous intergrade populations in Malawi.

PSAMMOPHYLAX VARIABILIS VARIABILIS Gunther

Psammophylax variabilis Gunther, 1893, Proc. Zool. Soc. London (1892), p. 557, pl. xxxv: Shire Highlands, Malawi, and 1894, p. 619.

Trimerorhinus variabilis Boulenger, 1896, p. 140 (Zomba); Gunha, 1935, p. 10 (Massangulo).

Trimerorhinus tritaeniatatus (not Gunther, 1863) Themido, 1941, p. 17 (Massangulo).

Psammophylax tritaeniatatus variabilis Loveridge, 1953a, p. 272 (Zomba, Mlanje and Nyika Plateaux), and 1953c, p. 144 (Chambe Plateau, Mlanje Mountain); Wilson, 1965, p. 161.

Eleven specimens examined from: ZAMBIA. Nyika Plateau.  
MALAWI. Chelinda (Nyika Plateau); Mlanje Mountain; Zomba Plateau.

Literature records. MALAWI. Mlanje Mountain; Nyika Plateau and Zomba Plateau. Sweeney (in litt.) found a mangled specimen near Dedza.  
MOZAMBIQUE. Massangulo.

Variation. Preocular 1; postoculars 2 (rarely 1); temporals 1 + 2 or 1 + 3 (rarely 2 + 3); upper labials 8 (rarely 7), the fourth and fifth (rarely fourth only) entering the orbit; lower labials 10 = 12, the first 4 - 6 in contact with the anterior sublinguals; dorsals in 17 - 17 - 13 rows; ventrals 149 - 161 in ♂♂, 151 - 160 in ♀♀; anal divided; subcaudals 54 - 58 in ♂♂, 53 - 58 in ♀♀. Dentition - maxillary 10 + II; palatine 9; pterygoid 20 - 23; dentary 16 (one skull).

Coloration. Grey-brown, olive or blackish above, uniform or with a dark vertebral stripe (divided by a pale hairline) and dark lateral stripes; slate grey or blackish below.

Size. Largest ♂ (MZ. 51185 - Mlanje Mountain) 536 + 149 = 835 mm.  
Largest ♀ (AMNH. 67743 - Zomba Plateau) 545 + 113 = 658 mm.

Discussion. As there is no evidence of intergradation between the montane grassland form and P. t. fitzgeraldi, which occurs alongside it (sympatric at Zomba?) throughout Malawi, P. variabilis must be restored to specific rank. Trinomials are required because of two forms described from Kafanga by Laurent (1956, pp. 235 & 237). P. v. festivus occurs on the Kundelungu Plateau and in the Upemba National Park, P. v. subniger was described from the Marungu Plateau, but also occurs in the mountains of Rwanda and Burundi. Both agree with typical P. variabilis in their dark ventral coloration and in normally having a single anterior temporal. The differences in ventral and subcaudal counts cited by Laurent are based on small series and may prove untenable when more material becomes available.

Breeding. Loveridge (1953a) records that on 10th August on Lichenya Plateau (Mlanje) two ♀♀ held 8 eggs (20 x 10 mm) and 9 eggs (23 x 10 mm) respectively. A 570+mm ♀, collected at Chelinda (Nyika) on 11th December, contains four young snakes 154 mm in total length, ready to be born. It is interesting to find that this montane species has become viviparous, in which respect it agrees with Pseudaspis cana and Duberria lutrix shirana, which occur in the same habitat.

Diet. Remains of a Rana in the above-mentioned Chelinda ♀. Gunther (1894) records specimens of Grammonys dolichurus from two stomachs. Loveridge (1953a) found a rat (Lophuromys flavopunctatus) in a Zomba snake and rodent fur in a Mlanje specimen; a Mabuia p. mlanjensis in a Mlanje snake,



while a Nyika reptile held the tail of a Nabuya varia and a Bufo t. nyikae; a Zomba juvenile had swallowed a Hyperolius.

Habitat. Loveridge dug six Mlanje snakes out of two shallow rodent burrows in which they apparently hibernate.

Distribution. Highlands of south-western Tanganyika, Malawi (and the Zambian sector of the Nyika Plateau) and north-western Mozambique.

Genus RHAMPHIOPHIS Peters

Rhamphiophis Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 624. Type by monotypy: R. rostratus Peters.

RHAMPHIOPHIS OXYRHYNCHUS ROSTRATUS Peters

Rhamphiophis rostratus Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 624; Tete, Mozambique, and 1882, p. 124, pl. xix, fig. 1 (Tete; Mossuril; Quitangonha); Bocage, 1896, p. 93; Pitman, 1934, p. 296; Bogert, 1940, p. 83, fig. 15 G.

Rhamphiophis oxyrhynchus (not Reinhardt) Boulenger, 1896, p. 147 (Fort Johnston), also 1907a, p. 11 (Petauke) and 1915, p. 212; Loveridge, 1923, p. 882 (Lumbo).

Rhamphiophis oxyrhynchus rostratus Loveridge, 1953a, p. 270 (Mtimbuka; Tete); Vesey - FitzGerald, 1953, p. 59; Broadley, 1959b, p. 44, and 1962a, p. 833; FitzSimons, 1962, p. 215 (Livingstone; Matetsi); Wilson, 1965, p. 162.

Fifty specimens examined from: RHODESIA. Chipinda Pools; Dett; Fatima; Ilamba Bridge; Kariba; Kariba Lake - Duni, Sanyatwe and Sebungwe Confluences, also Redcliff Island; Kotwa; Mavuradona Mtns.; Mtoko; Sabi - Lundi Confluence; Wankie National Park. ZAMBIA. Chikowa; Junbe; Kalichero; Kariba Lake - Chezia Confluence; Livingstone; Msandile; Msoror; Nyika Rest House. MALAWI. Fort Johnston; Fort Herald. MOZAMBIQUE. Matundo (USNM); Maguema; Nova Freixo.

Literature records. RHODESIA. Beithbridge (Isenmager, 1955, photograph); Matetsi. ZAMBIA. Livingstone; Petauke. MALAWI. Fort Johnston; Mtimbuka. MOZAMBIQUE. Lumbo; Mossuril; Quitangonha; Tete.

Variation. Preoculars usually 3, sometimes 2; postoculars 2 (rarely 3 or 4); temporals usually 2 + 3, frequently 2 + 4 or 3 + 4, rarely 1 + 2, 1 + 3, 2 + 2, 2 + 5, 3 + 3 or 3 + 5; upper labials 8 (rarely 7 or 9), the fifth (rarely fourth and fifth) entering the orbit (rarely excluded by a subocular); lower labials 10 - 12, the first 4 - 6 in contact with the anterior sublinguals; dorsals in 17 - 17 - 13 rows; ventrals 159 - 186; anal divided; subcaudals 87 - 106. Dentition - maxillary 5 - 6 + II; palatine 4; pterygoid 12 - 13; dentary 17 - 18 ( 2 skulls).

Coloration. Pale red-brown or chestnut above, each scale dark-edged, head and neck often greyish, a dark streak through the eye; white below.

Size. Largest (NMSR. 3597 - Kariba Lake) 1070 + 426 = 1496 mm.

Diet. A Wankie snake contained rodent fur and Wilson (1965) found an adult rat and nine young ones in a Jumbe snake. A Chikowa snake contained amphibian remains. Loveridge (1953a) found a Nucras t. ornata and the tail of a Mabuza in two Mtimbuka snakes. Captive snakes take rodents, small birds and skinks. Specimens of Philothamnus hoplogaster were twice killed and eaten by Wilson's captive snakes, another ate a large Xenopus.

Habitat. Usually found in dry sandy country at low altitudes, being very common in the Zambezi, Luangwa and Shire Valleys and north Mozambique. At Kambo Loveridge dug them out of termitaria and gerbil burrows. The presence of this lowland species on the Nyika Plateau is surprising, apart from a specimen collected by Wilson on the Zambian sector, Sweeney (letter of 14.xii.58) found two specimens lying on a road on the Malawi side, both immobilized by cold late in the afternoon.

Distribution. East Africa from the Sudan and Somalia south to Mozambique and the north-eastern Transvaal, west to the Victoria Falls.

#### RHAMPHIOPHIS ACUTUS ACUTUS (Gunther)

Psammophis acutus Gunther, 1888, Ann. Mag. Nat. Hist., (6) 1, p. 327, pl. xix, Fig. D; Pungo Andongo, Angola.

Rhamphiophis acutus Pittman, 1934, p. 296 (Lulimala River; Lukulu Delta).

Rhamphiophis acutus wittei Laurent, 1956, Ann. Mus. Congo, 48, p. 244: Kundelungu Plateau, Katanga (also Mporokose, Kawambwa, and acutus x wittei intergrades from Abercorn), and 1964c, p. 111 (N. E. Angola locs.).

Rhamphiophis acutus acutus Vesey - FitzGerald, 1958, p. 59 (Abercorn).



Eleven specimens examined from: ZAMBIA. Balovale Boma; Kalabo; Lukulu Swamps (BM); Lulimala River (BM).

Literature records. ZAMBIA. Abercorn; Kawambwa; Lukulu Swamps; Lulimala River; Mporokoso.

Variation. Preocular 1; postoculars 2; temporals 2 + 3 (rarely 1 + 2 or 2 + 4); upper labials 8, the fourth and fifth entering the orbit; lower labials 9 - 10 (rarely 11), the first 4 - 5 in contact with the anterior sublinguals; dorsals in 17 - 17 - 13 rows; ventrals 171 - 203 in ♂♂, 174 - 190 in ♀♀; anal divided; subcaudals 56 - 78 in ♂♂, 54 - 70 in ♀♀.

Coloration. The coloration and markings of this species closely resemble those described for Psammophylax t. tritaeniatus, except that the vertebral stripe often continues onto the head as a trident shaped marking.

Size. Largest ♂ (UM. 6604 - Kalabo) 860 + 217 = 1077 mm. Largest ♀ (BM. - Lukulu Swamps) 670 + 140 = 810 mm.

Discussion. Laurent distinguished wittei from typical acutus on its lower ventral counts (see Table 9 below), but data for Angola material published subsequently (Laurent, 1964c) gives the two forms a mosaic distribution which is largely correlated with altitude, i.e. in Angola, Katanga and Zambia acutus does not occur above 1000 metres (but found at 1450 metres upwards in Burundi), while wittei occurs at altitudes between 1250 and 1815 metres (4,000 - 6,000 feet approx.). When more material is available it may be possible to plot local clines running at right angles to contours from low counts at high altitudes to high counts at lower altitudes. The seven specimens from Kalabo and Balovale have the highest ventral and subcaudal counts recorded for the species and are more entitled to subspecific recognition than wittei. *Reilich (1957b,*

Race or population	VENTRAIS				SUBCAUDALS			
	♂♂		♀♀		♂♂		♀♀	
	N	Range	N	Range	N	Range	N	Range
<u>garambensis</u> (N.E. Congo)	9	179-188	5	177-179	7	64-71	5	63 - 69
<u>acutus</u> (Dundo, Katanga, Burundi)	4	185-192	5	175-184	4	59-73	5	53-63
<u>wittei</u> (Angola, Katanga, Zambia)	21	168-179	23	165-177	21	54-67	23	51-65
<u>acutus</u> (Balovale - Kalabo)	3	197-203	4	181-190	3	71-78	4	66-70

Table 9. Variation in ventral and subcaudal counts for Rhamphiophis acutus. Data largely extracted from Laurent (1956 and 1964c) and Witte (1959).

Hellmich (1957b, p. 71) has recorded 155-178 ventrals and 58 - 62 subcaudals for a series of nine specimens from Bela Vista at 1800 metres on the central plateau of Angola, these counts are the lowest yet recorded and are again associated with high altitude.

R. a. garambensis Witte is distinguished by black latero-ventral lines and is well isolated geographically, but I consider it premature to recognise additional races in the south, considering the limited amount of material available.

Diet. A 895 mm Kalabe ♂ contained a perfect Tomuropeltis longicauda 353 mm in length, the amphisbaenid had been seized in the middle of the body and folded in two when swallowed. The Balovale snake was dug out of the burrow of a Dendromus melanotis, it had eaten the mouse (Ansell register).

Habitat. Sandy flood-plains bordering the upper Zambezi in Bartoseland and Balovale District. This species does not seem to occur below 3,000 feet (914 metres), whereas Rhamphiophis o. rostratus is rarely found above this altitude.

Distribution. Angola, Katanga, western and northern Zambia, Burundi and southern Tanganyika.

#### RHAMPHIOPHIS MULTIMACULATUS (A. Smith)

Coronella multimaculata A. Smith, 1847, Ill. Zool. S. Africa, Rept., pl. lxi; Bushman Country, near the Orange River, i.e. Bushmanland.  
Rhamphiophis multimaculatus Hewitt & Power, 1913, p. 163 (Ky Ky); FitzSimons, 1935a, p. 521 (Auob River), and 1937, p. 263; FitzSimons & Brain, 1958b, p. 103; FitzSimons, 1962, p. 217 (Nossob River).

No local specimens examined.

Literature records. CAPE PROVINCE - BECHUANALAND BORDER. Auob River; Ky Ky; Nossob River.

Diet. The Auob River snake was taken while swallowing a young Ptenopus garrulus (FitzSimons, 1935a).

Habitat. Confined to dry, stony or sandy areas of the South West Arid.

Distribution. South West Africa and the western Cape Province, extending east to the southern Orange Free State.



Genus *DROMOPHIS* Peters

Philodendros Fitzinger, 1843, Syst. Rept., p. 26. Type by original designation: Dendrophis praeornata Schlegel. (A nomen oblitum as defined in Article 23b of the 1961 edition of the International Code of Zoological Nomenclature).

Dromophis Peters, 1869, Monatsb. Akad. Wiss. Berlin, p. 447. Type by monotypy: Dendrophis praeornata Schlegel

*DROMOPHIS LINEATUS* (Dumeril & Bibron)

Dryophylax lineatus Dumeril & Bibron, 1854, Erpet. Gen., 7, p. 1124: White Nile, Sudan.

Dromophis lineatus Boulenger, 1897, p. 801 (Kondowe to Karonga; Nyika Plateau - ?), and 1915, p. 212; Loveridge, 1933, p. 254 (Nyankolo); Pitman, 1934, p. 296 (Lukulu Delta); Bogert, 1940, p. 79, fig. 15A; Loveridge, 1940, p. 7; Laurent, 1956, p. 247; Vesey - FitzGerald, 1958, p. 60; Broadley, 1959b, p. 44; Broadley & Pitman, 1960, p. 444; FitzSimons, 1962, p. 219 (Kariba Lake locality rejected).

Twenty-one specimens examined from: BECHUANALAND. Kasane. RHODESIA. Nampini. ZAMBIA. Abercorn (IRSNB; UM); Bulaya (IRSNB); Kafue National Park - Lufupa River and Moshi Camp; Kalabo; Lukulu Swamps (EM); Lusaka; Mukupa (IRSNB); Mweru - Wantipa (IRSNB); Siantamba.

Literature records. ZAMBIA. Lukulu Swamps; Nyankolo. MALAWI. Kondowe to Karonga; Nyika Plateau (?).

Variation. Preocular 1; postoculars 2; temporals 1 + 2, sometimes 1 + 3 (rarely 2 + 2); upper labials 8 (rarely 7), the fourth and fifth (rarely third and fourth) entering the orbit; lower labials 9, the first 4 in contact with the anterior sublinguals; dorsals in 17 - 17 - 13 rows; ventrals 143 - 159; anal divided; subcaudals 81 - 89. Dentition - maxillary 17 + II; palatine 14; pterygoid 12; dentary 25 (one skull).

Coloration. Head dark brown above, with two pale transverse bands posteriorly, pre - and postoculars yellow, upper labials and chin greenish white. Body grey-brown above, a black-edged pale vertebral line, scales in the next three rows black-tipped, a poorly defined pale dorso-lateral line, flanks grey-brown, outer scale row black above and yellowish white below; ventrals yellowish-white, a black transverse marking at the ends of each ventral, subcaudals bluish-white.

Size. Largest ♂ (NMSR. 4931 - Moshi Camp)  $880 + 330 = 1210$  mm.  
Largest ♀ (NMSR. 1349 - Lufupa River)  $655 + 275 = 930$  mm.

Remarks. Loveridge (1940) gives the range for subcaudals as 83 - 105 and there may be a cline in this character. The highest counts recorded are 103 - 105 for two Niger snakes (Boulenger, 1896, p. 150) and the lowest are 78 - 80 for three snakes from Kundelungu Plateau, Katanga (Laurent, 1956), 81 for three Zambian snakes and 82 for a male from Mwaya, at the north end of Lake Malawi. Bogert (1940) gives 84 for an Angolan snake.

Breeding. A ♀ from Lufupa River contained eggs measuring  $16 \times 6$  mm on 11th August.

Diet. The Nampini snake was swallowing a rat beside the Zambezi when shot by M. P. S. Irwin.

Enemies. The largest ♂ (apparently a record for the species) was killed by a pair of Wattled Granes (Bugeranus carunculatus) at Moshi Camp.

Habitat. This species is usually associated with rivers and swamps, particularly the flood plains bordering the upper Zambezi, the Kafue, Lake Bangweulu and the Mweru - Wantipa.

Distribution. Sudan and Uganda, south along Lake Tanganyika to northern Malawi, northern and western Zambia, and the Chobe swamps on the northern border of Bechuanaland; west to Guinea, the Congo and Angola.

Genus PSAMMOPHIS Boie

Psammophis Boie, 1826, Isis von Oken, 19, col. 982. Type by monotypy:  
Coluber sibilans Linnaeus.

PSAMMOPHIS MOTOSTICTUS Peters

Psammophis moniliger var. notostictus Peters, 1867, Monatsb. Akad. Wiss. Berlin, p. 237 : Otjimbingue, South West Africa.

Psammophis notostictus FitzSimons & Brain, 1958b, p. 103; FitzSimons, 1962, p. 225.

Although there are no definite records of this species in Bechuanaland, it probably occurs along the Nossob River on the south-western border. FitzSimons & Brain (1958b) list it for the Kalahari Gemsbok National Park.



Distribution. South West Africa, western and central Cape Province (reaching Longitude  $27^{\circ}$ E) and the western Orange Free State.

PSAMMOPHIS LEIGHTONI TRINASALIS Werner

Psammophis sibilans trinasalis Werner, 1902, Verh. Zool. Bot. Ges. Wien, 52, p. 340; Windhoek, South West Africa; Loveridge, 1940, p. 46; FitzSimons & Brain, 1958, p. 103; FitzSimons, 1962, p. 231 (Ky Ky).  
Psammophis furcatus (not Bianconi) Werner, 1910, p. 361 (Kgokong to Kong); Hewitt & Power, 1913, p. 163 (Nossob); FitzSimons, 1935b, p. 316 (Kuke; Kaotwe; Gembok - Sunnyside).  
Psammophis leightoni trinasalis Mertens, 1955, p. 96.

Two specimens examined from: BECHUANALAND. Lake Dow; 10 mls. W of Maboane (USNM).

Literature records. BECHUANALAND. Gembok - Sunnyside; Kaotwe; Kgokong to Kong; Kuke; Ky Ky; Nossob River.

Variation. Nasals 3; preocular 1, in contact with frontal; postoculars 2; temporals 2 + 2 (rarely 2 + 3 or 2 + 1); upper labials 8, the fourth and fifth entering the orbit; lower labials 10, the first 4 in contact with the anterior sublinguals; dorsals in 17 - 17 - 13 rows; ventrals 153 - 160; anal divided; subcaudals 100 - 106. Dentition - maxillary 4 + 2 + 4/5 + II; palatine 12; pterygoid 18; dentary 4 + 20/21 (skull of Lake Dow snake).

Coloration. Above, grey-brown anteriorly, becoming pale red-brown posteriorly, scales dark-tipped, a pale dark-edged vertebral line, which may be broken up into a series of spots, this light stripe bifurcates on the head and continues to the anterior edge of the frontal as a pair of black-edged pale stripes, a pale median line usually extends from the rostral to the frontal; the upper labials, pre - and postoculars are white; a pale dorso-lateral stripe extends from the eye onto the tail; white or yellowish below, including lower half of outer dorsal scale row, chin and throat flecked with dark grey.

Size. Largest ♂ (VLKE 860 - Kaotwe) 443 + 360 = 803 mm. Largest ♀ (VLKE 865 - Gembok - Sunnyside) 537 + 297 = 834 mm.

Discussion. This form shows marked morphological differences from P. sibilans and is also sympatric with the latter throughout large areas of South West Africa and Bechuanaland, so I concur with Mertens (1955) in treating it as a race of P. leightoni of the Western Cape Province.

Distribution. South West Africa, southern and central Bechuanaland, northern Cape Province, western Orange Free State and western and northern Transvaal.

#### PSAMMOPHIS BREVIROSTRIS Peters

Psammophis brevirostris Peters (part), 1881, Sitz. Ges. Naturf. Freunde Berlin, p. 89; Ia Matlale, Mozambique; Boulenger, 1896, p. 166.

Psammophis sibilans (part) Hewitt, 1912, p. 272.

Psammophis sibilans sibilans (part) Loveridge, 1940, p. 30; FitzSimons, 1962, p. 227, pl. 23.

Nine specimens examined from: RHODESIA. Baddeloy; Empandene; Marandellas; Umtali. MOZAMBIQUE. 5 mls E. of Namaacha.

Literature record. MOZAMBIQUE. Matlale.

Variation. Nasals 2; preocular 1, not in contact with frontal; postoculars 2; temporals 2 + 2 or 2 + 3; upper labials 8, the fourth and fifth entering the orbit; lower labials 9 - 11, the first 4 (rarely 5) in contact with the anterior sublinguals; dorsals in 17 - 17 - 13 rows; ventrals 148 - 165; anal divided; subcaudals 82 - 101.

Coloration. Dark brown above with a pale vertebral line, a pale dorso-lateral stripe two scales wide, which is edged with black above; flanks grey-brown, usually with vague light vertical bars anteriorly; upper and lower labials immaculate, or suffused or spotted with dark grey; ventrum white or yellowish, uniform or with lateral series of dark streaks.

Size. Largest ♂ (UM. 9703 - Empandene)  $500 + 230 = 730$  mm. Largest ♀ (UM. 6661 - Umtali)  $575 + 240 = 815$  mm.

Discussion. This species has been confused with P. sibilans for the past 50 years, but in Rhodesia it is readily distinguished from sympatric sibilans by its distinct dorso-lateral stripes and low ventral and subcaudal counts. It is smaller in average size than P. sibilans, the largest examined being a ♂ from Pretoria of  $700 + 290 = 990$  mm.



Habitat. This species is typical of highveld between 4,000 and 5,000 feet, although the Namaacha specimen was found at 1,000 feet and the type locality is on the Mozambique Plain.

Distribution. The Transvaal highveld, extending east to southern Mozambique; the Rhodesian Plateau. Boulenger (1896) also recorded it from Angola, Natal and Port Elizabeth, but all the Psammophis sibilans material from southern Africa must be examined before the variation and distribution for the two species can be established.

PSAMMOPHIS SIBILANS LEOPARDINUS Bocage

Psammophis sibilans var. leopardina Bocage, 1887, Journ. Sci. Lisboa, 11, p. 206; Catumbella and Mossamedes, Angola; and 1895, p. 117.

Psammophis sibilans sibilans (not Linnaeus) Bogert (part), 1940, p. 79 (Lobito Bay, Angola).

Psammophis sibilans (part) Mertens, 1955, p. 98, fig. 68.

Psammophis ? sibilans Broadley & Pitman, 1960, p. 445.

Six specimens examined from: ZAMBIA. Abercorn (IRSNB); Mporokoso (IRSNB; PEM).

Variation. Nasals 2; preocular 1, not in contact with frontal; preoculars 2; temporals 2 + 3, sometimes 1 + 2 or 2 + 2; upper labials 7 - 8, the third and fourth, or fourth and fifth entering the orbit; lower labials 9 - 10, the first 4 in contact with the anterior sublinguals; dorsals in 17 - 17 - 13 rows; ventrals 149 - 159; anal divided; subcaudals 72 - 86.

Coloration. Greenish brown above, the scales black-edged, a pale black-edged vertebral line is bordered on each side by a series of confluent yellowish black-bordered rings which extend for about two-thirds the length of the body, posteriorly replaced by a pale dorso-lateral stripe; head brown with a black-edged yellow transverse stripe extending from the postoculars across the back of the frontal, and another extending from the posterior labials diagonally across the parietals; labials yellow spotted with black; greenish yellow below, each ventral irregularly bordered with black, subcaudals with a lateral line of black dots, chin yellowish with dark blotches.

Size. Largest (IRSNB - Abercorn) 560 + 198 = 758 mm.

Discussion. Nine Psammophis (AMNH 50612 - 20) collected by the Vernay Angola Expedition at Lobito Bay agree perfectly with Bocage's description of leopardinus and are almost topotypes if the type locality is restricted to Catumbela. They have higher <sup>(162 - 172)</sup> ventral and subcaudal (94 - 105) counts than the north Zambian specimens and the ventral markings consist of striations. One of the Lobito snakes is now UM. 5100 and it has a longer head than PEM 1438/12 from Mporokoso (the only Zambian specimen now available for comparison), the latter resembles brevirostris in its short snout and low ventral count. These Zambian snakes are sympatric with P. s. sibilans and therefore cannot be conspecific, but the relationship of the southern forms to typical P. s. sibilans of Egypt is not yet clear. The unusual dorsal markings are so similar to leopardinus that they are provisionally listed under that name, but taxonomic differences can be expected between typical leopardinus at sea level on the Angola coast and the Zambian populations occurring at 4 - 5,000 feet.

The snake from Tsissabschlucht S.W.A. illustrated by Mertens (1955, fig. 68), looks like a P. s. leopardinus in which the pale vertebral stripe is largely absent anteriorly, producing a ladder-like pattern which is repeated on the flanks, this design is restricted to the anterior quarter of the body, being replaced posteriorly by longitudinal stripes, the head is ornamented with an intricate white network.

Distribution. The coastal plain of Angola from Lobito Bay southwards, northern South West Africa and northern Zambia.

#### PSAMMOPHIS SIBILANS SIBILANS (Linnaeus)

Coluber sibilans Linnaeus (part), 1758, Syst. Nat., ed. 10, 1, p. 222;

"Asia" (in error), restricted to Egypt by Loveridge (1953a).

Psammophis moniliger Peters (part), 1854, p. 623.

Psammophis sibilans Gunther, 1864, p. 307 (Zambezi Expedition), and 1894, p. 618 (Shire Highlands); Bocage, 1896, p. 93; Boulenger, 1896, p. 161 (Zomba); Peracca, 1896, p. 2 (Kazungula); Boulenger, 1897, p. 801 (Nkata Bay to Ruarwe; Kondowe to Karonga; Fort Hill), also 1902, p. 18 (Mashanaland), 1907a, p. 11 (Feira District; Luangwa Valley), and 1907 b, p. 487 (Inhambane; Beira); Chubb, 1909a, p. 596 and 1909b, p. 36 (Bulawayo; Gwamayaya River); Roux, 1907, p. 77 (Rikatla); Gough, 1908, p. 29 (M'moouve; Serowe); Boulenger, 1910, p. 514 (Salisbury; Mazoe; Kafue River), and 1915, p. 213; Loveridge, 1923, p. 886 (Lumbo), and 1933, p. 255 (Ikombo; Nyamkele; Kalambo River);



Pitman, 1934, p. 297 (Namwala; Mambwa; Broken Hill; Munyamadzi River); Gott, 1935, p. 969 (Charre; M'Gaza); FitzSimons, 1935b, p. 317 (Kaotwe; Gembok; Maun; Shorobe; Shaleshonto; Kabulabula; Makarikari); Bogert (part), 1940, p. 79, figs. 14 & 15 H (Mlanje); Wilson, 1965, p. 162.

Psammophis sibilans var. mossambica Peters, 1882, Reise nach Mossambique, 3, p. 122: Mozambique Island, Cabaceira, Mossuril, Querimba Islands and Boror, Mozambique.

Psammophis sibilans var. tettensis Peters, 1882, Reise nach Mossambique, 3, p. 122: Tete, Mozambique.

Psammophis sibilans var. intermedius Fischer, 1884, Jahrb. Hamburg Wiss. Anst. 1, p. 14: Arusha, Tanganyika; Pfeffer, 1893, p. 86 (Quelimane); Gunther, 1894, p. 618 (Shire Highlands).

Psammophis thomasi Gough, 1908, Ann. Tvl. Mus., 1, p. 30, fig.: Salisbury, Rhodesia.

Psammophis sibilans sibilans Loveridge, 1940, p. 30, also 1953a, p. 274 (Kasungu; Nohisi Mountain; Likabula River; Nchenachena; Mtimbuka; Tete), and 1953c, p. 144 (Tangadzi Bungalow); Vesey - FitzGerald, 1958, p. 60 (Abercorn; Ghinsali; Mweru - Wantipa); Broadley, 1959a, p. 29, illus., and 1959 b, p. 45; Manacas, 1959, p. 151 (Lourenco Marques; Mauele; Manhica; Mambane; Vila Paiva de Andrada); Broadley & Pitman, 1960, p. 445; Hamney, 1961, p. 21 (Blantyre); Broadley, 1962d, p. 833; FitzSimons, 1962,, p. 227 (Bindura; Chishawasha; Fort Victoria; Hunyani; Inhaca Island; Insiza; Kutama; Livingstone; Maputo; Que Que; Sinoia; Trelawney; Tsessebe); Johnsen, 1962, p. 124 (Ndola; Mushi - Mpika; Kawambwa; 24 Km W of Mufulira).

Two hundred and seventy specimens examined from: BECHUANA-  
LAND. 10 mls SE of Letlaking; Mohembo; Okovango. CAPRIVI. Lake  
Liambezi. RHODESIA. Bromley; Bulawayo and 9 mls S; Chipinda Pools;  
Chipinga; Grosby Farm; Dett; Essexvale; Fatima; Haroni - Lusitu  
Confluence; Helvetia; Imbezu Park; Inyanga Tea Estates; Inyati;  
Irisvale; Kariba Lake; Lake MacIlwaine; Lupane; Makore Farm; Mel-  
fort; Mount Hampden; 4 mls W of Mtoko; Mtorashanga Reserve; New  
Years Gift; Ngerima Reserve (E); Norton; Nuanetsi; Odzi; Old Umtali;  
Plumtree; Pounsley; Pungwe Bridge (Inyanga); Redcliff; Riverside;  
Selukwe; Sinoia Caves; Tynwald; Ungusa River; Umtali, 30 mls S and  
10 mls WNW; Umtama; Wedza Mountain; Weirmouth; Zambezi - Dumi and  
Chewore Confluences. ZAMBIA. Abercorn; Broken Hill; Bulaya (IRSNB);

Chikwa; Chilanga; Chilongwelo; Chipengali; Chisungu Estate; Chunga (Kafue National Park); Fort Jameson; Fort Manning; Kabompo Boma; Kacholola; Kalabo; Kalichero; Kalomo; Kaputa; Kariba Lake - Chezia and Lolongwe Confluences; Kasama (IRSNB); Kasempa; Kasusu; Katanda; Katete; Lake Chisi (IRSNB); Livingstone; Lundazi; Lusaka and 30 mls E; Machili Forest Station; Mambwe; Mazabuka; <sup>Mporokoso (IRSNB);</sup> Msoro; Milanga; Mikupe (IRSNB); Muswema (IRSNB); Mutanda; Mweru - Wantipa (IRSNB); Ndola. MALAWI. Limbe; Mchenga; Rumpi. MOZAMBIQUE. Bandula; 10 mls S of Beane; Chiniziua; Dondo; Ilha dos Portugueses; Inhaca Island; Inhacamba Island; Mafora; Manga; Malei; Moamba; Muda - Lamego; Vila de Manica; Vila Machado; Vila Pery; Xiluvo.

Literature records. BECHUANALAND. Gembok; Kabulubula; Kaotwe; Makarikari; Maun; M'mocueve; Serowe; Shaleshente; Shorobe; Tsessebe. RHODESIA. Bindura; Bulawayo; Chishawasha; Fort Victoria; Gwamayaya River; Hunyani; Insiza; Kutama; Mazoe; Que Que; Salisbury; Trelawney. ZAMBIA. Abercorn; Broken Hill; Feira District; Ikombo; Kafue River; Kalambo River; Kawambwa; Kazungula; Livingstone; Luangwa Valley; Mushi - Mpika; 24 Km W of Mifulira; Mumbwa; Munyamadzi River; Mweru - Wantipa; Namwala; Ndola; Nyamkolo. MALAWI. Blantyre; Fort Hill; Kasungu; Kondowe to Karonga; Likabula River; Mlanje; Mtimbuka; Nchenachena; Nchisi Mountain; Nkata Bay to Ruarwe; Tangadzi; Zomba. MOZAMBIQUE. Beira; Boror; Cabaceira; Charre; Inhaca Island; Inhambane; Lourenco Marques; Lumbo; Mambone; Manhica; Maputo; Mauele; M'Gaze; Mossuril; Mozambique Island; Querimba Islands; Rikatla; Tete; Vila Paiva de Andrada.

Variation. Nasals 2 - 3; preocular 1 (very rarely 2), usually separated from frontal; postoculars 2 (very rarely 3); temporals 2 + 2 or 2 + 3 (very rarely 1 + 1, 1 + 2 or 2 + 1); upper labials 8 (very rarely 6, 7 or 9) the fourth and fifth (very rarely third only, third and fourth, or fourth, fifth and sixth) entering the orbit; lower labials 9 - 10 (very rarely 8 or 11), the first 4 (very rarely 3 or 5) in contact with the anterior sublinguals; dorsals in 17 - 17 - 13 rows; ventrals 155 - 184; anal divided (very rarely entire); subcaudals 85 - 109. Dentition - maxillary 3 - 4 + 2 + 3 - 4 + II; palatine 8 - 10; pterygoid 15 - 19; dentary 18 - 22 (10 skulls).

Coloration. Head brown above, uniform or with a pattern of chestnut markings, sides of head brown, preocular sometimes yellow, lower half of upper labials yellow, usually spotted with black, chin and throat yellow, speckled with black, or with a series of large pale-centred dark spots on the lower labials; body grey-brown to olive above, uniform, or with a



pale vertebral line, or with a series of narrow black vertebral stripes formed by black scale edgings; some specimens have scattered black scales on the neck and one Livingstone snake (NMR 4263) has 50% of its dorsal scales black; yellow to white below, uniform, or with a lateral series of dark blotches or longitudinal streaks, sometimes some dark speckling mesially.

Size. Largest ♂ (NMR. 3325 - Kabompo)  $1263 + 438 = 1701$  mm. Largest ♀ (QVM/R. 34 - Salisbury)  $1253 + 487 = 1740$  mm.

Discussion. This is the largest Psammophis found in southern Africa and is known to reach a length of six feet.

The typical form of Egypt (Vars. A, B and C of Boulenger, 1896) usually has a light vertebral line and a pair of broad yellow dorso-lateral stripes, ventrals 158 - 172, subcaudals 100 - 117, usually five lower labials in contact with the anterior sublinguals (Marx, 1958, p. 196). In coloration and markings it appears closer to the striped forms of West Africa, including leopardinus, than it does to the olive snakes (Var. F of Boulenger, 1896) of eastern and southern Africa. The situation is further confused by a population of P. sibilans at Dodoma, Tanganyika, which agree in coloration and markings with Egyptian material and also have high subcaudal counts (115 - 118), these snakes have faint ventral hair lines which had led to their identification as P. subtaeniatus sudanensis at the Nairobi Museum. An undescribed race of P. sibilans, endemic to the Rukwa Valley, agrees with P. subtaeniatus in coloration and markings, but has the low subcaudal counts (83 - 96), dentition, and large size (up to 2099 mm) of sibilans, it agrees with Egyptian sibilans and differs from all other southern forms of Psammophis in usually having five lower labials in contact with the anterior sublinguals.

Breeding. A 1348 mm Old Umtali ♀ contained 15 eggs measuring  $25 \times 9$  mm on 25th August; an 1185 mm ♀ from the same locality contained 19 eggs ( $27 \times 17$  mm) on 4th September. A 1197 mm Bulawayo ♀ laid 19 eggs on 2nd October, two of these hatched on 22nd February. One Mauale ♀ contained 7 eggs varying from  $20 \times 6.5$  to  $14.5 \times 5.5$  mm on 28th August and another held 4 eggs measuring  $35 \times 13.5$  mm on 20th October (Manacas, 1959). Two captive ♀♀ each laid 11 eggs on 27th September and on 6th October (Wilson, 1965).

Diet. Large specimens usually contain rats or rodent fur, subadult snakes prey largely upon lizards and frogs. An Ndola snake contained five young rats (Pelomys fallax).

Two snakes had eaten small birds, one being a Blue Waxbill (Uraeginthus angolensis). Wilson (1965) caught one big specimen while it was swallowing a newly hatched Guinea fowl chick.

Large P. sibilans frequently devour other snakes, Wilson (1965) found the remains of a Dispholidus t. typus in one, two others disgorged a 4 foot Thelotornis k. oatesi and a 2½ foot Telescopus s. semianulatus respectively. A 1399 mm specimen caught at Urvuna by D. S. Rider disgorged a Dendroaspis p. polylepis 663 mm in length. A 340 mm juvenile from Kiluvo contained a Leptotyphlops scutifrons. A 915 mm ♂ from Inyanga Tea Estates contained an adult Gerrhosaurus flavigularis.

Loveridge (1953a) found a shrew (Crocidura sp.) in a young Nehenachena snake, a Mabuia varia in an Mtinbuka reptile and frogs (Rana anchietae and Phrynobatrachus acridoides) in two Tete specimens.

Parasites. Nematodes (Polydelphis quadricornis) from a Lumbo snake (Loveridge, 1923). Pentastomids (Foroccephalus sp.) and nematodes (Abbreviata sp.; Polydelphis sp.) in two Likabula snakes (Loveridge, 1953a).

Enemies. Loveridge (1923) records a 50½ inch Naja n. mossambica killed while swallowing a Psammophis s. sibilans of about 46 inches at Lumbo.

Habitat. Wherever P. sibilans and P. subtaeniatus are sympatric, sibilans is found along rivers, in reedbeds, thick herbage and well wooded areas, while subtaeniatus frequents dry savanna where the vegetation cover is poor. In southern Mozambique, where P. subtaeniatus is absent, P. sibilans occupies a typical subtaeniatus habitat, being particularly common on Inhaca Island.

Distribution. Savanna areas of Africa from Egypt south to Port St. Johns, Natal, Transvaal, Bechuanaland and northern South West Africa; it occurs in the savanna bordering the Sahara through to Mauretania.

Most of the records from the South African highveld probably refer to P. brevirostris.

#### PSAMMOPHIS SUBTAENIATUS SUDANENSIS Werner

Psammophis sibilans var. subtaeniata (part) Peters, 1882, p. 121 (Boror only).

Psammophis subtaeniatus (not Peters) Boulenger, 1896, p. 160 (Cape Maclear; Lake Nyasa; Zomba); and 1897, p. 801 (Nkata Bay to Ruwara; Nyika Plateau; Fort Hill); Loveridge, 1923, p. 884 (Lumbo); Cott, 1935, p. 968 (Gala; M'Gaza); Cunha, 1935, p. 9 (Massangule); Themido, 1941, p. 17 (Palma).



Psammophis subtaeniatus var. sudanensis Werner, 1919, Denks. Akad. Wiss. Wien, 26, p. 504: Kadugli, Sudan (restricted by Loveridge, 1940).

Psammophis sibilans (not Linnaeus) Mertens, 1937, p. 14 (Inhaminga).

Psammophis subtaeniatus sudanensis Loveridge, 1940, p. 50 and 1953a, p.

275 (Kasungu; Kota Kota; Chibotela; Likabula River; ~~Chitala~~ River; Mtimbuka); Manacas, 1959, p. 149 (Inhassoro; Vila Paiva de Andrada; Mambone).

Twenty-four specimens examined from: MALAWI. Cape Maclear (Sweeney Coll.); Chiroso; Fort Johnston; Tengani; Zomba. MOZAMBIQUE. Chemezi; Dondo; Grudja; Inchope; Maferga; Maringa; Massangena (TM); Mida - Iamego; Namiale; Vila de Manica; Xiluvo.

Literature records. MALAWI. Cape Maclear; Chibotela; Chitala River; Fort Hill; Kasungu; Kota Kota; Likabula River; Mtimbuka; Nkata Bay to Ruwara; "Nyika Plateau"; Zomba. MOZAMBIQUE. Boror; Gais; Inhaminga; Inhassoro; Lumbo; Mambone; Massangulo; M'Gaza; Palma; Vila Paiva de Andrada.

Variation. Nasals 2; preocular 1 (very rarely 2), usually separated from the frontal; postoculars 2 (4 on one side of one snake); temporals 2 + 2 or 2 + 3 (rarely 1 + 2); upper labials 8 (very rarely 7 or 9), the fourth and fifth (very rarely third and fourth or fourth, fifth and sixth) entering the orbit; lower labials 10 (rarely 9 or 11), the first 4 (rarely 5) in contact with the anterior sublinguals; dorsals in 17 - 17 - 13 rows; ventrals 148 - 169; anal divided; subcaudals 94 - 115. Dentition - maxillary 4 + 2 + 4 - 5 + II; palatine 10 - 11; pterygoid 13 - 20; dentary 24 - 28 (5 skulls). This species averages more teeth on each tooth-bearing bone than P. sibilans.

Coloration. As in the typical form, but a black line running through the outer dorsal scale row sharply divides the dark dorsal coloration from the pale ventrum and the ventro-lateral stripes are heavier and more sharply defined.

Size. Largest ♂ (MZ. 51220 - Chitala River) 820 + 400 = 1220 mm. Largest ♀ (Manacas, 1959 - Vila Paiva de Andrada) 630 + 325 = 955 mm.

Breeding. A ♀ collected at Vila Paiva de Andrada on 27th September contained 11 eggs measuring 28 x 11.5 to 16 x 7.5 mm (Manacas, 1959).

Diet: Loveridge (1953a) found a mouse (Peromys natalensis) in the stomach of the big Chitala River ♂ and an Arthroleptis stenodactylus in

a young snake. A Gaia snake contained a young Agama hispida (Cott, 1935). Manacas (1959) found rodent remains in two snakes and a Mabuia in one. A Maringa snake contained a Hemidactylus and a juvenile from Xiluvo held a Phrynobatrachus acridoides. At Namaueva a specimen was seen with a Ptychadena anchietae in its mouth, the snake escaped, but the frog was preserved.

Enemies. Loveridge (1953a) found the tail of a P. subtaeniatus in the stomach of a Mehelya c. capensis at Mtimbuka.

Habitat. Dry savanna.

Distribution. Southern Sudan and Ethiopia, south through Uganda, Kenya and Tanganyika to Mozambique and Malawi. This form apparently reaches its southern limit just north of Inhambane.

PSAMMOPHIS SUBTAENIATUS SUBTAENIATUS Peters

Psammophis moniliger var. bilineatus Peters, 1867, Monatsb. Akad. Wiss.

Berlin, p. 237: Otjimbingue, South West Africa. (A nomen oblitum. See discussion by Mertens, 1955, p. 99).

Psammophis brevirostris Peters (part), 1881, Sitz. Ges. Naturf./Berlin, p. 89 (Matlale). Freunde,

Psammophis sibilans var. subtaeniata (part) Peters, 1882, Reise nach Mossambique, 3, p. 121: Tete, Mozambique (here restricted).

? Psammophis subtaeniata Bocage, 1896, p. 93.

Psammophis bocarki Boulenger, 1895, Proc. Zool. Soc. London, p. 538 and 1896, p. 161, pl. vii, fig. 1: Benguela, Angola, also 1910, p. 514 (Victoria Falls) and 1915, p. 213; Bogert, 1940, p. 82, fig. 15 F.

Psammophis transvaalensis Gough, 1908, Ann. Tvl. Mus., 1, p. 31, figs.: Louw's Creek, Transvaal.

Psammophis subtaeniatus Gubb, 1909a, p. 596 and 1909b, p. 35 (Bulawayo; Matopos); Hewitt, 1912, p. 273 (M'mocuve; Francistown); Hewitt & Power, 1913, p. 164; Power, 1927, p. 409 (Lobatsi); FitzSimons, 1925b, p. 317 (Gemsbok - Sunnyside; Mabeleapudi; Maun; Lupane; Makarikari), and 1939b, p. 23 (Birchenough Bridge).

Psammophis subtaeniatus subtaeniatus Loveridge, 1940, p. 55, and 1953a, p. 276 (Tete); Broadley, 1959b, p. 47, and 1962d, p. 833; Fitz-Simons, 1962, p. 223; Broadley, 1963a, p. 39, illus.; Wilson, 1965, p. 163.



One hundred and forty-three specimens examined from:  
 BECHUANALAND. Francistown and 12 mls S; Kube Pan (TM); Lobatsi (MMK); Mabeleapudi (TM); Makarikari Pan (TM); Matjemboefji; Maun (TM); M'Moouve (AM); Nguihaba Hills (TM); Okovango; Ramutsa Pan; Serondala; Serowe (AM); Sherobe; Tsessebe (AM). RHODESIA. Balla Balla; Beithbridge; Benga Spring; Binga; Birchenough Bridge (TM); Bulawayo and 9 mls S; Chipinda Pools; Empandene (AM); Essexvale; Filabusi; Gado (TM); Hope Fountain; Hot Springs; Inyati; Kapami and 10 mls SE; Kariba; Kariba Lake - Mwenda and Sanyati Confluences; Kyle Dam; Lumane; Makumbi (AM); Makuti; Malimbasingi; Malonga Bridge; Marungudzi; Matopos; Matusadona Reserve; 4 mls SW of Nuanetsi Bridge; Nuanetsi Gorge; Nyamaropa; Odzani Bridge; Old Umtali; Plumtree; Red-cliff (TM); Rekomitjie Research Station; Ruware; Sabi - Lundi Confluence; Sabi - Macheke Confluence; Sabi Valley Research Station; Sawmills; Sebungwe River; Selukwe; Shashi - Shashani Confluence; Shiloh; Todds Hotel; Triangle; Umtali and 14 mls NE; Victoria Falls (SAM); 5 mls W of Wankie; Westwood (AM); Zambezi - Chewore, Matetsi and Sebungwe Confluences. ZAMBIA. Balmoral Farm; Chikowa; Chipengali; Kalichero; Katete; Livingstone; Lundazi; Nahoonwe; Songwe River. MOZAMBIQUE. Viola.

Literature records. BECHUANALAND. Francistown; Gemsbok - Sunnyside; Lobatsi; Mabeleapudi; Makarikari; Maun; M'Moouve. RHODESIA. Birchenough Bridge; Bulawayo; Lupane; Matopos; Victoria Falls. MOZAMBIQUE. Matlale; Tete.

Variation. Nasals 2 - 3; preocular 1 (rarely 2); postoculars 2 (rarely 3); temporals 2+2 or 2 + 3 (rarely 1 + 1, 1 + 2 or 2 + 1); upper labials 9 (rarely 8 or 10), the fourth, fifth and sixth (rarely third, fourth and fifth, fourth and fifth, fifth and sixth, or fifth, sixth and seventh) entering the orbit; lower labials 10 (rarely 8, 9 or 11), the first 4, (rarely 3 or 5) in contact with the anterior sublinguals; dorsals in 17 - 17 - 13 rows; ventrals 156 - 181; anal divided; subcaudals 107 - 130. Dentition - maxillary 4 + 2 + 5 - 7 + II; palatine 11 - 13; pterygoid 21 - 27; dentary 26 - 31 (10 skulls). The typical form averages more teeth on all bones than P. s. sudanensis and differs more strikingly from P. s. sibilans.

Coloration. Head brown above, uniform or more often with a series of grey transverse markings, which continue onto the neck as a series of crossbars, upper labials, chin and throat white, yellow or vermillion, usually heavily speckled with black; seven dorsal scale rows brown, sometimes each scale black-edged, a yellow or white dorso-lateral stripe is black-edged above and followed by a chestnut to brown lateral band

2½ scales wide, the lower half of the outer scale row is white; the ventrals are yellow mesially, white laterally, the two zones separated by a pair of sharply defined black hairlines, which usually fade out on the subcaudals.

Size. Largest ♂ (NMSR. 3832 - Binga)  $900 + 470 = 1370$  mm. Largest ♀ (MZ. 51218 - Tete)  $885 + 455 = 1340$  mm.

Diet. Rodent fur is sometimes present in the stomachs of large specimens and Loveridge (1953a) found a young Rattus rattus in a Tete snake.

These snakes prey largely upon lizards. A Malimbasingi snake held 2 Mabuya striata; Mabuya varia were found in the stomachs of Chipengali (2) and Inyati snakes; snakes from Okavango, Francistown and Kalichero each contained an Ablepharus wahlbergi; a 1230 mm Victoria Falls snake had eaten an adult Gerrhosaurus nigrolineatus. Loveridge (1953a) found a young Varamis n. niloticus, a Mabuya striata, and the tail of a Mabuya lacertiformis in three Tete snakes. A few stomachs contain amphibian remains.

Enemies. Two fragmentary specimens were recovered from the crop of a Brown Snake Eagle (Circus cinereus) at Matjemloji.

Habitat. Dry savanna, especially mopane and Acacia, also rock outcrops. Very common in the Zambezi and Limpopo Valleys and along their major tributaries.

Distribution. Southern Angola and northern South West Africa, east through Bechuanaland to Rhodesia, the Transvaal and western parts of Mozambique, north into southern and south-eastern Zambia. This form intergrades with sudanensis in the south-eastern corner of Rhodesia and along the Transvaal - Mozambique border from Pafuri to Komatipoort.

PSAMMOPHIS JALIAE JALIAE Peracca

Psammophis jallae Peracca, 1896, Boll. Mus. Zool. Torino, 11, No. 255, p. 2, figs. : Kazungula to Bulawayo, Rhodesia; Boulenger, 1910, p. 514 (Importuni District); Werner, 1910, p. 363 (Loakaneng - Severelele); Hewitt, 1912, p. 275, and 1913, p. 481 (Springvale); Pitman, 1934, p. 297 (but no records); Loveridge, (part), 1940, p. 62 (exclude ansorgei); Broadley, 1959b, p. 49 and 1962d, p. 834; FitzSimons, 1962, p. 237 (Bulawayo; Dett; Driefontein; Salisbury).



Psammophis Rohani Angel, 1921, Bull. Soc. Zool. France, 46, p. 116, figs.: Near Loengoue, Lumina River, affluent of the Luiana, tributary of the Kwando River, south-east Angola.

Psammophis longirostris FitzSimons, 1932, Ann. Tvl. Mus. 15, p. 38 : Gomodimo Pan, Bechuanaland, and 1935b, p. 318, figs. 2 - 3 (Mabeleapudi).

Sixteen specimens examined from: BECHUANALAND. Debeeti; Lephepe. RHODESIA. Bembesi; 10 mls E of Lupane; Marandellas; Melfort; Plumtree; Ruwa; Somabula; Springvale; Wedza.

Literature records. BECHUANALAND. Gomodimo Pan; Loakaneng - Severelela; Mabeleapudi. RHODESIA. Bulawayo; Dett; Driefontein; Importuni District; Kazungula to Bulawayo; Salisbury; Springvale.

Variation. Nasals 3; preocular 1, semidivided, in broad contact with the frontal; postoculars 2; temporals usually 2 + 2, sometimes 1 + 2, 1 + 3, 2 + 1, 2 + 3 or 3 + 3; upper labials 7 (rarely 6 or 8), the third and fourth (rarely fourth and fifth) entering the orbit; lower labials 9, the first 4 in contact with the anterior sublinguals; dorsals in 15 rows on nape and at midbody, 11 - 13 (rarely 9) before the vent; ventrals 156 - 177; anal divided; subcaudals 84 - 109. Dentition - maxillary 4 + 2 + 4 + II; palatine 9 - 11; pterygoid 14 - 16; dentary 4 + 18 - 22 (3 skulls).

Coloration. Dark brown to light grey-brown above, uniform, or more often with the snout and supraoculars pale brown and a pair of pale dorso-lateral stripes, which are bordered with black above, sometimes a vertebral series of pale spots, situated at the base of each scale; lateral scales usually with light red-brown centres; upper labials, outer scale row and ventrum white or yellow; anterior sublabials, sublinguals and gulars often suffused with blue-grey in the centre of each scale, forming a symmetrical pattern, this dark suffusion may extend onto the throat, which is often suffused with brick-red mesially.

Size. Largest ♂ (TM. 24392 - Dett) 762 + 373 = 1135 mm. Largest ♀ (Werner, 1910 - Loakaneng) 620 + 295 = 915 mm.

Discussion. Loveridge (1940) placed P. ansorgii Boulenger in the synonymy of P. jallae, but Hellmich (1957b, p. 69) has shown that a distinct form with fewer ventrals (153 - 160) and subcaudals (70 - 78) occurs on the ventral plateau of Angola. This appears to be a north-western race of P. jallae.

Diet. A Somabula snake contained an Agama hispida.

Enemies. The fragmentary Lephepe specimen was found in the crop of a Chanting Goshawk (Melierax musicus).

Habitat. Kalahari sands and open grasslands on the main Rhodesian watershed.

Distribution. Southern Katanga, south-eastern Angola, north-eastern South West Africa, Bechuanaland, western and central Rhodesia, western Transvaal.

PSAMMOPHIS CRUCIFER (Daudin)

Coluber sibilans Linnaeus (part), 1758, Syst. Nat. ed. 10, 1, p. 222, and 1766, Syst. Nat. ed. 12, 1, p. 383.

Coluber crucifer Daudin, 1803, Hist. Nat. Rept., 7, p. 189: "Indes orientales" = South Africa.

Psammophis crucifer Boulenger, 1896, p. 169 (Matabeleland); Loveridge, 1940, p. 64; FitzSimons, 1958a, p. 210 (Nyamziwa); Broadley, 1959b, p. 49 and 1962d, p. 834; FitzSimons, 1962, p. 239.

Twelve specimens examined from: RHODESIA. Chimanimani Mountains; Odzani; Odzi; Silverstreams; Troutbeck; Tsetsera.

Literature records. RHODESIA. "Matabeleland"; Nyamziwa.

Variation. Nasals 2; preocular 1, not in contact with frontal; postoculars 2 (rarely 3); temporals 2 + 2 or 2 + 3 (rarely 1 + 2); upper labials 8, the fourth and fifth entering the orbit; lower labials 9, the first 4 in contact with the anterior sublinguals; dorsals in 15 - 15 - 13 rows; ventrals (118) 143 - 165; anal divided; subcaudals (46) 61 - 74. Dentition - maxillary 4 + 2 + 3 + II; palatine 9; pterygoid 17; dentary 4 + 19 (one skull).

Coloration. Head grey, with a dark red-brown, black-edged stripe extending from the snout, dividing on the frontal and again on the parietals, in each case enclosing a grey centre, continuing onto the body as a dorsal stripe; pre- and postoculars white, upper labials, chin and throat white, blotched or speckled with black. A three-scale wide red-brown vertebral stripe, bordered with black and separated by a thin white line from a grey dorso-lateral stripe two scales wide; a dark grey-brown lateral stripe, lower half of outer scale row white; ventrum orange with a broken black lateral line.

Size. Largest ♀ (UM. 8973 - Troutbeck) 460 + 130 = 590 mm.



Remarks. No more specimens with the remarkably low ventral (118) and subcaudal (46) counts of FitzSimons (1958a) Nyamziwa snake have been found.

Diet. The large Troutbeck ♀ contained a Mabuza p. punctatissimus.

Habitat. Largely confined to montane grassland and protea scrub.

Distribution. Widely distributed in South Africa, but most abundant in the coastal areas of the southern and eastern Cape Province and along the eastern escarpment. Relict populations occur on the eastern highlands of Rhodesia. It is doubtful whether the "Matabeleland" specimens in the British Museum came from Rhodesia; my 1959b Driefontein record was based on Hewitt's original identification of a P. jallae collected by Father K. Tasman, S.J.

#### PSAMMOPHIS ANGOLENSIS (Bocage)

Amphiphis angolensis Bocage, 1872, Journ. Sci. Lisboa, 4, p. 82: Dondo, Loanda District, Angola.

Psammophis angolensis Boulenger, 1896, p. 170 (Cape Maclear; Fort Johnston) also, 1897, p. 801 (Fort Hill); Peracca, 1910, p. 4 (Harotseland); Boulenger, 1915, p. 213; Angel, 1921, p. 42 (Lealui); Pitman, 1934, p. 297 (Munyamadzi River); Loveridge, 1940, p. 68, and 1953a, p. 277 (Kasungu); Vesey-FitzGerald, 1958, p. 63 (Abercorn); Broadley, 1959b, p. 51; Broadley & Pitman, 1960, p. 446; Broadley, 1962d, p. 834; FitzSimons, 1962, p. 235 (Binga; Guija; Trelawney); Johnsen, 1962, p. 124 (Ndola); Wilson, 1965, p. 163.

Seventy-nine specimens examined from: RHODESIA. Buffels Drift; Bulawayo and 12 & 25 mls NNW; Cement; Devuli Bridge; 7 mls E of Dumela; Fern Valley; Holderness Farm; Kapami; Kariba; Old Umtali; Penhalonga; Plumtree; Rusape; Salisbury; Sinola; Victoria Falls; Zambezi - Chewore Confluence. ZAMBIA. Abercorn; Chikowa; Chilanga; Chilongowelo; Chipengali; Fort Jameson; near Fort Manning; Kabendwe (IRSNB); Kabompo; Kalichero; Kaputa (IRSNB); Kaungashi River; Kitwe; Luambe Game Reserve; Mporokoso (IRSNB); Msoro; Mukupa (IRSNB); Mweru - Wantipa (IRSNB); Ndola; Rukuzi Dam. MALAWI. Karonga; Ruml. MOZAMBIQUE. Mida - Lamego.

Literature records. RHODESIA. Binga; Balla Balla (BM); Trelawney. ZAMBIA. Abercorn; Lealui; Munyamadzi River; Ndola. MALAWI. Cape Maclear; Fort Hill; Fort Johnston; Kasungu. MOZAMBIQUE. Guija.

Variation. Nasals 2; preocular 1, separated from frontal; postoculars 2; temporals 1 + 2 (rarely 1 + 1); upper labials 8 (rarely 6, 7, or 9), the fourth and fifth (rarely third and fourth, fourth only, or fifth and sixth) entering the orbit; lower labials 8 (rarely 7), the first 4 (rarely 3) in contact with the anterior sublinguals; dorsals in 11 rows without posterior reduction (9 in one Zambian snake); ventrals 140 - 155 (162); anal divided; subcaudals 62 - 79.

Coloration. Head dark brown, three narrow yellow transverse bands posteriorly, upper labials white; neck dark brown with one or two grey cross-bands which broaden laterally, a dark brown dorsal band four scales wide, greyish or yellowish laterally, sometimes with black hairlines through the outer two scale rows; ventrum and lower half of outer scale row white or yellow, uniform, or with an ill-defined lateral series of dark flecks.

Size. Largest ♂ (UM. 10139 - Salisbury)  $320 + 136 = 456$  mm. Largest ♀ (IRSNB. - Abercorn)  $355 + 140 = 495$  mm.

Diet. The big Salisbury ♂ contained an Ablepharus wahlbergi.

Habitat. Widespread in savanna.

Distribution. Angola, east through Katanga, Zambia and Malawi to Tanganyika and Mozambique, north to Ethiopia, south through Rhodesia to the Transvaal and Orange Free State.

#### Genus CALAMEIAPS Gunther

Calamelaps Gunther, 1866, Ann. Mag. Nat. Hist., (3), 18, p. 26. Type by original designation: Calamaria unicolor Reinhardt.

#### CALAMEIAPS UNICOLOR MIOLEPIS Gunther

Calamelaps miolepis Gunther, 1888, Ann. Mag. Nat. Hist., (6), 1, p. 323: Cape Maclear, Lake Malawi, Malawi.

Calamelaps unicolor (not Reinhardt) Bocage, 1896, p. 94; Barbour & Loveridge (part), 1928b, p. 130; Loveridge, 1933, p. 260; Pitman, 1934, p. 298; FitzSimons, 1939b, p. 24 (Birchenough Bridge); FitzGerald, 1958, p. 64.

Calamelaps polylepis (not Bocage) Boulenger, 1896, p. 246; Sternfeld, 1908, p. 247 (Chifumbazi); Hewitt, 1913, p. 480 (Empandene); Boulenger, 1915, p. 214; Angel, 1921, p. 42 (Lealui); Loveridge, 1923, p. 889 (Lumbo); Pitman, 1934, p. 298.



- Calamelaps warreni Boulenger, 1908, Ann. Natal Mus., 1, pp. 230, 234, fig. 3: Kosi Bay, Zululand, and 1910, p. 516 (Shesheke); Hewitt, 1912, p. 276 (Empandene); Cott, 1935, p. 970 (Caia).
- Calamelaps concolor (not A. Smith) Chubb, 1909b, p. 36 (Empandene).
- Calamelaps mellandi Boulenger, 1915, Proc. Zool. Soc. London, p. 214: Chirini Island, Lake Bangweulu; Pitman, 1934, p. 298.
- Calamelaps unicolor polylepis (not Bocage) Loveridge (part), 1944e, p. 162; FitzSimons, 1946, p. 382; Loveridge, 1953a, p. 282; Hanney, 1961, pp. 21 and 24 (Michiru); Manacas, 1961, p. 159 (Mambone).
- Calamelaps unicolor warreni Loveridge (Part), 1944e, p. 163; FitzSimons, 1946, p. 383 (Gatooma); Loveridge, 1953a, p. 283 (Tete).
- Calamelaps unicolor mirolepis Witte & Laurent, 1947, p. 31; Broadley, 1959b, p. 52 and 1959c, p. 201, illus. 1; Broadley & Pitman, 1960, p. 446; Broadley, 1962d, p. 834; FitzSimons, 1962, p. 242 (Driefontein; Inhambane; Livingstone; Maputo; Matopos; Odzi; Trelawney); Wilson, 1965, p. 164.

Eighty-three specimens examined from: RHODESIA. Beatrice; Birchenough Bridge; Bromley; Bulawayo and 15 mls N; Chiredzi; Empandene; Essexvale; Fern Valley; Gatooma; Grand Reef; Gwanda; Imbeza; Jersey Estate; <sup>Kyle Lake;</sup> Lake MacIlwaine; Mabelreign; Macheke; Manda; Matopos; Mount Darwin; Mpudzi Bridge; 15 mls WSW of Mtoko; Mutambara; Nyamapropa; Odzi; Old Umtali; Pounsley; Salisbury and 8 mls W; Sinoia; Trelawney; Umtali; Victoria Falls; Zimbabwe. ZAMBIA. Abercorn (IRSNB); 10 mls S of Broken Hill; Fort Jameson; Kabompo; Kalichero; Kasusu; Katete; Lake Chisi (IRSNB); Nyimba. MALAWI. Blantyre; Rumpi. MOZAMBIQUE. Amatongas; Chemezi; Inchope; Maforaga; Manga; Xiluvo.

Literature records. RHODESIA. Birchenough Bridge; Driefontein; Empandene; Gatooma; Matopos; Odzi; Trelawney. ZAMBIA. Chirini Island; Lealui; Livingstone; Sesheke. MALAWI. Cape Maclear; Michiru; MOZAMBIQUE. Caia; Chifumbazi; Inhambane; Lumbo; Mambone; Maputo; Tete.

Variation. No loreal or preocular; postocular 1 (rarely absent); temporal 0 + 1; upper labials 6 (rarely 5 or 7), the third and fourth (rarely second and third or third, fourth and fifth) entering the orbit; lower labials 7 (rarely 6 or 8), the first 4 (rarely 5) in contact with the sublinguals; dorsals in 17 - 19 - 17 rows in 32 ♂♂ and 5 ♀♀, 17 - 19 - 19 rows in one ♂, 19 - 21 - 19 rows in 1 ♂ and 51 ♀♀, 21 - 23 - 21 rows in one ♀; ventrals 168 - 185 in ♂♂, 195 - 215 in ♀♀; anal divided;

subcaudals 23 - 31 in ♂♂, 18 - 24 in ♀♀. Dentition - maxillary 3 + II; palatine 7; pterygoid 8; dentary 10 (one skull). Hemipenis simple, with single sulcus and no ornamentation.

Coloration. Uniform iridescent black, blue-grey when due to slough. A Chemezi female is leucistic, uniform greyish white.

Size. Largest ♂ (NMSR. 411 - Essexvale)  $495 + 55 = 550$  mm. Largest ♀ (NMSR. 2445 - Mount Darwin)  $1040 + 71 = 1111$  mm.

Discussion. The range of variation in this form is now fairly clear and sexual dimorphism in number of midbody scale rows is well marked. Unfortunately C. v. polylepis of Angola is only known from five specimens, so it remains to be seen whether Angola snakes invariably have 21 midbody scale rows.

Witte & Laurent (1947) revived hildebrandti (Peters) for Kenya and Tanganyika snakes with 17 - 19 midbody scale rows, pointing out that East African snakes with 17 rows had fewer subcaudals than C. u. unicolor of the equatorial forest regions (Guinea to Uganda). Loveridge (1951, 1955, 1956b) has published the data for 25 specimens collected by Ionides in south Tanganyika (all but 2 from Liwale), of these 3 ♂♂ and 1 ♀ had 17 midbody scale rows and 6 ♂♂ and 15 ♀♀ had 19 rows.

It is possible that when more material is available from Angola and north Mozambique a cline in midbody scale counts will be established linking hildebrandti through mirolepis to polylepis, as suggested by Laurent (1956, p. 159). In this case the three races could be united under the oldest name polylepis, they differ only in midbody scale counts, as shown in table 10 below.

RACE	MSR		VENTRALS		SUBCAUDALS	
			♂♂	♀♀	♂♂	♀♀
<u>C. u. unicolor</u>	17	166 - 182	201 - 208	33 - 38	21 - 27	
<u>C. u. hildebrandti</u>	17-19	159 - 179	188 - 204	24 - 30	16 - 21	
<u>C. u. mirolepis</u>	19-21	161 - 185	192 - 219	25 - 30	18 - 24	
<u>C. u. polylepis</u>	21	163 - 182	198 - 214	27	16 - 20	

Table 10. Variation in Calamelaps unicolor. Data largely extracted from Witte & Laurent (1947) and Loveridge (1951, 1955, 1956b).

Diet. A 1014 mm ♀ from Odzi contained a Typhlops s. micrus measuring about 600 mm, the same species was found in the stomach of a Maforga snake. A 334 mm ♀ from Jersey Estate held a Nucras t. ornata. Captive specimens feed readily on Typhlops, Leptotyphlops and small lizards; a Zimbabwe snake ate a Lycophidion c. capense placed in the same bag.



Enemies. A 3 foot ♀ was killed by a domestic cat at Umtali.

Habitat. Widespread in savanna and not uncommon, judging by the number killed on the roads at night.

Distribution. Mozambique, Malawi, western Tanganyika (Tukuyu), Zambia, Katanga, Rhodesia, Transvaal and Natal.

### CALAMELAPS VENTRIMACULATUS (Roux)

Rhinocalamus ventrimaculatus Roux, 1907, Rev. Suisse Zool., 15, p. 11,

figs. 1 - 2: Barotseland; Pitman, 1934, p. 298.

Calamelaps pellegrini Angel, 1921, Bull. Mus. Hist. Nat., Paris, 27, p. 42,

figs. 1 - 3: Lealui, Zambia; FitzSimons, 1935b, p. 321 (Kabulabula).

Calamelaps ventrimaculatus Witte & Laurent, 1947, p. 37.

Calamelaps ventrimaculatus websteri FitzSimons & Brain, 1958, Occ. Pap.

Nat. Mus. S. Rhod., 22 B, p. 202; Sawmills, Rhodesia; Broadley, 1959b, p. 53, and 1962d, p. 835; FitzSimons, 1962, p. 246.

Calamelaps ventrimaculatus ventrimaculatus FitzSimons, 1962, p. 245.

Sixteen specimens examined from: BECHUANALAND. Makalamabedi. RHODESIA. 2 mls S of Kazungula; 10 mls E of Lupane; Sawmills. ZAMBIA. Kalabo; Sesheke.

Literature records. BECHUANALAND. Kabulabula. RHODESIA. Sawmills. ZAMBIA. "Barotseland".

Variation. No loreal or preocular; postocular 1 (rarely absent); temporal 0 + 1; upper labials 5, the second and third entering the orbit; lower labials 5, the first three in contact with the sublinguals; dorsals in 15 - 15 - 15 rows; ventrals 172 - 188 in ♂♂, 177 - 200 in ♀♀; anal divided; subcaudals 24 - 26 in ♂♂, 17 - 24 in ♀♀.

Coloration. Top of head and median 5 to 11 dorsal scale rows purple-brown to black, each scale white-edged, sometimes bordered by a lemon-yellow lateral band which begins on the snout and extends onto the tail; ventrum white, uniform or with dark infuscations or spots.

Size. Largest ♂ (NMSR. 3454 - Sesheke) 305 + 31 = 336 mm. Largest ♀ (UM. 6805 - Kalabo) 420 + 31 = 451 mm.

Discussion. C. V. websteri was distinguished from the typical form on the following characters:

(a) third upper labial separated from the parietal by the postocular, with which the fourth upper labial is in short contact

(b) the enlarged third lower labials in contact mesially behind the chin shields.

## (c) Underparts pale.

In ten topotypic ventrimaculatus from Barotseland, the third labial is in contact with the parietal on 8 sides, separated on 12; in most of these specimens the ventrum is uniform white. The third lower labials are separated by the sublinguals in all the adults examined and I consider that the condition found in websteri is characteristic of juveniles (the types of websteri are probably recently hatched sibs, measuring 135 - 145 mm), so websteri is placed in the synonymy of the typical form.

Witte (1951) described C. v. katangensis from a juvenile snake 186 mm in total length. It differs from C. ventrimaculatus in its divided nasal, more pointed snout, larger frontal, prefrontals narrowly separated, more numerous ventrals (201) and subcaudals (30 +, so presumably a male). I consider katangensis to be a distinct species, more closely related to C. rodhaini Witte, from which it is distinguished by the presence of a postocular and its high subcaudal count. The lepidosis for these forms is given in Table 11 below. C. ventrimaculatus occupies an intermediate position between the round-snouted C. unicolor group and the Rhinocalamus group, which have enlarged pointed rostrals and enlarged frontals similar to Xenocalamus.

	MSR	VENTRAIS		SUBCAUDALS	
		♂♂	♀♀	♂♂	♀♀
<u>C. ventrimaculatus</u>	15	172 - 188	177 - 200	24 - 26	17 - 24
<u>C. katangensis</u>	15	201	—	30+	—
<u>C. rodhaini</u>	15	199 - 212	219	24	22
<u>C. dimidiatus</u>	17	192 - 207	215 - 219	25 - 27	19 - 20

Table 11. Variation in the Rhinocalamus section of the genus Calamelaps.

Diet. A Kalabo snake contained a Zygaspis quadrifrons and the same species was readily devoured by a captive Lupane snake which had ignored small skinks and geckos previously offered.

Enemies. The fragmentary Makalamabedi specimen was recovered from the stomach of a genet (Genetta genetta).

Habitat. Endemic to the Kalahari sands, usually found under logs.

Distribution. Barotseland, northern Bechuanaland and north-western Rhodesia.



Genus *AMBLYODIPSAS* Peters

*Amblyodipsas* Peters, 1856, Monatsb. Akad. Wiss, Berlin, p. 592. Type  
by monotypy: *Calamaria microphthalma* Bianconi.

*AMBLYODIPSAS MICROPHTHALMA* (Bianconi)

*Calamaria microphthalma* Bianconi, 1852, Spec. Zool. Mossamb., p. 94,  
pl. xii, fig 1: Inhambane, Mozambique.

*Amblyodipsas microphthalma* Peters, 1882, p. 109; Bocage, 1896, p. 94;  
Boulenger, 1896, p. 244, and 1910, p. 515; Witte & Laurent, 1947,  
p. 39; Manacas, 1959, p. 143 (Mauele); FitzSimons, 1962, p. 248  
(Lourenco Marques; Maputo; Rikatla).

One specimen examined from: MOZAMBIQUE. Inhaca Island.

Literature records. MOZAMBIQUE. Inhambane; Lourenco Marques;  
Maputo; Mauele; Rikatla.

Variation. No loreal or preocular; postocular 1 (absent in the  
Inhaca Island snake); temporal 0 + 1; upper labials 5, the second and  
third entering the orbit; lower labials 6, the first 3 in contact with  
the sublinguals; dorsals in 15 - 15 - 15 rows; ventrals 137 - 163  
(127 in the Inhaca Island ♂); anal divided; subcaudals 19 - 26.

Coloration. Dark purplish-brown to black above, upper labials,  
outer 2 rows of dorsals and ventrum white, but with a dark median ventral  
band which extends to the tail tip.

Size. largest ♂ (TM. 6266 - Lourenco Marques)  $291 + 30 = 321$  mm.  
Largest ♀ (Manacas, 1959 - Mauele)  $278 + 22 = 300$  mm.

Habitat. Coastal alluvium, usually found under logs.

Distribution. Southern Mozambique, northern Zululand and north-  
eastern Transvaal (Kruger National Park).

*AMBLYODIPSAS KATANGENSIS KATANGENSIS* Witte & Laurent

*Amblyodipsas katangensis* Witte & Laurent, 1942, Rev. Zool. Bot. Afr.,  
36, p. 113: N'Gayu, Katanga and 1947, p. 41.

*Calamelaps ventrimaculatus* (not Roux) Johnsen, 1962, p. 119 (14 Km NW  
of Ndola).

One specimen examined from: ZAMBIA. 10 mls NW of Ndola.

Description. No loreal or preocular; postocular 1; temporal 0 + 1; upper labials 5, the second and third entering the orbit; lower labials 5, the first 3 in contact with the sublinguals; dorsals in 15 - 15 - 15 rows; ♂ with ventrals (D) 179; anal divided; subcaudals 25.

Coloration. Uniform plumbeous above and below.

Size. ♂ (NMSR. 3851 - 10 mls NW of Ndola) 340 + 35 = 375 mm.

Remarks. This form was previously known only from the two types. Trinominals are required because of A. k. ionidesi Loveridge (1951, p. 193) of south Tanganyika.

Distribution. Katanga and adjoining Zambia.

#### Genus XENOCALAMUS Gunther

Xenocalamus Gunther, 1868, Ann. Mag. Nat. Hist. (4), 1, p. 414. Type by monotypy: X. bicolor Gunther.

#### XENOCALAMUS TRANSVAALIENSIS Methuen

Xenocalamus transvaalensis Methuen, 1919, Proc. Zool. Soc. London, p. 350, fig. 1 B: N'jalele River, N. Transvaal; FitzSimons, 1946b, p. 385, figs. 7 & 8 (Lourenco Marques); Witte & Laurent, 1947, p. 51; Broadley, 1962d, p. 836; FitzSimons, 1962, p. 250.

Nine specimens examined from: RHODESIA. Birchenough Bridge; Chipinda Pools; Chiredzi; Lundi River Bridge; Ruware; Sabi Research Station.

Literature records. MOZAMBIQUE. Lourenco Marques.

Variation. Nasal semidivided; a "pseudo-preocular" is actually the prefrontal displaced by the enlarged frontal; a small supraocular; postocular 1; temporal 0 + 1; upper labials 5 or 6, the second and third or third and fourth (rarely third only) entering the orbit; lower labials 6 (rarely 5), the first 3 (rarely 2), in contact with the sublinguals; dorsals in 17 - 17 - 17 rows; ventrals 184 - 197 in ♂♂, 213 - 215 in ♀♀; anal divided; subcaudals 27 - 30 in ♂♂, 22 - 23 in ♀♀. Dentition - maxillary 4 + II; no palatine or pterygoid teeth; dentary 8 (skull of UM. 2523 - Birchenough Bridge). I have compared this skull with that of the type, kindly lent by the Transvaal Museum, and noted the following differences:



CHARACTER	TYPE (TM. 10121)	UM. 2523
Skull shape	Moderate	Elongate
Frontal	Paired frontals	A single frontal
Premaxilla	Moderate, not transverse-ly enlarged anteriorly	Large, transversely enlarged anteriorly
Palatine teeth	3 - 4 present	Absent

Coloration. Black above, outer  $2\frac{1}{2}$  dorsal scale rows and ventrum white.

Size. Largest ♂ (UM. 2523 - Birchenough Bridge)  $400 + 46 = 446$  mm. Largest ♀ (UM. 1961 - Lundi Bridge)  $425 + 31 = 456$  mm., but UM. 8893, a ♀ from Sabi Research Station with a truncated tail, measures 485 mm from snout to vent.

Discussion. Two of the diagnostic characters for X. transvaalensis, the upper labial formula and the presence of palatine teeth, prove to be unreliable, leaving only the semidivided nasal to distinguish this form from X. bicolor, a character which alone does not merit specific recognition. There are certainly two full species in the X. bicolor group, because transvaalensis and lineatus are sympatric at Lourenco Marques. Table 12 below shows the variation in ventral and subcaudal counts within this group listed in sequence from the least specialised form (transvaalensis) to the very attenuated lineatus.

	VENTRALS		SUBCAUDALS	
	♂♂	♀♀	♂♂	♀♀
<u>X. transvaalensis</u>	184-197	213-215	27-30	22-23
<u>X. b. australis</u>	190-198	206-217	28-31	23-26
<u>X. b. concavorostralis</u>	198-204	---	29	---
<u>X. b. pernasutus</u>	209-214	216-228	29	21-26
<u>X. b. maculatus</u>	216	---	32	---
<u>X. b. bicolor</u>	220-228 (217)	244-250	29-33+	24-25
<u>X. b. lineatus</u>	225-230	244-246	32-37	26-29

Table 12. Variation in the Xenocalamus bicolor group. Data largely extracted from FitzSimons (1946b) and Witte & Laurent (1947).

It would be reasonable to group the first five forms together as races of pernasutus, but the type of X. bicolor is a ♀ with 217 ventrals and 24 subcaudals, so it is either aberrant or else represents the western form at present called X. b. pernasutus, in which case the latter

would become a synonym of X. b. bicolor and a new name would have to be found for the form at present listed as X. b. bicolor, which would be a race of X. lineatus. More material is needed from northern Bechuanaland and north-western Rhodesia before the position can be clarified.

Diet. The largest ♂ contained a 269 mm Monopeltis sphenorhynchus.

Distribution. South-eastern Rhodesia, north-eastern Transvaal and southern Mozambique.

XENOCALAMUS BICOLOR MACULATUS FitzSimons

Xenocalamus bicolor maculatus FitzSimons, 1932, Ann. Tvl. Mus. 15, p. 39 and 1935b, p. 322, figs. 6 - 7: Kuke Pan, Bechuanaland; Witte & Laurent, 1947, <sup>p. 47</sup> / FitzSimons, 1962, p. 256.

Two fragmentary specimens (including an undamaged head) examined from: BECHUANALAND. Makalamabedi.

Description. Nasals 2; a small supraocular; postocular 1; temporal 0 + 1; upper labials 6, the third and fourth entering the orbit; lower labials 5, the first 3 in contact with the sublinguals; midbody scale rows 17; ventrals 216; anal divided; subcaudals 32 (♂).

Coloration. Yellow above and below, with a paired series of irregular large dark brown blotches which may be confluent.

Size. Type ♂ (TM. 14450 - Kuke Pan) 396 + 44 = 440 mm.

Enemies. The fragmentary Makalamabedi specimens were recovered from the stomachs of two genets (Genetta genetta) collected along the Botlele River.

Distribution. Central Kalahari, Bechuanaland.

XENOCALAMUS BICOLOR BICOLOR Gunther

Xenocalamus bicolor Gunther, 1868, Ann. Mag. Nat. Hist. (4), 1, p. 415, pl. xix, fig. A : "ZAMBEZI" (here restricted to the Zambezi-Sebungwe Confluence); Boulenger, 1896, p. 248; Pitman, 1934, p. 298.

Xenocalamus bicolor bicolor FitzSimons, 1946b, p. 388; Witte & Laurent, 1947, p. 45; Broadley, 1959b, p. 54; FitzSimons, 1962, p. 254.



Six specimens examined from: BECHUANALAND. 7 mls W. of Ghansi. RHODESIA. Kariba Lake - Charara Confluence; Mana Pools Road (Urungwe). MOZAMBIQUE. 15 mls SSW of Inhaminga.

Literature records. RHODESIA. Zambezi River (type). MOZAMBIQUE, Inhambane.

Variation. Nasals 2; a small supraocular; a minute postocular; temporal 0 + 1; upper labials 6, the third and fourth entering the orbit; lower labials 5, the first 3 in contact with the sublinguals; dorsals in 17 - 17 - 17 rows; ventrals 222 - 228 in ♂♂, 217 in the type ♀, but about 250 in two damaged ♀♀ from Urungwe; anal divided; subcaudals 29 - 33 + in ♂♂, 24 - 25 in ♀♀. Length/diameter ratio 60 - 81.

The sex of the ♀ type has been checked by Dr. Underwood, it has a ventral count of 217 by the Dowling method, 220 by the "first broader than long" system, subcaudals 24; tail not truncated.

The Kariba juvenile lacks the top of the head, but has 244 ventrals and 22 subcaudals, which fits a ♀ X. b. bicolor better than a X. meehowi. The two Urungwe ♀♀ were also badly damaged by the grader that uncovered them, making an accurate ventral count impossible.

Coloration. Very variable. The type and the Kariba juvenile are black above, with the outer 2 - 3 rows of dorsals and the ventrum uniform white. The two Urungwe ♀♀ are plumbeous above, one with vague pale irregular transverse bands, underside yellow, each ventral suffused with brown anteriorly. The Ghansi ♂ has a dorsal band nine scales wide in which each scale is dark brown at the base, pale at the tip, but dorso-lateral series of large uniform dark blotches leave the paler coloration restricted to a narrow vertebral stripe and a series of irregular cross-bands; uniform white below. The ♂ from near Inhaminga is uniform black above and below.

Size. Largest ♂ (UM. 6078 - 15 mls SSW of Inhaminga) 470 + 45 = 515 mm. Largest ♀ (UM. 5373 - Mana Pools Road) 640 + 8 + = 648 + mm.

Remarks. The lack of a good series of typical X. bicolor inhibits work on the taxonomy of the group. Three of the specimens examined were uncovered by graders and badly damaged, the Inhaminga snake was found dead on the road and the head was badly damaged by ants. In the two Urungwe snakes the rostral is greatly enlarged and projects laterally beyond the level of the internasals.

Habitat. Kalahari sand (Ghansi); alluvium (Inhaminga).

Distribution. In 1862 James Chapman travelled along the south bank of the Zambezi from the Deka Confluence to a point opposite the Chimene Confluence (Federal Atlas Map No. 18) and his "Zambezi" specimen was probably collected in this area, so the type locality is here restricted to the

Zambezi - Sebungwe Confluence. Although Chapman visited the Victoria Falls, it is likely that any specimen collected there would have been labelled accordingly, in any case the only Xenocalamus known from the upper Zambezi is mechowi.

The few Rhodesian specimens are all from the Zambezi Valley, but the other records are scattered through Bechuanaland, Mozambique and the Transvaal.

NMSR. 1171 from Mareetsane (on the railway line just south of Mafeking, northern Cape Province), listed under the typical form by FitzSimons (1962), seems to me closer to X. b. concavorostralis Hoffman.

XENOCLAMUS BICOLOR LINEATUS Roux

Xenocalamus bicolor lineatus Roux, 1907, Rev. Suisse Zool., 15, p. 79:

Rikatia, Mozambique; FitzSimons, 1946b, p. 388 (Lourenco Marques); Witte & Laurent, 1947, p. 49; Manacas, 1959, p. 142 (Manhica); FitzSimons, 1962, p. 255.

No specimens examined.

Literature records. MOZAMBIQUE. Lourenco Marques; Manhica; Rikatia.

Variation. Head shields as in the typical form; dorsals in 17 - 17 - 15 rows (Manacas, 1959); ventrals 224 - 230 in ♂♂, 244 - 246 in ♀♀; anal divided; subcaudals 31 - 37 in ♂♂, 25 - 29 in ♀♀

Coloration. Yellow above and below, with a purplish-brown dorsal stripe 1 - 7 (usually 3) scales wide.

Size. Largest ♂ (TM. 6277 - Lourenco Marques)  $356 + 35 = 391$  mm. Largest ♀ (Manacas, 1959 - Manhica)  $468 + 32 = 500$  mm.

Habitat. Coastal alluvium.

Distribution. Southern Mozambique.

XENOCLAMUS MECHOWI MECHOWI Peters

Xenocalamus mechowi Peters, 1881, Sitzb. Naturf. Ges. Freunde Berlin, p. 147: Malange, Angola.

Xenocalamus mechowi mechowi (part) Witte & Laurent, 1947, p. 49 (exclude Barotseland references).



Five specimens examined from: ZAMBIA. Kabompo; Zambezi River at 13°01'S; 22°44'E.

Variation. No supracular; postoculars 2; temporal 0 + 1; upper labials 6, the third and fourth entering the orbit; lower labials 5, the first 3 in contact with the anterior sublinguals; dorsals in 17 - 17 - 17 rows; ventrals 238 - 239 in ♂♂, 253 - 258 in ♀♀; anal divided; subcaudals 27 - 28 in ♂♂, 21 - 24 + in ♀♀.

Coloration. Dark red-brown to black above, with irregular white crossbands or blotches, outer 2 - 4 scale rows and ventrum white.

Size. Largest ♂ (NMSR. 4982 - Kabompo) 540 + 43 = 583 mm. Largest ♀ (NMSR. 4331 - Kabompo) 673 + 42 = 715 mm.

Diet. A 494 mm ♀ from the Zambezi River contained a 337 mm Tomuropeltis pistillum, the big Kabompo ♀ also contained a large amphisbaenid, probably the same species.

Habitat. Kalahari sand.

Distribution. Congo (Leopoldville, Kasai and Katanga provinces), northern Angola and north-western Zambia.

#### XENOCLAMUS MECHOWI INORNATUS Witte & Laurent

Xenoclamus mechowi (not Peters) Roux, 1907, p. 80 (Barotseland); Pitman, 1934, p. 298 (Senanga).

Xenoclamus mechowi inornatus Witte & Laurent, 1947, p. 45 (key) and p. 51 (spelt inornatus): Ovamboland, South West Africa; Mertens, 1955, p. 104 (Andara); Broadley, 1962d, p. 836; FitzSimons, 1962, p. 252.

Thirteen specimens examined from: BECHUANALAND. Mandabusa. RHODESIA. 8, 16 and 26 mls SE of Lupano. ZAMBIA. Kalabo; Livingstone; Senanga.

Literature records. CAPRIVI. Andara. ZAMBIA. "Barotseland"; Senanga.

Variation. No supracular; postoculars 2; temporal 0 + 1; upper labials 6, the third and fourth entering the orbit; lower labials 5 (rarely 6), the first 3 in contact with the sublinguals; dorsals in 17 - 17 - 17 rows; ventrals 248 - 264 in ♂♂, 270 - 280 in ♀♀; anal divided; subcaudals 28 - 32 in ♂♂, 23 - 26 in ♀♀.

Coloration. Red-brown to plumbeous above, uniform or more often with irregular yellow or white cross-bars or blotches; uniform white below.

Size. Largest ♂ (NMSR. 4583 - 8 mls SE of Lupane)  $580 + 45 = 625$  mm. Largest ♀ (NMSR. 4585 - 26 mls SE of Lupane)  $762 + 49 = 811$  mm.

Discussion. It is remarkable that specimens from Barotseland should be subspecifically distinct from those of Balovale and Kabompo Districts, but the abrupt increase in ventral and subcaudal counts south of the Barotseland border is very obvious.

Dist. A Kalabo snake contained a half digested Tomropeltis pistillum.

Habitat. Normally found in Kalahari sand, but the largest ♀ was in mppane bush on basalt.

Distribution. Northern South West Africa, northern Bechuanaland, north-western Rhodesia, south-western Zambia.

#### Genus MIODON Dumeril

Miodon A. Dumeril, 1859, Arch. Mus. Hist. Nat. (Paris), 10, p. 206.

Type by monotypy: Elapomorphus gabonensis A. Dumeril.

#### MIODON COLLARIS CHRISTYI Boulenger

Miodon Christyi Boulenger, 1903, Ann. Mag. Nat. Hist., (7), 12, p. 354; Uganda; Witte & Laurent, 1947, p. 73; Broadley & Pitman, 1960, p. 447.

Miodon gabonensis christyi Loveridge, 1944a, p. 178.

Miodon collaris christyi Loveridge, 1957, p. 283.

Five specimens examined from: ZAMBIA. Abercorn (IRSNB); Kasempa (TM); Solwezi.

Variation. No loreal; preocular 1; postoculars 1 - 2; temporals 1 + 1 (rarely 0 + 1 + 1); upper labials 7, the third and fourth entering the orbit; lower labials 7, the first 4 in contact with the anterior sublinguals; dorsals in 15 - 15 - 15 rows; ventrals 211 in ♂, 229 - 240 in ♀♀; anal divided; subcaudals 21 in ♂, 15 - 17 in ♀♀.

Coloration. Uniform black above and below.

Size. ♂ (IRSNB - Abercorn)  $550 + 35 = 585$  mm. Largest ♀ (NMSR. 2993 - Solwezi)  $770 + 36 = 806$  mm.



Diet. The big Solwezi ♀ contained a Grotaphopeltis hotamboeia measuring over 600 mm (head digested), the 430 mm Kasempa ♀ contained another Grotaphopeltis measuring 305 mm.

Habitat. Forested or recently deforested areas (Loveridge, 1944e).

Distribution. Central Uganda, south to western Tanganyika, eastern Congo (Kivu and Katanga) and northern and western Zambia.

Genus CHILORHINOPHIS Werner

Chilorhinophis Werner, 1907, Akad. Anz. Wien, 44, p. 479 and 1908, Stizb. Akad. Wiss. Wien, 116, Abt. 1, p. 1881. Type by monotypy : C. butleri Werner.

Parkerophis Barbour & Amaral, 1927, Bull. Antivenin Inst. America, 1, p.25. Type by original designation : Apostolepis gerardi Boulenger.

CHILORHINOPHIS GERARDI GERARDI (Boulenger)

Apostolepis gerardi Boulenger, 1913, Rev. Zool. Afr., 3, p. 103, fig. : Kikondja, Lualaba, Katanga and 1915, p. 214.

Parkerophis gerardi Parker, 1927b, p. 81, fig. 1a (Sinoia).

Chilorhinophis gerardi (part) Pitman, 1934, p. 298; Witte & Laurent, 1947, p. 54.

Chilorhinophis gerardi gerardi Loveridge, 1951, p. 194 (key); Broadley, 1959b, p. 54; FitzSimons, 1962, p. 263 (Que Que); Johnsen, 1962, p. 124 (Broken Hill).

Seventeen specimens examined from: RHODESIA. Binga; Charama Plateau; Clifton Estates; Gatooma; Karoi; Lukosi; Makuti; St. Swithins Block; Sinoia; Zana Farm. ZAMBIA. Kasempa (NMSR; TM); Luanshya.

Literature records. RHODESIA. Que Que; Sinoia. ZAMBIA. Broken Hill.

Variation. Preocular 1; postocular 1; temporal 0 + 1; upper labials 4 (rarely 5), the third (rarely third and fourth) entering the orbit; lower labials 5, the anterior pair in broad contact behind the mental, the first 3 in contact with the anterior sublinguals; dorsals in 15 - 15 - 15 rows; ventrals 263 - 285 in ♂♂, 275 - 311 in ♀♀; anal divided; subcaudals 24 - 31 in ♂♂, 20 - 26 in ♀♀.

Coloration. Top of head and neck black with a pair of yellow spots on the supraocular/parietal sutures and sometimes another behind the parietals, upper labials yellow with black stripes extending through the eye to the lip and from the parietal to the commissure of the mouth; body yellow above, with a black vertebral stripe two scales wide, followed by an interspace two scales wide and a black lateral stripe one scale wide; bright orange below except for chin which is yellow; the posterior third of the blunt tail is black, blotched with bluish-white to simulate the head.

Size. Largest ♂ (UM. 8892 - Charama Plateau)  $400 + 33 = 433$  mm.  
Largest ♀ (UM. 10708 - Zana Farm)  $440 + 28 = 468$  mm.

Diet. The largest ♂ regurgitated a juvenile Lycophidion c. capense when captured.

Habitat. The two Zana Farm specimens were found under rotting tobacco leaves lying in shade at 3,800 feet in Brachystegia woodland.

Distribution. Katanga, western Zambia and northern parts of Rhodesia.

CHILORHINOPHIS GERARDI TANGANYIKAE Loveridge

gerardi

Chilorhinophis/(not Boulenger) Loveridge (part), 1933, p. 262 (Nyamkolo); Pitman (part), 1934, p. 298; Witte & Laurent (part), 1947, p. 54; Vesey - FitzGerald, 1958, p. 64.

Chilorhinophis gerardi tanganyikae Loveridge, 1951, Bull. Mus. Comp. Zool. 106, p. 195 : Nyamkolo, Lake Tanganyika, Zambia.

No specimens examined.

Literature record. ZAMBIA. Nyamkolo.

Description. Differs from the typical form in its higher ventral count, 308 in holotype ♂, subcaudals 26. A paratype ♂ from Ujiji, Tanganyika has 310 ventrals and 25 subcaudals; a paratype ♀ from Lukonzolwa, Lake Mweru, Katanga, has 375 ventrals and 23 subcaudals.

Size. Holotype ♂ (MGZ. 30402 - Nyamkolo)  $420 + 25 = 445$  mm.

Distribution. From eastern Katanga east through northern Zambia to the eastern side of Lake Tanganyika.



## CHILORHINOPHIS CARPENTERI CARPENTERI (Parker)

Apostolepis gerardi (not Boulenger) Carpenter, 1919, Journ. E. Afr.

Uganda Nat. Hist. Soc., 15, p. 496 (Anquabe) and 1925, A Naturalist in East Africa, p. 132, pl. vii.

Parkerophis gerardi (part, not Boulenger) Barbour & Amaral, 1927, Bull.

Antiven. Inst. America, 1, p. 25.

Parkerophis carpenteri Parker, 1927, Ann. Mag. Nat. Hist. (9), 20, p. 85, fig. 3: Anquabe, Mozambique.

Chilorhinophis carpenteri Witte & Laurent, 1947, p. 57.

Chilorhinophis carpenteri carpenteri Loveridge, 1951, p. 194 (key).

Known only from the type.

Description. Nasal fused with first upper labial; prefrontal very large, entering the orbit above a very small preocular; postocular 1; temporal 0 + 1; upper labials 4, the third entering the orbit; lower labials 5, the first pair in contact behind the mental, the first 3 in contact with the anterior sublinguals; dorsals in 15 rows; ventrals 269 (♀); anal divided; subcaudals 21.

Coloration. Similar to C. gerardi, but the dorsal stripe is ladder-like, there is a narrow dorso-lateral dark stripe along the suture between the fifth and sixth scale rows and a narrow brown lateral line between the third and fourth scale rows; lower lateral scales faintly edged with brown; posterior half of tail black above and below, with a pale patch below near the tip.

Size. Holotype ♀ (BM. 1918. 11.20.1 - Anquabe) 264 + 16 = 280 mm.

Diet. The northern race, C. c. liwalensis Loveridge of southern Tanganyika, is known to feed on small amphibia.

Distribution. Northern Mozambique.

## Genus HYPOPTOPHIS Boulenger

Hypoptophis Boulenger, 1908, Ann. Mag. Nat. Hist. (8), 2, p. 93. Type by monotypy: H. wilsoni.

Michellia Muller, 1911, Zool. Anz., 38, p. 358. Type by monotypy:

M. katangae Muller = H. wilsoni Boulenger.

## HYPOPTOPHIS WILSONI Boulenger

Hypoptophis wilsoni Boulenger, 1908, Ann. Mag. Nat. Hist. (8), 2, p. 93:  
Inkongo, Sankuru, Congo.

Micellia katangae Muller, 1911, Zool. Anz., 38, p. 358 : Kituri, Katanga,  
Congo.

Hypoptophis wilsoni wilsoni Witte & Laurent, 1947, p. 92.

Hypoptophis wilsoni katangae Witte & Laurent, 1947, p. 93; Witte, 1953,  
p. 265.

Three specimens examined from: ZAMBIA. Kabompo; Kalabo.

Variation. No loreal; preocular 1; postoculars 1 - 2; temporals 1 + 1; upper labials 7, the third and fourth entering the orbit; lower labials 7, the first 4 in contact with the anterior sublinguals; dorsals in 15 - 15 - 15 rows, feebly keeled posteriorly; ventrals 103 - 106 in ♂♂, 113 in ♀; anal entire; subcaudals (single) 37 - 40 in ♂♂, 33 in ♀.

Coloration. Uniform black above and below.

Size. Larger ♂ (NMSR. 4332 - Kabompo) 158 + 36 = 194 mm. ♀ (NMSR. 4333 - Kabompo) 445 + 95 = 540 mm.

Discussion. Witte & Laurent (1947) distinguished katangae from typical H. wilsoni on its fewer ventrals and subcaudals and the separation of the rostral from the nasal (meeting at a point in one of the four specimens then known). The two ♂♂ Zambian snakes agree with wilsoni in the rostral/nasal contact, but the ♀ agrees with katangae. The scale counts for the ♂♂ bridge the gap between the two races, while the ♀ conforms to katangae, see Table 13 below:-

	VENTRAIS		SUBCAUDALS	
	♂♂	♀♀	♂♂	♀♀
<u>H. w. wilsoni</u> (Congo)	106 - 109	116 - 118	40 - 45	35 - 49
<u>H. w. katangae</u> (Congo)	102 - 103	101 - 114	36 - 39	31 - 37
<u>H. wilsoni</u> (Zambia)	103 - 106	113	37 - 40	33

Table 13. Variation in Hypoptophis wilsoni. Data largely extracted from Witte & Laurent (1947) and Witte (1953).

There seems to be little justification for the retention of katangae as a southern race.

Distribution. Kasai and Katanga provinces of the Congo, western Zambia.



## Genus APARALLACTUS A. Smith

Aparallactus A. Smith, 1849, Illus. Zool. S. Africa, Rept., App. p. 15.

Type by monotypy: A. capensis A. Smith.

Uriechis Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 623. Type by subsequent designation: U. lunulatus Peters.

## APARALLACTUS LUNULATUS LUNULATUS (Peters)

Uriechis lunulatus Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 623;

Tete, Mozambique, and 1882, p. 113, pl. xviii, fig. 2; Gunther, 1888, p. 324 (Lake Nyasa); Bocage, 1896, p. 100.

Aparallactus lunulatus Boulenger, 1896, p. 258, and 1907a, p. 12 (Ulungu Mtn.); Sternfeld (part) 1908, p. 247 (Chifumbazi); Boulenger, 1915, p. 216; Pitman, 1934, p. 298; Mertens, 1937, p. 14 (Inhaminga); Loveridge, 1944, p. 195 (Victoria Falls); Witte & Laurent (part), 1947, p. 110; Vesey-FitzGerald, 1958, p. 65; Manacas, 1959, p. 141 (Vila Paiva de Andrada).

Aparallactus lunulatus lunulatus Loveridge, 1953a, p. 283 (Tete); Broadley, 1959b, p. 55; Hanney, 1961, p. 24 (Matope); Broadley, 1962d, p. 836; FitzSimons, 1962, p. 265 (Guija; Mazoe); Wilson, 1965, p. 164.

Fifty specimens examined from: RHODESIA. Balla Balla; Birchenough Bridge; Bulawayo and 9 mls S; Chipinda Pools; Dorowa; Essexvale; Fatima; 7 mls W of Gwaai Bridge; Holderness Farm; Irisvale; 6 mls SE of Kapami; Kariba; Kyle Dam; Malimbasingi; Mount Darwin; Nyamaropa; Odzi; Old Umtali; Ruware; Shashi - Shashani Confluence; Triangle; Umtali; Victoria Falls; Vumba Mountain; West Sebungwe. ZAMBIA. Chikowa; Fort Jameson; Jumbo; Kafue River (USNM); Kalichero; Livingstone; Msoro. MOZAMBIQUE. Muda-Lamego; Vila Machado; Xiluvo.

Literature records. RHODESIA. Mazoe. ZAMBIA. Ulungu Mountain; Victoria Falls. MALAWI. "Lake Nyasa"; Matope. MOZAMBIQUE. Chifumbazi; Guija; Inhaminga; Tete; Vila Paiva de Andrada.

Variation. Nasal usually divided; no loreal; preocular 1; postocular 1; temporals 0 + 1 + 1; upper labials 6, the third and fourth entering the orbit; lower labials 6 (rarely 5), the first pair in contact behind the mental (rarely narrowly separated), the first 4 (rarely 3) in contact with the anterior sublinguals; dorsals in 15 - 15 - 15 rows; ventrals 145 - 164 in ♂♂, 157 - 174 in ♀♀; anal entire; subcaudals single, 50 - 65 in ♂♂, 50 - 61 in ♀♀.

Coloration. Head pale brown; body light grey, with the base of each dorsal scale black, a black transverse band on nape, followed by a series of up to twelve dark dorsal blotches on the neck (these markings are usually very faint in adults); ventrum uniform yellowish-white. Some specimens (especially from the Mozambique Plain) are uniform plumbeous above and below.

Size. Largest ♂ (UM. 1449 - Birchenough Bridge)  $315 + 92 = 407$  mm.  
Largest ♀ (MMB. 84 - Matope)  $505 + 112 = 617$  mm.

Diet. Two centipedes (Scolopendra morsitans) eaten by a captive Essexvale snake (Broadley, 1959b).

Enemies. One specimen was found in the stomach of a Naja n. mossambica killed on the road near Gwaai Bridge; a juvenile had been eaten by a Lizard Buzzard (Kaupifalco monogrammicus) at Vila Machado.

Habitat. Widespread in savanna.

Distribution. The Sudan, south through Uganda and Tanganyika to Mozambique, Malawi, Zambia, Rhodesia and the eastern Transvaal.

#### APARALLACTUS GUENTHERI Boulenger

Uriechis capensis (part, not Smith) Gunther, 1888, p. 324 (Lake Nyasa).

Aparallactus Guentheri Boulenger (part, exclude Angola), 1895, Ann. Mag.

Nat. Hist. (6), 16, p. 172 : Lake Nyasa, Shire Highlands and Zanzibar, also 1896, p. 259, pl. xi, fig. 2, 1902, p. 18 ("Mashonaland" = Mazoe), 1910, p. 516, and 1915, p. 216; Witte & Laurent, 1947, p. 115; Loveridge, 1953a, p. 284 (Zomba); Broadley, 1959b, p. 56, and 1962d, p. 837; FitzSimons, 1962, p. 267 (Guija).

Aparallactus lunulatus (part, not Peters) Sternfeld, 1908, p. 247 (Chifumbazi).

Aparallactus uluguruensis Barbour & Loveridge, 1928, Mem. Mus. Com. Zool., 50, p. 132 : Nyanga, Uluguru Mountains, Tanganyika.

Aparallactus capensis bocagii (part, not Bocage) Loveridge, 1944a, p. 202 (Chifumbazi record).

Aparallactus capensis capensis (part, not A. Smith) Loveridge, 1944a, p. 205.

Nineteen specimens examined from: RHODESIA. Haroni - Lusitu Confluence; Makore Farm; 5 mls. E of Masetter; Mtarazi Bridge; Penhalonga; Tilbury; Toronto; Umtali. Mozambique. Macequece.



Literature records. RHODESIA. Mazoe. MALAWI. "Lake Nyasa"; "Shire Highlands"; Zomba. MOZAMBIQUE. Chifumbazi.

Variation. Nasal usually divided; preocular 1; postocular 1 (rarely 2); temporals 0 + 1 + 1 (rarely 1 + 1); upper labials 6, the third and fourth entering the orbit; lower labials 5 (rarely 6), the first 3 (rarely 4) in contact with the anterior sublinguals, which separate the first pair of labials; dorsals in 15 - 15 - 15 rows; ventrals 148 - 158 in ♂♂, 158 - 173 in ♀♀; anal entire; subcaudals (single) 53 - 60 in ♂♂, 48 - 52 in ♀♀.

Coloration. Head dark grey with a narrow sulphur yellow band crossing parietals posteriorly, broadening laterally to cover the sixth labial, this is followed by a black band seven scales wide and another yellow band two scales wide expanding laterally; chin and throat white or greyish, rest of body iridescent steel blue above and below. One adult from the Haroni River lacks the yellow bands on the neck, resembling the uniform phase (*uluguruensis* Barbour & Loveridge) found in forested areas of Kenya and Tanganyika. Loveridge (1957, p. 287, footnote 150) was wrong in calling the yellow neck bands a juvenile characteristic, he had previously (1944e, p. 211) pointed out that 182 mm juveniles of *uluguruensis* were uniform like the adults.

Size. Largest ♂ (UM. 4602 - Umtali) 345 + 91 = 436 mm. Largest ♀ (UM. 5269 - 5 mls E of Malsetter) 380 + 88 = 468 mm.

Habitat. This species seems to be associated with forested or formerly forested areas.

Distribution. The coastal strip of Kenya, Tanganyika, northern and central Mozambique, Malawi and eastern Rhodesia.

#### APARALLACTUS CAPENSIS A. Smith.

*Aparallactus capensis* A. Smith, 1849, Ill. Zool. S. Africa, 3, App., p.

16; "Kaffirland, to the eastward of Cape Colony" = Natal; Boulenger, 1902, p. 18 (Mazoe); Roux, 1907, p. 81 (Rikatla); Gough, 1908, p. 33 (Salisbury); Chubb, 1909a, p. 596 and 1909 b, p. 36 (Bulawayo); Boulenger, 1910, p. 516; Hewitt, 1912, p. 276 (Serowe); Boulenger, 1915, p. 216; Loveridge, 1923, p. 889 (Lumbo); Pitman, 1934, p. 298; FitzSimons, 1935b, p. 323 (near Gwelo; Fort Victoria), also 1937, p. 263 and 1939 b, p. 24 (Vumba Mountain); Bogert, 1940, p. 43 (Mlanje); Themido, 1941, p. 17 (Palma).

*Urieichis nigriceps* (part) Peters, 1854, p. 623 (Tete, specimen with 142 ventrals and 51 subcaudals).

- Uriechis capensis Peters, 1882, p. 112 (Tete); Bocage, 1882, p. 288 (Angoche); Gunther, 1893, p. 555 (Shire Highlands); Bocage, 1896, p. 94.
- Aparallactus punctatolineatus Boulenger, 1895, Ann. Mag. Nat. Hist. (6), 16, p. 173 : Bihalla, Angola, also 1896, p. 261 (Chiradzulu), and 1915, p. 217; Pitman, 1934, p. 298.
- Aparallactus bocagii Boulenger, 1895, Ann. Mag. Nat. Hist., (6), 16, p. 173: Gambos and Novo Redondo, Angola.
- Aparallactus nigriceps (not Peters) Boulenger, 1896, p. 260 (Zomba).
- Aparallactus Luebberti Sternfeld, 1910, Mitt. Zool. Mus. Berlin, 5, p. 57: Between Omaruru and Okanjanda, South West Africa.
- Aparallactus capensis capensis Loveridge (part) 1944a, p. 205; Witte & Laurent, 1947, p. 122; Loveridge, 1953a, p. 284 (Blantyre); FitzSimons, 1953a, p. 210 (Nyamziwa); Vesey-FitzGerald, 1958, p. 65 (Abercorn); Broadley, 1959b, p. 56, and 1962d, p. 837; FitzSimons, 1962, p. 268 (Beitbridge; Chishawasha; Hunyani; Lourenco Marques; Trolawney; Victoria Falls).
- Aparallactus capensis bocagii Loveridge, 1944a, p. 202 (part, exclude Chifumbazi record); Witte & Laurent, 1947, p. 126.
- Aparallactus capensis punctatolineatus Witte & Laurent, 1947, p. 128; Broadley & Pitman, 1960, p. 447; Johnsen, 1962, p. 119 (Ndola; Kawambwa); Wilson, 1965, p. 164.
- Aparallactus capensis capensis x bocagii Broadley, 1959b, p. 58.

One hundred and forty-eight specimens examined from:

BECHUANALAND. Bushman Mine \*; Francistown \*; Serowe \* (AM); Tsessebe \* (AM); RHODESIA. Beitbridge \*; Pambesi; Bulawayo; Bundi Valley; Cecil Kop; W. Chimanimani Mountains; Chiredzi; Chishawasha; Condo; Cross Kopje; Domboshawa; Driefontein (AM); Eagles Nest; Engwa; Essexvale; Fatima; Fern Valley; Gatooma; Gwaai Siding; Gwelo; Helvetia; Imbeza; Inyanga Tea Estates; 10 mls SE of Kapami\*; Kariba Lake - Charara Confluence\*; Kyle Dam; Lake Macilwaine; Lower Gwelo; Lumane; Marandellas; Matopos; Matopos Dam; Mazoe; Melfort; Mount Hampden; Mount Silinda; Odzani Falls; Odzi; Plumtree; Rhodes Inyanga Estate; Rusape (AM); Sabi - Lundi Confluence; Salisbury (SAM); Selukwe; Sinoia\*; Syringa; Tilbury; Turk Mine; Ungusa River; Umtali; Vumba Mountain. ZAMBIA. Abercorn\*; Chilanga\*; Fort Jameson\*; Kabompo\*; Kalichero\*; Kasama\* (IRSNB); Kawambwa\* (ZMC); Mweru-Wantipa\*; Ndola\* (ZMC). MALAWI. Rumpi\*. MOZAMBIQUE. Dondo; Inchope; Jorge; Manga; Metuchira; Muda-Lamego; Viola\*; Xiluvo.



Literature records. BECHUANALAND. Serowe. RHODESIA. Beitbridge; Bulawayo; Chishawasha; Fort Victoria; Gwelo; Hunyani; Mazoe; Salisbury; Trelawney; Vumba Mountain. ZAMBIA. Abercorn; Kawambwa; Ndola; Victoria Falls. MALAWI. Blantyre; Chiradzulu; Mlanje; Zomba. MOZAMBIQUE. Angochs; Lourenco Marques; Lumbo; Palma; Rikatla; Tete.

Variation. Nasal usually entire; no loreal; preocular 1; postocular 1; temporals 0 + 1 + 1; upper labials 5\* or 6 (very rarely 4), the second and third \*, or third and fourth (rarely third only), entering the orbit; lower labials 5 (very rarely 4), the first pair separated by the anterior sublinguals, with which the first 3 (rarely 2) labials are in contact; dorsals in 15 - 15 - 15 rows; ventrals 130 - 169 in ♂♂, 145 - 184 in ♀♀; anal entire; subcaudals (single) 39 - 57 in ♂♂, 36 - 55 in ♀♀. NOTE: Localities at which the 5 (2, 3) upper labial formula (characteristic of nigriceps, punctatolineatus and luebberti) predominates are indicated by an \* in the above lists of localities.

Coloration. Top of head and neck black, extending laterally on the neck, sometimes a pair of pale elongate spots behind the parietals; body pale grey-brown to bright red-brown, uniform, or with a narrow dark vertebral line, or with five evenly spaced narrow dark lines; uniform white below.

Size. Largest ♂ (UM. 7180 - Metuchira) 235 + 70 = 305 mm. Largest ♀ (NMSR. 1190 - Odzi) 268 + 63 = 331 mm.

Discussion. The genus Aparallactus has been revised by Loveridge (1944e) and Witte & Laurent (1947). In both revisions uluguruensis was treated as a race of A. capensis, whereas it is now known to be a synonym of A. guentheri, which Loveridge had placed in the synonymy of typical A. capensis.

Loveridge recognised bocagii as a western race of A. capensis, distinguished by its high ventral counts (168 - 191) compared with 134 - 166 in the typical form. Witte & Laurent recognised five races of A. capensis based on upper shield labial formula and ventral counts, i.e.

Six upper labials, the third and fourth entering the orbit:

Ventrals 137 - 166 ..... A. c. capensis

Ventrals 175 - 191 ..... A. c. bocagii

Five upper labials, the second and third entering the orbit.

Ventrals 110 - 123, subcaudals 21 - 35 ..... A. c. nigriceps

Ventrals 135 - 163, subcaudals 36 - 52.. A. c. punctatolineatus

Ventrals 172 - 185, subcaudals 50 - 61 ..... A. c. luebberti

While preparing an analysis of the variation within Aparallactus capensis I have examined 260 specimens, including 105 from South Africa. The data available shows that A. nigriceps is distinguishable by its low ventral and subcaudal counts, but that bocagei is inseparable from typical capensis, while luebberti is a synonym of punctatolineatus. The ventral range for A. c. capensis is 130 - 191, but four independent factors contribute to this great variability:

(a) Marked sexual dimorphism: ♂♂ have about 15 more ventrals than ♀♀ from the same locality.

(b) There is an overall clinal increase in ventral counts from east (130 at Dondo, Mozambique) to west (191 for the type of bocagei).

(c) Superimposed are local microclines, with ventral counts increasing from high altitudes to low altitudes.

This is phenotypic variation, apparently controlled by the temperature at which the embryo develops. For example three ♂♂ taken in Umtali (between 3,500 and 4,000 feet) have 151 - 155 ventrals, but two ♂♂ taken at 5,000' on Cecil Kop (overlooking the town) have 137 - 145 ventrals.

(d) There is much mosaic variation between adjoining demes, even where the topography does not change. The lowest ventral count is 130 for a Dondo ♂, while a ♀ from nearby Manga has 147, but only 40 miles away on the Pungwe Flats (Muda - Lamago) 8 ♂♂ have 148 - 155 ventrals and 6 ♀♀ have 164 - 172. There is a gradual increase in average counts westwards to the Plumtree - Francistown area (3 ♂♂ 157 - 158; 3 ♀♀ 170 - 184). The types of bocagei (? ♀♀) had 175 - 191 ventrals. Zambian snakes (punctatolineatus) all have high average ventral counts, e.g. Abercorn ♀♀ 162 - 174, Fort Jameson ♂ 153, ♀♀ 171 - 178.

Until recently I regarded punctatolineatus as a valid/north-western race, for all thirty Zambian specimens agree with this form in upper labial formula, which is also dominant in Malawi and Bechuanaland. A review of South African material shows that populations with the labial arrangement characteristic of punctatolineatus occur throughout the Kruger National Park, there is a possible connection with east Bechuanaland through the Limpopo Valley, for a Beitbridge specimen conforms to punctatolineatus. Recognition of punctatolineatus as a valid race would leave an isolated pocket of typical capensis in Angola, so I prefer to treat A. capensis as a monotypic species until additional western material is available to establish the status of punctatolineatus.

Breeding. A 252 mm ♀ from the Chimanimani Mountains contained 3 eggs measuring 23 x 5 mm on 21st November; a 198 mm Viola ♀ held 3 eggs measuring 21 x 5 mm on 9th December. Other ♀♀ contained 1 - 4 eggs.



Diet. Four snakes contained centipedes (Scolopendra morsitans), captive snakes ate the smaller Cormocephalus spp.

Habitat. Widespread in savanna, extending into montane grassland up to about 6,000 feet.

Distribution. Tanganyika south to the eastern Cape Province, west through Zambia and Katanga to Angola and northern South West Africa, also Malawi, Rhodesia, eastern Bechuanaland, Transvaal and Orange Free State.

#### APARALLACTUS NIGRICEPS (Peters)

Uriechis nigriceps Peters (part), 1854, Monatsb. Akad. Wiss. Berlin, p. 623 : Tete, Mozambique; Bianconi, 1859, Sped. Zool. Mossamb., p. 385 (Inhambane); Peters, 1882, p. 111, pl. xviii, fig. 1 (Tete; Inhambane); Bocage, 1896, p. 100.

Eucritus atrocephalus Jan, 1857, Cenni Museo Civico Milano, p. 44 : Inhambane, Mozambique (not seen).

Uriechis atriceps (lapsus for nigriceps) Jan, 1862, Arch. Zool. Anat. Fisiol., 2, p. 49 (not seen), and 1866, Icon. Gen. Ophid. (Milano), livr. 15, pl. 1, fig. 4.

Aparallactus nigriceps Boulenger (part) 1896, p. 260 (no material); Loveridge, 1944a, p. 212.

Aparallactus capensis nigriceps Witte & Laurent, 1947, p. 127.

No, specimens examined.

Literature records. MOZAMBIQUE. Inhambane; Tete.

Description. Nasal entire; preocular 1; postocular 1; temporals 0 + 1 + 1; upper labials 5, the second and third entering the orbit; first pair of lower labials separated by the anterior sublinguals, with which the first 3 labials are in contact; dorsals in 15 rows; ventrals 110 - 123; anal entire; subcaudals 20 - 35.

Coloration. As in A. capensis.

Size. Type (ZMB - Tete) 210 + 45 = 225 mm.

Discussion. The status of the names nigriceps and atrocephalus will remain in doubt until more material is available from Mozambique. Typical A. capensis occurs both at Tete and in southern Mozambique (Rikatla and Lourenco Marques), the only areas from which nigriceps has been recorded.

Peters (1854) originally listed two snakes from Tete under the name Uriechis nigriceps n. sp., one had 123 ventrals and 35 subcaudals, the other 142 and 51. He subsequently (1882) transferred the second snake to U. capensis and added the data for two Inhambane snakes listed by Bianconi (1859), which became the types of atrocephalus Jan. No further specimens have been recorded, Mertens' (1937, p. 14) specimen from the Kruger National Park has 178 ventrals and 49 subcaudals and resembles the other specimens from this area (punctatolineatus) which I have included under A. capensis.

The counts for the type of nigriceps are not very far below the minimum given for capensis, and were it not for the very low counts of the atrocephalus types I would have few qualms about synonymising nigriceps.

The only specimen recently collected in the Tete area is a ♀ from Viola, on the Luenha River 30 miles to the south-west, this has 173 ventrals and 45 subcaudals. As several of Peters' type localities have proved suspect, one wonders if the type of nigriceps did not in fact come from Inhambane, where he collected a considerable amount of material.

It is notable that nigriceps and punctatolineatus agree in upper labial formula, so the Inhambane population of nigriceps may prove to be linked to the Kruger National Park populations of punctatolineatus by a steep cline bridging the 240 mile gap across the Mozambique Plain. In this case nigriceps would become the first available name for a race based on the 5 (2,3) upper labial formula, should this subsequently prove recognisable.

Distribution. Southern Mozambique.

#### Subfamily DASYPELTINAE

Genus DASYPELTIS Wagler

Dasypeltis Wagler, 1830, Nat. Syst. Amphib., p. 178. Type by monotypy:  
Coluber scaber Linnaeus.

DASYPELTIS SCABRA SCABRA (Linnaeus)

Coluber scaber Linnaeus, 1758, Syst. Nat., ed. 10, 1, p. 223: "In Indiis" = Cape Colony, South Africa).

Rachiodon abyssinicus (lapsus for abyssinus) Lichtenstein, 1856, p. 28 (Tete).



Rachiodon scaber Jan, 1863, p. 106 (Mozambique).

Dasypeltis scaber var. mossambicus Peters, 1864, Monatsb. Akad. Wiss.

Berlin, p. 644 : Tete and Boror, Mozambique, and 1882, p. 120.

Dasypeltis scabra Bocage, 1882, p. 289 (Angoche); Gunther (part), 1893,

pp. 618, 619 ("Shire Highlands" = Zomba); Boulenger (part), 1894a,

p. 354 (Matabeleland; Zomba; Mouth of the Zambezi); Bocage (part),

1896, p. 93 ("Mozambique"; Boror); Boulenger, 1897, p. 801 (Nyika

Plateau; Fort Hill), also 1902, p. 17 (Mazoe), and 1907a, p. 11

(Mterize River); Gough, 1908, p. 26 (M'mocoue; Serowe); Chubb,

1909a, p. 595 and 1909b, p. 35 (Bulawayo); Boulenger, 1910, p. 510

(Salisbury; Delagoa Bay); Hewitt & Power, 1913, p. 162 (Francistown);

Boulenger, 1915, p. 209; Loveridge, 1923, p. 880 (Lumbo), and 1929,

p. 28 (Lumbo); Pitman, 1934, p. 295 (Broken Hill; S. E. Bangweulu);

Cott, 1935, p. 967 (Charre); Cunha, 1935, p. 7 (Massangulo); Themido,

1941, p. 16; Vesey - FitzGerald, 1958, p. 66; Broadley, 1958a, p. 29,

illus., and 1959b, p. 59; Gans, 1959, p. 141 (Inhaca Island; Marbo;

Nchanga; Luano Valley; Chirinda Forest; Umtali - Odzi); Broadley &

Pitman, 1960, p. 447.

Dasypeltis scaber scaber Loveridge, 1953a, p. 265 (Cholo Mountain; Kasum-

badedza; Kota Kota); Laurent, 1956, p. 258 (Kitunde; Abercorn;

Kasama; Nsama); Hanney, 1961, p. 21 (Blantyre); Johnsen, 1962, p. 125

(Masaiti; 24 Km E of Mifulira).

Dasypeltis scaber palmarum (not Leach) Loveridge, 1953a, p. 266 (Fort Hill).

Dasypeltis scabra scabra Manacas, 1959, p. 152 (Maquenze); Broadley, 1962d,

p. 838; FitzSimons, 1962, p. 176 (Chishawasha; Guija; Inhambane;

Laurence Marques; Ramaquabane); Wilson, 1965, p. 164.

Dasypeltis medici medici (part, not Bianconi) FitzSimons, 1962, p. 175

(Odzi - Umtali).

Ninety-eight specimens examined from: BECHUANALAND. 32 mls W of Kanye; Lake Dow. RHODESIA. Banket; Bembesi; Bulawayo, 10 mls S and 25 mls N; 40 mls NE of Chirundu; Fatima; Fern Valley; Gatooma; Inyanga Tea Estates; Irene; 10 mls NW of Lupane; Marandellas; Mount Hampden; Norton; Odzani Falls; Odzi (EM); Old Umtali; Salisbury and 10 mls W; Springvale; Tandasai; Turk Mine; Umtali; Wankie National Park (Nyamandhlovu Pan); Vumba Mountain; Wedze; Westacre. ZAMBIA. Abercorn; Chikowa; Fort Jameson; Kabompo; Kalabo; Kalichero; Kasusu; Lake Bangweulu (SE); Livingstone; Lochinvar; Lusaka; Machile Forest Station; Msoro; Mufuwe Lagoon; Mukupa (IRSNB); Mulanga; Nyika Plateau (7,300 ft). MOZAMBIQUE. Inhaca Island (EBM); Manga; Mungaró (USNM); Vila Pery and 5 mls NW.

Literature records. BECHUANALAND. Francistown; M'moouve; Serowe. RHODESIA. Bulawayo; Chirinda Forest; Chishawasha; Mazoe; Odzi - Umtali; Ramaquabane; Salisbury. ZAMBIA. Abercorn; Bangweulu (SE); Broken Hill; Kasama; Kitunde; Luana Valley; Marbo; Masasi; Mterize River; 24 Km E of Mufulira; Nchanga. MALAWI. Blantyre; Cholo Mtn.; Fort Hill; Kota Kota; Nyika Plateau; Zomba. MOZAMBIQUE. Angoche; Boror; Gharre; Delagoa Bay; Guija; Inhaca Island; Inhambane; Kasumbadedza; Lourenco Marques; Lumbo; Maqueze; Massangulo; Tete; Zambezi Mouth.

Variation. No loreal; preocular 1 (rarely 2); postoculars 2 (rarely 1 or 3); temporals usually 2 + 3, sometimes 2 + 2, 2 + 4, 3 + 3 or 3 + 4 (rarely 1 + 3); upper labials 7 (rarely 6 or 8), the third and fourth (rarely second and third, third only, or second, third and fourth) entering the orbit; dorsals keeled in 22 - 28 rows at midbody; ventrals 184 - 241 in ♂♂, 202 - 255 in ♀♀; anal entire; subcaudals 50 - 80 in ♂♂, 45 - 62 in ♀♀.

Coloration. (a) Rhombic phase: light brown or greyish above, with a dorsal series of dark elongate blotches and a lateral series of dark vertical bars, a broad V-shaped marking pointing forward on the neck is usually preceded by one or two narrower V's on the head; ventrum white, usually with some brown flecking at the ends of the ventrals.

(b) Brown phase: red-brown, orange or yellow-brown above, uniform or with a faint indication of the dorsal series of blotches, often consisting merely of short whitish transverse bars, white below. This phase is sympatric with the commoner rhombic phase and has been recorded from the following localities: ZAMBIA. Fort Jameson. MALAWI. Fort Hill; Nyika Plateau; Zomba. RHODESIA. Banket; Gatooma; Irene; Mazoe; Odzi; Old Umtali; Salisbury; Umtali. All these localities are over 3,000 feet.

Size. Largest ♂ (NMSR. 802 - Salisbury)  $495 + 90 = 585$  mm. Largest ♀ (UM. 2835 - Kalichero)  $850 + 98 = 948$  mm.

Breeding. A 635 mm Kalichero ♀ contained 6 eggs measuring  $40 \times 10$  mm on 17th October; an 888 mm Fort Jameson ♀ contained 18 eggs measuring  $21 \times 10$  mm on 18th May.

Diet. Captive specimens feed readily on birds' eggs up to the size of a pigeon, none would take hens' eggs.

Habitat. Widespread in savanna. Specimens from Zambia (especially the extensive swamps of the Kafue Flats and Lake Bangweulu) average larger than those from Rhodesia. V. J. Wilson found a 535 mm ♂ under a rock in montane grassland at 7,300 feet on the Nyika Plateau, this snake has 80 subcaudals, the highest count recorded for the species.



Distribution. All savanna areas of Africa, extending down the Nile into Egypt; south-west Arabia.

DASYPELTIS MEDICI MEDICI (Bianconi)

Dipsas Medici Bianconi, 1859, Mem. Accad. Sci. Bologna, 10, p. 501, pl. xxvi : Mozambique (? Inhambane).

Dasypeltis scabra Gunther (part), 1894, pp. 618, 619 ("Shire Highlands" = Zomba); Boulenger (part), 1894a, p. 354 (Var. C, Zomba); Bocage, (part), 1893, p. 93 (Inhambane); Boulenger (part), 1897, p. 801 (Nkata Bay to Ruarwe).

Dasypeltis scabra medici Loveridge, 1953a, p. 266 (Cholo Mtn.).

Dasypeltis medici medici Gans, 1959, p. 157 (Matemo; Ribaue); Broadley, 1962d, p. 837; FitzSimons (part), 1962, p. 175 (exclude Odzi - Umtali record).

Two specimens examined from: RHODESIA. Inyangani Tea Estates. MOZAMBIQUE. Ribaue (TM).

Literature records. MAIAWI. Cholo Mtn.; Nkata Bay to Ruarwe; Zomba. MOZAMBIQUE. Inhambane (?); Matemo; Ribaue.

Variation. No loreal; preocular 1; postoculars 2 (rarely 1); upper labials 7 (rarely 6), the third and fourth (rarely second and third) entering the orbit; dorsals keeled in 23 - 26 rows; ventrals 232 - 250 in ♂♂, 240 - 259 in ♀♀; anal entire; subcaudals 84 - 90 in ♂♂, 73 - 84 in ♀♀.

Coloration. Mottled pinkish-brown above, all apical pits dark brown, about five narrow forward pointing brown V's on the neck, followed by a series of narrow lateral vertical bars; cream with brown stippling below.

Size. Largest ♂ (NMSR. 3918 - Inyangani Tea Estates) 600 + 130 = 730 mm. Largest ♀ (BM. 93.10.26.53 - Zomba) 735 + 154 = 889 mm.

Habitat. Restricted to the coastal plain and the Malawi rift valley, i.e. below 3,000 feet.

Distribution. South-eastern Kenya, eastern Tanganyika, Mozambique, Malawi, eastern Rhodesia.

Although Bianconi did not specify a definite type locality, his material came from Inhambane and Bocage's 1896 record of Dasypeltis scabra from Inhambane is based on Bianconi's D. medici. As the solitary Rhodesian specimen was collected at about 3,000 feet it is probable that this species does extend south along the Mozambique Plain to Inhambane.

## Family ELAPIDAE

## Genus ASPIDELAPS A. Smith

Aspidelaps A. Smith, 1849, Ill. Zool. S. Africa, Rept., App., p. 21.

Type by monotypy : Natrix lubrica Laurenti.

Cryptophis A. Smith, 1849, Ill. Zool. S. Africa, Rept., App., p. 22.

Type by monotypy : C. scutatus A. Smith.

## ASPIDELAPS SCUTATUS (A. Smith)

Cryptophis scutatus A. Smith, 1849, Ill. Zool. S. Africa, Rept., App.,

p. 22 : "Kaffirland and the country towards Natal."; Peters, 1854, p. 625, and 1882, p. 139, pl. xx, figs. 1 - 6 (Inhambane; Lourenco Marques); Bocage, 1896, p. 100.

Naia fula-fula Bianconi, 1849, Nuovi Ann. Sci. Nat. (2), 16, p. 108, pl. iv, fig. 1 : Inhambane, Mozambique.

Aspidelaps scutatus Boulenger, 1896, p. 391; Gough, 1908, p. 36 (Palla Road); Chubb, 1909a, p. 597 and 1909b, p. 36 (Empandene); Boulenger, 1910, p. 519 (Delagoa Bay); Werner, 1910, p. 325 (Kokong - Kong; Vlei Topan); FitzSimons, 1935b, p. 325 (Gomodimo Pan; Maun), also 1937, p. 263, and 1962, p. 273 (Bulawayo; Gaberones; Inhambane; Lourenco Marques; Rikatla; Serowe; Zavala = Quissico).

Aspidelaps scutatus bachrani Mertens, 1954, Zool. Anz., 152, p. 217, and 1955, p. 107, pl. 17, fig. 76 and pl. 24, fig. 147 : Okahandja, South West Africa.

Aspidelaps scutatus scutatus Broadley, 1959b, p. 60, pl. iv; Manacas, 1959, p. 154 (Mauele; Mohamba; Mambone); Broadley, 1962d, p. 838.

Twenty specimens from: BECHUANALAND. Francistown; Makalamabedi and 10 mls E (Botlele River); 100mls S of Maun; 78 mls W of Nata; Nokanang; Okovango. RHODESIA. Beitbridge; Bubi River Bridge; Empandene; Kezi; 5 and 11 mls NW of Lupane; Matopos South; Sabi-lundi Confluence; Shashi - Shashani Confluence; Sun Yat Sen Mine; Zezani.

Literature records. BECHUANALAND. Gaberones; Gomodimo Pan; Kokong - Kang; Maun; Palla Road; Serowe; Vlei Topan. RHODESIA. Bulawayo; Empandene. MOZAMBIQUE. Delagoa Bay; Inhambane; Lourenco Marques; Mambone; Mauele; Mohambe; Quissico; Rikatla.

Variation. Preocular 1; postoculars 3 (rarely 2 or 4); temporals 2 + 4 (rarely 2 + 5); upper labials 6 (rarely 5), the fourth entering the eye (rarely excluded); lower labials 7 - 9, the first 3 or 4 in contact with the anterior sublinguals; dorsals in 21 - 25 rows on nape, 21 - 23 at midbody and 16 - 19 before the vent, scales strongly keeled



posteriorly, larger and smoother laterally; ventrals 113 - 120 in ♂♂, 119 - 123 in ♀♀; anal entire; subcaudals 27 - 38 in ♂♂, 21 - 33 in ♀♀. Dentition - maxillary II + 0; palatine 5; pterygoid 8; dentary 8 - 13 (2 skulls).

Coloration. Bright orange, pale yellow or pinkish brown above, scales dark centred, a series of dark dorsal blotches, a black forward-pointing chevron on head, separated by a narrow white V from a broad black chevron on the neck, in western populations (Bechuanaland and Rhodesia) the head, neck and throat of adults becomes completely black; white below.

Size. Largest ♂ (Manacas, 1959 - S. Mozambique)  $550 + 119 = 669$  mm. Largest ♀ (TM. 14705 - Maun)  $516 + 71 = 587$  mm.

Discussion. Mertens (1954) separated western snakes as A. s. bachrani because the adults have the head and neck uniform black. All the Bechuanaland and Rhodesian material examined conforms to bachrani, the only snakes with typical scutatus markings being the three subadults, less than 300 mm in total length. FitzSimons (1962) synonymised bachrani because of the presence of many intermediate specimens in the eastern part of the species range and there is no obvious break in the distribution which would promote subspeciation.

On the other hand the data published by Manacas (1959) suggests that south Mozambique snakes differ from western populations in midbody scale count (23 instead of 21) and higher subcaudal counts (33 - 38 in ♂♂, 33 in ♀, instead of 27 - 30 in ♂♂, 20 - 23 in ♀♀). The situation warrants review when more eastern material is available.

Diet. The specimen from 78 mls. W of Nata contained a Breviceps m. adspersus; the Matopos South snake held a Pyxicephalus d. cryptotis. A captive Zezani snake ate frogs (Pyxicephalus d. cryptotis; P. marmoratus; Ptychadena anchietae).

Enemies. Fragmentary specimens were redcovered from the stomachs of a genet (Genetta genetta) at Makalamabedi and a White-tailed Mongoose (Ichneumia albicauda) at Nokaneng.

Habitat. Sandy country, especially Kalahari sand and coastal alluvium.

Distribution. South West Africa, Bechuanaland, western and southern areas of Rhodesia, the Transvaal and southern Mozambique.

#### Genus ELAPSOIDEA Bocage

Elapsoidea Bocage, 1866, Journ. Sci. Lisboa, 1, pp. 50, 70. Type by monotypy : E. guntheri Bocage.

The taxonomy of this genus is still very unsatisfactory and a comprehensive revision is badly needed. Loveridge's revision (1944a) defined the two southern forms sundevalli and fitzsimonsi, but failed to separate the northern forms of Elapsoidea. The most serious weakness in this paper is that sexual dimorphism in ventrals and subcaudals is not recorded. Parker (1949) examined the geographical variation in colour pattern, which had been largely neglected by Loveridge.

The most important contribution to our understanding of this genus was made by Laurent (1956), who analysed the sexual dimorphism for ventrals and subcaudals in Congo material and pointed out that there were two valid species: guentheri, in which males have more ventrals than females and the white crossbands are usually wider than the black interspaces, and a species that he called decosteri, in which sexual dimorphism is slight, but normal (i.e. females average more ventrals) and the black interspaces are broader than the white crossbars.

Analysis of sexual dimorphism in E. s. decosteri has shown that this form agrees with guentheri in this respect and I consider both forms to be races of E. sundevalli. The forms listed by Laurent as races of decosteri should be transferred to E. nigra Gunther. A provisional key to the genus Elapsoidea is provided below.

- 1a. Inverse sexual dimorphism in ventrals, ♂♂ having higher counts than ♀♀; savanna forms ..... 2 (E. sundevalli)
- 1b. Sexual dimorphism in ventrals poorly marked, but normal, ♀♀ averaging higher counts than ♂♂; mainly forest forms ..... 6 (E. nigra)
- 2a. Ventrals 162 - 184 ..... 3
- 2b. Ventrals 132 - 162 ( - 169 in South Africa) ..... 4
- 3a. Juveniles with 14 - 34 light crossbands on body and 4 on tail, these are subequal to or slightly broader than the dark interspaces, adults often lose the light crossbands except for pairs of light rings marking their outer edges; Natal .....  
..... E. sundevalli sundevalli (A. Smith)
- 3b. Juveniles similar to typical sundevalli, but adults uniformly dark above, white below; Kalahari regions .....  
..... E. sundevalli fitzsimonsi Loveridge
- 4a. Juveniles with 14 - 22 light crossbands on body and 2 - 4 on tail, these are subequal to, or slightly broader than the dark interspaces; adults usually with well defined pairs of light rings marking the outer edges of the pale bands; Cabinda, Lower Congo, Katanga, Angola, western Zambia .....  
..... E. sundevalli guentheri Bocage



- 4b. Juveniles with 8 - 15 (- 25 in South Africa) white crossbands on body and 0 - 3 on tail, these are half to a quarter the width of the black interspaces; adults usually uniform black or plumbeous above ..... 5
- 5a. Subcaudals in ♀♀ 14 - 24; savannas of south-eastern Africa ..... E. sundevalli decosteri Boulenger
- 5b. Subcaudals in ♀♀ 13 - 17; northern savanna (Sudan, northern Congo)..... E. sundevalli laticincta Werner
- 6a. Ventrals 162 - 171 ..... 7
- 6b. Ventrals 149 - 162 ..... 8
- 7a. Juveniles with 17 - 23 black bands on the body subequal in width to the light interspaces; Kivu, Rwanda, Uganda..... E. nigra colleti Laurent
- 7b. Juveniles with 24 - 26 black bands on the body, more than twice the width of the light interspaces; Uele - Ituri, N. E. Congo .. E. nigra multicineta Laurent
- 8a. Subcaudals 24 - 27 in ♂♂, 19 - 25 in ♀♀ ..... 9
- 8b. Subcaudals 18 - 24 in ♂♂, 13 - 17 in ♀♀; montane forests of Tanganyika ..... E. nigra nigra Gunther
- 9a. Light crossbands subequal in width to dark interspaces, 27 on the body of the type, a ♂ with 147 ventrals; Ruzizi Plain, Kivu, Congo ..... E. nigra scalaris Laurent
- 9b. Light crossbands much narrower than dark interspaces, 13 - 21 on body; ventrals 149 - 161 ..... 10
- 10a. Juveniles with white crossbands, which persist in the adult as pairs of white bands with a pale (pink or red in life) intermediate zone; central Kenya ..... E. nigra loveridgei Parker
- 10b. Juveniles with white crossbands, which degenerate into paired narrow white rings in the adult; Congo and western Kenya west to Guinea ..... E. nigra moebiusi Werner

ELAPSOIDEA SUNDEVALLI FITZSIMONSI Loveridge

Elapichis sundevallii (not A. Smith) FitzSimons, 1935b, p. 326 (Kuke - Gomodimo; Gomodimo Pan; Okwa River; Damara Pan).

Elapsoidea sundevallii fitzsimonsi Loveridge, 1944, Bull. Mus. Comp. Zool., 95, p. 229: Gomodimo Pan, Bechuanaland; FitzSimons & Brain, 1958b, p. 104 (Nossob River); FitzSimons, 1962, p. 282.

Two specimens examined from: RHODESIA. Beitbridge; Sabi - Lundi Confluence.

Literature records. BECHUANALAND. Damara Pan; Gomodimo Pan; Kuke - Gomodimo; Nossob River; Okwa River.

Variation. Preocular 1; postoculars 2; temporals 1 + 2; upper labials 7, the third and fourth entering the orbit; lower labials 6 - 7, the first 3 - 4 in contact with the anterior sublinguals; ventrals 162 - 181 (♂ with the highest counts, e.g. 181 in the type, 172 in Sabi - Lundi Confluence ♂; the Beitbridge ♀ has only 149); anal entire; subcaudals 17 - 29 (21 in type ♂; 29 in the Sabi - Lundi ♂; 25 in the Beitbridge ♀).

Coloration. Juveniles with alternate bands of dark brown to black and pale yellow to white, the bands being of equal width; head yellowish above and laterally, with an anterior prolongation of the dark nuchal band extending to the prefrontals, a dark spot behind the eye; yellowish below. Adults and subadults uniform dark purplish-brown above, upper lip and outer scale row pale pink in life, ventrum pure white.

Size. Largest ♂ (TM. 14708 - Gomodimo Pan)  $716 + 50 = 766$  mm. Largest ♀ (CNHM. 17666 - Gomodimo - Kuke)  $570 + 36 = 606$  mm.

Discussion. Unfortunately FitzSimons and Loveridge did not record the sexual dimorphism in ventrals and subcaudals for their material, but it appears that this form and typical *E. sundevalli* agree in their high ventral counts and marked sexual dimorphism in both ventrals and subcaudals, ♂♂ having higher counts in each case.

The Beitbridge ♀ has the distinctive coloration of *fitzsimonsi*, but the low ventral count of *decosteri*, it is probably an intergrade.

Diet. A 15 inch specimen caught in the bed of the Nossob River contained a *Psammophis* nearly 14 inches long (FitzSimons & Brain, 1958b).

Habitat. Arid country, especially Kalahari sand.

Distribution. South West Africa, Bechuanaland, northern Cape Province, north-western Transvaal, south-eastern Rhodesia.

#### ELAPSOIDEA SUNDEVALLI GUNTHERI Bocage

*Elapsoidea Guntheri* Bocage, 1866, Journ. Sci. Lisboa, 1, pp. 50, 70, pl. 1, figs. 3 - 36: Cabinda (restricted by Parker, 1949, p. 97), and 1895, p. 129, pl. xiv, figs. 3, 3a - c.

*Elapsoidea semi-annulata* Bocage, 1882, Journ. Sci. Lisboa, 8, p. 303: Caconda, Angola.



Elapsoidea Hessei Boettger, 1887, Zool. Anz., 10, p. 650: Povo Netonna, Lower Congo.

? Elapechis guentheri Angel, 1921, p. 44 (Lealui).

Elapsoidea sundevallii semiannulata Witte, 1953, p. 274.

Elapsoidea guentheri guentheri Laurent, 1956, p. 273.

Two specimens examined from: ZAMBIA. Chingola; Kalabo.

Variation. Preocular 1; postoculars 2; temporals 1 + 2; upper labials 7, the third and fourth entering the orbit; lower labials 7, the first 3 or 4 in contact with the anterior sublinguals; dorsals in 13 - 15 rows on nape, 13 at midbody, 11 - 13 before the vent; ventrals 136 - 139 in ♀♀; anal entire; subcaudals 18.

Coloration. Dark grey above with 14 - 19 pairs of white rings on body, 2 pairs on tail, these rings are one scale wide, but the broad pale bands of the juvenile coloration would have been 5 scales wide and the black interspaces 6 scales wide in the middle of the body; lower half of outer scale row and underside white or brown.

Size. Larger ♀ (UM. 10103 - Kalabo) 450 + 40 = 490 mm.

Discussion. In this form the pale bands of the juvenile are usually wider than the black interspaces, slightly narrower in the type of semiannulata, which resembles these Zambian snakes. Ventral counts are lower than in E. s. fitzsimonsi, with sexual dimorphism less marked; ventrals 142 - 158 in ♂♂, 136 - 146 in ♀♀; subcaudals 21 - 26 in ♂♂, 16 - 19 in ♀♀, data collated from Witte (1953) and Laurent (1956).

Distribution. Lower Congo, Angola, Katanga and parts of western Zambia.

#### ELAPSOIDEA SUNDEVALLI DECOSTERI Boulenger

Elapsoidea Decosteri Boulenger, 1888, Ann. Mag. Nat. Hist. (6), 2, p. 141: Delagoa Bay, Mozambique; Johnsen, 1962, p. 125 (Ndola).

Elapsoidea Boulengeri Boettger, 1895, Zoo. Anz., 18, p. 62: Boroma, Zambezi River, Mozambique.

Elapechis guentheri Boulenger (part), 1896, p. 359 (Shire Highlands); Peracca, 1896, p. 4 (Kazungula); Chubb, 1909a, p. 596 and 1909b, p. 36 (Bulawayo; Deka); Hewitt & Power, 1913, p. 165 (Eldorado).

Elapechis Sundevallii (not A. Smith) Peracca, 1896, p. 4 (Kazungula).

Elapechis decosteri Boulenger, 1896, p. 360 and 1910, p. 519.

Elapechis boulengeri Boulenger, 1896, p. 361; Themido, 1941, p. 18 (Zumbo).

Elapechis niger (not Gunther) Boulenger, 1907a, p. 12 (Mbala Country); Sternafeld, 1908, p. 247 (Chimbo); Peracca, 1912, p. 6 (Kazungula); Loveridge (part), 1923, p. 890 (Lumbo).

Elapsoidea guentheri (not Bocage) Pitman, 1934, p. 298 (Broken Hill); Johnsen, 1962, p. 125 (Solwezi; Mpika).

Elapsoidea sundevallii decosteri Loveridge, 1944a, p. 217 (Lourenco Marques; Broken Hill to Bwana Mkubwa; Gatooma; Wankie); Parker, 1949, p. 97; Loveridge, 1953a, p. 285 (Likabula River), and 1955, p. 191 (S. Tanganyika); Vesey - FitzGerald, 1958, p. 68; Broadley, 1959b, p. 61; Broadley & Pitman, 1960, p. 448; Broadley, 1962d, p. 838; FitzSimons, 1962, p. 279 (Guija; Maputo; Rikatla; Zavala = Quissico); Wilson, 1965, p. 165.

Elapsoidea sundevallii guentheri (part, not Bocage), Parker, 1949, p. 98 (N. Rhodesia and Nyasaland material).

One hundred and fifteen specimens examined from: **BECHUANALAND**. Francistown. **GAPRIVI**. Lake Liambezi. **RHODESIA**. Bulawayo; Deka; Gatooma; Heany; Kariba; Kazungula; Loxley Coombe Ranch; 3 mls SE and 9 mls NW of Lupane; Matopos; Miami; Mount Darwin; Norton; Que Que; Sabi - Lundi Confluence; Salisbury and 10 mls W; Selukwe; Umtali; Urungwe; Wankie; Zambezi - Rumi Confluence; Zana Farm. **ZAMBIA**. Bulaya; Chibelele Camp; Chikowa; Chilonga; Chipengali; Fort Jameson; Kabompo; Kafue Pilot Polder; Kalichero; Kasempa; Katanda; Katete; Lake Chisi; Lusaka; S of Mpika; Msoro; Mumbwa; Mweru - Wantipa; Nanzila Flats; Ndola; Siantamba. **MOZAMBIQUE**. Metuchira; Mude; Mugeba and 5 mls N; Nharuchonga; Xiluvo.

Literature records. **RHODESIA**. Bulawayo; Deka; Eldorado; Gatooma; Wankie. **ZAMBIA**. Broken Hill; Broken Hill to Bwana Mkubwa; Kazungula; Mbala Country; Mpika; Ndola; Solwezi. **MALAWI**. Likabula River; Shire Highlands. **MOZAMBIQUE**. Boroma; Chimbo(? = Chimbonde near Tete); Delagoa Bay; Guija; Lourenco Marques; Lumbo; Maputo; Quissico; Rikatla; Zumbo.

Variation. Preocular 1; postoculars 2 (very rarely 1 or 3); temporals 1 + 2 (very rarely 1 + 3); upper labials 7 (rarely 6), the third and fourth (rarely second and third) entering the orbit; lower labials 7 (rarely 6), the first 3 or 4 in contact with the anterior sublinguals; dorsals in 15 (rarely 17) rows on nape, 13 at midbody, 11 - 13 before the vent; ventrals (D) 142 - 162 in ♂♂, 132 - 156 in ♀♀; anal entire; subcaudals (sometimes single in parts) 20 - 29 in ♂♂, 14 - 24 in ♀♀. Dentition - maxillary II + 3; palatine 10 - 11; pterygoid 15; dentary 16 (2 skulls).

Coloration. Juveniles black above, usually with 9 to 15 white cross-bands on body and 0 - 3 on tail, these bands being half to a quarter the width of the black interspaces; head whitish, with an anterior projection of the black ~~maxilla~~ band extending to the prefrontals; usually plumbeous



or dark brown below, sometimes lighter laterally, or entirely white. While the snake is between 250 and 350 mm in total length, the white-crossbands fade out through a gradual darkening of each scale from the centre. Adults are usually uniform black or plumbeous above, but sometimes (especially in Mozambique specimens) the outer edges of the white bands persist as a pair of narrow white rings; underside usually dark, except for a white patch on the chin, if entirely white the transition from the dark dorsum is gradual, not abrupt as in E. s. fitzsimonsi.

Size. Largest ♂ (UM. 8001 - Mugeba)  $655 + 47 = 702$  mm. Largest ♀ (LMM - Quissico)  $982 + 82 = 1064$  mm.

Discussion. Parker (1949, p. 97) notes that specimens from southeastern Africa have a low number of pale cross-bands, the type of E. boulengeri having only 8 in the body and 2 on the tail. In the material at present under consideration the minimum numbers of bands are found in specimens from the Mozambique Plain, i.e.  $9 + 0$  for a Metuchira ♂,  $10 + 0$  for a Xiluvo ♂,  $9 + 2$  for a Xiluvo ♀; the white bands are 3 - 4 scales wide and the black interspaces 8 - 11 scales wide.

FitzSimons (1962) records 9 - 25 white cross-bands on body and 2 - 4 on tail, but notes that the average number of bands on the body is 12 in Rhodesia and 20 in South Africa. This striking increase in number of cross-bands south of the Limpopo is accompanied by an increase in average number of ventrals and it appears that these southern populations are intergrades between decosteri and fitzsimonsi.

Diet. A captive specimen ate a Lycophidion c. capense (Wilson, 1965).

Habitat. Widespread in savanna, but rarely found above 4,500 feet.

Distribution. Southern Tanganyika, south through Mozambique to northern Zululand.

Genus HEMACHATUS Fleming

Hemachatus Fleming, 1882, Philos. Zool., 2, p. 295. Type by monotypy: Vipere haemachate Lacepede.

HEMACHATUS HAEMACHATUS (Lacepede)

Vipere haemachate Lacepede, 1788, Hist. Nat. Quad. Ovip. Serp., 2, p. 115, pl. iii, fig. 2: "Japon et Perse" = South Africa.

Hemachatus haemachatus Broadley, 1962d, p. 839; FitzSimons, 1962, p. 287.

Five specimens examined from: RHODESIA. Inyanga National Park (Mare Dam; Nyamziwa; Pungwe View).

Variation. Preocular 1; postoculars 3; temporals 2 + 2 or 2 + 3; upper labials 7, the third and fourth entering the orbit; lower labials 8, the first 4 in contact with the anterior sublinguals; dorsals in 17 - 18 rows on nape, 17 - 19 at midbody, 13 before the vent; ventrals 124 in ♂, 127 in ♀; anal entire; subcaudals 38 in ♂, 35 in ♀.

Coloration. Head black, body yellow or grey-brown (sometimes reddish anteriorly, the interstitial skin on the hood vermillion) with about 40 narrow black cross-bands, subequal in width to the light interspaces; below, chin dark brown, throat black with two white cross-bands, posterior ventrals and subcaudals black mesially, grey laterally.

Size. ♂ (UM. 1307 - Pungwe View) 635 + 133 = 768 mm. ♀ (UM. 3061 - Mare Dam) 578 + 102 = 680 mm.

Discussion. Although this relict population at Inyanga is separated from the south-eastern Transvaal populations by a gap of 500 miles, it does not differ significantly in either lepidosis or coloration.

Diet. The ♂ from Pungwe View contained a Bufo regularis.

Habitat. Scrub Brachystegia and montane grassland with bracken and heath between 5,800 and 6,300 feet. Also reported from pine plantations in the area.

Distribution. Southern and eastern Cape Province, Orange Free State, Basutoland, Natal, Swaziland, south-eastern Transvaal and a relict population on the Inyanga highlands of Rhodesia.

Cott's record (1935, p. 970) of this species from Charre, Mozambique is rejected. This was a live specimen sent to the London Zoo and it probably came from Mortimer, Cape Province, like two other snakes in the same shipment.

#### Genus BOULENGERINA Dollo

Boulengerina Dollo, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, 4, p. 159.

Type by monotypy B. stormsi Dollo.

#### BOULENGERINA ANNULATA STORMSI Dollo

Boulengerina stormsi Dollo, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, 4, p. 160, fig. : Lake Tanganyika, Congo.

Boulengerina annulata stormsi Loveridge, 1933, p. 263; Laurent, 1956, p. 287; FitzGerald, 1958, p. 68 (Mpulungu); Berry, 1961, p. 35 (Sumbu); Johnsen, 1962, p. 125; Ionides & Pitman, 1965, p. 93.



Eleven specimens examined from: ZAMBIA. Lake Tanganyika at Mpulungu.

Literature records. ZAMBIA. Mpulungu; Sumbu.

Variation. Preocular 1; postoculars 1 - 3; temporals 1 + 2 or 1 + 3; upper labials 7 (rarely 8), the third and fourth (rarely fourth and fifth) entering the orbit; lower labials 8, the first 4 in contact with the anterior sublinguals; dorsals in 21 rows at midbody; ventrals 206 - 218; anal entire; subcaudals 68 - 75.

Coloration. Reddish brown, olive brown or blackish above, with three to six light-edged black cross-bands on the neck, which may be followed by a series of black dorsal blotches gradually diminishing in size; grey or yellowish below with some darker mottling posteriorly.

Size. Largest ♀ (NMBR. 4050 - Mpulungu)  $1805 + 390 = 2195$  mm. The largest of sixty-seven water cobras captured alive at Mpulungu by C. J. P. Ionides was 7 feet 4 inches.

Breeding. Five ♀♀ captured by Ionides each laid 22 - 24 eggs during August-September (Ionides & Pitman, 1965).

Diet. This species appears to be entirely piscivorous.

Parasites. Ticks (Aponomma latum) are frequently found on the head and neck.

Habitat. These snakes venture far out into Lake Tanganyika during the day, but return to rocky shores or rock-built jetties in the late afternoon, where they find refuge among the partially submerged rocks.

Distribution. Endemic to Lake Tanganyika and its affluents.

Genus NAJA Laurenti

Naja Laurenti, 1768, Syn. Rept., p. 90. Type by tautonym: Coluber naja Linnaeus.

NAJA HAJE ANNULIFERA Peters

Naja haje var annulifera Peters, 1854, Monatsb. Akad. Wiss. Berlin. p. 624; Tete, Mozambique.

Naja haje (not Linnaeus) Peters, 1882, p. 137, pl. xx, figs 7 - 8;

Bocage, 1896, p. 100; Vesey - FitzGerald, 1958, p. 71.

Naja haje (not Linnaeus) Boulenger, 1891, p. 308 (Shire Valley), and 1902, p. 18 (Umtali - Marandellas); Gough, 1908, p. 35 (Hunyani); Chubb, 1909a, p. 596 and 1909b, p. 36 (Bulawayo; Springvale Farm; Matopos); Boulenger, 1910, p. 517 (Delagoa Bay; Hunyani River, Salisbury); Hewitt & Power, 1913, p. 164 (Marandellas; Francistown; Mochudi); Cott, 1935, p. 970 (Charre).

Naja haje var annulifera Chubb, 1909a, p. 597 and 1909b, p. 36 (Bulawayo).

Naja haje haje (not Linnaeus) Bogert, 1940, p. 288; Loveridge, 1953a, p. 286 (Kasumbadedza); Broadley, 1958b, p. 125, illus., also 1959b, p. 61, pl. v, and 1962d, p. 839; FitzSimons, 1962, p. 293 (Amandas; Chishawasha; Driefontein; Gatooma; Glendale; Hunyani; Inhaca Island; Mazoe; Palapye; Rikatla; Serowe; Trelawney; Umvuma).

One hundred and fifty-three specimens examined from: RHODESIA. Balla Balla; Bembesi; Birchenough Bridge; Bromley; Buby River; Bulawayo, 7 mls N and 10 mls S; Essexvale; Feruka; Figtree; Filabusi; Grand Reef; Gwelo; Horseshoe Block; Hunters' Road; Inyazura; Irisvale; Kariba Lake; Lake Macilwaine; Lochard; Makore Farm; Marandellas; Matopos; Mount Hampden; Noema Dam; Ngundu; Nyamandhlovu; Nyamazi; Odzi; Old Umtali; Plumtree; Redbank; Rusape; Salisbury and 9 mls S; Selukwe; Siesta Farm; Stanmore; Thorn Park; Toronto; Turk Mine; Umtali; Vumba Mountain; Westacre; West Nicholson; Zambezi - Sebungwe Confluence; Zimunya Reserve. ZAMBIA. Kariba Lake - Chezia Confluence; Mpika. MALAWI. Port Herald (USNM). MOZAMBIQUE. Inhaca Island (EBM); Lamago; Manga.

Literature records. BECHUANALAND. Francistown; Mochudi; Palapye; Serowe. RHODESIA. Amandas; Bulawayo; Chishawasha; Driefontein; Gatooma; Glendale; Hunyani; Macheke; Marandellas; Matopos; Mazoe (BM); Salisbury; Springvale Farm; Trelawney; Umtali - Marandellas; Umvuma. MALAWI. Shire Valley. MOZAMBIQUE. Charre; Inhaca Island; Kasumbadedza; Rikatla; Tete.

Variation. Scales in ocular ring usually 5 - 7 (1 preocular, 2 - 3 suboculars, 2 - 3 postoculars); temporals 1 + 2 or 1 + 3; upper labials 7 (rarely 6), excluded from the orbit (suboculars rarely absent, with the second and third, third, or third and fourth upper labials entering the orbit); lower labials 8 - 9 (rarely 6 - 7), the first 4 in contact with the anterior sublinguals; dorsals in 19 (rarely 17 or 21) rows on neck and at midbody, 13 - 15 before the vent; ventrals 179 - 202 in ♂♂, 180 - 205 in ♀♀; anal entire; subcaudals 54 - 66 in ♂♂, 55 - 65 in ♀♀.



Coloration. Juveniles: head brown, body dull yellow (sometimes greenish) above, with a broad black band encircling the neck; bright yellow below. Hatchlings of the banded phase have faint indications of light and dark bands, but one yellow band usually divides the broad black band on the neck.

Adults: Head dark brown to black, body grey-brown, dark grey or blue-black (rarely yellow or reddish with pink interstitial skin) above, yellow mottled with brown below, often darkening to uniform blackish except for the chin, which is yellow.

Banded phase: head brown, body blue-black, with 7 - 11 bright yellow or creamy white cross-bands, which are usually about half the width of the black interspaces; bright yellow below, uniform or more frequently heavily blotched with black where the black dorsal bands would continue, sometimes completely ringed in black and yellow. The anterior yellow band (in the centre of the hood when spread) is narrow and often broadened mesially with a dark central spot. Some specimens have only a few yellow bands posteriorly, one Umtali snake had a series of yellow dorsal blotches instead of bands. Banded Cobras are usually males, the ratio being 30 ♂♂ : 2 ♀♀ in the material examined.

Size. Largest ♂ (UM. 5790 - Hunters' Road)  $1955 + 353 = 2308$  mm. Largest ♀ (UM. 6296 - Invazura)  $1946 + 365 = 2311$  mm, but another ♀ (NMSR. 3286 - Kariba Lake) measures 1990 mm from snout to vent (tail truncated).

Discussion. The Egyptian Cobras of south-eastern Africa differ from the typical form in usually having only 19 scale rows at midbody and averaging fewer ventrals (179 - 205). There is a break in the distribution of the species - extending across Africa through the Congo, northern Zambia and southern Tanganyika. Naja haje haje normally has 21 midbody scale rows and 195 - 220 ventrals, it occurs in arid country bordering the Sahara from Morocco to Egypt, south through the Sudan and Somalia to Kenya and northern Tanganyika, west to Senegal.

The only available name for the south-eastern race of Naja haje is annulifera Peters. According to Loveridge (1957, p. 291) Naja intermixta Dumeril & Bibron (1854) was based on plate xix of A. Smith (1849), which makes it a synonym of Naja nivea Linnaeus.

Breeding. A 1534 mm Bulawayo ♀ contained 11 eggs measuring 25 x 15 mm in September.

Diet. Toads (Bufo spp) are the staple diet of this species, but other snakes, rodents and birds are readily taken. A 2238 mm Bulawayo ♀ contained a gravid ♀ Bitis a. arietans which held 19 young. A 1943 mm Red-bank ♂ had also swallowed an adult Puffadder.

This cobra is a persistent raider of poultry runs, taking both eggs and young birds.

Parasites. Many specimens harbour ticks (Aponomma latum), particularly on the neck.

Enemies. On the N'Sese River (Matopos) I saw a Martial Eagle (Polemaetus bellicosus) take off with a dead Egyptian Cobra at least six feet long.

Habitat. Widespread in savanna up to 6,000 feet. A termitarium is the usual lair, but rodent burrows are sometimes occupied. At Kariba Lake this species tends to be more aquatic than Naja n. mossambica, although in Victoria Nyanza it is Naja nigricollis and Naja melanoleuca which have become aquatic and piscivorous.

Distribution. Central and southern Mozambique, southern Malawi, Rhodesia, eastern Bechuanaland, Transvaal, Swaziland and northern Natal. The distribution of this form in Zambia is not yet clear, it occurs in the Gwembe Valley and there is a single juvenile from Mpika (NMSR. 9), so it should be found in the Luangwa Valley.

#### NAJA HAJE ANCHIETAE Bocage

Naja anchietae Bocage, 1879, Journ. Sci. Lisboa, 7, pp. 89, 98 : Caconda, Angola, and 1895, p. 133, pl. xvi, figs. 2a - c; FitzSimons, 1935b, p. 325 (Maun; Kabulabula).

Naja anchietae Boulenger, 1910, p. 517 (Livingstone); Peracca, 1910, p. 4 (Barotseland); Boulenger, 1915, p. 219; Pitman, 1934, p. 299.

Naja Anchietae var barotseensis Angel, 1921, Bull. Mus. Hist. Nat. (Paris) 27, p. 43 : Lealui, Barotseland, Zambia.

Naja haje (not Linnaeus) Pitman, 1934, p. 298 (Batoka - Barotse frontier); (?) Pike, 1964, p. 38 (Chilubi Island, Lake Bangweulu).

Naja haje anchietae Bogert, 1940, p. 90 and 1943, p. 288; Witte, 1953, p. 276; Broadley, 1959b, p. 65, and 1962d, p. 839; FitzSimons, 1962, p. 296.

Naja haje barotseensis Bogert, 1943, p. 288.

Fourteen specimens examined from: BECHUANALAND. Bushman Pits. RHODESIA. Gwaai Bridge; Matetsi River Bridge; 15 mls SSE of Victoria Falls; Wankie National Park - Main Camp and Nyamandhlovu Pan. ZAMBIA. Kalabo; Katima - Mulilo; Livingstone; Mahhile Forest Station; Namwala.



Literature records. BECHUANALAND. Kabulubula; Maun. ZAMBIA. Batoka - Barotse frontier; Chilubi Island; Lealui; Livingstone.

Variation. Scales in ocular ring 4 - 6; temporals 1 + 2, 1 + 3 or 2 + 3; upper labials 7 (rarely 6 or 8), excluded from orbit; lower labials 8 - 9, the first 4 in contact with the anterior sublinguals; dorsals in 15 - 17 rows on neck, 17 (rarely 15 or 19) at midbody and 13 (rarely 11) before the vent; ventrals 182 - 193 in ♂♂, 185 - 197 in ♀♀; anal entire; subcaudals 56 - 60 in ♂♂, 53 - 66 in ♀♀.

Coloration. Juveniles similar to N. h. annulifera, but often with a vague grey vertebral stripe and irregular narrow transverse dark lines. Adults occur in the same colour phases as N. h. annulifera. The two banded specimens examined are both females.

Size. Largest ♂ (TM. 14725 - Maun) 1662 + 316 = 1978 mm. Largest ♀ (UM. 1156 - Nyamandhlovu Pan) 1830 + 347 = 2177 mm.

Discussion. Angel's variety barotseensis was distinguished from typical anchietae principally by its 15 midbody scale rows, the differences in head shield proportions and coloration can be attributed to the immaturity of the type, which is only 430 mm in total length. As typical anchietae has been collected at Kalabo, only 30 miles from the type locality for barotseensis, there is little doubt that the latter was based on an aberrant specimen. Specimens with 17 or 21 midbody scale rows are occasionally found among normal populations of N. h. annulifera.

Diet. A subadult from Matetsi Bridge contained a Bufo regularis. Two ♀♀ captured in the Wankie National Park fed readily on rats, birds, skinks and snakes, but refused toads.

Habitat. This race is largely confined to Kalahari sand areas, the Matetsi snake came from a black basalt vlei.

Distribution. Central and southern Angola, northern South West Africa, northern Bechuanaland, north-western Rhodesia, western Zambia and south-eastern Katanga.

Unfortunately all Pike's Lake Bangweulu material was destroyed in a fire, but I have provisionally referred local cobras to anchietae because of Witte's (1953) record of this race from swamps south of Bangweulu in Katanga. N. h. annulifera occurs only a little further east at Mpika. Naja haje has not been recorded in the Lake Mweru - Abercorn region, in spite of extensive collecting by Bredo and Vesey-FitzGerald.

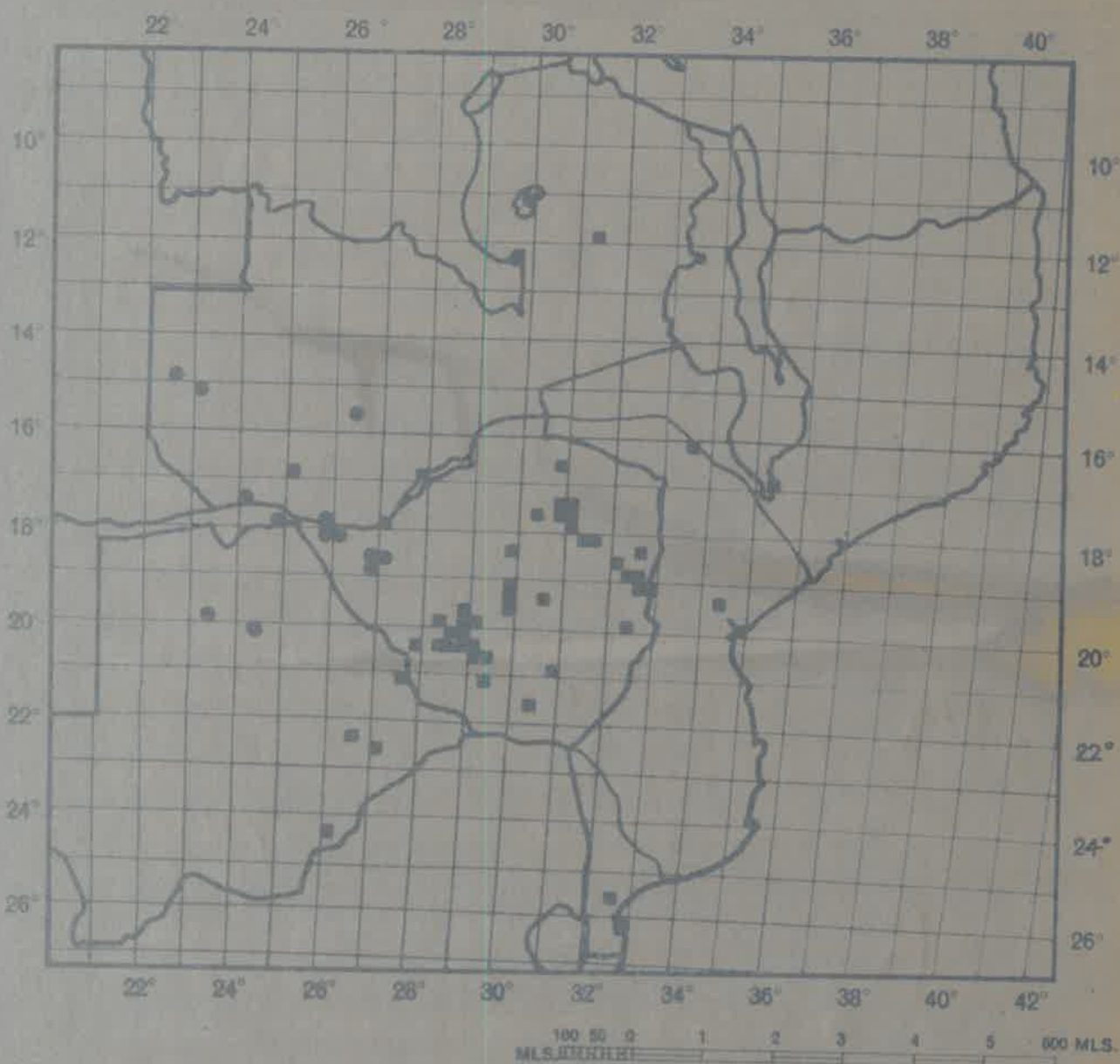


Fig. 12. Distribution of *Haja haje* (Linnaeus)

- *Haja haje annulifera* Peters
- *Haja haje anchietas* Bocage



## NAJA NIVEA (Linnaeus)

Coluber niveus Linnaeus, 1758, Syst. Nat. ed. 10, 1, p. 223 : "Africa"  
= Cape of Good Hope.

Naia flava Werner, 1910, p. 364 (Kang).

Naja flava FitzSimons, 1935b, p. 323 (Kuke Pan).

Naja nivea FitzSimons & Brain, 1958, p. 103; FitzSimons, 1962, p. 297  
(Twee Rivieren).

One specimen examined from: BECHUANALAND. 40 mls NW. of  
Lephepe.

Literature records. BECHUANALAND. Kang; Kuke Pan; Twee Rivieren.

Variation. Preocular 1; postoculars 3; temporals 1 + 2, 1 + 3;  
upper labials 7, the third and fourth entering the orbit; lower labials  
9, the first 4 in contact with the anterior sublinguals; dorsals in 21 -  
23 rows on neck, 19 - 21 at midbody; 15 before the vent; ventrals 200 in  
♂, 202 in ♀; anal entire; subcaudals 55 in ♂, 58 in ♀.

Coloration. Uniform cream to yellowish brown above, cream or yellow-  
ish below.

Size. ♂ (UM. 9725 - 40 mls NW of Lephepe) 1190 + 233 = 1423; ♀ (VLKE  
893 - Kuke Pan) 1260 + 220 = 1480 mm.

Habitat. Kalahari sand regions. The Kuke specimen was dug out of a  
gerbille burrow (FitzSimons, 1935b).

Distribution. Cape Province, western Orange Free State and Basutoland,  
southern and central South West Africa, southern Bechuanaland.

## NAJA MELANOLEUCA Hallowell

Naia haie var. melanoleuca Hallowell, 1857, Proc. Acad. Nat. Sci. Phila-  
delphia, p. 61: Gabon.

Naia melanoleuca Boulenger, 1896, p. 378 (Shire Valley), and 1915, p. 219;  
Pitman, 1934, p. 299; Cott, 1935, p. 970 (Charre); Themido, 1941, p.  
18 (Beira).

Naja melanoleuca Bogert, 1940, p. 238; Mitchell, 1946, p. 29 (Port Herald);  
Loveridge, 1953a, p. 238 (Likabula River; Misuku Mtns.) and 1953c, p. 144  
(Zomba; Cholo - Mlanje); Vesey - Fitzgerald, 1958, p. 71 (Abercorn);  
Broadley, 1959b, p. 68, pl. vi; Broadley & Pitman, 1960, p. 448; Fitz-  
Simons, 1962, p. 300 (Ilha dos Portuguesas; Inhambane; Lourenco Mar-  
ques); Johnsen, 1962, p. 126 (Kitwe; Kaniki); Pike, 1964, p. 39 (Sam-  
fya, Lake Bangweulu); Wilson, 1965, p. 166.

Naja melanoleuca subfulva Laurent, 1955, Revue Zool. Bot. Afr., 51  
p. 132 : Lwiro, Kabare Territory, Kivu, Congo, and 1956, p. 291;  
Broadley, 1962d, p. 840.

Thirty-one specimens examined from: RHODESIA. Haroni - Lusitu Confluence; Inyanga National Park - Mare Dam; Inyanga Tea Estates; Jersey Tea Estates; Manga Reserve (E); Ngorima Reserve (E). ZAMBIA. Abercorn (IRSNB; NMSR); Chakwanga; Chibalashi River; Fitete Stream; Ikelenge; Kaniki; Katete; Kaungashi; Lunga Game Reserve; Mambwe (IRSNB); Solwezi Boma. MALAWI. Miralongwe. MOZAMBIQUE. Amatongas; Chemezi; Ilha dos Portuguesas (EBM); Inhaca Island (EBM).

Literature records. ZAMBIA. Abercorn; Kaniki; Kitwe; Mweru - Wantipa (B); Samfya. MALAWI. Cholo - Mlanje; Likabula River; Misuku Mtns.; Port Herald; Shire Valley; Zomba. MOZAMBIQUE. Beira; Charre; Ilha dos Portuguesas; Inhambane; Lourenco Marques.

Variation. Preocular 1; postoculars 3; temporals 1 + 2 or 1 + 3; upper labials 7, the third and fourth (rarely fourth only) entering the orbit; lower labials 8 (rarely 9), the first 4 in contact with the anterior sublinguals; dorsals in 22 - 25 rows on neck, 19 at midbody, 13 before the vent; ventrals 203 - 218 in ♂♂, 209 - 215 in ♀♀; anal entire; subcaudals 60 - 71 in ♂♂, 66 - 69 in ♀♀.

Coloration. Head light brown, body grey-brown or yellow-brown heavily blotched with black, often entirely black posteriorly; bright yellow heavily blotched with black below, becoming entirely black posteriorly, a black transverse band may be present on the throat, but this is usually poorly defined or absent.

Size. Largest ♂ (EBM - Ilha dos Portuguesas) 2000 + 400 + = 2400+ mm. Largest ♀ (UM. 5796 - Jersey Tea Estate) 2050 + 395 = 2445 mm.

Discussion. N. m. subfulva Laurent was distinguished from the typical form on the following characters:

- (a) Lighter coloration above and below.
- (b) Lower ventral counts : 202 - 211 in ♂♂ (instead of 211 - 221) and 208 - 218 in ♀♀ (instead of 219 - 226).
- (c) Anterior temporal as long as the supraocular (much shorter in the typical form), with frequently three posterior temporals (always two in the typical form).
- (d) Savanna habitat, the typical form inhabiting equatorial forest.

I have examined 44 specimens of N. melanoleuca and find that the above characters are not correlated. Seven West African cobras



agree with Laurent's diagnosis of the typical form except that a ♂ from Bafut, West Cameroons (UM 9813) has only 207 ventrals. Four ♂♂ from Uganda agree with typical melanoleuca in coloration, but have only 206 - 210 ventrals. A ♀ from Pundo Andongo, Angola (BM. 1904. 5.2.79) has 214 ventrals and also agrees with subfulva in coloration. Sixteen specimens from Zambia and Malawi are variable in coloration, but tend towards subfulva, (the juveniles are black as in the typical form), ventral counts are variable, 203 - 218 in ♂♂, 215 in ♀. Sixteen cobras from Rhodesia, Mozambique and Zululand agree with subfulva in both coloration and ventral counts. The temporal characters cited by Laurent prove to be very variable both in West Africa and south-east Africa.

The retention of subfulva as a race based on coloration alone is not warranted, for this phase is not restricted to savanna as Laurent suggests. In south-eastern Africa Naja melanoleuca is found in forested or formerly forested areas, sometimes extending into savanna along rivers.

Diet. A ♀ from Manga Reserve contained a Bufo pusillus. Vesey-FitzGerald (1958) found two barbel (Clarias sp.) in a 2150 mm ♂ collected at Lake Chila, Abercorn. A ♀ from Mtunzini, Zululand (UM. 2185) contained fish scales and the claw of a Golden Mole. A ♀ from Mount Silinda fed on rats and Typhlops s. mucruse in captivity.

Habitat. Evergreen forest and formerly forested areas, especially in the vicinity of streams, lakes and dams. This species may spread into savanna areas if these are not occupied by Naja h. annulifera, as appears to have happened in the Manga Reserve at the foot of the eastern escarpment. The ecological relationships of these two species where they are sympatric (e.g. Inhaca Island) warrant careful study.

Distribution. Forested areas of west, central and eastern Africa from Senegal to Somalia, south to Angola on the west coast, Zululand on the east coast.

#### THE NAJA NIGRICOLLIS COMPLEX

A comprehensive revision of all the African species of Naja is long overdue, but especially the "spitting cobras" of the Naja nigricollis group. It has long been the custom to regard this as a single polytypic species with about seven recognisable races, but there is now sufficient evidence to support the recognition of at least two species. I provisionally recognise the following forms:



Naja nigricollis - A large species attaining a length of 2,400 mm, coloration dark, often entirely black above, a broad black throat band always present. There are two valid races.

Naja nigricollis nigricollis Reinhardt - A northern savanna form ranging from Senegal to western Kenya and Somalia. Midbody scale rows 21 - 23 (rarely 19 or 25), ventrals 180 - 219.

Naja nigricollis crawshayi Gunther - A western savanna race ranging from Angola to western Tanganyika. Midbody scale rows 17 - 21; ventrals 176 - 205. (occidentalis Bocage and atricollis Laurent are synonyms).

Naja mossambica - A small species, rarely exceeding 1,500 mm in length, coloration generally pale (except for the melanistic race woodi). There are five valid races.

Naja mossambica mossambica Peters - An eastern savanna form ranging from S. E. Tanganyika to Natal and west to Bechuanaland. Midbody scale rows 23 - 25 (rarely 21 or 27), ventrals 180 - 205; subcaudals 52 - 69. Throat with irregular black bands and blotches, dorsal scales dark-edged.

Naja mossambica nigricincta Bogert - An arid country race of western Angola and northern South West Africa. Distinguished from the typical form by its high ventral count (198 - 226) usually only 21 midbody scale rows, dorsum with numerous narrow black cross-bars.

Naja mossambica pallida Boulenger - A Somali Arid race ranging from the Sudan to north-east Tanganyika. Distinguished from the typical form by its high ventral counts (197 - 228), uniform red dorsal coloration and broad black throat band, midbody scale rows 21 - 27.

Naja mossambica woodi Pringle - An arid country form of the western Cape Province and southern South West Africa, perhaps specifically distinct. Readily distinguished from the other races of N. mossambica by its uniform black coloration, and very high ventral (223 - 232) and subcaudal (67 - 73) counts. This form apparently averages larger than the other races.

Naja mossambica katiensis Angel is another arid country form ranging from Mali to northern Nigeria. It is readily distinguished by its very low ventral (165 - 179) and subcaudal (43 - 54) counts, midbody scale rows 25 in two Nigerian specimens in the BM.

Throughout most of their ranges N. nigricollis and N. mossambica are allopatric, but sympatry apparently occurs in the following areas:

1. North-eastern Africa - N. n. nigricollis and N. m. pallida occur side by side with no sign of intergradation (C. J. P. Ionides, in litt.).



2. Eastern Zambia - N. n. crawshayi and N. m. mossambica are sympatric (See discussion under the latter form).

3. Western Angola - N. n. crawshayi and N. m. nigricincta are sympatric at Dondo (see Bocage, 1895, p. 136, Bocage's name fasciata is preoccupied).

#### NAJA NIGRICOLLIS CRAWSHAYI Gunther

Naja nigricollis var. crawshayi Gunther, 1893, Proc. Zool. Soc. London, p. 620 : Lake Mweru, Zambia.

Naja nigricollis var. occidentalis Bocage (part), 1895, Herp. Angola & Congo, p. 135 : Dondo; Quissange; Quillenques; Huilla, Humbe; Angola (exclude Bissau).

Naja nigricollis (not Reinhardt) Boulenger (part), 1896, p. 379, and 1915, p. 219; Angel, 1921, p. 44 (Lealui); Pitman (part), 1934, p. 299 (Broken Hill).

Naja nigricollis nigricollis (not Reinhardt) Bogert, 1940, p. 88 (part, exclude Merebank specimen); Witte, 1953, p. 280 (Katanga localities).

Naja nigricollis atriceps Laurent, 1955, Revue Zool. Bot. Afr., 51, p. 135: Magera, Burundi.

Naja nigricollis crawshayi FitzGerald, 1938, p. 69 (Abercorn); Broadley & Pitman, 1960, p. 448; Broadley, 1962a, p. 31; Johnsen, 1962, p. 126 (Ndola; Kasama; Abercorn); Wilson, 1965, p. 166.

Naja nigricollis occidentalis Laurent, 1964c, p. 119 (Angola).

Seventy-two specimens examined from: ZAMBIA. Abercorn; Broken Hill; Chinakila; Chipengali; Chingwe; Fort Jameson; Kabompo; Kalabo; Kalichero; Kasempa and 15 & 70 miles S; Lake Mweru (EM - type); Luanshya; Lundazi; Lusaka; Mambwe (IRSNB); Mporokoso (IRSNB); Msandile; Mukupa (IRSNB); Mumbwa; Mwekera; Mwinilunga; Ndola; Youmbers; Sitwe.

Literature records. ZAMBIA. Abercorn; Broken Hill; Kasama; Lake Chisi (B); Lake Mweru; Lealui; Ndola. MALAWI. Karonga.

Variation. Preoculars 2; postoculars 3; temporals 2 + 3, 2 + 4, 2 + 5 (rarely 2 + 2, 3 + 3, 3 + 4 or 3 + 5); upper labials 6 (very rarely 7), the third (very rarely fourth) entering the orbit (excluded in one snake); lower labials 8 - 9, the first 4 in contact with the anterior sublinguals; dorsals in 19 - 28 rows on neck, 17 - 21 (very rarely 23) at midbody, 11 - 15 before the vent; ventrals 185 - 195 in ♂♂, 190 - 202 in ♀♀; anal entire; subcaudals 57 - 69 in ♂♂, 56 - 65 in ♀♀.

Coloration. Juveniles grey above, large adults usually jet black; a broad black band on the throat covers the first 20 - 25 ventrals, the next 25 ventrals are usually yellow heavily mottled with grey, becoming uniform grey posteriorly; the head may be black above and below (var. atriceps Laurent) or brown above and below.

Size. Largest ♂ (NMR. 1551 - Abercorn)  $1777 + 365 = 2142$  mm. Largest ♀ (UM. 2969 - Kalichero)  $1000 + 212 = 1212$  mm. (NOTE: Most of the largest specimens are represented by skins or heads only and therefore cannot be measured.)

Discussion. Laurent (1956 and 1964c) recognises three races in the southern Congo - northern Angola area, based largely on differences in ventral counts (See Table 14 below).

REGION	VENTRALS		SUBCAUDALS	
	♂♂	♀♀	♂♂	♀♀
N. Angola (Laurent - <u>occidentalis</u> )	186 - 193	193 - 201	57 - 67	56 - 61
S. Angola (Bogert)	176 - 193	194 - 197		
Zambia (Broadley)	185 - 195	190 - 202	57 - 69	56 - 65
Katanga (Witte - <u>crawshayi</u> )	177 - 185	182 - 186	56 - 64	55 - 63
S.E.Kivu (Laurent - <u>crawshayi</u> )	180	182 - 183	57	52
N.E.Kivu, Rwanda, Burundi, W. Tanganyika (Laurent - <u>atriceps</u> )	191 - 203	198 - 206	59 - 65	55 - 60

Table 14. Variation in ventrals and subcaudals for Naja nigricollis crawshayi.

Laurent also distinguished atriceps from crawshayi on head coloration, uniform black in the former, brown in the latter. In this respect most Zambian specimens agree with crawshayi, but Abercorn cobras conform to atriceps and large cobras from all areas usually have entirely black heads.

Populations in Katanga and S. E. Kivu have lower ventral counts than those of N. Angola, Zambia, W. Tanganyika, Rwanda, Burundi and N. E. Kivu, and these could be segregated as N. n. crawshayi, the populations with high ventral counts being united under the name N. n. occidentalis Bocage. However, the range of ventrals given for 9 Capelongo ♂♂ by Bogert (1940) is as extensive as that given by Laurent for crawshayi and occidentalis together, while the range of ventrals found in Zambian snakes closely coincides with occidentalis, but also overlaps atriceps. In



the circumstances it seems advisable to group all these populations under the earliest name crawshayi.

Breeding. A Kalichero ♀ contained 12 eggs (31 mm in length) on 28th July (Wilson, 1965).

Diet. One Kabompo cobra contained a Crotaphopeltis h. hotamboeia, another held a shrew (Crocidura hirta). A Kalichero ♀ contained three partially digested rats and captive specimens fed readily on toads (Wilson, 1965).

Habitat. Common in savanna above 3,000 feet.

Distribution. Angola, southern and eastern Congo, Zambia (above 3000 feet), northern Malawi, western Tanganyika, Rwanda, Burundi, intergrading with the typical form in Uganda.

NAJA MOSSAMBICA MOSSAMBICA Peters

Naja mossambica Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 625 : Sena and Tete, Mozambique; Gunther, 1864, p. 307 (Zambezi Expedition).

Naja nigricollis (not Reinhardt) Bocage, 1882, p. 289 (Angoche); Peters, 1882, p. 138, pl. xx, figs. 9 - 10; Gunther, 1894, p. 618 (Zomba); Bocage, 1896, p. 95 (Sofala); FitzSimons, 1935b, p. 324 (Maun); Mitchell, 1946, pp. 29, 42; Pike, 1964, p. 39 (Kabende).

Naja nigricollis (not Reinhardt) Boulenger, 1896, p. 378 (part - Zomba; Shire Valley; Zambezi); Peracca, 1896, p. 4 (Kazungula); Boulenger, 1897, p. 801 (Kondowe to Karonga), 1902, p. 18 (Mazoe), 1907a, p. 12 (Feira District; Petauke), and 1907b, p. 487 (Coguno; Beira); Gough, 1908, p. 35 (Palapye Road); Chubb, 1909a, p. 597 (Bulawayo; Mazepa Mine; Deka) and 1909b, p. 36 (Empandene; Syringa); Boulenger (part), 1910, p. 5 18 (Mazoe); Peracca, 1910, p. 4 (Barotseland); Hewitt & Bower, 1913, p. 165 (Eldorado); Loveridge (part), 1923, p. 890 (Lumbo); Power, 1927, p. 410 (Lobatsi); Pitman (part), 1934, p. 299; Gott, 1935, p. 970 (Charre; Fambani).

Naja nigricollis mossambica Mertens, 1937, p. 15 (Inhaminga); Bogert, 1943, p. 290; Laurent, 1956, p. 297, pl. xxviii, fig. 1 (South of Lake Bangweulu); Broadley, 1959b, p. 65, pl. vi; Manacas, 1959, p. 153 (Fumo - Chide; Vila Paiva de Andrada); Broadley, 1962a, p. 31, and 1962d, p. 840; Wilson, 1965, p. 166.

Naja nigricollis nigricollis (not Reinhardt) Loveridge, 1953a, p. 286 (Kasungu; Likabula River; Mtimbuka; Ruo River; Kasumbadedza); Hamney, 1961, p. 21 (Blantyre); FitzSimons, 1962, p. 302 (Babata; Bindura; Filabusi; Livingstone; Lourenco Marques; Maputo; Que Que; Trelawney; Wankie).

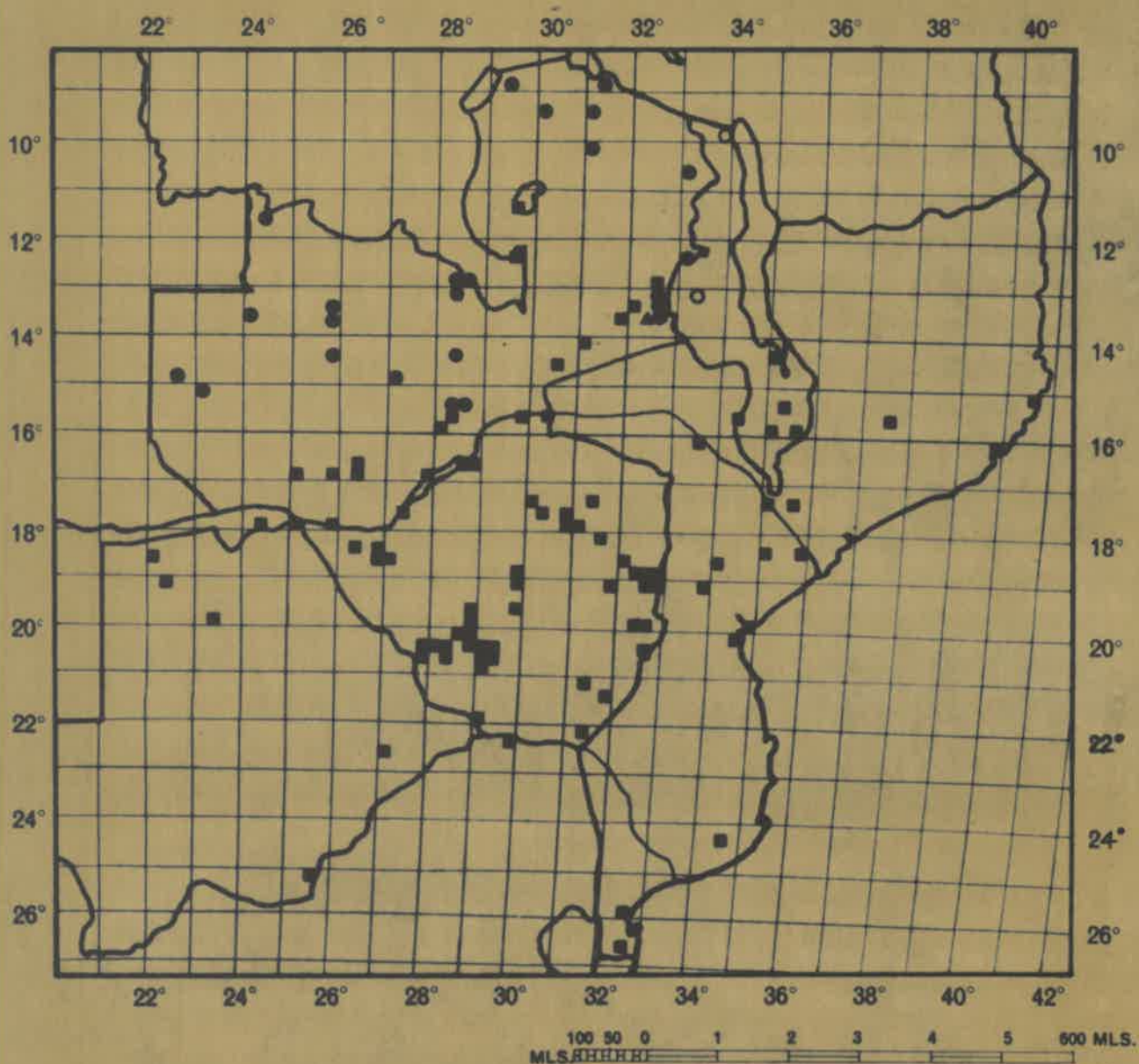


Fig. 13. Distribution of the *Haja nigricollis* Group

- *Haja nigricollis crawshayi* Gunther
- *Haja mossambica mossambica* Peters
- ▲ *H. n. crawshayi* and *H. n. mossambica*
- Species uncertain (literature records)



One hundred and ninety-nine specimens examined from:

BECHUANALAND. 15 mls NE of Gomare; Sepopa. CAPRIVI. Lake Liambezi. RHODESIA. Atlantica; Balla Balla; Beitbridge; Bombesi; Binga; Birchenough Bridge; Bulawayo; Cement; Chipinda Pools; Chirinda Forest; Dorowa; Essexvale; Fern Valley; Glass Block; 4 & 7 mls W of Gwaai River Bridge; Heathfield; Hunters' Road; Imbezu Park; Inyazura; Irisvale; Kapami; Kariba; Kariba Lake - Sanyati Confluence; Malapati Drift; Malonga River Bridge; 10 mls N of Marandellas; Matopos; Ntabazinduna; Nyamakari; Odai; Old Umtali; Penhalonga; Plumtree; Que Que; Salisbury; Selukwe; Silverstreams; Sinkukwe; Sincioa; Syringa; Triangle; Tuli; Turk Mine; Umzilizwe River; Wankie National Park (Balla Balla Pan); Zambezi - Chewore Confluence. ZAMBIA. Chikowa; Chilanga; Chipongwe; Kacholola; Kafue River (USNM); Kalichero; Kariba Lake - Gwembe and Chezia Confluences; Kasusu; Katanda; Livingstone; Lukusuzi Game Reserve; Machile Forest Station; Msoro; Mulanga; Petauke Old Boma; Siantamba. MOZAMBIQUE. 8 mls SW of Alto Molocue; Amatongas; Inchope; Lumbo (NMK); Machipanda; Morrumbala; Vila de Manica, 5 mls W.; 10 mls SW of Zobue.

Literature records. BECHUANALAND. Lobatsi; Maun; Palapye Road. RHODESIA. Balla Balla (BM); Bambata; Bindura; Bulawayo; Deka; Eldorado; Empandene; Filabusi; Mazeppa Mine; Mazoe; Que Que; Syringa; Trelawney; Wankie. ZAMBIA. Feira District; Kabende; Kazungula; Livingstone; Petauke Old Boma. MALAWI. Blantyre; Kasungu (?); Kondowe - Karonga (?); Likabula River; Mtimbuka; Ruo River; Shire Valley; Zomba. MOZAMBIQUE. Angocho; Beira; Charre; Coguno; Fambani; Fumo-Chide; Inhanninga; Kasumbadedza; Lourenco Marques; Lumbo; Maputo; Sena; Spfala; Tete; Vila Paiva de Andrada.

Variation. Preoculars 2 (very rarely 3); postoculars 3 (very rarely 2 or 4); temporals 2 + 4, 2 + 5 (rarely 2 + 3, 2 + 6, 3 + 4, 3 + 5, 3 + 6 or 3 + 7); upper labials 6 (rarely 5 or 7), the third (rarely fourth) entering the orbit; lower labials 9 (rarely 10), the first 4 (rarely 3) in contact with the anterior sublinguals; dorsals in 23 - 29 rows on neck, 23 - 25 (rarely 21 or 27) at midbody, and 15 - 19 before the vent; ventrals 180 - 200 in ♂♂ and 184 - 205 in ♀♀; anal entire; subcaudals 54 - 69 in ♂♂, 52 - 67 in ♀♀.

Coloration. Pale grey to olive brown above, each scale dark-edged; salmon pink below, with a series of irregular black cross-bands and blotches on the throat, never a single broad band.

Size. Largest ♂ (UM. 9216 - Silverstreams) 1250 + 270 = 1520 mm. Largest ♀ (NMSR. 973 - Essexvale) 1285 + 258 = 1543 mm.



Discussion. This small, light-coloured cobra is immediately distinguishable from the massive black Naja nigricollis. The two species are sympatric in eastern Zambia, although N. mossambica is more plentiful in the Luangwa Valley and N. nigricollis crawshayi on the plateau above 3000 feet. A comparison of the material collected in this area by V. J. Wilson revealed the following differences between 28 N. n. crawshayi and 14 N. m. mossambica.

(a) Coloration - all specimens were readily diagnosed on this character alone.

(b) Size - the largest N. m. mossambica measured 1140 mm in total length; the largest N. n. crawshayi had been skinned out, but two ♂♂ measured 1800 + mm and 1730 + mm.

(c) Midbody scale rows:	19	20	21	22	23	24	25	Mean.
<u>Naja nigricollis crawshayi</u>	12	1	14	-	1	-	-	20.2
<u>Naja mossambica mossambica</u>	-	-	1	-	6	-	7	23.9

(d) Ventral counts for ♂♂. Fifteen N. n. crawshayi ♂♂ have 186 - 193 ventrals ( $\bar{X} = 190.1$ ); five N. m. mossambica ♂♂ have 182 - 187 ventrals ( $\bar{X} = 185.4$ ). As ♀♀ of both forms have 192 - 202 ventrals, sexual dimorphism is more marked in N. m. mossambica.

(e) Number of scales (upper temporals and nuchals) bordering the parietals.

N. n. crawshayi 7 - 11 ( $\bar{X} = 9.2$ )

N. m. mossambica 10 - 13 ( $\bar{X} = 11.8$ ).

(f) Shape of frontal - only slightly longer than broad in most N. n. crawshayi, usually  $1\frac{1}{2}$  times as long as broad in N. m. mossambica.

Characters (e) and (f) may prove more useful in distinguishing the two species in Kenya. Two Kenya specimens of N. n. nigricollis have 7 - 9 scales bordering the parietals and their frontals measure 8.1 x 6.5 mm and 10 x 8 mm: a Kenya N. m. pallida has 13 scales bordering the parietals and its frontal measures 9.6 x 6.4 mm.

Breeding. A 1220 mm Likabula River ♀ contained 21 eggs measuring 25 x 10 mm on 30th July (Loveridge, 1953a).

Diet. Frogs (Bufo regularis and Bufo carens) are the staple diet of this species. A specimen from Kariba Lake contained a Mabuya q. margaritifera and a road casualty near Gwaai Bridge had eaten an Aparallactus l. lunulatus. An Irisvale cobra disgorged a Philothamnus hoplogaster, and an Imbeza cobra regurgitated a Duberria l. rhodesiana. Several stomachs contained rodents or small chickens.

Parasites. Most specimens harbour ticks (Aponomma latum).

Habitat. Widespread in savanna, but not found above 5000 feet. Most plentiful at low altitudes, especially along the major rivers.



Distribution. South-eastern Tanganyika south to Natal, west through Rhodesia and the Transvaal to Bechuanaland. In Zambia this form is found in the south and east, with apparently a relict population in the Lake Bangweulu area. Its northern limit in Malawi is not known.

Genus DENDROASPIS Schlegel

Dendroaspis Schlegel, 1848, Versl. Zool. Gen. Amsterdam, p. 5. Type by monotypy : Elaps jamesoni Traill.

DENDROASPIS POLYLEPIS POLYLEPIS Gunther

Chlorocephis (Naja) angusticeps (not A. Smith) Peters, 1854, p. 625 (Tete).

Dendroaspis polylepis Gunther, 1864, p. 310: Zambezi Expedition.

Dinophis angusticeps (not A. Smith) Peters, 1882, p. 136, pl. xix A, fig. 4 (Mossuril).

Dinophis polylepis Peters, 1882, p. 137.

Dendroaspis angusticeps (not A. Smith) Boulenger (part), 1896, p. 437

(Zambezi), also 1910, p. 520, and 1915, p. 220; Pitman, 1934, p. 299 (Batoka; Feira; Sesheke; Balovale and Petauke Districts); Fitz-Simons, 1935b, p. 327 (Gaberones; Maun; Kwaai; Kabulabula); Mitchell, 1946, pp. 28, 42.

Dendroaspis angusticeps (not A. Smith) Bogert, 1940, p. 92.

Dendroaspis polylepis FitzSimons, 1946b, p. 393; Vesey-FitzGerald, 1958, p. 72 (Abercorn; Luangwa River); Pike, 1964, p. 40 (Kapalala; Mbati; Kampolombo).

Dendroaspis polylepis polylepis Loveridge, 1953a, p. 290 (Mtimbuka; Karon-ga; Mzimba); Broadley, 1959b, p. 69; Broadley & Pitman, 1960, p. 448; Broadley, 1961c, p. 299, illus.; Manacas, 1961, p. 159 (Lourenco Marques); Broadley, 1962d, p. 841; FitzSimons, 1962, p. 307 (Hartley; Inhambane; Mahalapye; Maputo; Que Que); Johnsen, 1962, p. 126 (15 Km N of Fort Rosebery; Chingola - Solwezi; 10 Km NW of Ndola); Wilson, 1965, p. 166.

One hundred and twenty-four specimens examined from:

BECHUANALAND. 30 mls S of Francistown; Maitengwe River; Mhembo; Sepopa. CAPRIVI. Lake Liambezi. RHODESIA. 30 mls N of Bindura; Bulye River; Bulawayo and 14, 20 and 25 mls N; Chipinda Pools; Chirundu; Dett; Dorowa; Devenby Farm; Grand Reef; Granmore Farm; Hartley; Heany; Hot Springs; Inyati; Irene; Kapami and 10 mls SE;

Kariba; Kariba Lake - Sanyati Confluence; Kyle Dam; Lonely Mine; Malapati Drift; Matopos; Mkota Reserve; Mtorashanga; Nyamandhlovu; Odzani Bridge; Odzi; Old Umtali; Plumtree; Que Que; Redbank; Sabi River (Nr. Wedza); 10 mls W of Salisbury; San Mine; Selukwe; Solusi; Trelawney; Tuli; Turk Mine; Umtali & 25 mls S; Umvuma; Umvumvumu River; Vumba Mountain; Wankie; West Nicholson; West Sebungwe; Zambezi River opposite Feira; Ziyambe. ZAMBIA. Abercorn; Chakwenga; Chikowa; Chilanga; Chizera; Dimba Dambo; Fort Jameson; Kabompo; Kalichero; Kariba Lake - Iulongwe Confluence; Kasempa; Kasempa - Mumbwa Road; Kasusu; Londe; Lundazi; Lusaka and 10 mls E; Mambova; Sinazongwe; 40 mls E of Solwezi. MOZAMBIQUE. Bandula; 15 mls SSW of Zobue; Xiluvo.

Literature records. BECHUANALAND. Gaberones; Kabulubula; Kwaai; Mahalapye; Maun. RHODESIA. Hartley; Inyazura (T); Que Que. ZAMBIA. Abercorn; Chingola - Solwezi; 15 Km NW of Fort Rosebery; Kampololo; Kapalala; Luangwa River; Mbatl; 10 Km NW of Ndola. MALAWI. Karonga; Mtimbuka; Mzimba. MOZAMBIQUE. Inhambane; Lourenco Marques; Maputo; Mossuril (T); Tete (?).

NB Peters had only one specimen, but gave its locality first as Tete (1854), subsequently as Mossuril (1882).

Variation. Preoculars 3 (rarely 2 or 4); postoculars 3 or 4 (rarely 1, 2 or 5); temporals 2 + 3 (rarely 2 + 4, 2 + 5 or 3 + 3, or lower temporals fused with labials, all temporals fused with labials in one Matopos mamba); upper labials 8 or 9 (rarely 7, 10, 11 or 12), the fourth (rarely third and fourth, fourth and fifth, fifth or sixth) entering the orbit (excluded on one side of one snake); lower labials 11 - 13 (rarely 10 or 14), the first 4 or 5 (rarely 3) in contact with the anterior sublinguals; dorsals in 21 - 25 rows on neck and at midbody, 15 - 17 before the vent; ventrals 249 - 281 in ♂♂, 256 - 275 in ♀♀; anal divided; subcaudals 112 - 131 in ♂♂, 110 - 127 in ♀♀. Dentition - maxillary II + 0; palatine 4; pterygoid 16 - 17; dentary 2 + 10 (one skull).

Coloration. Dark olive green when freshly sloughed, but normally dark brown, olive or pale grey-brown, often heavily mottled with blackish-brown or with vague dark cross-bands posteriorly; whitish or pale olive green below, with darker mottling posteriorly. Juveniles do not differ from adults in coloration. Inside of mouth blue-grey to black.

Size. Largest ♂ (Grand Reef) 2186 + 581 = 2767 mm. Largest ♀ (NMSR. 372 - 20 mls N of Bulawayo) 2280 + 595 = 2875 mm. Wilson (1965) records a 3110 mm ♂ from Fort Jameson.



Breeding. A 9 foot ♀ contained 12 eggs measuring 75 x 27 mm on 21st November (Wilson, 1965).

Diet. A Kapami mamba contained 4 fledglings and one collected on the Mozambique - Malawi border south of Zebue held a bird. Several stomachs contained rodent fur. A 2663 mm ♀ contained a leveret (Lepus sp.) (Wilson, 1965). Captive mambas feed readily on rats and small birds.

Enemies. A 663 mm juvenile was disgorged by a Psammophis s. sibilans captured by D. S. Rider near Umvuma.

Parasites. Ticks (Aponomma latum) usually present on the neck.

Behaviour. An Account of a combat dance at Kwaai is given by Fitz-Simons (1935b).

Habitat. Common on well-wooded rocky hills and in mopane woodland, but also found in more open country at higher altitudes (e.g. Norton). This species does not seem to occur above 5,000 feet. Black Mambas take refuge in rock crevices, hollow trees and termitaria, several may be found together.

Distribution. Southern Kenya south to north-eastern Cape Province (Port St. Johns), west to Angola and South West Africa.

#### DENDROASPIS JAMESONI JAMESONI (Traill)

Elaps jamesoni Traill, 1843, Essai Phys. Serpents, p. 179, pl. ii, figs. 19 - 20.

Dendroaspis jamesoni jamesoni Bogert, 1940, p. 91; Witte, 1953, p. 284 (Katanga localities).

Dendroaspis jamesoni Pike, 1964, P. 40 (Isangano = Isango; Munikazi River; Lake Kampolombo).

No local specimens examined.

Literature records. ZAMBIA. Isango; Lake Kampolombo; Munikazi River.

Discussion. Unfortunately Pike's specimens from the Lake Bangweulu area were destroyed in a fire, but the swamp forests of this region provide the right habitat for the species, and in view of its presence in Katanga, its discovery in Zambia is not surprising. This forest-dwelling Mamba may also occur in the Mwinilunga District, where many forest mammals and birds have been found.

Distribution. Equatorial forests from Guinea west to the Congo, south to northern Angola and parts of north-western Zambia.

## DENDROASPIS ANGUSTICEPS (A. Smith).

Nais angusticeps A. Smith, 1849, Ill. Zool. S. Africa, Rept., pl. lxx :  
Natal, South Africa.

Dendraspis intermedius Gunther, 1865, Ann. Mag. Nat. Hist., (3), 15, p.  
97, pl. iii, fig. C: Zambezi River, Mozambique.

Dinophis intermedius Peters, 1882, p. 137.

Dendraspis angusticeps (part) Boulenger, 1896, p. 437 (Zambezi), also  
1910, p. 520, and 1915, p. 220.

Dendroaspis angusticeps Loveridge, 1950, p. 251 (Mount Silinda), and 1953a,  
p. 289 (Cholo Mtn.; Mzimba); Broadley, 1959b, p. 69, and 1962d, p. 841;  
FitzSimons, 1962, p. 312 (Marrucuen = Vila Luisa).

Twenty specimens examined from: RHODESIA. Haroni - Lusitu  
Confluence; Inyangani Tea Estates; Jersey Tea Estates; Muzinga River.  
MALAWI. Blantyre (live specimen caught by R. G. H. Sweeney). MOZAM-  
BIQUE. Amatongas; Dondo; Garuso; Gondola; Tica (live specimen in the  
Zoo); Vila Pery.

Literature records. RHODESIA. Mount Silinda. MALAWI. Chiromo  
(Sweeney in litt.); Cholo Mtn.; Mzimba. MOZAMBIQUE. Vila Luisa;  
Zambezi River.

Variation. Preoculars 3 (rarely 2); postoculars 4 (rarely 3 or 5);  
temporals 2 + 3 (rarely 1 + 3 or 2 + 2); upper labials 8 (rarely 7 or 9),  
the fourth (rarely third or third and fourth) entering the orbit; lower  
labials 9 - 11, the first 4 (rarely 3) in contact with the anterior sub-  
linguals; dorsals in 17 - 19 rows on neck and at midbody, 13 before the  
vent; ventrals 204 - 215 in ♂♂, 214 - 221 in ♀♀; anal divided; sub-  
caudals 109 - 120 in ♂♂, 107 - 126 in ♀♀.

Coloration. Bright emerald green or yellow-green above, pale green  
below.

Size. Largest ♂ (UM. 10558 - Muzinga River, Inyanga) 1450 + 410 =  
1860+mm. Largest ♀ (UM. 7057 - Jersey Tea Estates) 1480 + 515 = 1995 mm.

Breeding. The largest ♀ contained 10 eggs measuring 65 x 25 mm on 8th  
October; an 1856 mm ♀ from the Haroni - Lusitu Confluence held 9 eggs  
measuring 22 x 7 mm on 26th May.

Diet. One Haroni River specimen contained a bird (Quelea quelea) and  
a rat (Hemmiscomys griselda).

Field Notes. One Green Mamba was shot in the Amatongas Forest at  
night while it was being "mobbed" by two Galagos (Galago s. granti).



Habitat. Most plentiful in lowland forest areas, but also found on the Pungwe Flats, where the only suitable cover is provided by Mango trees and the extensive reedbeds bordering the Pungwe River. One juvenile was killed on the road in an extensive area of Lantana thicket on the eastern outskirts of Vila Pery.

Distribution. Eastern Africa from Kenya south to Natal and northern Pondoland, west to Lake Tanganyika, Malawi and eastern Rhodesia.

Family HYDROPHIIDAE

Genus PELAMIS Daudin

Pelamis Daudin (part), 1803, Hist. Nat. Rept., 7, p. 361. Type by designation of Fitzinger (1843); P. bicolor Daudin = Anguis platyrus Linnaeus

PELAMIS PLATURUS (Linnaeus)

Anguis platyrus Linnaeus, 1766, Syst. Nat. ed. 12, 1, p. 351: No locality.  
Pelamis platurus FitzSimons, 1962, p. 315.

No local specimens examined.

Although this sea snake certainly occurs in Mozambique waters, there appear to be no definite records. Loveridge (1959, p. 42) has recorded a specimen collected by Ionides near Kilwa, south Tanganyika and there are many records from the southern and eastern coasts of South Africa.

Distribution. Indian and Pacific Oceans.

Family VIPERIDAE

Genus ATRACTASPIS A. Smith

Atractaspis A. Smith, 1849, Ill. Zool. S. Africa, Rept., footnote to text of pl. lxxi. Type by monotypy: A. bibronii A. Smith.

ATRACTASPIS CONGICA CONGICA    Peters

Atractaspis congica Peters, 1877, Monatsb. Akad. Wiss. Berlin, p. 616, pl., fig. 2 : Chinchoxo, Cabinda.

Atractaspis congica orientalis Laurent, 1945, Rev. Zool. Bot. Afr. 38, p. 330: Sandoa, Katanga.

Atractaspis bibroni rostrata (not Gunther), Vesey - FitzGerald (part), 1958, p. 74 (Abercorn).

Atractaspis congica congica x orientalis Broadley & Pitman, 1960, p. 449 (Abercorn).

Six specimens examined from: ZAMBIA. Abercorn (IRSNB & NMSR).

Variation. Preocular 1; postocular 1; temporals 1 + 2; upper labials 5, the second and third entering the orbit; lower labials 5, the first 3 in contact with the anterior sublinguals; dorsals in 19 - 19 - 17 rows; ventrals 208 in ♂, 219 - 225 in ♀♀; anal entire (4) or divided (2); subcaudals 25 in ♂, 19 - 21 in ♀♀, usually the first 4 to 9 single, otherwise paired.

Coloration. Dark purplish-brown above, slightly paler below.

Size. ♂ (IRSNB - Abercorn)  $450 + 37 = 487$  mm. Largest ♀ (NMSR. 1762 - Abercorn)  $506 + 29 = 535$  mm.

Discussion. Witte & Laurent (1950, p. 15) distinguished orientalis from typical A. congica on the following characters:

		<u>A. c. congica</u>	<u>A. c. orientalis</u>
Mental and sublinguals		Separated	In contact
Midbody scale rows		19 or 21	19
Width of frontal in relation to supraoculars		4 times as wide	3 - $3\frac{1}{2}$ times as wide
Vertical diameter of eye in relation to distance separating it from the mouth		X $3\frac{1}{4}$ - $3\frac{1}{2}$ times	X 2 times
Ventrals	♂♂	200 - 224	193 - 207 ( 2 ♂♂)
	♀♀	220 - 237	215 ( 1 ♀)
Range		Cameroun; Lower Congo; Angola.	Dilolo, Katanga

The Abercorn specimens are the most easterly known, but they agree with typical congica in ventral counts, the mental and sublinguals may be in contact or separated and the proportions of the other head shields are intermediate. Laurent (1964c, p. 123) has recorded a similar intergrade from Alto Cuilo, N. E. Angola, but a typical orientalis from Lac Calundo, further south. The latter specimen agrees with four Abercorn snakes in having an entire anal. In view of the variability shown by this species I do not



consider that orientalis warrants subspecific status. Trinominals are still required because of A. c. leleupi Laurent, based on a pair of snakes with dorsals in 17 - 17 - 15 rows from the Kundelungu Plateau of Katanga.

Breeding. The largest ♀ contained 6 eggs measuring 32 x 12 mm on 21st August.

Diet. A 523 mm ♀ had eaten a small rodent, but only the hind feet and tail were undigested.

Distribution. Cameroun, Lower Congo and Angola, east through Katanga to north-eastern Zambia.

#### ATRACTASPIS BIBRONI A Smith

Atractaspis bibroni A. Smith, 1849, Ill. Zool S. Africa, Rept., pl. lxxi :

"Eastern Districts of Cape Colony" († = Natal); Peters, 1854, p. 625

(Mossimboa); Bocage, 1882, p. 290 (Angoche); Peters, 1882, p. 142, pl.

xix A, figs. 3 - 3a, pl. xx, fig. 11; Bocage, 1896, p. 95 (Quelimane);

Chubb, 1909b, p. 36 (Bulawayo); Boulenger, 1910, p. 523 (Delagoa Bay);

Peracca, 1910, p. 5 (Barotseland), and 1912, p. 7 (Luwingu); Boulenger,

1915, p. 223; FitzSimons, 1935b, p. 331 (Gomodimo Pan) and 1937, p. 264;

Bogert, 1940, p. 106 (Mlanje).

Atractaspis rostrata Gunther, 1868, Ann. Mag. Nat. Hist., (4), 1, p. 429,

pl. xix, fig. 1 : Zanzibar; Bocage, 1896, p. 95 ("Mozambique");

Boulenger, 1896, p. 514 (Lake Nyasa); Boettger, 1898, p. 136 (Boroma);

Loveridge, 1923, p. 897 (Lumbo); Cott, 1935, p. 971 (Charre; Ghanzi;

Livingstone); Cunha, 1935, p. 16 (Massangulo); Themido, 1941, p. 18.

Atractaspis irregularis (not Reinhardt) Pfeffer (part), 1893, p. 20 (Quelimane); Bocage, 1896, p. 100.

Atractaspis katangae Boulenger, 1901, Ann. Mus. Congo Zool. (1) 2, p. 13,

pl. v, fig. 2 : Lofoi, Katanga; Pitman, 1934, p. 302; Mertens, 1937,

p. 16 (Nsombo).

Atractaspis duerdeni Gough, 1907, Rec. Albany Mus., 2, p. 178, fig. :

Serowe, Bechuanaland, and 1908, p. 40; Boulenger, 1910, p. 523; Witte

& Laurent, 1950, p. 36.

Atractaspis bibroni bibroni Witte & Laurent, 1950, p. 32; Broadley, 1959b,

p. 70 and 1962d, p. 841; FitzSimons, 1962, p. 319 (Palapye; Trelawney).

Atractaspis bibroni rostrata Witte & Laurent, 1950, p. 33; Loveridge,

1953a, p. 291; Vesey - FitzGerald (part), 1958, p. 74 (Abercorn);

Broadley & Pitman, 1960, p. 449; Hanneý, 1961, p. 24 (Chileka; Matope);

Johnsen, 1962, p. 127 (Ndola; Kawambwa; 20 Km NW of Ndola); Wilson,

1965, p. 167.

Atractaspis bibroni x rostrata Broadley, 1959b, p. 72.

Atractaspis microlepidota (not Gunther) Pike, 1964, p. 37 (Lake Bangweulu).

One hundred and forty-nine specimens examined from: RHODESIA. BallaBalla; Bembesi; Bulawayo and 10 mls S; Chishawasha; Dube Ranch; Essexvale; Haroni - Lusitu Confluence; Heathfield; Imbeza; Inyanga Tea Estates; Irisvale; Jersey Tea Estates; Kariba - Sanyati Confluence; Lake MacIlwaine; 5 mls SE of Lupane; Matopos South; Mchingwe River Bridge; Mount Hampden; Mtoko; Nembudzia; Nyamandhlovu; Odzi; Old Umtali; Plumtree; Que Que; Ruenya River Drift; Ruarwe; Sabi - Lundi Confluence; Salisbury and 10 mls W; Sawmills; Sinoia; Tsungwesi; Umtali; 25 mls W of Victoria Falls; Vumba Mountain; Warren Hills; West Sebungwe; Whitewaters. ZAMBIA. Abercorn; Chikowa; Chilanga; Chilongwelo; Fort Jameson; Kabompo; Kacholola; Kalichero; ~~Kasama~~; Kasusu; Katete; Kawambwa; Livingstone; Mambwe; Msoro; Ndola. MALAWI. Blantyre; Chileka; Fort Manning; Matope; Mpatamanga. MOZAMBIQUE. Amatongas; Maforge; Muda - Lanego; Mugeba; Vila de Manica; Xiluvo.

Literature records. BECHUANALAND. Ghanzi; Gomodimo Pan; Palapye; Serowe. RHODESIA. Bulawayo; Driefontein (T); Kutama (T); Trelawney. ZAMBIA. Abercorn; Kawambwa; Lake Bangweulu; Livingstone; Lawingu; Ndola and 20 Km NW; Nsombo. MALAWI. Chileka; Lake Nyasa; Matope; Mlanje. MOZAMBIQUE. Angoches; Boroma; Charre; Delagoa Bay; Lumbo; Massangulo; Mossimboa; Quelimane.

Variation. Preocular 1; postocular 1; temporals 1 + 2 (very rarely 1 + 3); upper labials 5 (very rarely 4 or 6), the third and fourth (very rarely second and third, third or fourth only) entering the orbit; lower labials 5 (rarely 6) the first 3 (rarely 4) in contact with the anterior sublinguals; dorsals in 21 - 25 rows at midbody, 17 - 21 before the vent (19 - 19 - 17 in UM. 3845, a ♀ from Sabi - Lundi Confluence); ventrals 217 - 255 in ♂♂, 221 - 252 in ♀♀; anal entire; subcaudals 21 - 28 in ♂♂, 18 - 25 in ♀♀.

Coloration. Uniform dark purple-brown to black above, uniform brown below, or with the anal white, or the ventrals white-edged or mottled with white. Nine Rhodesian specimens have the ventrum and outer 2 - 3½ dorsal scale rows pure white.

Size. Largest ♂ (UM. 8000 - Mugeba) 590 + 32 = 622 mm. Largest ♀ (QVM/R. 565 - Salisbury) 600 + 33 = 633 mm.

Discussion. Laurent (1945, p. 338) revived rostrata Gunther as a northern race of A. bibroni because East African snakes usually have 23 midbody scale rows, instead of 21 as in South Africa. Loveridge (1953a; 1955, p. 192) subsequently followed Laurent. I have previously (1959b)



drawn attention to the intermediate status of most Rhodesian populations. The reduction in average midbody scale count from north to south is clinal and does not warrant the recognition of rostrata, see Table 15 below.

	N	19	20	21	22	23	24	25	Mean
Kenya	5	-	-	-	-	5	-	-	23.0
Tanganyika	137	-	-	10	5	121	-	1	22.8
Katanga	21	-	-	2	-	18	-	1	22.9
Zambia	52	-	-	3	2	44	2	1	23.0
Malawi	6	-	-	2	-	3	-	1	22.7
North Mozambique	9	-	-	1	-	8	-	-	22.8
Rhodesia	76	1	-	40	2	31	-	2	21.9
Central Mozambique	18	-	-	10	2	6	-	-	21.8
South West Africa	7	-	-	7	-	-	-	-	21.0
Bechuanaland	2	-	-	2	-	-	-	-	21.0

Table 15. Geographical variation in the number of midbody scale rows in Atractaspis bibroni.

In Bechuanaland and South Africa most specimens are white-bellied (FitzSimons, 1962), but this coloration is very rare north of the Zambezi. In Rhodesia both colour phases may be found at a single locality, but the white-bellied specimens have lower average midbody scale counts (7 with 21; one each with 19 and 23). Two specimens from the Sabi - Lundi Confluence are very different, a white-bellied ♀ has 19 midbody scale rows, 225 ventrals and 24 subcaudals, but a dark-bellied ♂ has 23 scale rows, 236 ventrals and 24 subcaudals.

There is no correlation between 21 midbody scale rows and the white-bellied colour phase, for although 21 out of 22 snakes from Umtali, Melssetter and Chipinga Districts (E. Rhodesia) have 21 scale rows, only one of them is white-bellied.

**Breeding.** A 536 mm Kacholola ♀ contained 6 eggs measuring 36 x 12 mm on 18th June (Wilson, 1965).

**Diet.** This snake preys largely on fossorial reptiles: a 346 mm Whitewaters ♀ had eaten a Typhlops delalandei tail first, a 275 mm Mchingwe River ♂ disgorged an Aparallactus capensis, a 463 mm Kabompo ♀ disgorged a Mehelya nyassae and a Bulawayo snake contained an Acontias g. broadleyi. Mertens (1937) recovered a Typhlops gracilis from the stomach of a Lake Bangweulu specimen. Two snakes from Plumtree and Bulawayo had eaten adult specimens of Nucras t. ornata and these sand lizards are presumably caught in their burrows at night, the body of the snake serving to block the entrance and prevent the occupant from

escaping. Small rodents are also devoured, a 405 mm ♀ from near Fort Manning contained 3 adult Mus minutoides and a Kalichero snake held newborn mice.

Enemies. While checking the oil pipe-line trench at night near Maforga I rescued a 190 mm juvenile from a solfugid, which had just killed it. An adult with a crushed head was found on top of a boulder below the nest of a pair of Barn Owls (Tyto alba) at Bulawayo.

Habitat. Widespread in savanna, usually found under logs or stones, which often have a burrow leading to a lower chamber.

Distribution. Kenya south to Natal, west to Katanga, Angola and South West Africa.

Genus CAUSUS Wagler

Causus Wagler, 1830, Nat. Syst. Amphib., p. 172. Type by monotypy (as Naja V - nigrum Boie is a synonym) : Sepedon rhombeata Lichtenstein

CAUSUS BILINEATUS Boulenger

Causus rhombeatus var. bilineatus Boulenger, 1905, Ann. Mag. Nat. Hist., (7), 16, p. 114 : Between Benguela and Bihe, Angola.

Causus lineatus Laurent, 1955, Revue Zool. Bot. Afr., 51, p. 136 : Seram Research Station, Kundelungu Plateau, Katanga, and 1956, p. 314 (Katanga localities).

Causus bilineatus bilineatus Laurent, 1964c, p. 125 (Angola localities).

Eight specimens examined from: ZAMBIA. Kabompo; Kalabo; Kasempa and 70 mls S; Luansongwe River; Ngangi - Kabompo Confluence (1224 Bb); Pompola.

Variation. Scales in ocular ring 3 - 5; temporals 2 + 3; upper labials 6, excluded from orbit; lower labials 8 - 10, the first 3 - 5 in contact with the anterior sublinguals; dorsals in 16 - 17 rows on nape and at mid-body, 11 - 12 before the vent; ventrals (D) 134 in ♂, 128 - 137 in ♀♀; anal entire; subcaudals 27 in ♂, 21 - 24 in ♀♀. Dentition - maxillary II + 0; palatine 9; pterygoid 27 - 29; dentary 25 (one skull).

Coloration. Grey-brown, with a dark V on the head extending to the anterior edge of the frontal and a series of irregular dark cross-bands on the body, which are broadest mesially and are usually broken by a pair of pale



dorso-lateral stripes, which extend from the nape to the tail; ventral coloration variable, generally dark mesially and light laterally, chin and throat pale.

Size. ♂ (NMSR. 5352 - Pompolo)  $260 + 35 = 295$  mm. Largest ♀ (NMSR. 2342 - Nsangi - Kabompo Confluence)  $500 + 48 = 548$  mm.

Discussion. This sibling species is sympatric with C. rhombeatus in western Zambia, but can usually be distinguished by a combination of characters, i.e. - coloration, smaller size, narrow head and slender body, lower average ventral counts. Laurent (1964c) considers the Kundelungu Plateau populations to be subspecifically distinct (C. b. lineatus), but the Zambian material seems to be intermediate in both ventral counts and size, and as this is a very variable species I consider it premature to recognise races.

The variation in the species C. bilineatus and C. rhombeatus in south-eastern Africa is tabulated below.

		<u>C. bilineatus</u>		<u>C. rhombeatus</u>	
		W. Zambia	Zambia	Bechuanaland Rhodesia & Mozambique	
	N.	1 ♂, 6 ♀♀	51 ♂♂, 51 ♀♀	30 ♂♂, 14 ♀♀	
Midbody scale rows	Range	16 - 17	15 - 19	17 - 19	
" " "	Mean	16.9	17.8	17.6	
Ventrals ♂♂	Range	134	135 - 150	138 - 148	
"	Mean		141.3	141.6	
" ♀♀	Range	128 - 137	134 - 153	138 - 146	
"	Mean	133.2	142.4	143.0	
Subcaudals ♂♂	Range	27	26 - 35	23 - 32	
"	Mean	-	29.9	27.4	
" ♀♀	Range	21 - 24	21 - 33	22 - 26	
"	Mean	22.8	26.2	24.1	

Table 16. Range of Variation in Causus bilineatus and C. rhombeatus in South-east Africa.

Distribution. Angola, western Zambia, Katanga, Rwanda.

#### CAUSUS RHOMBEATUS (Lichtenstein)

Sepedon rhombeata Lichtenstein, 1823, Verz. Doubl. Mus. Zool. Berlin, p. 106: No locality.

Causus rhombeatus Peters, 1882, p. 144 (Inhambane); Gunther 1894, p. 618 (Shire Highlands); Bocage, 1896, p. 100; Boulenger, 1896, p. 467

(Zomba; Mandala; Blantyre); Peracca, 1896, p. 4 (Kazungula); Boulenger, 1897, p. 801 (Nyika Plateau), and 1902, p. 18 (Mazoe); Gough, 1908, p. 38 (Salisbury); Chubb, 1909b, p. 36 (Empandene); Boulenger, 1910, p. 521 (Salisbury; Mazoe); Peracca, 1910, p. 5, (Barotseland); Hewitt & Power, 1913, p. 165 (Marandellas); Boulenger, 1915, p. 220; Pitman, 1934, p. 300 (Broken Hill; Lulimala River; Lukulu Swamps); Cunha, 1935, p. 14 (Massangulo); FitzSimons, 1935b, p. 328 (Shorobe); and 1939b, p. 24 (Mount Silinda); Bogert, 1940; p. 96 (Mlanje; Karonga); Themido, 1941, p. 18; Mitchell, 1946, p. 42; Loveridge, 1953a, p. 292 (Zomba Plateau; Likabula River; Cholo Mtn.; Chinunkha; Misuku Mtns; Nchenachena; Mlanje Mtn.); Broadley, 1957b, p. 115, illus.; Vesey - FitzGerald, 1958, p. 75 (Abercorn; Mpulungu; Chinsali); Broadley, 1959b, p. 73; Broadley & Pitman, 1960, p. 449; Hanney, 1961, p. 22 (Blantyre); Broadley, 1962d, p. 842; FitzSimons, 1962, p. 324 (Chishawasha; Eldorado; Hunyani; Inhaca Island; Lourenco Marques; Trelawney; Tsessebe); Pike, 1964, p. 35 (Milambo).

Gausus rhombeatus rhombeatus Laurent, 1956, p. 311; Manacas, 1959, p. 156 (Lifidzi; Matengo Balema); Johnsen, 1962, p. 128 (Solwezi District; Abercorn; Tunduma; Chingola); Wilson, 1965, p. 167.

Gausus sp. Cunha, 1935, p. 15 (Massangulo).

One hundred and seventy-nine specimens examined from:

BECHUANA LAND. Kwaai River. RHODESIA. Bulawayo and 12 mls S; Chimanimani Mountains (Bundi Valley); Chirinda Forest; Clearwaters; Haroni - Lusitani Confluence; Essexvale; Gatcom; /Honde Valley; Hope Fountain; Inyanga Tea Estates; Mount Dombo; Mount Hampden; Odzani; Odzi; Old Umtali; Rhodes Inyanga Estate; Sabi - Lundi Confluence; Salisbury; Selukwe; Silverstreams; Sipolilo; Thorn Park; Vumba Mountain; Westacre. ZAMBIA. Abercorn; Balovale District; Chikowa; Chilanga; Chipengali; Fort Jameson; Ikelenge; Kabompo; Kafue National Park; Kalichero; Kaniki; Kasempa & 10 mls S; Kasusu; Kaungashi; Kitwe; Lower Lushwishi River; Lundazi; Lunga Game Reserve; Lusaka; Mpika; Mporokoso; Mpulungu; Msoro; Mukup; Mumbwa; Nsefu; Serenje (BM); Siantamba; Solwezi; Zambezi River (1322 Ba). MOZAMBIQUE. Chemezi.

Literature records. BECHUANA LAND. Shorobe; Tsessebe. RHODESIA. Chishawasha; Eldorado; Empandene; Hunyani; Marandellas; Mazoe; Mount Silinda; Salisbury; Trelawney. ZAMBIA. Abercorn; Broken Hill; Chingola; Chinsali; Kabuta (B); /Kasama (B); Kalaba (B); Kawambwa (B); Kazungula; Lukulu Swamps; Lulimala River; Mambwe (B); Milambo; Mporokoso (B); Mpulungu; Mweru - Wantipa (B); Solwezi District;



Tunduma. MALAWI. Blantyre; Chimunkha; Cholo Mtn.; Karonga; Likabula River; Mandala; Misuku Mtns.; Mlanje Mtn; Nchenachena; Nyika Plateau; Zomba; Zomba Plateau. MOZAMBIQUE. Inhaca Island; Inhambane; Lifidzi; Lourenco Marques; Massangulo; Matengo Balema.

Variation. Scales in ocular ring 2 - 6; temporals 2 + 3 (rarely 1 + 2, 1 + 3, 2 + 2 or 2 + 4); upper labials 6 (rarely 7), excluded from orbit; lower labials 8 - 10 (rarely 7 or 11), the first 3 - 4 (rarely 5) in contact with the anterior sublinguals; dorsals in 15 - 18 (usually 17) rows on neck, 15 - 19 (usually 17 or 18) at midbody, 11 - 13 (usually 12) before the vent; ventrals 135 - 150 in ♂♂, 134 - 154 in ♀♀; anal entire; subcaudals 23 - 35 in ♂♂, 21 - 33 in ♀♀. Dentition - maxillary II + 0; palatine 8; pterygoid 20 - 23; dentary 19 - 25 (3 skulls).

Coloration. Grey-brown, gray-green, yellow-brown or pink above, sometimes uniform, but usually with a dark V on the head with the apex on the frontal and a series of dark rhombic markings on the back (these may be pale-edged) and vague dark transverse bars on the flanks; usually pearl white below, the ventrals often infuscated with black at the base, but rarely as dark as C. bilineatus.

Size. Largest ♂ (UM. 9676 - Silverstreams) 770 + 92 = 862 mm. Largest ♀ (MCZ. 51581 - Misuku Mtns.) 740 + 106 = 846 mm.

Breeding. A 572 mm ♀ from the Lushwishi River contained 16 eggs measuring 13 x 7 mm on 28th June. Wilson (1965) recorded clutches of 25 - 29 eggs laid by four captive ♀♀ between 9th September and 4th October. Loveridge (1953a) found 26 eggs (25 x 14 mm) in a Likabula ♀ on 2nd August and 22 eggs (14 x 6 mm) in a Misuku ♀ on 5th October.

Diet. This species seems to feed almost entirely on toads (Bufo spp.), but other amphibians are also taken.

Parasites. Ascarid worms (Ophidascaris, Polydelphis and Hexametra spp.) were found in the alimentary tracts of night adders from Malawi (Loveridge, 1953a).

Enemies. A 336 mm Ikelenge ♀ was killed by a Lizard Buzzard (Kaupifalco monogrammicus) and a Selukwe snake was killed by a domestic hen.

Habitat. Widespread in savanna up to 6,000 feet, but absent from most of the Mozambique Plain, where it is replaced by C. defilippii.

Distribution. The Sudan and Somalia south to the Cape Province, west to the lower Congo and Angola. Replaced by C. maculatus Hallowell in the western rain forests and by C. defilippii on the East African coastal plains, absent from the South West Arid.

## CAUSUS DEFILIPPII (Jan)

Heterodon De Filippii Jan, 1862, Arch. Zool. Anat. Fisiol., 2, p. 225: Africa.

Causus (Heterophis) rostratus Gunther, 1863, Ann. Mag. Nat. Hist., (3), 12, p. 363 : Ugogo, Tanganyika.

Causus resimus (not Peters) Bocage, 1882, p. 290 (Angoche); Boulenger, 1907a, p. 12 (Petauke); Pitman, 1934, p. 300; Vesey - FitzGerald, 1958, p. 77; Pike, 1964, p. 36 (Chilubi Island; Mutwamina).

Causus rostratus Gunther, 1893, p. 555 (Shire Highlands); Bocage, 1895, p. 147 and 1896, p. 95 (Angoche).

Causus defilippii Boulenger, 1896, p. 469 (Zomba), and 1902, p. 18 (Mazoe); Chubb, 1909a, p. 597 and 1909b, p. 36 (Bulawayo); Boulenger, 1910, p. 521 (Salisbury; Livingstone), and 1915, p. 221; Pitman, 1934, p. 300; Cott, 1935, p. 970 (Gaia; Charre; Fambani); Mertens, 1937, p. 16 (Inhaminga); FitzSimons, 1939b, p. 24 (Vumba Mountain; Mount Silinda; Birchenough Bridge); Bägert, 1940, p. 99 (Mlanje); Loveridge, 1953a, p. 293 (Nchenachena; Chitala River; Ruo River); Broadley, 1957b, p. 115, illus; Vesey - FitzGerald, 1958, p. 77; Broadley, 1959b, p. 74; Manacas, 1959, p. 155 (Vila Paiva de Andrada); Broadley & Pitman, 1960, p. 450; Broadley, 1962d, p. 842; FitzSimons, 1962, p. 328 (Chishawasha; Filabusi; Lourenco Marques; Masieni; Shangani; Trelawney); Johansen, 1962, p. 128 (Penhalonga); Wilson, 1965, p. 168.

One hundred and fifty-four specimens examined from: RHODESIA.

Balla Balla; Belingwe; Bengi Spring; Birchenough Bridge; Bulawayo and 165 mls N; Chirinda Forest; Empandene; Essexvale; Figtree; Gwaai Siding; Haroni - Lusitu Confluence; Inyanga Tea Estates; Irisvale; Kariba Lake - Charama Confluence; Karoi; Khami; Kyle Dam; Lundi - Tokwe Confluence; Matopos; Matopos South; Odzi; Salisbury; Selukwe; Syringa Farm; Triangle; Victoria Falls; Vumba Mountain. ZAMBIA.

Chikowa; Chipengali; Fort Jameson; Jumbe; Kalichero; Livingstone; Msoro; Mukupa (IRSNB); Petauke Old Boma (BM); Serenje. MALAWI.

Injeri Estates; Rumpi. MOZAMBIQUE. Dondo; Erege; Inchope; Maforaga; Manga; Muda - Lamego; Ribau; Vila de Manica; Xiluvo.

Literature records. RHODESIA. Balla Balla (BM); Birchenough Bridge; Bulawayo; Chishawasha; Filabusi; Mazoe; Mount Silinda; Musami (T); Penhalonga; Salisbury; Shangani; Trelawney; Vumba Mtn. ZAMBIA. Abercorn(B); Chilubi Island; Livingstone; Mambwe (B); Mutwamina; Mweru - Wantipa (B); Petauke. MALAWI. Chitala River; Mlanje; Nchenachena; Ruo River; Zomba. MOZAMBIQUE. Angoche; Gaia; Charre; Fambani; Inhaminga; Lourenco Marques; Masieni; Vila Paiva de Andrada.



Variation. Scales in ocular ring 3 - 7; temporals 2 + 3 (rarely 1 + 2, 1 + 3, 2 + 2, 2 + 4 or 3 + 4); upper labials 6 (very rarely 7), excluded from the orbit (third labial enters orbit in one specimen only); lower labials 6 - 10, the first 3 - 4 in contact with the anterior sublinguals; dorsals in 17 (rarely 18) rows on neck, 17 (rarely 16 or 18) at midbody, and 13 (rarely 11 or 12) before the vent; ventrals 110 - 123 in ♂♂, 112 - 129 in ♀♀; anal entire; subcaudals 13 - 19 in ♂♂, 10 - 17 in ♀♀. Dentition - maxillary II + 0; palatine 7; pterygoid 21; dentary 22 (one skull).

Coloration Pale brown, pink, mauve or bright green above, with a darker dorsal band, a black V on the head with its apex on the frontal, a series of dark dorsal blotches or triangles with their apices directed posteriorly and some dark lateral bars; juveniles black below, becoming lighter in adults, usually pearl white.

Size. Largest ♂ (UM. 6324 - Muda - Lamago)  $345 + 30 = 375$  mm; Largest ♀ (MZ. 51596 - Ruu River)  $385 + 28 = 413$  mm.

Remarks. The green phase of C. defilippii seems to be restricted to Zambia and Malawi and it has been misidentified as C. resimus on several occasions.

Breeding. Loveridge (1953a) found 6 eggs measuring  $11 \times 6$  mm in a Chitala River ♀ on 15th December. Wilson (1965) records 10 eggs laid by a captive ♀ on 19th October, while other females examined held 7 - 10 eggs. I have found 3 - 6 eggs in ♀♀ collected in early December.

Diet. This species feeds on small amphibians, a 302 mm Erego ♂ contained an adult Breviceps m. mossambicus.

Habitat. Very common on the Mozambique Plain, but also found on the plateau areas up to 5,000 feet, where it may locally replace C. rhombeatus (as at Umtali and parts of south - western Matabeleland).

Distribution. Eastern Kenya south to Natal, west to Zambia, Rhodesia and northern Transvaal.

Genus BITIS Gray

Cobra Laurenti, 1768, Syn. Rept., p. 103. Type by designation of Fitzinger (1843): Coluber atropos Linnaeus. (Rejected in favour of Bitis: 1945, Opin. Declar. Inter. Comm. Zool. Nomencl., 3, Opinion 188).

Bitis Gray, 1842, Zool. Misc., p. 69. Type by tautonymy: Coluber  
Bitis (sic) Bonnaterra = Cobra lachesis Laurenti (Echidna arietans  
Merrem).

BITIS ARIETANS ARIETANS (Merrem)

Cobra lachesis Laurenti, 1768, Syn. Rept., p. 104: No locality;  
Mertens, 1937, p. 16 (Inhaminga).

Vipera (Echidna) arietans Merrem, 1820, Vers. Syst. Amphib., p. 152:  
Cape of Good Hope; Bocage, 1896, p. 95.

Echidna arietans Peters, 1854, p. 626 (Tete; Mozambique; Boror).

Clotho arietans Gunther, 1864, p. 307 (Zambezi Expedition), and 1893,  
p. 555 (Shire Highlands).

Bitis arietans Peters, 1882, p. 145 (Tete; Sena; Mozambique; Inham-  
bana); Boulenger, 1896, p. 493 (Zomba; Chiradzulu; Lake Nyasa;  
Zambezi), also 1897, p. 801 (Nyika Plateau), 1902, p. 18 (Mazoe),  
1907a, p. 12 (Petauke; Mbala Country), and 1907b, p. 487 (Inhambane;  
Beira); Gough, 1908, p. 39 (Salisbury; Serowe); Chubb, 1909a, p.  
597 and 1909b, p. 36 (Bulawayo); Boulenger, 1910, p. 522 (Mazoe;  
Hunyani River; Salisbury); Peracca, 1910, p. 5 (Barotseland);  
Werner, 1910, p. 366 (Koca); Hewitt & Power, 1913, p. 165 (Maran-  
dellas; Ky Ky; Nossob); Boulenger, 1915, p. 221; Loveridge, 1923,  
p. 894 (Lumbo); Pitman, 1934, p. 300; Cott, 1935, p. 971 (M'Gaza;  
Gaia; Charre; Amatongas; Fambani); Cunha, 1935, p. 13 (Massan-  
gulo); FitzSimons, 1935b, p. 329 (Kuke; Kuke - Gomodimo; Gomodimo  
Pan; Gomodimo - Kaotwe; Kaotwe; Damara Pan; Mabeleapudi; Motlhat-  
logo; Maun; Shorobe; Kwaai; Tsotsoroga; Kabulabula); and 1939b,  
p. 24 (Mount Silinda); Themido, 1941, p. 18 (Zumbo; Massangulo);  
Mitchell, 1946, p. 42; \* FitzSimons & Brain, 1958b, p. 104; Vesey-  
FitzGerald, 1958, p. 77 (Abercorn); Pike, 1964, p. 34 (Isangano; Mbo  
Island). \* Loveridge, 1953c, p. 144 (Zomba; Chiromo - Port Herald);

Bitis lachesis Bogert, 1940, p. 99 (Karonga).

Bitis arietans arietans Loveridge, 1953a, p. 293 (Kasungu; Cholo Mtn.;  
Likabula River; Misuku Mtns.; Nchisi Mtn.; Mwera Hill; Chitala  
River; Mtimbuka; Kasumbadedza); Broadley, 1959b, p. 76; Broadley  
& Pitman, 1960, p. 450; Hanney, 1961, p. 22 (Blantyre); Broadley,  
1962d, p. 842; FitzSimons, 1962, p. 334 (Chishawasha; Filabusi;  
Guija; Hunyani; Inhaca Island; Inhambane; Livingstone; Lourenco  
Marques; Mahalapye; Maputo; Marandellas; Moamba; Que Que; Rama-  
quabane; Rikatla; Trelawney; Tsessebe; Twee Rivieren; Umvuma;  
Wankie; Zavala = Quissico); Johnsen, 1962, p. 128 (Ndola and 22 Km  
NW); Wilson, 1965, p. 168.



Bitis lachesis lachesis Manacas, 1959, p. 157 (Manhica; Vila Coutinho; Vila Paiva de Andrada; Govuro), and 1961, p. 160.

One hundred and sixty-nine specimens examined from:

BECHUANALAND. Debeeti; Matjemloaji; Maun; Okovango; Sepopa.  
RHODESIA. Balla Balla; Binga; Buby River; Bulawayo, 7 mls NW, 10 mls N and 9 mls S; Burma Valley; Eiffel Flats; Essexvale; Gatooma; Gwaai Siding; Gwanda; Gatsi; Haroni - Lusitu Confluence; Insiza; Inyanga Tea Estates; Inyazura; Kapami; Kariba; Kariba Lake - Bumi Confluence; Khami; 10 mls SE of Lupane; Malimbasingi; Malapati Drift; Martin Forest Reserve; Mazoe; Odzi; Old Umtali; Penhalonga; 8 mls W of Que Que; Riverside; Sabi - Lundi Confluence; 5 mls W of Selous; Selukwe; Shangani River; Silverstreams; Sinoia; Skyline Junction; Stapleford; Tuli; Umgusa River; Umtali; Victoria Falls; Vumba Mountain; Woodlands; Zambezi - Sebungwe Confluence. ZAMBIA. Abercorn; Chikowa; Chilanga; Chingola; Chingola - Solwezi; Chipengali; Fort Jameson; Fort Rosebery; Kabompo; Kafue National Park; Kalichero; Kasempa; Kasusu; Kitwe; Luanshya; Lusaka; Maoro; Mufulira; Ndola District; Siantamba; Solwezi Boma. MOZAMBIQUE. Inchope; Inhaca Island (EBM); Manga; Metuchira; Morrumbala; Vila de Manica; Xiluvo.

Literature records. BECHUANALAND. Damara Pan; Gomodimo Pan; Gomodimo - Kaotwe; Kabulabula; Kaotwe; Koca; Kuke; Kuke - Gomodimo; Kwaai; Ky Ky; Mabeleapudi; Mahalapye; Maun; Motlhatlogo; Nossob; Serowe; Shorobe; Tsessebe; Tsotsoroga; Tsee Rivieren. RHODESIA. Bulawayo; Chishawasha; Filabusi; Hunyani; Marandellas; Mazoe; Mount Silinda; Que Que; Ramaquabana; Salisbury; Trelawney; Umvuma; Wankie. ZAMBIA. Abercorn; Broken Hill (BM); Isangano; Kasama (B); Kawambwa (B); Lake Bangweulu (B); Livingstone; Mbala Country; Mbo Island; Ndola and 22 Km NW; Petauke; Serenje (BM). MALAWI. Blantyre; Chiradzulu; Chiromo - Port Herald; Chitala River; Cholo Mtn.; Karonga; Kasungu; Lake Nyasa; Likabula River; Misuku Mtns.; Mtimbuka; Mvera Hill; Nchisi Mtn.; Nyika Plateau; Zomba. MOZAMBIQUE. Amatongas; Beira; Boror; Caia; Charre; Fambani; Govuro; Guija; Inhaca Island; Inhambane; Inhanga; Kasumbasedza; Lourenco Marques; Lumbo; Manhica; Maputo; Massangulo; M'Gaza; Moamba; Mozambique Island; Quissico; Rikatla; Sena; Tete; Vila Coutinho; Vila Paiva de Andrada.

Variation. Upper labials 12 - 17; dorsals in 27 - 37 rows at mid-body; ventrals 124 - 138 in ♂♂, 125 - 141 in ♀♀; anal entire; subcaudals 26 - 37 in ♂♂, 14 - 27 in ♀♀.

Coloration. Yellow brown or blackish above, the top of the head with a light interocular stripe, the back with a series of dark pale-edged chevrons pointing posteriorly, the tail with light and dark cross-bands; yellow or white below with black blotches.

Size. Largest ♂ (UM. 3149 - Chipengali)  $880 + 137 = 1017$  mm. Largest ♀ (UM. 9623 - Manga)  $925 + 80 = 1005$  mm.

Breeding. The young are born during December and early January, the brood varying from 19 to 43.

Diet. Juveniles feed largely on toads; a 389 mm Kiluvo ♀ contained a young Pyxicephalus adspersus. Some adults take toads, but they prey largely on rodents. Wilson (1965) has recorded a hatchling Testudo p. babcocki eaten by a Puffadder.

Enemies. Adult ♀♀ were twice recovered from the stomachs of large Naja h. annulifera in the Bulawayo area. The remains of a Puffadder were found in the stomach of an African Wild Cat from Kabulabula and domestic cats frequently kill Puffadders.

Parasites. The common snake tick Aponomma latum has been recorded from a Vila Paiva de Andrada specimen by Manacas (1959).

Habitat. Common in savanna and found in open grassland up to 5,500 feet.

Distribution. The whole of Africa except for rain forest areas, highlands and true desert, also southern Arabia.

#### BITIS ATROPOS ATROPOS (Linnaeus)

Coluber atropos Linnaeus, 1757, Syst. Nat., ed. 10, 1, p. 216 : "America", in error for Cape of Good Hope.

Bitis atropos FitzSimons, 1958a, p. 210 (Pungwe River Causeway); Broadley, 1959b, p. 79

Bitis atropos atropos Broadley, 1962d, p. 842; FitzSimons, 1962, p. 343.

Thirty-two specimens examined from: RHODESIA. Chimanimani Mountains; Inyanga National Park (Inyangani Mountain; Mare Dam); Inyanga North; Tsetsera. MOZAMBIQUE. Chimanimani Mountains near Martin's Falls.

Literature records. RHODESIA. Pungwe River Causeway.

Variation. Upper labials 10 - 13; dorsals in 27 - 33 rows at midbody; ventrals 121 - 132 in ♂♂, 129 - 134 in ♀♀; anal entire; subcaudals 20 - 25 in ♂♂, 16 - 22 in ♀♀.

Coloration. Grey-brown to blackish, with a dark marking on top of the head and a pair of pale (often broken) dorso-lateral stripes, which are bordered above and below by dark semicircular markings, which may be confluent dorsally; bluish white to slate grey below, the lower labials with black markings.



Size. Largest ♂ (UM. 3408 - Chimanimani Mtns.)  $326 + 33 = 359$  mm.  
Largest ♀ (UM. 8424 - Taetsera)  $410 + 27 = 437$  mm.

Remarks. The relict Rhodesian populations differ from those of South Africa in a lower average subcaudal count, i.e. 20 - 25 in ♂♂ instead of 25 - 28 and 16 - 22 in ♀♀ instead of 18 - 25, but there appear to be no other differences which would support subspecific separation.

Breeding. A 430 mm Chimanimani ♀ contained 7 embryos and an infertile egg. New born young measure 140 - 142 mm in total length.

Diet. A 340 mm Chimanimani ♂ contained a Cordylus c. rhodesianus.  
A captive juvenile from Inyanga North fed readily on young Bufo regularis.

Habitat. Montane grassland from 5,000 to 8,000 feet.

Distribution. The eastern escarpment from Table Mountain to the Transvaal Drakensberg, descending to sea level in the eastern Cape Province. Relict populations on the Rhodesian escarpment from the Chimanimani Mountains north to the Inyanga Highlands.

#### BITIS CAUDALIS (A. Smith)

Vipera (Cerastes) caudalis A. Smith, 1839, Ill. Zool. S. Africa, Rept., pl. vii: "Sandy districts north of Cape Colony."

Bitis caudalis Boulenger, 1896, p. 498; Gough, 1908, p. 39 (Serowe; M'moouve); Chubb, 1909a, p. 597 and 1909b, p. 36 (Bulawayo); Boulenger, 1910, p. 523 (Serowe; Insiza); Werner, 1910, p. 367 (Lehututu; Sekgoma); Hewitt & Power, 1913, p. 165 (Ky Ky); Fitz Simons, 1935b, p. 330 (Molepolole - Kuke; Gomodimo Pan; Kaotwe; Okwa River; Damara Pan), and 1937, p. 264; FitzSimons & Brain, 1958b, p. 104; Broadley, 1959b, p. 78; FitzSimons, 1962, p. 349 (Palapye; Tsee Rivieren).

Sixteen specimens examined from: RHODESIA. Beitbridge; Bulawayo; Matopos; Tuli.

Literature records. BECHUANALAND. Damara Pan; Gomodimo Pan; Kaotwe; Ky Ky; Lehututu; M'moouve; Molepolole - Kuke; Okwa River; Palapye; Sekgoma; Serowe; Tsee Rivieren. RHODESIA. Bulawayo; Insiza.

Variation. Upper labials 11 - 14; dorsals in 24 - 29 rows at midbody; ventrals 120 - 135 in ♂♂, 126 - 135 in ♀♀; anal entire; subcaudals 21 - 27 in ♂♂, 15 - 19 in ♀♀.

Coloration. Very variable. Males usually have the head light red-brown, passing to grey on the temples, there is a yellow interocular line, dark lines radiate from the orbit to the lip, a dark red-brown U-shaped marking on the back of the head extends onto the neck, body blue-grey above, with a series of dark red-brown, yellow-edged dorsal blotches, which are more or less oval in shape; light red-brown laterally, with a series of oval markings, which are grey above and dark red-brown, edged with yellow, below; ventrum white, tinged with orange laterally. Females are often sandy brown with the markings poorly defined.

Size. Largest ♂ (NMSR. 357 - Beitbridge)  $270 + 31 = 301$  mm. Largest ♀ (UM. 5314 - Matopos)  $405 + 27 = 432$  mm.

Habitat. Generally found in arid sandy regions, but some specimens from Bulawayo have been collected on red schist soils.

Distribution. Southern Angola, South West Africa, the western Cape Province, southern Bechuanaland, south-western Rhodesia and north-western Transvaal.

#### BITIS GABONICA GABONICA (Dumeril & Bibron)

Echidna Gabonica Dumeril & Bibron, 1854, Erpet. Gen. 7, p. 1428, pl. lxxx b: Gabon.

Echidna rhinoceros (not Schlegel) Peters, 1854, p. 626 (Boror).

Bitis rhinoceros (not Schlegel) Peters, 1882, p. 146.

Vipera rhinoceros (not Schlegel) Bocage, 1896, p. 101.

Bitis gabonica Boulenger, 1896, p. 499 (part), also 1907a, p. 12 (Ndola), and 1915, p. 221; Pitman, 1934, p. 300 (Kawambwa); Billson, 1951, p. 66 and 1956, p. 33 (Kitwe); FitzSimons, 1958a, p. 211 (Honde Valley); Vesey - FitzGerald, 1958, p. 78 (Abercorn); Berry 1963, p. 71 (21 mls E of Mumbwa; Mumbwa; Ngoma; Kabompo; Danger Hill; Kasanka Game Reserve); Pike, 1964, p. 33 (Samfya; Yongollo; Kapalala).

Cobra gabonica Mertens, 1937, p. 16 (Inhaminga).

Bitis gabonica gabonica Broadley, 1959b, p. 77; Broadley & Pitman, 1960, p. 450; Manacas, 1961, p. 161 (Vila Paiva de Andrada); FitzSimons, 1962, p. 339 (Chibabava; Vila Pery); Johnsen, 1962, p. 129 (Ndola).

Thirty specimens examined from: RHODESIA. Dzorora Farm; Haroni - Lusitu Confluence; Inyanga Tea Estates; Ngorima Reserve (E); Pungwe Bridge (Inyanga); Stapleford. ZAMBIA. Abercorn; Chikata; Kabompo; Kawambwa; Kitwe; Mumbwa; Ngoma. MOZAMBIQUE. Chemezi; Inchope.



Literature records. RHODESIA. Honde Valley. ZAMBIA. Abercorn; Danger Hill; Kabompo; Kapalala; Kasanka Game Reserve; Kawambwa; Kitwe; Mporokoso (B); Mumbwa; 21 mls E of Mumbwa; Ndola; Ngoma; Samfya; Yon-gollo. MOZAMBIQUE. Boror; Chibabva; Inhaminga; Vila Paiva de Andrada; Vila Pery.

Variation. Supranasal horns present or absent; upper labials 13 - 17; dorsals in 38 - 46 rows at midbody; ventrals 125 - 134 in ♂♂, 132 - 139 in ♀♀; anal entire; subcaudals 27 - 32 in ♂♂, 17 - 23 in ♀♀.

Coloration. Head buff, with a dark median line, a dark brown triangle with its apex at the orbit and its base bordering the lip, this is divided by a narrow light line or spot; a vertebral series of sharply defined buff rectangles are linked by hour-glass shaped brown markings; the lateral markings consist of a complex, basically triangular pattern in buff, purple, brown and pink; buff below with dark grey infuscations.

Size. Largest ♂ (UM. 10387 - E. Ngorima Reserve)  $1193 + 135 = 1328$  mm. Largest ♀ (NMSR. 4347 - Kabompo)  $1285 + 85 = 1370$  mm. Specimens nearly six feet in length have been killed on the Inyanga Tea Estates (Garbett, pers. comm.). I have examined the skin of a 5 feet 3 inch specimen killed on Mount Silinda. The largest recorded in the Lake Bangweulu area measured 5 feet 2 inches and weighed  $16\frac{1}{2}$  lbs (Pike, 1964) and Berry (1963) records a 5 feet 3 inch specimen from 21 miles east of Mumbwa.

Breeding. The 1370 mm Kabompo ♀ contained about 35 eggs on 19th March, she weighed 12 lbs (Ansell register).

Diet. A juvenile from Inyanga Tea Estates contained a Praomys natalensis. A Chikata ♂ contained an Aethomys chrysophilus (Ansell register). A Kitwe specimen of 5 feet 1 inch contained a vervet monkey (Cercoptes aethiops) (Newby, in litt.). A 1400 mm Boror ♀ contained a Bushy-tailed Mongoose (Bdeogale crassicaudata) (Peters, 1882). Pike (1964) records the following stomach contents from the Lake Bangweulu region: fledgling birds, cormorants, rats, young hares, lizards, frogs, toads and locusts. Captive specimens feed readily on rodents and birds, Berry (1963) records a freshly killed fruit bat being taken.

Habitat. Forested or formerly forested areas, especially forest fringes. On the Inyanga Tea Estates they are usually found during clearing operations, especially under piles of brushwood (Garbett, pers. comm.). Specimens have been collected on Stapleford Forest Reserve up to 6,000 feet in montane grassland. In Zambia this species occurs in thorn thicket on Kalahari sand in the Kafue National Park, but it is largely restricted to Brachystegia - Julbernardia woodlands in the high rainfall (32 inches +) areas (Berry, 1963).

In the Lake Bangweulu region it may frequently be seen swimming across rivers and lagoons (Pike, 1964).

Distribution. Southern Sudan, south to Zululand, west to Togoland, the Congo, Angola, northern and western Zambia and eastern Rhodesia. It is apparently rare and local in Malawi, but Sweeney (in litt.) has seen skins from Mzuzu.

#### BITIS NASICORNIS (Shaw)

Coluber nasicornis Shaw, 1802, Nat. Miscell., 3, pl. xciv : Interior of Africa (from the Master of a Guinea vessel).

Bitis nasicornis Laurent, 1956, p. 327 (Kivu material); Pike, 1964, p. 36 (Chibula).

No local specimens examined.

Pike (1964) has recorded four specimens from the swamp forest (Mushitu) of Chibula, Lake Bangweulu, unfortunately they were destroyed in a fire. Although the nearest records are in the Kivu Province of the Congo (Laurent, 1956), this viper can hardly be confused with anything else and the Bangweulu swamp forests provide an ideal habitat for a relict population. It should be noted that the Western Forest Otter-Shrew (Potamogale velox) occurs in the Bangweulu area (Ansell, 1960).

#### Genus ATHERIS Cope

Chloroechis Bonaparte, 1849, Proc. Zool. Soc. London, p. 145, footnote.

Type by tautonymy: Vipera chloroechis Schlegel (Nomen oblitum).

Atheris Cope, 1862, Proc. Acad. Nat. Sci. Philadelphia, p. 337. Type by monotypy: Vipera chloroechis Schlegel.

#### ATHERIS SUPERCILIARIS Peters

Vipera superciliaris Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 625:

Mainland opposite Querimba Island, Cape Delgado, Mozambique, and 1882, p. 144, pl. xxi; Pfeffer, 1893, p. 89 (Quelimane); Bocage, 1896, p. 101; Loveridge, 1933, p. 275 (Mwaya, Tanganyika); Cott, 1935, p. 970, pl. 1 (Charre; Caia; Fambani); FitzSimons, 1962, p. 331.

Atheris superciliaris Marx and Rabb, 1965, p. 182.



Two specimens examined from: MALAWI. Liwonde (Shire River).  
MOZAMBIQUE. Muda.

Literature records. MALAWI. Nchisi Island, Lake Chilwa (BM).  
MOZAMBIQUE. Gaia; Charre; Fambani; Mainland opposite Querimba Island;  
Quelimane.

Variation. Upper labials 8 - 9; dorsals in 27 (rarely 26 or 30) rows at midbody; ventrals 142 - 152 in ♂♂, 145 - 159 in ♀♀; anal entire; subcaudals 38 - 43 in ♂♂, 32 - 43 in ♀♀.

Coloration. Grey-brown above; sides of head cream, three broad black chevrons on head, which extend to the lip; a series of transverse black dorsal blotches are divided by a dorso-lateral series of yellow streaks; white below, with a pair of black lateral stripes on the chin and a median black stripe on the throat, ventrum with irregular large black spots.

Size. Largest ♂ (Type)  $493 + 77 = 570$  mm. Largest ♀ (Cott, 1935 - Charre)  $552 + 55 = 607$  mm.

Habitat. Swamps.

Distribution. The Malawi trough from Mwaya at the northern end of the Lake (Loveridge, 1933) to the Shire - Zambezi Confluence, with an eastward extension to Lake Chilwa, the swamps bordering the lower Zambezi, then north through the coastal swamps of northern Mozambique to Cape Delgado; the Urema trough which links the lower Zambezi swamplands with those of the lower Pungwe.

#### ATHERIS NITSCHKEI RUNGWEENSIS Bogert

Atheris sp. Pitman, 1934, p. 302 (but no material).

Atheris nitschkei rungweensis Bogert, 1940, Bull. Amer. Mus. Nat. Hist., 77, p. 104, fig. 18: Rungwe Mountain, Tanganyika; Loveridge, 1953a, p. 295, pl., v, fig. 1 (Misuku Mtns.); Vesey-FitzGerald, 1958, p. 79 (Abercorn); Broadley & Pitman, 1960, p. 450; Wilson, 1965, p. 169.

Two specimens examined from: ZAMBIA. Abercorn to Mbeya (IRSNB); Nyika Plateau.

Literature records. ZAMBIA. Abercorn. MALAWI. Misuku Mountains,

Variation. Interorbital scales 11 - 13; top of head covered with keeled scales; upper labials 9 - 12; gulars more or less keeled; dorsals in 26 - 31 rows at midbody; ventrals 153 - 164; anal entire; subcaudals 49 - 58, single.

Coloration. Dark green above, lighter laterally, with a pair of dorso-lateral yellow zig-zag lines, which may be linked across the back by yellow cross-bands; yellow below.

Size. Largest ♂ (MCZ. 51614 - Misuku Mtns.)  $370 + 70 = 440$  mm. Largest ♀ (MCZ. 51615 - Misuku Mtns.)  $550 + 92 = 642$  mm.

Discussion. Loveridge (1942, p. 313) has pointed out that the only valid character distinguishing this southern race from the [typical] form is the keeled gulars. There is a clinal increase from north to south in number of head scales, ventrals and subcaudals (see discussion by Laurent, 1956, p. 338), and rungeensis apparently differs in coloration, having yellow dorsal markings instead of black markings as in the typical form. Atheris katangensis Witte (1953, p. 301) appears to be closely related to A. n. rungeensis, but is readily distinguishable by its low ventral (133 - 144) and subcaudal (38 - 49) counts, also its brown coloration, although its yellow markings resemble those of rungeensis.

In their key to the genus Marx and Rabb (1965, p. 188) separated A. nitschei from the rest of the genus on the grounds that it has smooth gulars and the keels of the lateral scales serrated. In Uganda specimens of A. n. nitschei the gulars are smooth, but there is no serration on the keels of lateral scales, whereas in the Nyika specimen of A. n. rungeensis the gulars are keeled and the lateral scales have serrated keels.

Diet. Loveridge (1953a) recovered two Phrynobatrachus u. ukingensis from the stomach of one Misuku snake.

Habitat. Fringes of montane evergreen forest, especially near streams or swampy areas. The Nyika specimen was on a firebreak surrounding a patch of forest.

Distribution. South-western Tanganyika, north-eastern Zambia and northern Malawi, reaching its southern limit on the Nyika Plateau.

Class AMPHIBIA

Order GYMNOPIHONA

Family CAECILIIDAE

Genus SCOLECOMORPHUS Boulenger

Scolecomorphus Boulenger, 1883, Ann. Mag. Nat. Hist., (5), 11, p. 48.

Type by monotypy : S. kiriki Boulenger.



Coloration. Dark green above, lighter laterally, with a pair of dorso-lateral yellow zig-zag lines, which may be linked across the back by yellow cross-bands; yellow below.

Size. Largest ♂ (MCZ. 51614 - Misuku Mtns.)  $370 + 70 = 440$  mm. Largest ♀ (MCZ. 51615 - Misuku Mtns.)  $550 + 92 = 642$  mm.

Discussion. Loveridge (1942, p. 313) has pointed out that the only valid character distinguishing this southern race from the typical form is the keeled gulars. There is a clinal increase from north to south in number of head scales, ventrals and subcaudals (see discussion by Laurent, 1956, p. 338), and rungeensis apparently differs in coloration, having yellow dorsal markings instead of black markings as in the typical form. Atheris katangensis Witte (1953, p. 301) appears to be closely related to A. n. rungeensis, but is readily distinguishable by its low ventral (133 - 144) and subcaudal (38 - 49) counts, also its brown coloration, although its yellow markings resemble those of rungeensis.

In their key to the genus Marx and Rabb (1965, p. 188) separated A. nitschei from the rest of the genus on the grounds that it has smooth gulars and the keels of the lateral scales serrated. In Uganda specimens of A. n. nitschei the gulars are smooth, but there is no serration on the keels of lateral scales, whereas in the Nyika specimen of A. n. rungeensis the gulars are keeled and the lateral scales have serrated keels.

Diet. Loveridge (1953a) recovered two Phrynobatrachus u. ulingensis from the stomach of one Misuku snake.

Habitat. Fringes of montane evergreen forest, especially near streams or swampy areas. The Nyika specimen was on a firebreak surrounding a patch of forest.

Distribution. South-western Tanganyika, north-eastern Zambia and northern Malawi, reaching its southern limit on the Nyika Plateau.

Class AMPHIBIA

Order GYMNOPIHOMA

Family CAECILIIDAE

Genus SCOLECOMORPHUS Boulenger

Scolecormorphus Boulenger, 1883, Ann. Mag. Nat. Hist., (5), 11, p. 48.

Type by monotypy : S. kirkii Boulenger.

## SCOLECOMORPHUS KIRKI KIRKI Boulenger

Scolecormorphus Kirkii Boulenger, 1883, Ann. Mag. Nat. Hist. (5) 11, p. 48:

"Probably vicinity of Lake Tanganyika."; Gunther, 1893, p. 555 (Shire Highlands); Mitchell, 1946, p. 33 (Zomba Mountain).

Scolecormorphus kirkii kirkii Loveridge, 1953b, p. 332 (Zomba Plateau; Cholo Mtn.), and 1957, p. 307; Poynton, 1964b, p. 196.

One specimen examined from: MALAWI. Cholo Mountain (Exch. MCZ).

Literature records. MALAWI. Cholo Mountain; Zomba Plateau.

Variation. Body annuli 131 - 152.

Coloration. Black above, brownish laterally; white below, stippled with pink posteriorly.

Size. Largest (BM. 93. 10. 26. 94 - Shire Highlands) 451 mm.

Diet. One Cholo specimen was swallowing an earthworm (Loveridge, 1953b).

Habitat. The Cholo series were found under piles of vegetation outside the forest.

Distribution. Highlands of south-western Tanganyika and Malawi. Loveridge (1957) included Zambia in error, for Pitman's inclusion of this species in his 1934 provisional checklist was not supported by material.

Order ANURA

Suborder OPISTHOCOEIA

Family PIPIDAE

Genus XENOPUS Wagler

Xenopus Wagler, 1827, Isis von Oken, 20, col. 726. Type by monotypy:

X. boiei Wagler = Bufo laevis Daudin.

XENOPUS LAEVIS LAEVIS (Daudin)

Bufo laevis Daudin, 1802, Hist. Nat. Rainettes, p. 85, pl. xxx, fig. 1 :  
No locality.



Xenopus laevis Boulenger, 1902, p. 15 (Mashonaland); Chubb, (part), 1909b, p. 34 (Gwanda District); Boulenger, 1910, p. 537; Hewitt, 1911, p. 228; Power, 1927, p. 421 (Lobatsi); Parker, 1931, p. 905 (Amatongas); FitzSimons, 1939b, p. 39 (Mount Silinda); Mitchell, 1946, p. 29.

Xenopus laevis laevis FitzSimons, 1935b, p. 379 (Metsimklaba River); Mertens, 1937, p. 17 (Salisbury); Loveridge, 1953b, p. 334 (Nchisi Mtn.; Mnema; Blantyre; Cholo; Limbe; Zomba); Poynton, 1964a, p. 30 (Plumtree; Chishawasha; Driefontein), and 1964b, p. 196.

Xenopus sp. Turnbull-Kemp, 1960, p. 6 (Inyanga National Park).

Eighty-six specimens examined from: RHODESIA. Ambi Falls; Atlantica; Bembesi; Bulawayo; Chimanimani Mountains; Chizarira Range; Chinyamanda; Fern Valley; Haroni - Lusitu Confluence; Inyanga National Park; Inyazura; Kapami; Kyle Lake; Lake MacIlwaine; Macheke; Marandellas; 5 mls W of Mtoko; Pachanza; Ruware; Salisbury; Sengwa River; 12 mls ESE of Sipolilo; Somabula; Soti Source; Stapleford; Thorn Park; Tynwald; Umvukwes; Vumba Mountain; 10 mls N of Wankie. MALAWI. Cholo Mountain; Lujeri Estate. MOZAMBIQUE. Chemezi; Chimanimani Mountains (Martin's Falls); Garuso; Inhaca Island; 12 mls SW of Mungari; Namaacha.

Literature records. BECHUANALAND. Lobatsi; Metsimklaba River, RHODESIA. Chishawasha; Driefontein; Gwanda District; Inyanga National Park; Mount Silinda; Plumtree; Salisbury. MALAWI. Blantyre; Cholo; Limbe; Mnema; Nchisi Mtn.; Zomba. MOZAMBIQUE. Amatongas.

Variation. Subocular tubercle much less than half the orbital diameter; width of nostril/internarial space = 0.8 or more; transverse bars in lateral line from eye to vent 23 or more; inner metatarsal tubercle raised into a narrow ridge.

Maximum length. 102 mm.

Habitat. Lakes, ponds, rivers and swamps. It colonises isolated pools by migrating at night during wet weather.

Distribution. All southern Africa, excluding arid areas of the west. Largely replaced by X. muelleri on the Mozambique Plain and by other subspecies in Angola, Zambia and the northern parts of South West Africa and Bechuanaland. Relict populations occur in highland areas of Malawi and Mozambique, the intervening lowlands being populated by X. muelleri. There is also a relict population on Inhaca Island.

## XENOPUS LAEVIS POWERI Hewitt

Xenopus laevis (not Daudin) Chubb (part), 1909b, p. 34 (Umsitu River);

Angel, 1921, p. 44 (Lealui).

Xenopus poweri Hewitt, 1927, Rec. Albany Mus., 3, p. 413, pl. 24, fig.

3: Victoria Falls; Loveridge, 1933, p. 352; Pitman, 1934, p. 311; Mertens, 1937, p. 17 (Nsombo).

Xenopus laevis laevis (not Daudin) Pitman, 1934, p. 311 (Chinsali;

Nkana).

Xenopus laevis poweri Schmidt & Inger, 1959, p. 8 (Katanga material);

Poynton, 1964a, p. 32 (near Lusaka).

Forty-eight specimens examined from: BECHUANALAND. 15 mls NE of Gomare; Maun. ZAMBIA. Bilibili Hot Springs; Chilanga; Livingstone and 4 mls W; Lochinvar Ranch.

Literature records. ZAMBIA. Lealui; near Lusaka; Nsombo; Sandaula Plain (P); Victoria Falls.

Variation. Subocular tubercle much less than half the orbital diameter; width of nostril/internarial space = 0.44 - 0.67; transverse bars in lateral line from snout to vent 20 - 24; inner metatarsal tubercle raised into a narrow ridge.

Maximum length. 85 mm.

Distribution. Northern South West Africa and Bechuanaland, southern Angola, plateau areas of Zambia, Katanga and south-western Tanganyika.

## XENOPUS MUELLERI (Peters)

Dactylethra Muelleri Peters, 1844, Monatsb. Akad. Wiss. Berlin, p. 37:

"Mozambique" (restricted to Tete by Loveridge, 1953b), and 1854, p. 628 (Cabaceira; Boror; Seha; Tete).

Xenopus muelleri Peters, 1882, p. 180, pl. xxv, fig 3 and pl. xxvi, fig.

12 (Mossuril; Quelimane); Pfeffer, 1893, p. 102 (Quelimane); Bocage, 1896, p. 97 (Lourenco Marques); Boulenger, 1897, p. 801 (Kondowe to Karonga; Nyika Plateau (?); Fort Hill); Parker, 1931, p. 905 (Amatongas; Fambani River); Pitman, 1934, p. 311 (Luangwa Valley in Mpika and Serenje Districts); Hoffman, 1944, p. 173 (Chitala); Mitchell, 1946, p. 29; Loveridge, 1953b, p. 335 (Chitala River; Mtimbuka; Boroma; Chikwawa; Chiromo; Port Herald), and 1953c, p. 144 (Chiromo; Mpata-manga Gorge); Poynton, 1964a, p. 33 (Lundi River Bridge; Beira), also 1964b, p. 197 and 1966b.



Ninety-three specimens examined from: BECHUANALAND. 15 mls. NE of Gomare; Maun; RHODESIA. Chikombedzi; Kariba Lake - Bumi Confluence; Majenji Pan; Makosa; 4 mls W of Mtoko; Ruware; Zambezi-Chewore Confluence. ZAMBIA. Chakwenga River; Chipengali; Kalichero; Kalikali; Katete; Luembwe; Mkanda. MALAWI. Mchenga. MOZAMBIQUE. Beira; Boane; Boror; Buzi River, 20 mls E of Gogoi; Cabaceira Peninsula; Garuso; Guro; Metambanhe; Mitacue Mountain; Muda; Vila Bocage.

Literature records. RHODESIA. Lundi River Bridge. ZAMBIA. Luangwa Valley; Mpubenga (P). MALAWI. Chikawa; Chiromo; Chitala; Fort Hill; Kondowe to Karonga; Mpatamanga Gorge; Mtimbuka; Nyika Plateau (?); Port Herald. MOZAMBIQUE. Amatongas; Beira; Boroma; Boror; Cabaceira; Fambani River; Lourenco Marques; Mossuril; Quelimane; Sena; Tete.

Variation. Subocular tentacle at least half the orbital diameter; inner metatarsal tubercle papillate.

Maximum length. 76 mm (Vila Bocage, Mozambique).

Enemies. Eight specimens were recovered from the stomach of a Hammerkop (Scopus umbretta) at Boroma (Loveridge, 1953b).

Distribution. East African lowlands from the southern Sudan south to northern Zululand, westwards to Dahomey and northern Bechuanaland.

Suborder PROCOEIA

Family BUFONIDAE

Genus BUFO Laurenti

Bufo Laurenti, 1768, Syn. Rept., p. 25. Type by tautonymy: B. vulgaris Laurenti = Rana bufo Linnaeus.

Schismaderma Smith, 1849, Illus. Zool. S. Africa, Rept., App. p. 23. Type by original designation: S. lateralis Smith = Bufo carens Smith.

BUFO GARIEPENSIS INYANGAE Poynton

Bufo gariepensis inyangae Poynton, 1963, Ann. Natal Mus., 15, p. 319: Inyangani Mountain, Rhodesia, and 1964 a, p. 49.

Thirty-four specimens examined from: RHODESIA. Chirwe - Gasresi Ridge, Inyanga; Inyangani Mountain; S. Inyangombe Headwaters; Pungwe Gorge.

Variation. Dorsal pupillary umbraculum small; parotid glands fairly prominent, width anteriorly approximately  $\frac{1}{3}$  length; dorsum moderately warty; throat not, or only slightly granular; tarsal fold a faint glandular ridge; inner metatarsal tubercle elongated, length of outer metatarsal tubercle less than half inner, toes with almost no margin of web,  $2\frac{1}{2}$  phalanges of third toe free of webbing.

Coloration. Yellow or olive with an irregular dark brown blotched pattern; greyish-white below, with or without dark flecks.

Maximum length. 46.5 mm.

Habitat. Found under stones on wet rock faces on Inyangani Mountain. It breeds in shallow pools in the rock, the tadpoles disperse by wriggling across the wet rock.

Distribution. Endemic to Inyangani Mountain and adjoining areas over 7,000 feet.

#### BUFO REGULARIS Reuss

Bufo regularis Reuss, 1834, Mus. Senckenberg, 1, p. 60 : Egypt; Boulenger (part), 1907b, p. 479 (Beira); Hewitt & Power (Part), 1913, p. 172 (Eldorado); FitzSimons, (part), 1939b, p. 39 (Vumba Mtn.; Chirinda Forest); Poynton, 1964a, p. 51 (Livingstone; Mtoko; Inhambane; Lundi River Bridge), also 1964b, p. 197 (Mlanje Mtn.; Chikwawa) and 1966 b.

Bufo regularis regularis Parker, 1931, p. 905 (Amatongas; Charre); FitzSimons (part), 1935b, p. 380 (Maun; Kabulabula; Victoria Falls); Mertens, 1937, p. 17 (Lundi River; Fort Jameson; Nsombo; Chipile); FitzSimons, 1958a, p. 211 (Nyamziwa; Pungwe River Causeway).

Bufo regularis gutturalis Power, 1927, Trans. Roy. Soc. S. Afr., 14, p. 416, pl. xxi, fig. 2 : Lobatsi and Kuruman.

Two hundred and twelve specimens examined from: BECHUANALAND.

15 mls NE of Gomare; Sekhuma Pan; Kanye; Kasane; Maun; Sepopa.

CAPRIVI. Mlambezi Lake. RHODESIA. Bulawayo, Chapungu; Chido; Chimanimani Mountains; Chirinda Forest; Criterion Mine; Darwendale; Eldorado; Erin; Figtree; Haroni - Lusitu Confluence; Hope Fountain; Kariba Lake; Kazungula and 5 mls SE; Kyle Lake; Lupane; Marandellas; Melfort; Miware Grove; Mount Hampden; Mount Silinda; 10 mls NE of Mtoko; Ngorima Reserve; Nyamakanga Bridge; Nyamakari; Odzani Dam; Outward Bound School; Panhalonga; Pungwe Falls; Rhodes Inyanga Estate;



Ruyurukuru River; Salisbury; Sanyati Island; Sengwe River; Silver-streams; 12 mls ESE of Sipolilo; Soti Source; Tandaai River; Troutbeck; Turk Mine; Umtali; 20 mls WNW of Victoria Falls; Vumba Mountain; Watsomba; Zambezi - Chewore Confluence; Zewa. ZAMBIA. Balmoral Farm; Balovale District (1322 Da); Chavuma; Chikoe; Chipengali; Fort Jameson; Ikelenge; Kasama; Kasusu; Luembwe; Lundazi; Lusungazi; Mfuwe; Mkanda; Ndola; Nyimba; Sayiri; Sitwe; Solwezi. MALAWI. Cape Maclear; Cholo Mountain; Lujeri; Mzimba; Nyika Plateau; Zomba Plateau. MOZAMBIQUE. Amatongas; Beira; Boror; Braganca (USNM); Chemba; Cruzado; Garuso; Gorongosa Mountain; Gumba; Inhaca Island; Inchope; Maforga; Manga; Metambanhe; Mitucue Mountain; Morrumbala Mountain; Muda - Lamago; Nabau-nama Dam; Nampula; Namaacha; Ponte do Pungwe; Vila Gamito (USNM); Vila Gouveia (USNM); Vila de Manica; Xiluvo.

Literature records. BECHUANALAND. Kabulabula (Chobe River); Lobatsi; Maun. RHODESIA. Chirinda Forest; Eldorado; Lundi River Bridge; Mtoko; Nyamziwa; Pungwe River Causeway; Victoria Falls; Vumba Mountain. ZAMBIA. Chipili; Fort Jameson; Livingstone; Nsombo. MALAWI. Chikwawa; Mlanje Mountain. MOZAMBIQUE. Amatongas; Beira; Charre; Inhambane.

Variation. Pabotid glands prominent and porous, not warty; glands behind commissure of mouth well developed, forming a continuous or broken ridge extending to above axilla; glands under forearm usually form a conspicuous row of white tubercles, not fused to form a continuous ridge.

Coloration. Various shades of olive, grey or brown above, with distinct or poorly defined paired dark dorsal blotches and transverse cross-bars on limbs; top of head with a pale cross formed by the intersection of a light median stripe and an interocular bar; sometimes red infusions present on thighs; uniform greyish-white below.

Maximum length. 97 mm.

Enemies. Recovered from the stomachs of the following snakes : Philothamnus i. irregularis; Crotaphopeltis h. hotamboeia; Haemachatus haemachatus; Naja h. annulifera; Naja h. anchietae; Naja m. mossambica; Causus rhombeatus; Causus defilippii; Bitis a. arietans.

Habitat. Ubiquitous in savanna, forests and montane grassland up to about 7,000 feet; absent from the central Kalahari.

Distribution. All savanna areas of central and eastern Africa, extending northwards to the Nile Delta, west to Senegal and south to the northern Cape Province, Orange Free State and Natal.

## BUFO PUSILLUS Mertens

Bufo pantherinus (not Dumeril & Bibron) Peters, 1854, p. 628 (Tete).

Bufo angusticeps (not A. Smith) Peters, 1882, p. 179 (Tete).

Bufo regularis pusillus Mertens, 1937, Abhand. Senckenb. Naturf. Gesell., 435, p. 17, fig. 1: Letaba Camp, Kruger National Park, Transvaal.

Bufo regularis (not Reuss) FitzSimons (part), 1939b, p. 39 (Birchenough Bridge).

Bufo pusillus Poynton, 1964a, p. 53 (Ponte do Calichane; Lundi River Bridge; Chimanimani Mountains; Umtali; Mtoko), also 1964b, p. 198 (Chiromo; Chikwawa; Mlanje Mountain), and 1966b.

One hundred and sixty-two specimens examined from: RHODESIA. Chibakwe Bridge; Chikombedzi; Chimwara Ranch; Chinyika Reserve; Chipinda Pools; Chiwaka Bridge; Darwendale; Fern Valley; Gungunyana; Kapami; Kariba; Kariba Lake - Mwenda Confluence; Lupane; Lusulu; Mambwe Pass; 11 mls S of Malimbasingi; Maryland; Matetsi River Bridge; Ndanga; Old Umtali; Matopos; Melfort; Mtarazi River Bridge; 10 mls NE of Mtoko; Ruenya River Drift; Ruwa; Ruware; Ruyurukuru River; Sabi - Lundi Confluence; West Sebungwe; 12 mls ESE of Sipolilo; Somabula; Soti Source; Thomson Junction; Triangle; Tuli; Stapleford; Umtali; Victoria Falls; Vumba Mountain; Wankie; Zambesi - Matetai Confluence; Zewa. ZAMBIA. Chipengali; Kalikali; Kasusu; Katete; Luembwe; Lundazi; Lusungazi; Mkanda; Nyimba; Petauke Old Boma; Sasare; Sayiri. MALAWI. Nyika Plateau; Wankurumadzi Bridge. MOZAMBIQUE. Chapala; Chemezi; 5 mls NE, 5 mls NW, 10 mls NNW of Dondo; 12 mls S of Erego; Gondola - Gorongosa Pontoon; Goonda; Gorongosa Mountain; Grudja; Gumbo; Inchope; Maforga; Manga; Metambanhe; Mitucue Mountain; 9 mls S of Muanza; Namaacha; Nabaunama Dam; Pungwe River; Tete; Vila de Manica; Vila Gouveia (UM & USNM); 5 mls SW of Zobue.

Literature records. RHODESIA. Birchenough Bridge; Chimanimani Mountains; Lundi River Bridge; Mtoko; Umtali. ZAMBIA. Mpubenga (P). MALAWI. Chikwawa; Chiromo; Mlanje Mountain. MOZAMBIQUE. Ponte do Calichane; Tete.

Variation. Parotid glands flattened, with an indistinct inner margin and usually obscured by small dark-tipped spinose warts; glands behind commissure of mouth well developed, forming a broken ridge; glands under forearm form a conspicuous row of white tubercles.

Coloration. Usually pale sandy brown above, with similar markings to B. regularis, but generally rather poorly defined, usually a narrow yellow vertebral line from snout to urostyle; greyish-white below, often with darker speckling.



Maximum length. 65 mm.

Enemies. Recovered from the stomach of a Naja melanoleuca from Manga Reserve.

Habitat. Widespread in savanna, but rarely found above 5,000 feet; absent from the Kalahari.

Distribution. Savanna areas of Africa, extending south to northern South West Africa, Rhodesia, eastern Transvaal and northern Zululand.

BUFO NGAMIENSIS FitzSimons

Bufo regularis ngamiensis FitzSimons, 1932, Ann. Tvl. Mus. 15, p. 40 :

Motlhatlogo, Lake Ngami, Bechuanaland, and 1935b, p. 381.

Bufo ngamiensis Poynton, 1964a, p. 55.

Known only from the holotype and paratype.

Variation. Skull expanded, reaching maximum width at anterior corner of eyes; parotid glands distinct; a glandular ridge extends from commissure of mouth to above axilla; glands under forearm indistinctly separated.

Coloration. Uniform dark olive brown above; uniform brownish white below.

Length of holotype. 76 mm.

Habitat. Found among the undergrowth of an old reedbed within the Lake Ngami depression.

Distribution. Known only from Lake Ngami: if endemic, this form may be on the verge of extinction due to the dessication of the lake and consequent elimination of the extensive reedbeds which existed up to fifty years ago (Pole Evans, 1948, pp. 92 - 107).

BUFO GARMANI Meek

Bufo garmani Meek, 1897, Field. Mus. Nat. Hist. Zool. Ser., 1, p. 176 :

"Haili" = Halleh, Somalia; Poynton, 1964a, p. 55 (Ponte do Calichane; Bela Vista; Lourenco Marques; Motlhatlogo; Antelope; Lundi River Bridge; Battlefields; Tete), and 1964b, p. 198.

Bufo regularis (not Reuss) Hewitt & Power (part), 1913, p. 172 (Francistown); Power, 1927, p. 416, pl. xxi, fig. 1 (Lobatsi); FitzSimons, (part), 1939b, p. 39 (Birchenough Bridge.)

Bufo regularis regularis (not Reuss) FitzSimons (part), 1935b, p. 380 (Gaberones; Matsimaklaba River; Lake Ngami; Maun; Victoria Falls).

Bufo regularis poweri Hewitt, 1935, Rec. Albany Mus., 4, p. 293 : Kimberley, Cape Province.

Ninety-one specimens examined from: BECHUANALAND. Kanye; Lake Dow; Lake Ngami; Maun; 5 mls S of Nata; Sehitwa; Totten; Tselenyane Pan. RHODESIA. Bambesi; Birchenough Bridge; Beitbridge; Bulawayo and 14 mls NW; Cement; Chimwara Ranch; Chipinda Pools; Heany; Kaitane; Kamativi; Kariba Lake - Bumi, Charara and Chimburu Confluences; Kapami; Kazungula; Lupane and 7 & 10 mls N; Lukosi; Malapati Drift; Mpudzi Bridge; Nyamandhlovu and 10 mls WSW; <sup>Pachanza;</sup> Rekometjie Research Station; Sabi - Lundi Confluence; Shashi - Shashani Confluence; Sinoia; Thomson Junction; Triangle; Tsungwesi River; Wankie National Park; <sup>Main Camp</sup> Weirmouth; Zambezi - Chewere and Sebungwe Confluences. ZAMBIA. Chikoa; Chipengali; Kalichero; Katete; Lundazi; Lusungazi; Mbanda; Mwekera; Nyimba; Petauke Old Boma; Sitwe. MALAWI. Misuku Mountains. MOZAMBIQUE. Chinamainza; Magasso; 12 mls SW of Mungari; Tete (USNM); Vila Coutinho (USNM).

Literature records. BECHUANALAND. Francistown; Gaberones; Lake Ngami; Lobatsi; Maun; Matsimaklaba River; Motlhatlogo. RHODESIA. Antelope; Battlefields; Birchenough Bridge; Lundi River Bridge; Victoria Falls. MOZAMBIQUE. Bela Vista; Lourenco Marques; Ponte do Calichane; Tete.

Variation. Parotid glands prominent, smooth or pitted, never warty; a broken glandular ridge extends from commissure of mouth to above axilla; glands under forearm flattened, forming a more or less continuous whitish ridge.

Coloration. Usually buff or yellowish above, with well-defined dark red-brown paired dorsal blotches and transverse bars on the limbs; snout usually uniform buff anterior to a divided dark interorbital bar, the two halves converging obliquely backwards; thighs usually suffused with scarlet; uniform whitish below.

Maximum length. 98 mm.

Enemies. Recovered from the stomach of a Mehelya c. capensis at Kalichero.



Habitat. Widespread in savanna, but found in more arid country than either B. regularis or B. pusillus. This form is scarce at altitudes above 4,000 feet, it is the commonest toad in the Kalahari and the dry Zambezi and Limpopo Valleys.

Distribution. Savannas of Africa, from Somalia south to the northern Cape Province, Transvaal, Orange Free State and Zululand.

BUFO LEMAIRESI Boulenger

Bufo lemairii Boulenger, 1901, Ann. Mus. Congo (1), 2, 1, 1, pl. 1, fig.

1 : Pweto, Lake Mweru, Katanga; Witte, 1934, p. 165, pl. v, figs.

1 & 4 (Katanga locs.); Mertens, 1937, p. 18 (Kalungu River).

Bufo lemairii Pitman, 1934, p. 310 (Lukulu Swamps).

No specimens examined.

Literature records. ZAMBIA. Kalungu River; Lukulu Swamps.

Description. Snout pointed; tympanum as large as, or larger than, eye; parotids prominent, long and narrow, followed by a series of tubercles; third toe very long.

Coloration. Males bright yellow above with paired dark dorsal blotches and transverse bars on limbs; females mottled browns, olive green, pinkish, etc. (Pitman, 1934).

Maximum length. 66 mm.

Habitat. Very common in the extensive swamps south-east of Lake Bangweulu (Pitman, 1934), apparently never found far from water.

Distribution. Eastern Katanga and northern Zambia.

BUFO CARENS A. Smith

Bufo carens A. Smith, 1848, Illus. Zool. S. Africa, Rept., pl. lxviii,

fig. 1 : Interior of South Africa; Boulenger, 1907a, p. 4 (Petauke), and 1907b, p. 480 (Coguno); Chubb, 1909a, p. 591 (Bulawayo; Kana River), and 1909b, p. 34 (Chilanga); Boulenger, 1910, p. 537 (Salisbury; Matopos); Werner, 1910, p. 293 (Mashoning); Hewitt, 1911, p. 227; Hewitt & Power, 1913, p. 173 (Eldorado); Power, 1927c, p. 418 (Lobatsi); Loveridge, 1929, p. 95 (Kafue River), and 1933, p. 355 (near Ikombo); Pitman, 1934, p. 310 (Broken Hill; Nkana; Kafue River); FitzSimons,

1935b, p. 382 (Metsimaklaba River; Gaberones), and 1937, p. 270; Mertens, 1937, p. 18 (Fort Victoria); Hoffman, 1944, p. 174 (Chitala); Mitchell, 1946, p. 42; Loveridge, 1953b, p. 337 (Chitala; Fort Johnston; Mzimba), and 1953c, p. 144 (Nchalo); Tasman, 1956, p. 2; Poynton, 1964a, p. 60 (Lundi River Bridge; Chilimanzi; Antelope; Umtali; Mazamba), and 1964b, p. 198 (Salima).

Seventy-seven specimens examined from: BECHUANALAND. Ootsi, RHODESIA. Beitbridge; Bembesi; Bulawayo; Cement; Chimwara Ranch; Chiredzi; Criterion Mine; Feruka; Heany; Kapami and 5 & 10 mls SE; Kariba Lake - Charara and Sengwa Confluences; Kazungula; Lonely Mine; Mount Hampden; Mzarabani Reserve; 10 mls NW of Nyamandhlovu; Old Umtali; Sabi - Lundi Confluence; Sincia; Somabula; Thomson Junction; Umtali; 10 mls NE of Umvuma; Wankie; Wankie National Park - Main Camp. ZAMBIA. Balmoral Farm; Chikoa; Chipengali; Chipongwe; Fort Jameson; Kasusu; Katete; Mfuwe; Mkanda; Ndola; Nkala; Siantamba. MOZAMBIQUE. Gumba; Vila Machado; Vila Gamito (USNM).

Literature records. BECHUANALAND. Gaberones; Lobatsi; Mashoning; Metsimaklaba River. RHODESIA. Antelope; Bulawayo; Chilimanzi; Eldorado; Fort Victoria; Kana River; Matopos; Salisbury; Umtali. ZAMBIA. Broken Hill; Chilanga; Ikombo; Kafue River; Nkana; Petauke. MALAWI. Chitala; Fort Johnston; Mazimba; Nchalo; Salima. MOZAMBIQUE. Coguno; Mazamba.

Variation. Parotid glands absent; a prominent glandular ridge extends from above tympanum to groin; tympanum very large, its horizontal diameter equal to the distance between eye and nostril; tarsal fold present.

Coloration. Pink or maroon above, breeding males greenish, a pair of small dark blotches in the sacral region and often a poorly defined pair in the scapular region; a dark lateral band below the lateral ridge; whitish below, usually speckled with grey or black.

Maximum length. 92 mm.

Enemies. Three specimens recovered from the stomach of a civet (*Viverra civetta*) at Kasane. Recovered from the stomach of a *Grotaphopeltis hotamboeia* at Bulawayo. Loveridge (1953b) recovered three from the stomach of a Giant Eagle Owl (*Bubo lacteus*) and two from *Grotaphopeltis hotamboeia*.

Habitat. Widespread in savanna up to about 5,000 feet, absent from arid regions.

Distribution. Eastern Africa from Kenya south to Natal, west to the Congo, Zambia, Rhodesia, eastern Bechuanaland and Transvaal.



## BUFO URUNGUENSIS Loveridge

Bufo urunguensis Loveridge, 1932, Bull. Mus. Comp. Zool., 72, p. 383 :  
Kitungulu, Urungu, Tanganyika; Pitman, 1934, p. 311.

None examined.

Other records: ZAMBIA. Kalambo Falls. (B.M.).

Description (after Loveridge, 1932) Crown without bony ridges; snout short, truncated, with very distinct canthus; interorbital space flat, equal in width to an upper eyelid; tympanum small but quite distinct, round, its diameter scarcely half that of the eye. Fingers long and rather pointed, first considerably shorter than the second; toes provided with minute lateral spines, not, or but scarcely, webbed at the base, paired conical subarticular tubercles, soles of feet covered with spinose or sharply conical tubercles, two conspicuous conical metatarsal tubercles, no tarsal fold; the tibio-tarsal articulation of the adpressed hind limb reaches the axilla while the metatarsal tubercles <sup>scarcely</sup> reach to the eye. Upper parts very rough by reason of the numerous little warts surmounted by sharp spines, the warts very considerably in size.

Coloration in life - ♀. Above, grey tinged with brick-red and a trace of purple, a paler area on the snout extends backwards between the eyes and then branches so as to cover the parotid glands; several dark brown blotches, irregular in shape and position, but usually a V-shaped one, with apex directed posteriorly, just above the anus. Below, creamy white speckled with purple, a concentration of these specks upon the chest and along the median ventral line; soles of hands and feet dark, the tubercles conspicuously white. (Loveridge, 1932).

Maximum length. 29 mm.

Habitat. Patches of rain forest.

Distribution. Known only from the type locality and Kalambo Falls, both near the south-eastern shore of Lake Tanganyika.

## BUFO VERTEBRALIS FENOULHETI Hewitt &amp; Methuen

Bufo fenoulheti Hewitt & Methuen, 1913, Trans. Roy. Soc. S. Afr., 3, p. 108:  
Newington & Woodbush, N. E. Transvaal.

Bufo fenoulheti albiventris Power, 1927, Trans. Roy. Soc. S. Africa, 14,  
p. 418 : Lobatsi, Bechuanaland.

Bufo fenoulheti rhodesianus Hewitt, 1932, Ann. Natal Mus., 7, p. 110, pl. vi, figs. 2, 3; Driefontein, Rhodesia (also Triashill); Tasman, 1956, p. 3 (Mrewa; Makumbi).

Bufo vertebralis obtusum Hewitt. FitzSimons, 1935b, p. 382 (Titumi).

Bufo vertebralis fenoulheti Poynton, 1964a, p. 63 (Salisbury District; Rusape; Lundi River Bridge).

One hundred and twenty-three specimens examined from:

BECHUANALAND. Ootsi. RHODESIA. 20 mls NW of Birchenough Bridge; Chido; Chimwara Ranch; Chipinda Pools; Dora; Fatima; Fern Valley; 5 and 10 mls SE of Kapami; Kariba; Kariba Lake - Charara Confluence; Malonga River Bridge; Mapembi; Mare Dam; Matowa; Msoro; 7 and 32 mls NE of Mtoko; Rowa Division; Vumba Mountain; Wankie National Park - Main Camp; Watsonba; Zewa; Zimbabwe. ZAMBIA. Victoria Falls. MOZAMBIQUE. Belas; Comacha; Garuso; 5 mls W of Tete.

Literature records. BECHUANALAND. Lobatsi; Titumi. RHODESIA. Driefontein; Lundi River Bridge; Makumbi; Mrewa; Rusape; Salisbury District; Triashill.

Variation. Parotid glands moderately distinct to very indistinct; tympanum distinct; skin on snout markedly granular, skin on throat wrinkled, but not very granular; no tarsal fold;  $2\frac{1}{2}$  phalanges of third toe free of web.

Coloration. Usually mottled in grey and blackish above, with a large pale grey blotch on the nape; uniform white below.

Maximum length. 43 mm.

Habitat. Usually found in rock crevices and under stones and often very common on damp rock outcrops; in northwestern Rhodesia it occurs in the Kalahari sands.

Distribution. Zululand, Transvaal, eastern Bechuanaland, Rhodesia and adjoining Mozambique, south-western Zambia, northern South West Africa.

#### BUFO VERTEBRALIS GRINDLEYI Poynton

Bufo vertebralis grindleyi Poynton, 1963, Ann. Natal Mus., 15, p. 320;

Chimanimani Mountains, Rhodesia; and 1964a, p. 65.

Twenty-seven specimens examined from: RHODESIA. Chimanimani Mountains.



Variation. Parotid glands prominent and very warty in specimens collected below 6,000 feet, but inconspicuous in specimens from higher altitudes; tympanum distinct; skin on snout smooth, throat wrinkled, but not very granular; males with large spinose warts on back (largest in specimens from low altitudes), females with rounded warts; no tarsal fold; webbing rudimentary.

Coloration. Grey with more or less symmetrical dark dorsal blotches, leaving a light vertebral stripe which terminates on the occiput; white below, usually with dark flecking or marbling.

Maximum length. 33 mm.

Habitat. A series of twenty were collected on gently sloping grass-covered rock faces near the summit of Turret Towers at 7,500 feet, they were breeding in shallow pools. The species occurs at altitudes varying from 5,300 feet in the Bundi Valley to 8,000 feet on Point 71, but seems to be less plentiful at lower altitudes.

Distribution. Endemic to the Chimanimani Mountains, on the Rhodesia - Mozambique Border.

BUFO TAITANUS TAITANUS Peters

Bufo taitanus Peters, 1878, Monatsb. Akad. Wiss. Berlin, p. 208, pl. ii, fig. 8 : "Taita" = Teita, Kenya.

Bufo taitanus taitanus Pitman, 1934, p. 310; Loveridge, 1953a, p. 339 (Chifumbazi); Poynton, 1964b, p. 199 (Nyika Plateau; Nkonjera Mtn.), and 1966b, - (Chipengali).

Three specimens examined from: ZAMBIA. Bwana Mkubwa. MALAWI. Nkonjera Mountain.

Literature records. ZAMBIA. Chipengali; Nkana (MMK); Nyika Plateau; Sandaula Plain (P). MALAWI. Nkonjera Mountain. MOZAMBIQUE. Chifumbazi.

Variation. Parotid glands hardly discernible; tympanum hidden; skin on snout granular; skin of throat as granular as on belly; no tarsal fold; 2 or more phalanges of fourth toe free of web.

Coloration. Uniform brown above, white below, chest and belly heavily infuscated with dark brown.

Maximum length. 32 mm.

Distribution. Uplands of Somalia, Kenya, Tanganyika, Mozambique, Malawi and Zambia,

## BUFO TAITANUS NYIKAE Loveridge

Bufo taitanus nyikae Loveridge, 1953, Bull. Mus. Comp. Zool., 110, p. 339;  
Nyika Plateau above Nchenachena, at 7,500 feet, Malawi; Poynton,  
1964b, p. 199 (Nyika Plateau in Zambia and Malawi).

No specimens examined.

Literature records. ZAMBIA. Nyika Plateau. MALAWI. Nyika Plateau.

Variation. Parotid glands flat and elongate; tympanum hidden; no tarsal fold; toes barely webbed at the base.

Coloration. A light vertebral line present; white below flecked with brown or black.

Maximum length. 42 mm (holotype ♀).

Enemies. Loveridge (1953b) recovered one from the stomach of a Psammophylax v. variabilis and the remains of another from a mouse (Lophuromys flavopunctatus).

Habitat. Montane grassland.

Distribution. Endemic to the Nyika Plateau.

## BUFO TAITANUS BEIRANUS Loveridge

Bufo taitanus (not Peters) Boulenger, 1907b, p. 480 (Beira); and 1910, p. 537.

Bufo taitanus beiranus Loveridge, 1932, Occ. Pap. Boston Soc. Nat. Hist., 8, p. 45; Beira, Mozambique; Poynton, 1964a, p. 67 and 1966b.

Seventeen specimens examined from: MOZAMBIQUE. 12 mls S of Eregó; Mitucue Mountain; Mida - Lamego; Nova Freixo; Vila Machado.

Literature record. MOZAMBIQUE. Beira.

Variation. Parotid glands hardly discernible; tympanum hidden; skin on snout granular, skin of throat as granular as on belly; no tarsal fold; two or more phalanges of third toe free of web.

Coloration. A pale vertebral stripe present, or reduced to a small scapular spot, a light occipital patch usually present; cream below with light grey flecking.

Maximum length. 24 mm.



Habitat. Common in the seasonal swamps of the Pungwe Flats. The north Mozambique specimens were collected on granite hillsides.

Distribution. Northern Mozambique, including the Niassa Platform and the Mozambique Plain.

BUFO ANOTIS Boulenger

Bufo anotis Boulenger, 1907, Ann. Mag. Nat. Hist., (7), 20, p. 48, pl. 3; Chirinda Forest, Mount Silinda, Rhodesia, and 1910, p. 537; FitzSimons, 1939b, p. 39 (Chirinda Forest); Poynton, 1964a, p. 68.

Five specimens examined from: RHODESIA. Chirinda Forest.

Literature records. RHODESIA. Chirinda Forest.

Variation. Parotid glands distinct and very broad, forming a continuous "platform" with the flattened top of the head; tympanum usually invisible, sometimes distinct; skin on snout very granular; dorsal surfaces covered with granular warts; throat granular; one phalanx of third toe free of web.

Coloration. Dark brown or red-brown above, with dark transverse bars on hind limbs; whitish below, usually with irregular dark infuscations.

Maximum length. 45 mm.

Habitat. Usually found within or beneath rotten logs lying in the forest.

Distribution. Endemic to Chirinda Forest.

Suborder DIPLASIOCOEIA

Family MICROHYLIDAE

Genus PROBREVICEPS Parker

Probreviceps Parker, 1931, Ann. Mag. Nat. Hist., (10), 8, p. 262.

Type by original designation: Breviceps macrodactylus Nieden.

## PROBREVICEPS "RHODESIANUS"

One specimen examined from: RHODESIA. Stapleford.

Description. This specimen has been compared with both *P. macrodactylus* and *P. uluguruensis* by Dr. J. C. Poynton, who has noted the following differences (letter of 18. iv. 66) "Differs from the known forms of *Probreviceps* in its shorter hind limbs, the tarso-metatarsal articulation reaching the elbow (tibio - tarsal articulation reaching elbow or beyond in other forms), and shorter fourth toe, which is less than twice the length of the third toe (more than twice the length of the third toe in other forms)."

Coloration. The northern forms are uniform purplish brown above; pale brown below, with pale or dark spotting or marbling (Parker, 1934, pp. 184 - 5). The southern form differs as follows: Dorsum pale orange, but this ground colour is largely obscured by the purple coloration of the closely juxtaposed warts; a purple lateral band extends from the snout through the eye to the groin; tympanum red-brown; ventrum pale purple-brown, heavily mottled with large white tubercles.

Length. 48 mm.

Habitat. Taken by R. E. Pletts in drifted leaves between the buttress roots of a tree near the edge of evergreen forest at 5,000 feet.

Distribution. Wet evergreen forest at Stapleford on the eastern escarpment just north of Umtali.

Genus BREVICEPS Merrem

*Breviceps* Merrem, 1820, Vers. Syst. Amphib., p. 177. Type by monotypy :  
*Rana gibbosa* Linnaeus

BREVICEPS MOSSAMBICUS ADSPERSUS Peters

*Breviceps adspersus* Peters, 1882, Reise nach Mossambique, p. 177 : Damara-land and Transvaal; Parker, 1934, p. 193 (Gwamayaya River; Eldorado; Marandellas); FitzSimons, 1939b, p. 44 (Birchenough Bridge), and 1959a, p. 214 (Nyamziwa; Pungwe River Causeway).



Brevicans mossambicus (not Peters) Chubb, 1909a, p. 591 and 1909b, p. 34 (Bulawayo; Gwamayaya River); Boulenger (part) 1910, p. 534 (Delagoa Bay); Hewitt (part), 1911, p. 213 (Marandellas); Hewitt & Power, 1913, p. 171 (Eldorado; Marandellas); Power (part), 1926b, p. 461 (Delagoa Bay; Rikatla; Mochudi; Serowe; Hunyani; Bulawayo; Insiza; Eldorado; Empandene); FitzSimons, 1930 (part), p. 48 (Hunyani; Gwamayaya River; Bulawayo; Lourenco Marques); Parker (part), 1934, p. 194 (Delagoa Bay); FitzSimons, 1935b, p. 395 (Metsimaklaba River; Gomodimo; Kaotwe), and 1939b, (part), p. 45 (Vumba Mountain); Tasman (part), 1956, p. 9 (Vumba Mountain; Macheke); Poynton, 1964a, p. 84 (Bembesi; Bulawayo; Macia).

Breviceps adpersus adpersus Poynton (part), 1964a, p. 79 (Mtoko; Macheke; Rusape; Chilimanzi; Gokwe; Antelope; Mabeleapudi; Inhaca Island).

Seventy-six specimens examined from: BECHUANALAND. 40 mls NW of Lephepe; Maun; 78 mls W of Nata; Shorobe; Tamafupi. RHODESIA. Bembesi; Bulawayo; Chimanimani Mountains; Chipinda Pools; Fern Valley; Irisvale; 6 and 10 mls SE of Kapami; Lupane and 10 mls E; Macheke; Malapati Drift; Mare Dam; Mashaba; Pungwe Gorge; Shashi - Shashani Confluence; Silverstreams; Stapleford; Umtali. MOZAMBIQUE. Inhaca Island; Lourenco Marques (NM); Martin's Falls; Ponte do Galichens (NM).

Literature records. BECHUANALAND. Gomodimo; Kaotwe; Mabeleapudi; Metsimaklaba River; Mochudi; Serowe. RHODESIA. Antelope; Bembesi; Birchenough Bridge; Bulawayo; Chilimanzi; Ghrinda Forest; Eldorado; Empandene; Gokwe; Gwamayaya River; Hunyani; Insiza; Macheke; Marandellas; Mtoko; Nyamziwa; Pungwe Causeway; Rusape; Vumba Mountain. MOZAMBIQUE. Delagoa Bay; Inhaca Island; Lourenco Marques; Rikatla.

Variation. Tympanum invisible; dorsum almost smooth to very rough, ventrum usually smooth; outer finger extending well beyond subarticular tubercle of adjacent finger; outer toe not reaching basal tubercle of fourth, much shorter than second.

Coloration. Usually three or four pairs of light paravertebral blotches and three pale lateral blotches, often a pale interorbital stripe; markings well defined in specimens from Bechuanaland, Shashi, Irisvale and Macheke, but very faint in most eastern material. An Inhaca Island specimen has a pale vertebral stripe. Cream below, throat often with a pair of longitudinal dark bands or uniformly dark, chest sometimes mottled brown.

Maximum length. 59 mm.

Discussion. Poynton (1964a) has treated adpersus as a full species, sympatric with mossambicus, distinguishing them largely on dorsal coloration and a difference in call. My impression is that adpersus is a western race which has evolved in the Kalahari and spread east into Rhodesia, Transvaal and southern Mozambique, intergrading extensively with the typical form.

Enemies. Recovered from the stomachs of the following snakes: Crotaphopeltis hotamboeia from near Lupane and Chimanimani Mountains (twice); Thelotornis k. capensis at Umtali and Aspidelaps scutatus from 78 mls W of Nata.

Habitat. Widespread and common in savannas, montane grassland and the Kalahari.

Distribution. Northern South West Africa, Bechuanaland, Rhodesia (intergrading with B. m. mossambicus in the east), Transvaal, northern Orange Free State, Swaziland, southern Mozambique, eastern Natal.

BREVICEPS MOSSAMBICUS MOSSAMBICUS Peters

Breviceps mossambicus Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 628: Mozambique Island and Sena, Mozambique, and 1882, p. 176, pl. xxv, fig. 2 and pl. xxvi, fig. 11; Gunther, 1893, p. 555 (Shire Highlands); Bocage, 1896, p. 96 (Mozambique Island); Boulenger, 1897, p. 801 (Misuku Mountains; Fort Hill), and (part) 1910, p. 534 (Salisbury; Mazoe); Procter, 1920, p. 420 (Lumbo); Power (part), 1926b, p. 461 (Salisbury; Mazoe; Bindura); Parker, 1931, p. 905 (Charre), and 1934, p. 194 (Lake Nyasa; Fwambo; Fort Johnston; Misuku Mountains; Fort Hill; Zomba; Zambezi River; Mazoe); FitzSimons (part), 1939b, p. 45 (Chirinda Forest); Mitchell, 1946, p. 31; Laurent, 1953, p. 29 (Katanga locs.); Loveridge, 1953b, p. 392 (Misuku Mountains; Kasungu; Mtimbuka; Lujeri River; Cholo Mountain; Blantyre; Limbe); Tasman, 1958, fig. 9; Poynton (part), 1964a, p. 84, also 1964b, p. 200 (Zomba Plateau), and 1966b.

Breviceps mitchelli Hoffman, 1944, Soolog. Navors. Nas. Mus. Bloemfontein, 1, p. 182, fig. 10: "Chitjala" = Chitala River, Malawi; Mitchell, 1946, pp. 31, 42.

Breviceps adpersus adpersus Poynton (part), 1964a, p. 79.



Ninety-two specimens examined from: RHODESIA. Gungunyana; Jersey Tea Estate; Mount Silinda; Sinoia; Umzilizwe River. MALAWI. Cholo Mountain; Injeri. MOZAMBIQUE. Erego; Gumba; Inchope; Martin's Falls; Mitucue Mountain; Morrumbala Mountain; Mozambique Island; Muda - Lamago; Vila Junqueiro; Xiluvo.

Literature records. RHODESIA. Bindura; Chirinda Forest; Mazoe; Salisbury. ZAMBIA. Fwambo. MALAWI. Blantyre; Chitala River; Cholo Mountain; Fort Hill; Fort Johnston; Kasungu; Lake Nyasa; Limbe; Injeri River; Misuku Mountains; Mtimbuka; Zomba; Zomba Plateau. MOZAMBIQUE. Charre; Lumbo; Mozambique Island; Sena.

Variation. Tympanum invisible; dorsum smooth, but porous, ventrum smooth; outer finger extending well beyond subarticular tubercle of adjacent finger; outer toe not reaching basal tubercle of fourth, much shorter than second.

Coloration. Dorsum light plum coloured to dark brown or blackish, sometimes with irregular dark spots, often a pale vertebral hair line which meets another pale hair line running from foot to foot above the vent; a dark band extends diagonally back from the eye and may connect with dark markings on the throat, which may be entirely dark or heavily marbled with brown, the rest of the ventrum may be uniform cream or blotched with dark brown.

Maximum length. 43 mm.

Discussion. A few specimens from the Muda - Lamago and Xiluvo series (45 specimens) show pale paravertebral patches, but on the whole this material is much closer to typical mossambicus than adspersus.

Two specimens from Sinoia, referred by Poynton to adspersus, seem to me closer to mossambicus, although they have a dorso-lateral row of pale spots similar to poweri. A specimen from Cholo Mountain also has faint indications of pale dorso-lateral spots.

Enemies. Recovered from the stomachs of a Thelotornis k. capensis on Mitucue Mountain and a Causus defilippii at Erego. Loveridge (1953a) found young specimens in the stomachs of three Thelotornis k. capensis and a Grotaphopeltis hotamboeia at Cholo.

Habitat. Savanna. Very common in alluvium on Mozambique Island, where it may be the only surviving amphibian.

Distribution. Tanganyika, northern and central Mozambique, Malawi, northern Zambia, west through Katanga to Angola, parts of north-eastern and eastern Rhodesia.

## BREVICEPS MOSSAMBICUS POWERI Parker

Breviceps mossambicus (not Peters) Boulenger, 1907a, p. 5 (Mterize River; Lukashashi River); ? Angel, 1921, p. 44 (Lealui); Pitman, 1934, p. 310 (Nkana).

Breviceps sp. nov. Pitman, 1934, p. 310 (Broken Hill).

Breviceps poweri Parker, 1934, A Monograph of the frogs of the family Microhylidae, p. 195 : Broken Hill, Zambia (also Mterize River); Laurent, 1953, p. 29 (Katanga locs.); Poynton, 1964a, p. 83 (Zongwe River; Zimba; near Lusaka), and 1964b, p. 199.

Twenty specimens examined from: ZAMBIA. Chikowa; Chipengali; Fort Jameson; Kalichero; Kasusu; Katete; Kitwe; Luembwe; Mkanda; Msandile; Ndola; Sayiri. MALAWI. Mpatamanga Gorge.

Literature records. ZAMBIA. Broken Hill; Lealui (?); Lukashashi River; Lusaka; Mterize River; Nkana; Zimba; Zongwe River.

Variation. Tympanum invisible; dorsum smooth to moderately rough, ventrum smooth; outer finger very short, not extending beyond subarticular tubercle of adjoining finger; outer toe a mere tubercle.

Coloration. Brick red, brown or black above, with a dorso - lateral series of 2 - 5 pale blotches, sometimes confluent, a pale spot above the vent and usually a light line running from foot to foot above the vent; chin and throat dark, abdomen cream, sometimes with dark flecking.

Maximum size. 47.5 mm.

Discussion. A specimen from Mpatamanga Gorge agrees with poweri in its short outer finger and three pale lateral blotches, but has only a small pale spot above the vent; it has a pale vertebral hair line posteriorly like some typical mossambicus and its outer toe is rather longer than is usual for poweri, it shows very faint indications of the pale paravertebral blotches characteristic of adpersus. There is evidently a zone of intergradation between mossambicus and poweri on the western slopes of the Shire Highlands.

Enemies. Recovered from the stomachs of a Crotaphopeltis hotamboeia (Chikwa) and Thelotornis k. oatesi (Msandile).

Habitat. Savanna.

Distribution. Southern Katanga, Zambia, south-western Malawi and presumably western Mozambique.



## Genus PHRYNOMERUS Noble

Brachymerus A. Smith (not Dahlbom), 1847, Illus. Zool. S. Afr. Rept., p. 63. Type by monotypy : B. bifasciatus A. Smith.

Phrynomantis Peters (part), 1867, Monatsb. Akad. Wiss. Berlin, p. 35 (new name for Brachymerus Smith - preoccupied). Type : P. fusca Peters.

Phrynomerus Noble, 1926, Amer. Mus. Novit., 237, p. 20 (new name for Brachymerus Smith - preoccupied). Type : Brachymerus bifasciatus A. Smith.

## PHRYNOMERUS BIFASCIATUS BIFASCIATUS (A. Smith)

Brachymerus bifasciatus A. Smith, 1847, Ill. Zool. S. Africa, Rept., pl. lxiii : "Country to the east and north-east of Cape Colony"; Peters, 1854, p. 628 (Tete); Gunther, 1864, p. 307 (Zambezi Expedition).

Dendrobates inhambanensis Bianconi, 1849, Nuovi Ann. Sci. Nat (1848), (2), 10, p. 107, pl. v, figs. 4 - 4a, and 1850, Spec. Zool. Mossamb. Rept., p. 26, pl. v, figs. 4 - 4a : Inhambane, Mozambique.

Phrynomantis bifasciata Peters, 1882, p. 172, pl. xxvi, fig. 9 (Tete; Inhambane); Bocage, 1896, p. 102; Boulenger, 1897, p. 801 ("Nyika Plateau"), also 1907a, p. 5 (Lukashashi River), and 1907b, p. 480 (Beira); Chubb, 1909a, p. 591 (Bulawayo; Shangani River), and 1909b, p. 34 (Bembesi); Boulenger, 1910, p. 533 (Palapye; Shire Valley); Hewitt, 1911, p. 225; Hewitt & Power, 1913, p. 171 (Eldorado; Marandellas); Proctor, 1920, p. 420 (Lumbo).

Phrynomerus bifasciatus Power, 1927c, p. 415 (Lobatsi); Pitman, 1934, p. 310; FitzSimons, 1935b, p. 396 (Titumi; Molepolole; Metsimaklaba River), and 1937, p. 271; Mitchell, 1946, p. 30; Tasman, 1956, p. 8, fig. 2.

Phrynomerus bifasciatus nyasalandensis Hoffman, 1944, Soolog. Navors. Nas. Mus. Bloemfontein, 1, p. 181, fig. 9 : "Chitjala" = Chitala River, Malawi.

Phrynomerus bifasciatus bifasciatus Loveridge, 1953b, p. 395 (Zomba; Chikwawa; Chiromo; Fort Johnston; Port Herald), and 1953c, p. 150 (Nchalo); Poynton, 1964a, p. 85 (Francistown; Livingstone; Plumtree; Antelope; Salisbury; Mtoko; Umtali; Lundi River Bridge; Lourenco Marques), also 1964b, p. 200, and 1966b.

Sixty-seven specimens examined from: BECHUANALAND. Tselenyane Pan. RHODESIA. Bambesi; Bulawayo and 15 mls NW; Chibakwe River Bridge; Fairfield; Gandi; Irisvale; Kariba; Lupane; Majinji Pan; Mount Hampden; 32 mls NE of Mtoko; Nyamandhlovu; Pungwe View; Umtali; Wankie; Westacre. ZAMBIA. Dimba; Mulanga. MOZAMBIQUE. Amatongas; Boane; Lua-la River Bridge; Magasso; Metuchira; Mossuril; Muda - Lamago; Xiluvo.

Literature records. BECHUANALAND. Francistown; Lobatsi; Metsimanklaba River; Molepolole; Palapye; Titumi. RHODESIA. Antelope; Bambesi; Bulawayo; Eldorado; Lundi River Bridge; Marandellas; Mtoko; Plumtree; Salisbury; Shangani River; Umtali. ZAMBIA. Livingstone; Lukashashi River. MALAWI. Chikwawa; Chiromo; Chitala River; Fort Johnston; Nchalo; "Nyika Plateau"; Port Herald; Shire Valley; Zomba. MOZAMBIQUE. Beira; Inhambane; Lourenco Marques; Lumbo; Tete.

Variation. Snout not, or only slightly projecting beyond mouth; horizontal diameter of eye two-thirds the distance between eye and tip of snout; finger-tips expanded into truncated discs; toes not webbed.

Coloration. Silvery grey to jet black, with orange or pink markings consisting of a dorso-lateral band extending from snout to groin (sometimes broken up) a large blotch above the vent and transverse bands or spots on the limbs; pale brown spotted with white below, throat often dark.

Maximum length. 68 mm.

Enemies. One was found in the stomach of a Pyxicephalus adspersus at Salisbury.

Habitat. Widespread in savanna up to about 5,000 feet, absent from the central Kalahari.

Distribution. Eastern Africa from Kenya south to Zululand and the Transvaal, west to northern South West Africa, Angola and Katanga.

#### PHRYNOMERUS AFFINIS (Boulenger)

Phrynomantis affinis Boulenger, 1901, Ann. Mus. Congo (1) 2, fasc. 1, p. 6, pl. ii, figs. 5 - 5d: Pweto, Lake Mweru, Katanga.

Phrynomerus affinis Pitman, 1934, p. 310; Poynton, 1964a, p. 86 (Ngoma).

One specimen examined from: ZAMBIA. Ngoma.



Description. Snout projecting slightly beyond mouth; horizontal diameter of eye about two-thirds the distance between eye and tip of snout; canthus rostralis extremely rounded and flattened; finger-tips not, or hardly expanded into discs; toes not webbed.

Coloration. Black above, with scattered small red (or pink) dots and blotches covering the entire dorsum.

Size. The Ngoma ♂ is 46 mm in length, but a male from South West Africa (type of *P. hoeschi*) measures 66 mm.

Distribution. Northern South West Africa, western Zambia and southeastern Katanga.

Family RANIDAE

Subfamily RANINAE

Genus PYXICEPHALUS Tschudi

*Pyxicephalus* Tschudi, 1838, Classif. Batr., pp. 46, 83. Type by designation of Boulenger, 1918 : *P. adpersa* Tschudi.

*Tomopterna* Dumeril & Bibron, 1841, Erpet. Gen. 8, p. 443. Type by designation of Boulenger, 1918 : *P. delalandei* Tschudi.

PYXICEPHALUS ADSPERSUS Tschudi

*Pyxicephalus adpersus* Tschudi, 1838, Classif. Batr., pp. 46, 84 : "Promentarium Bonae Spei"; Boulenger, 1910, p. 528 (Mazoe); Werner, 1910, p. 298, fig. 6 (Vlei Topan; Leclake Pan); Power, 1927c, p. 411 (Lobatsi); FitzSimons, 1930, p. 41 (Hunyani; Magude); also, 1935b, p. 389 (Metsimanklaba River; Kuke; Van Zyl's Cutting; Gembok Pan; Mabeleapudi; Maun; Makarikari) and 1939b, p. 40 (Mount Silinda); Poynton, 1964a, p. 93 (Mabua suffubi Pan; Wankie; Beira; Lundi River Bridge; Matopos; Flumtree; Mochudi), also 1964b, p. 201, and 1966b.

*Pyxicephalus edulis* Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 626 : Tete (restricted by Loveridge, 1953b), also Mozambique Island and Boror, and 1882, p. 152, pl. xxiii, fig. 1 & pl. xxvi, fig. 1.

*Rana adpersa* Pfeffer, 1893, p. 90 (Quelimane); Bocage, 1896, p. 101; Boulenger, 1902, p. 15 (Mashonaland), and 1907a, p. 5 (Luangwa River; Lukashashi River); Chubb, 1909a, p. 591 and 1909b, p. 34 (Bulawayo; Gwamayaya River); Hewitt, 1911a, p. 219; Angel, 1921, p. 44 (Lealui);

Parker, 1931, p. 897 (Caia; Mutarara); Pitman, 1934, p. 308 (Broken Hill); Mertens, 1937, p. 20 (Chama - Luvumbu River); Mitchell, 1946, pp. 30, 42 (Port Herald); Tasman, 1956, p. 4, fig. 5; Inger, 1959, fig. 14 (distribution map).

Phrynomantis Boulengeri Pfeffer, 1893, Jahrb. Hamburg Wiss. Anst. (1892), 10, p. 101, pl. 11, figs 5 - 6 : Quelimane, Mozambique; Bocage, 1896, p. 102.

Rana sdsersa edulis Loveridge, 1953b, p. 375 (Kasumbadedza; Chiromo; Chitala River).

Eighty-nine specimens examined from: BECHUANALAND. Kanye; 32 and 41 mls W of Kanye; Kwebe Hills and 15 mls N; Lake Dow; 10 mls S of Lothlekane; 100 mls E of Maun; Nata and 5 mls S; Plumtree - Francistown; Tsangara Pan. RHODESIA. Binga; Bulawayo; Cement; Chibwe; Heany; Kariba Lake - Charara Confluence; Kasungula; Mabelreign; Majinji Pan; 32 mls NE of Moko; Mount Hampden; Msoro; Salisbury; Wankie; Wankie National Park - Nyamandhlovu Pan; Zambezi - Chewore Confluence. ZAMBIA. Lochinvar; Malanga; Nkala. MALAWI. Mchenga. MOZAMBIQUE. Beira; Grudja; Matundo; Mada - Lamago; 45 mls ENE of Tete; Xiluvo.

Literature records. BECHUANALAND. Gembok Pan; Euke; Leelake Pan; Lobatsi; Mabelespudi; Mabua suffubi Pan; Makarikari; Maun; Metsimaklaba River; Mochudi; Van Zyl's Cutting; Vlei Topan. RHODESIA. Bulawayo; Gwamayaya River; Hunyani; Lundi River Bridge; Matopos; Mazoe; Mount Silinda; Plumtree; Wankie. ZAMBIA. Broken Hill; Chama - Luvumba River; Lealui; Luangwa River; Lukashashi River. MALAWI. Chiromo; Chitala River; Port Herald. MOZAMBIQUE. Beira; Boror; Caia; Kasumbadedza; Magude; Mozambique Island; Mutarara; Quelimane; Tete.

Variation. Lower jaw with two very large tooth-like bony projections, skin smooth to very rugose (in large adults), usually with about 8 broken dorsal longitudinal folds; no outer metatarsal or tarsal tubercles; 1 to 2 phalanges of outer toe free of web.

Coloration. Usually olive green, sometimes yellow-brown, with or without lighter and darker mottling, often a yellow vertebral stripe; yellow to white below.

Maximum length. Approximately 200 mm..

Diet. Salisbury specimens contained a small Grotaphoneltis hotamboeia and a Phrynomerus h. bifasciatus. Near Magasso I saw a bullfrog leap from the water to snatch a Chiromantis xerampelina from a low branch.



Enemies. These frogs are eaten by Bushmen (FitzSimons, 1935b) and many Bantu tribes (Boulenger, 1907a; Mitchell, 1946). A juvenile had been eaten by an African Wild Cat (Felis libyca) at Tselenyane Pan, others were recovered from a Dispholidus t. typus at Binga and a juvenile Bitis a. arietans at Xiluvo. Mitchell (1946) noted that many were eaten by pelicans (Pelecanus rufescens) at Port Herald. Loveridge (1953b) recovered one from the stomach of a Varanus n. niloticus near Tete.

Habitat. Widespread in savanna, but most common in arid areas.

Distribution. Eastern Africa from Somalia south to the Eastern Cape Province, west to Nigeria.

PYXICEPHALUS DELALANDEI CRYPTOTIS  
(Boulenger)

Rana cryptotis Boulenger, 1907, Ann. Mag. Nat. Hist., (7), 20, p. 109 :  
Mossamedes, Angola.

Rana delalandei (not Tschudi) Chubb, 1909a, p. 591, and 1909b, p. 34 (Bulawayo).

Pyxicephalus delalandii (not Tschudi), Power, 1927c, p. 412 (Lobatsi);  
FitzSimons, 1935b, p. 387 (Titumi; Lobatsi - Mafeking; Gaberones;  
Metsimaklaba River; Kuke Pan; Gomodimo Pan; Gomodimo - Kaotwe; Kaotwe  
Pan; Gemsbok Pan; Mabeleapudi; Makarikari).

Pyxicephalus delalandei cryptotis Poynton, 1964a, p. 96 (Okovango Swamp;  
Maun; Victoria Falls; Mtoko; Beira; Lundi River Bridge; Antelope;  
Serowe; Bela Vista) and 1964b, p. 201 (Salima).

Ninety-nine specimens examined from: BECHUANALAND. Francis-  
town; 32 mls W of Kanye; 5 mls S of Nata; Toten; 25 mls S of Taau;  
Tselenyane Pan. RHODESIA. Bambesi; Bulawayo - also 14 mls NW and 17  
mls NE; Chibakwe Bridge; Essexvale; Fatima; Irisvale; Kamativi; Kapami  
and 5 mls SE; Lupane; Mpudzi Bridge; Matetsi River Bridge; Mount Hampden;  
Sengwe River; Umshandige River; Wankie. ZAMBIA. Fort Jameson; Living-  
stone; Shesheke.

Literature records. BECHUANALAND. Gaberones; Gemsbok Pan; Gomodimo  
Pan; Gomodimo - Kaotwe; Kaotwe Pan; Kuke Pan; Lobatsi; Lobatsi - Mafeking;  
Mabeleapudi; Makarikari; Maun; Metsimaklaba River; Okovango Swamp;  
Serowe; Titumi. RHODESIA. Antelope; Bulawayo; Lundi River Bridge;  
Mtoko. ZAMBIA. Sandaula Plain (P); Victoria Falls. MALAWI. Salima.  
MOZAMBIQUE. Beira; Bela Vista.

Variation. Tympanum distinct to hidden, vertical diameter usually greater than horizontal diameter; a prominent white longitudinal gland lying below region of tympanum, usually forming a continuous ridge, but occasionally slightly interrupted; outer metatarsal tubercle feebly developed or absent; inner metatarsal tubercle longer than horizontal diameter of tympanum; usually a tarsal tubercle present just below the tibio-tarsal articulation; webbing not reaching middle sub-articular tubercle of fourth toe, and incised further than the distal tubercle of the outer toe.

Coloration. Marbled grey and brown, usually with a narrow pale vertebral line, sometimes with a pair of pale dorso-lateral lines, a large light occipital blotch or dark wavy longitudinal bands; white below.

Maximum length. 51 mm.

Enemies. One was found in the stomach of a Selous' Mongoose (Paracynictis selousi) at Toten; also recovered from a Crotaphopeltis hotamboeia at Victoria Falls and an Aspidelaps scutatus from Matopos.

Habitat. Widespread in savanna, but most common in the Kalahari and other sandy regions of the west.

Distribution. Most savanna areas of Africa, absent from true deserts, the western Cape Province and the moist highlands above about 5,000 feet.

#### PYXICEPHALUS MARMORATUS Peters

Pyxicephalus marmoratus Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 626 : Boror, Mozambique, and 1882, p. 155, pl. xxlii, fig. 2, and pl. xvi, fig. 2; Poynton, 1964a, p. 99 (Victoria Falls; Lake Kariba; Gokwe; Mtoko; Tete; Umtali; Lundi River Bridge; Titumi), also 1964b, p. 201, and 1966b.

Pyxicephalus delalandii (not Tschudi) Boulenger (part), 1910, p. 528 (Matopos).

Arthroleptis rosei Hoffman, 1944, Zoolog. Navors. Nat. Mus. Bloemfontein, 1, p. 174, figs. 1-4 : "Chitjala" = Chitala River, Malawi.

Rana delalandii delalandii (not Tschudi) Loveridge, 1953b, p. 376.

Eighty-seven specimens examined from: BECHUANA LAND. Francistown. RHODESIA. Chibakwe River Bridge; Chipinda Pools; Chisumbanje; Fatima; Irisvale; Kaitano; Kamativi; Kapami and 15 mls SE; Kariba; Kariba Lake - Charara Confluence; Kotwa; Lusulu; Lutope Gorge; Mambwe Pass; Mkota Reserve; Mpudzi Bridge; Msoro; 32 mls NE of Mtoko; Nyampanda;



Odzi; Old Umtali; Rekomitjie Research Station; Shashi - Shashani Confluence; Sinoia; 8 mls SE of Tjolotje; Tuli; Umzilizwe Bridge; Wankie; Zambezi - Matetsi Confluence. ZAMBIA. Balmoral Farm; Fort Jameson; Sayiri. MOZAMBIQUE. Chicamba Dam; Magasse.

Literature records. BECHUANALAND. Titumi. RHODESIA. Gokwe; Kariba Lake; Landi River Bridge; Matopos; Mtoko; Umtali; Victoria Falls. MIAWI. Chitala River. MOZAMBIQUE. Boror; Tete.

Variation. Tympanum distinct, vertical diameter usually greater than horizontal diameter; usually no prominent white glandular ridge below tympanum; outer metatarsal tubercle absent or represented by a small rounded white protuberance; inner metatarsal tubercle longer than horizontal diameter of tympanum; usually a tarsal tubercle present just below the tibio - tarsal articulation; webbing reaching middle subarticular tubercle of fourth toe on at least one side, not incised further than the distal tubercle of the outer toe.

Coloration. Maroon, orange or grey-brown, usually with some darker marbling, often a pale occipital blotch present; white below.

Maximum length. 52 mm.

Habitat. Savanna.

Distribution. Most savanna areas of Africa, extending south to Rhodesia, extreme eastern Bechuanaland, eastern Transvaal and northern Zululand.

#### PIXICEPHALUS TUBERCULOSUS (Boulenger)

Pyxicephalus rugosus Gunther, 1864, <sup>P</sup>roc. Zool. Soc. London, p. 479, pl. xxxiii, fig. 1 : Pungo Andongo, Angola.

Rana tuberculosa Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., 2nd ed., p. 30 (new name for R. rugosa Gunther, preoccupied by rugosa Schlegel).

Rana pulchra Boulenger, 1896, Ann. Mag. Nat. Hist., (6), 18, p. 468 : "Lake Tanganyika."

Pyxicephalus tuberculosus Poynton, 1964a, p. 100 (Rukute Farm; Ngoma Kurriwa; Mtoko; Marandellas), and 1964b, p. 202.

Fifteen specimens examined from: RHODESIA. Chibakwe Bridge; Marlborough; Rusape; Salisbury; Soti Source. ZAMBIA. Chipengali; Sayiri.

Literature records. RHODESIA. Marandellas; Mtoko; Ngomakurriwa; Rukute Farm. ZAMBIA. Abercorn (BM).

Variation. Tympanum distinct; dorsum with numerous skin ridges; outer metatarsal tubercle conspicuous and projecting; inner metatarsal tubercle subequal to horizontal diameter of tympanum; a tarsal tubercle present just below the tibio-tarsal articulation; webbing falling far short of middle subarticular tubercle of fourth toe and distal subarticular tubercle of outer toe.

Coloration. Pale grey-brown with well defined paired dark dorsal markings and dark transverse bands on the limbs, usually a narrow cream vertebral stripe; white below.

Maximum length. 43 mm.

Habitat. Open grassland or Brachystegia woodland between 4,000 and 5,000 feet.

Distribution. Plateau areas of Rhodesia, Zambia, Angola, Katanga and Tanganyika.

PYXICEPHALUS NATALIENSIS A. Smith

Pyxicephalus natalensis A. Smith, 1849, Ill. Zool. S. Afr., Rept., App., p. 23 : "Eastward of the Cape Colony."; Poynton, 1964a, p. 101.

Four specimens examined from: MOZAMBIQUE. Namaacha.

Variation. Tympanum distinct; outer metatarsal tubercle faintly indicated or absent; inner metatarsal tubercle subequal to horizontal diameter of tympanum; no clear tarsal tubercle; webbing not, or just reaching middle subarticular tubercle of fourth toe, reaching distal subarticular tubercle of outer toe.

Coloration. Marbled grey to brown with a dark stripe from snout, through eye to shoulder, a pair of small dark paravertebral spots in the scapular region and scattered dark spots above the vent; white below.

Maximum length. 39 mm.

Habitat. Upland savanna.

Distribution. Transvaal, adjoining Mozambique (eastern plateau slopes), Natal, eastern Cape Province.

Genus RANA Linnaeus

Rana Linnaeus, 1758, Syst. Nat., ed. 10, 1, p. 210. Type by designation of Fitzinger : R. temporaria Linnaeus.



Strongylopus Tschudi, 1838, Class. Batr. Rept., p. 83. Type by monotypy:

S. fasciatus Tschudi = R. fasciata auct.

Hylarana Tschudi, 1838, Class. Batr. Rept., p. 83. Type by monotypy :

Hyla erythraea Schlegel.

Poynton (1964a, p. 92) recognised Hylarana as a full genus, distinguishing it from Rana sensu strictu on colour pattern and the tropical distribution pattern shown by this group in Africa. Inger (1954, p. 195), considering the Phillipine species, demonstrated that Hylarana showed no appreciable ecological shift warranting generic status, for Rana (Hylarana) erythraea and Rana (Rana) cancrivora occur together in flooded rice fields, while Rana (Hylarana) nicobarensis and Rana (Rana) limnocharis both live in grass along small streams and ditches. Inger has also pointed out (in litt.) that Rana sensu strictu includes many tropical forms if it is considered on a global basis. Another weakness is the intermediate status of Rana darlingi and R. galamensis, which Poynton includes in Hylarana, but which Laurent (1964c, p. 132) excludes.

Rana darlingi is a "grass frog" like R. f. fasciata and the two are sympatric in some areas. Rana galamensis bravana is an aquatic form usually found in extensive swamps and could be considered the lowland counterpart of Rana angolensis.

I do not consider that Hylarana warrants generic status on either morphological or ecological grounds.

#### RANA OCCIPITALIS Gunther

Rana occipitalis Gunther, 1858, Cat. Batr. Sal. Brit. Mus., p. 130, pl. xi :  
Gambia; Loveridge, 1933, p. 361 (Nyamkolo); Pitman, 1934, p. 308;  
Witte, 1952, p. 5 (Mbete Bay).

No material examined.

Literature records. ZAMBIA. Mbete Bay; Munwa (P); Nyamkolo.

Diagnosis. A trans-occipital groove present.

Coloration. Uniform dark greenish grey or mottled, usually a light occipital bar.

Maximum length. c. 130 mm.

Habitat. Entirely aquatic, feeding to a great extent on smaller frogs.

Distribution. West Africa, extending east to the Sudan, south through Uganda, Kenya, Tanganyika and the Congo to northern Zambia and Angola.

## RANA ANGOLENSIS Bocage

Rana delalandii Dumeril & Bibron, 1841, Erpet, Gen., 8, p. 388 : "environs du cap de Bonne - Esperance" = South Africa; Boulenger, 1910, p. 526 (Salisbury).

Rana angolensis Bocage, 1866, Jour. Sci. Lisboa, 1, p. 73 : Duque de Braganca, Angola; Boulenger, 1897, p. 801 (Fort Hill), also 1902, p. 15 (Mashonaland), and 1907a, p. 5 (Petauke); Chubb, 1909a, p. 591 (Bulawayo; Matopos; Gwamayaya River), and 1909b, p. 34 (Lomagundi District; Umsitu River); Hewitt & Power, 1913, p. 168 (Marandellas; Eldorado); Parker, 1931, p. 897 (Amatongas); FitzSimons, 1939b, p. 40 (Mount Silinda; Birchenough Bridge), and 1958a, p. 212 (Nyamziwa; Pungwe River Causeway); Poynton, 1964a, p. 103 (Lobatsi; Chishawasha; Rukute Farm; Lundi River Bridge; Chimanimani Mountains; Umtali; Penhalonga; Machipanda; Tete), also 1964b, p. 202 (Cholo; Chikwawa; Mlanje Mountain; Zomba Plateau), and 1966b.

Rana nyassae Gunther, 1893, Proc. Zool. Soc. London (1892), p. 558 : Shire Highlands, Malawi.

Rana mutti Boulenger, 1896, Ann. Mag. Nat. Hist., (6), 18, p. 467 : "Lake Tanganyika"; Parker, 1931, p. 897 (Amatongas).

Rana fuschigula (not Dumeril & Bibron) Boulenger, 1897, p. 801 (Nyika Plateau).

Rana fuschigula angolensis Pitman, 1934, p. 308 (Chinsali); Loveridge, 1953b, p. 365 (Misuku Mtns.; Nyika Plateau; Nchenachena; Nchisi Mtn.; Chitala River; Zomba Plateau; Chiradzulu; Limbe; Cholo Mtn.; Ruo River; Likabula River; Zomba; Livingstonia), and 1953c, p. 147 (Chirombedzi Creek; Mlanje Mtn.).

Rana fuschigula fuschigula (not Dumeril & Bibron) Loveridge, 1953a, p. 366 (Misuku Mtns.; Nchisi Mtn.; Chowe).

Three hundred and sixty-eight specimens examined from: BECHUANA-  
LAND. Kanye. RHODESIA. Atlantica; Bridal Veil Falls; Bulawayo;  
Changadzi River Bridge; Charama Plateau; Chibakwe River Bridge; Chimani-  
mani Mountains; Chinyika Reserve; Chinyamanda; Chishawasha; Concession;  
Darwendale; Engwa; 10 mls S of Featherstone; Hatopani - Umsitu Confluence; Honde  
Vaaley; Hope Fountain; Inyangani Mountain; Kyle Lake; Lutopo River;  
Mambwe Pass; Mare Dam; Matopos; Melfort; Moodies Pass; Mount Hampden;  
Mount Silinda; Mpudzi Bridge; Mtarazi River (Lower); 4 mls W of Mtoko;  
Muriel Mine; Ngorima Reserve (E); Nyahodi Bridge; Nyamakari; Nyamashatu  
River; Odzani Dam; Odzi; Pachanza; Plumtree; Rhodes Inyanga Estate;  
Ruenya River Drift; Rusape; Ruwa; Salisbury; Selous; Sengwe Gorge; Silverstreams; Sinoia;  
Sinoia Caves; 12 mls ESE of Sipolilo; Somabula; Soti Source; Stapleford;  
Thorn Park; Troutbeck; Tynwald; Umtali; Urvukwes; Ubailizwe Bridge;  
Vumba Mountain; Weltevreden Farm; Wicklow; Zewa. ZAMBIA. Abercorn;



Fort Jameson; Ikelenge; Kabompo; Kalichero; Katete; Nyika Plateau; Petauke Old Boma; Sitwe. MALAWI. Lujeri; Misuku Mountains; Mlanje Mountain. MOZAMBIQUE. Chemezi; Chimanimani Mountains (Martin's Falls); Chinamainza; 12 mls S of Erego; Fermerenga; Garuso; Gondola - Gorongoza Pontoon; Gorongoza Mountain; Maforga; Matareca; Mitucue Mountain;  Namaacha; Ribaue; Vila Gouveia (USNM).

Literature records. BECHUANALAND. Lobatsi. RHODESIA. Birchenough Bridge; Bulawayo; Chimanimani Mountains; Chishawasha; Eldorado; Gwamayaya River; Lomagundi District; Lundi River Bridge; Marandellas; Matopos; Mount Silinda; Nyamziwa; Penhalonga; Pungwe River Causeway; Rukute Farm; Salisbury; Umtali. ZAMBIA. Chinsali; Petauke; Umsitu River. MALAWI. Chikwawa; Chiradzulu; Chirombedzi Creek; Chitala River; Cholo Mountain; Chowe; Fort Hill; Likabula River; Limbe; Livingstonia; Misuku Mountains; Nchenachena; Nchisi Mountain; Nyika Plateau; Ruw River; Zomba; Zomba Plateau. MOZAMBIQUE. Amatongas; Machipanda; Tete.

Variation. Width of head about one third body length, head tapering from level of tympanum, width of skull at level of nostrils less than distance from nostril to posterior corner of eye; horizontal diameter of tympanum at least half the diameter of the eye, less than distance from eye to nostril; length of tibia more than half body length, head width/tibia length ratio about 50 - 65%; two phalanges of fourth toe free of web.

Coloration. Ground colour can change from yellow-brown to emerald green quite rapidly, a yellow or green dorsal stripe often present and usually numerous dark dorsal spots; white below, uniform or with dark mottling, especially on the throat.

Maximum length. 95 mm.

Enemies. Two were found in the stomach of a Herpestes ichneumon at Salisbury. This species is heavily preyed upon by aquatic snakes, especially Philothamnus spp.

Habitat. Rivers, streams and lakes in upland savanna, forests and montane grassland, rarely found below 1,000 feet.

Distribution. Most well-watered parts of Africa, excluding the East African lowlands and the western Cape Provinces.

RANA JOHNSTONI JOHNSTONI Gunther

Rana johnstoni Gunther, 1894, Proc. Zool. Soc. London (1893), p. 620:

"Tshiromo", Malawi; Loveridge, 1953b, p. 367; Poynton, 1964b, p. 203 (Mlanje Mountain).

Fifteen specimens examined from: MAIAWI. Mlanje Mountain.

Variation. Tympanum less than half the diameter of the eye; width of skull/distance from tip of snout to posterior border of tympanum = 0.97 - 1.11 ( $\bar{X}$  = 1.04; SD. 0.04); head width/tibia length = 0.69 - 0.76; 1 - 2 phalanges of fourth toe free of webbing, outer toe with not more than half a phalanx free of web.

Coloration. Olive brown above, uniform or marbled and with dark cross-bands on the limbs.

Maximum length. 57.5 mm.

Habitat. Juveniles were found in rock pools fringing the Ruo River above the falls, but the adults apparently keep to deeper water.

Rana angolensis was not found in association with R. j. johnstoni above the Ruo Falls, although it was the only aquatic frog found in the Ruo Gorge below the Falls.

Distribution. Mlanje Mountain. The type locality "Chiromo" is certainly erroneous (see Poynton, 1964b.)

#### RANA JOHNSTONI INYANGAE Poynton

Rana johnstoni inyangae Poynton, 1966, *Arnoldia* (Rhodesia), 2, No. 19, p. 1: Inyangani Mountain, Inyanga District, Rhodesia at about 7,500 feet.

Nine specimens examined from: RHODESIA. Inyangani Mountain; Mtarazi Falls (foot).

Variation. Tympanum less than half the diameter of the eye; width of skull/distance from tip of snout to posterior border of tympanum = 0.94 - 1.01 ( $\bar{X}$  = 0.97; SD. 0.03); head width/tibia length = 0.58 - 0.67; 1-2 phalanges of fourth toe free of webbing; outer toe webbed almost to the tip.

Coloration. When captured, the holotype ♀ was emerald green mottled with black, but when placed in the shade she turned light golden-brown with dark brown markings; white below, throat and pectoral region pale grey with white spots.

Maximum length. 58.7 mm. (holotype ♀).

Habitat. Mountain streams in the Inyanga highlands, where it is sympatric with Rana angolensis. R. j. inyangae seems to prefer turbulent water, especially at the foot of Mtarazi Falls (4,500 feet), where these frogs sit on boulders in a raging torrent below the main fall.

Distribution. Endemic to the Inyanga Highlands.



RANA GRAYI RHODESIANA Hewitt

Rana grayi rhodesiana Hewitt, 1937, Occ. Pap. Nat. Mus. S. Rhod., 6, p. 12, pl. 1 : Chirinda Forest, Rhodesia; FitzSimons, 1939b, p. 41 (Vumba Mtn.; Chirinda Forest); Poynton, 1964a, p. 114 (Penhalonga; Chimanimani Mtns.).

Rana grayi grayi (not A. Smith) FitzSimons, 1958a, p. 212 (Pungwe River Causeway).

Seventy-one specimens examined from: RHODESIA. Chimanimani Mountains; Engwa; Inyanga National Park; Inyangani Mountain; Makurupini River; Mare Dam; Mount Chililokwe; Mount Silinda; Ngorima Reserve (E); Silverstreams; Stapleford; Tandaai; Vumba Mountain; Weltevreden Farm. MOZAMBIQUE. Chimanimani Mountains (Martin's Falls); Gorongoza Mountain.

Literature records. RHODESIA. Chimanimani Mountains; Chirinda Forest; Penhalonga; Pungwe River Causeway; Vumba Mountain.

Variation. Length of foot equal to distance from tip of urostyle to posterior edge of tympanum; head width/length of fourth toe less than 84%; 3 - 4 phalanges of fourth toe free of web.

Coloration. Dorsum uniform red, yellow or pale grey, sometimes with dark mottling laterally, or with paired dark dorsal blotches (especially in the Chimanimani Mountains), limbs with dark cross-bands; white below.

Maximum length. 46 mm.

Enemies. FitzSimons (1939b) recovered one from the stomach of a Lycodonomorphus rufulus on Vumba Mountain.

Habitat. Evergreen forests are populated by uniform red or yellow frogs which are hard to detect against a background of dead leaves. Open velds and grasslands are inhabited by yellow or grey frogs, which usually show some darker markings.

Distribution. Eastern highlands of Rhodesia, but descending to 1,200 feet on the eastern escarpment at Makurupini River. Relict populations occur on the summit of Gorongoza Mountain at 6,000 feet.

RANA FASCIATA FASCIATA A. Smith

Rana fasciata Boie. A. Smith, 1849, Ill. Zool. S. Africa, Rept., pl. Lxxviii, figs. 1a - c : Southern Africa; FitzSimons, 1939b, p. 40 (Mount Silinda).

Rana fasciata fasciata FitzSimons, 1958a, p. 213 (Nymaziwa); Poynton, 1964a, p. 115 (Chimanimani Mountains).

Sixty-one specimens examined from: RHODESIA. Chido; Chimanimani Mountains; Engwa; Inyanga National Park; Marandellas; Odzani Dam; Old Umtali; Selukwe; Silverstreams; Stapleford; Troutbeck; Umtali; Umzilizwe Bridge; Vumba Mountain.

Literature records. RHODESIA. Chimanimani Mountains; Mount Silinda; Nyamziwa.

Variation. Length of foot equal to distance from tip of urostyle to tympanum or eye; head width/foot length ratio 0.39 - 0.43;  $3\frac{1}{2}$  - 4 phalanges of fourth toe free of web.

Coloration. Yellow or pale brown with a pair of dark brown dorsal stripes extending from between eyes to tip of urostyle and usually two more lateral stripes on each side; thigh with poorly defined dark blotches, tibia with longitudinal dark markings; usually uniform silvery-white below.

Maximum length. 50 mm.

Habitat. Montane grassland.

Distribution. Coastal areas of the eastern Cape Province and Natal, the Drakensberg and Transvaal highveld; relict populations on the Rhodesian highlands, extending along the main watershed through Marandellas to Selukwe.

#### RANA FASCIATA FUELLEBORNI Nieden

Rana fasciata (not A. Smith) Günther, 1893, p. 555 (Shire Highlands).

Rana fülleborni Nieden, 1910, Sitzb. Ges. Naturf. Freunde Berlin, p. 436:

Ngosi Volcano Grater Lake, Poroto Mountains, Tanganyika.

Rana fasciata fülleborni Loveridge, 1953a, p. 373 (Nyika Plateau; Likabula River); Poynton, 1964b, p. 203 (Zomba Plateau).

Eight specimens examined from: ZAMBIA. Nyika Plateau. MALAWI. Nyika Plateau.

Literature records. MALAWI. Likabula River; Nyika Plateau; Zomba Plateau.

Variation. Head width/foot length ratio 0.42 - 0.50;  $3\frac{1}{2}$  - 4 phalanges of fourth toe free of web.

Coloration. As in the typical form except that the dark lateral stripes tend to be ragged or broken up.

Maximum length. 52 mm.



Habitat. Montane grassland.

Distribution. Mountains of southern Tanganyika and Malawi.

RANA GALAMENSIS BRAVANA (Peters)

Limnodytes bravans Peters, 1882, Sitzb. Ges. naturf. Freunde Berlin, 1, p. 9 : Brava, Somalia.

Rana galamensis (not Dumeril & Bibron), Boulenger, 1907b, p. 481 (Beira), and 1910, p. 526; Parker, 1931, p. 897 (Fambani River).

Rana galamensis bravana Witte, 1951, p. 5 (Mpulungu); Loveridge, 1953a, p. 364 (Likabula River).

Hylarana galamensis bravana Poynton, 1964a, p. 121, and 1964b, p. 204.

Thirty-two specimens examined from: MALAWI. Mchenga.

MOZAMBIQUE. Beira.

Literature records. ZAMBIA. Mpulungu. MALAWI. Likabula River.

MOZAMBIQUE. Beira; Fambani River.

Variation. Vocal sacs of ♂♂ external, forming loose bags of darkly pigmented skin below the angles of the jaw; ♂♂ with a large flattened pad on the upper arm; outer metatarsal tubercle weakly developed or absent;  $2\frac{1}{2} = 3$  phalanges of fourth toe free of web.

Coloration. Dorsum with a pair of broad light dorso-lateral stripes extending from between the eyes to the groin, intermediate zone darker, often with irregular blotches or a dark inner border to the dorso-lateral stripes; a dark brown lateral band is speckled with yellow; thighs dark with pale mottling; uniform cream below.

Maximum length. 85.5 mm.

Habitat. This aquatic species is apparently confined to extensive swamps.

Distribution. Eastern Africa from Somalia south to central Mozambique, west to Lake Tanganyika.

RANA DARLINGI Boulenger

Rana darlingi Boulenger, 1902, Proc. Zool. Soc. London, p. 15, pl. 3,

fig. 1: Mazoe and between Umtali and Marandellas; Chubb, 1909b,

p. 34 (Victoria Falls); Boulenger, 1910, p. 526; Pitman, 1934, p. 308

(Nkana).

Hylarana darlingi Poynton, 1964a, p. 119 (Livingstone; Selous; Salisbury).  
Rana albolabris adiscifera Schmidt & Inger, 1959, Explor. Parc Nat. Upemba,  
 Miss. G. F. de Witte, Amphib. 56, p. 48, fig. 19 : Chitau, Angola.

Eighty-one specimens examined from: RHODESIA. Bromley;  
 Chinyika Reserve; Cleveland Dam; Darwendale; Fairfield; Haroni - Lusitu  
 Confluence; Lake MacIlwaine; Marandellas; Mount Hampden; Mount Silinda;  
 Old Untali; Salisbury; Shawanoe Bridge; Soti Source; Thorn Park; Um-  
 fesi; ZAMBIA. Siantamba. MOZAMBIQUE. 8 mls SSE of Vila Gouveia;  
 Vila Paiva de Andreia.

Literature records. RHODESIA. Mazoe; Salisbury; Selous; Untali -  
 Marandellas; Victoria Falls. ZAMBIA. Livingstone.

Variation. Vocal sacs of ♂♂ internal; a large very flattened and in-  
 conspicuous pad present on upper arm of breeding ♂♂; a small outer meta-  
 tarsal tubercle usually present, sometimes absent; 2 - 3 phalanges of fourth  
 toe free<sup>full</sup> of webbing.

Coloration. Dorsum gold, usually immaculate, separated by a sharply  
 defined line from the dark brown or blackish flanks; a prominent white  
 line extends from tip of snout, under eye and tympanum to a glandular ridge  
 above the axilla; juveniles spotted below, but adults immaculate except for  
 the limbs, which are faintly spotted.

Maximum length. 62 mm.

Habitat. Grassland and Brachystegia woodlands, where it is essentially  
 a "grass frog", but also found in evergreen forest at Haroni - Lusitu Con-  
 fluence.

Distribution. Southern Katanga, Angola, western Zambia, the Rhodesian  
 Plateau and the Manica Platform of Mozambique.

#### RANA ALBOLABRIS LEMAIREI Witte

Rana lemairei Witte, 1921, Rev. Zool. Bot. Afr., 2, p. 1, pl. i, figs. 1 -  
 4: Lofot, Katanga.

Rana albolabris lemairei Schmidt & Inger, 1959, p. 41, figs. 19, 20 (Katanga  
 material).

One specimen examined from: ZAMBIA. Ikkelenge.

This frog resembles Rana darlingi very closely except for the  
 presence of digital discs.

Distribution. Savannas of Angola, Katanga and north-western Zambia.



## Genus HILDEBRANDTIA Nieden

Hildebrandtia Nieden, 1907, Sitzber. Ges. naturf. Freunde Berlin, p. 229.

Type by monotypy: Pyxicephalus ornatus Peters.

## HILDEBRANDTIA ORNATA ORNATA (Peters)

Pyxicephalus ornatus Peters, 1878, Monatsber. Akad. Wiss. Berlin, p. 207, pl. ii, fig. 7: "Taita" = Teita, Kenya.

Rana ruddi Boulenger, 1907, Proc. Zool. Soc. London, p. 480, pl. xxi, figs. 1, 1a - b: Beira, Mozambique; Hewitt & Power, 1913, p. 168 (Eldorado).

Pyxicephalus ruddi Boulenger, 1910, p. 528.

Rana ornata Pitman, 1934, p. 308 (Broken Hill).

Hildebrandtia ornata ornata Poynton, 1964a, p. 122 (Musami; Lundi River Bridge; Antelope), and 1964b, p. 205

Forty-nine specimens examined from: RHODESIA. Chipinda Pools; Kariba - Charara Confluence; Majinji Pan; Msoro; 32 mls NE of Mtoko; Ngamo; 10 mls W of Salisbury; Wankie National Park (Nyamandhlovu Pan). ZAMBIA. Sayiri. MOZAMBIQUE. Amatongas; Inchope; Magasso; Metuchira; 12 mls SW of Mungari; Kiluvo.

Literature records. RHODESIA. Antelope; Eldorado; Lundi River Bridge; Musami. ZAMBIA. Broken Hill. MOZAMBIQUE. Beira.

Variation. Snout pointed; no outer metatarsal tubercle; webbing not to just reaching middle subarticular tubercle of fourth toe.

Coloration. Dorsum with a complex and variable pattern of longitudinal markings in dark brown, gold and green; limbs with dark transverse bands; white below, but throat with conspicuous dark longitudinal bands.

Maximum length. 65 mm.

Habitat. A fossorial form, widespread in savannas below 5,000 feet.

Distribution. Eastern Africa from Somalia south to Mozambique and the eastern Transvaal, west to southern Angola and northern South West Africa.

## Genus PTYCHADENA Boulenger

Ptychadena Boulenger, 1918, Bull. Soc. Zool. France (1918), p. 114. Type by original designation : Rana mascareniensis Dumeril & Bibron.  
Abrana Parker, 1931, Proc. Zool. Soc. London (1930), p. 898. Type by monotypy : A. cotti Parker = Rana floweri Boulenger.

## PTYCHADENA OXYRHYNCHUS (A. Smith)

Rana oxyrhynchus A. Smith, 1849, Ill. Zool. S. Africa, Rept., pl. lxxvii, figs. 2, 2a - c : "Kaffirland and the region of Port Natal" = Durban; Peters, 1854, p. 626 (Cabaceira Peninsula; Quelimane; Boror), and 1882, p. 147; Boulenger, 1897 (part), p. 801 (Nyika Plateau), and 1907b, p. 481 (Coguno; Beira); Hewitt & Power, 1913, p. 168 (Marandellas); Parker, 1931, p. 898 (Amatongas; Caia; Charre; Fambani River).  
Rana oxyrhynchus oxyrhynchus Mertens, 1937, p. 19 (Nsombo).  
Rana oxyrhynchus gribinguiensis Angel, Loveridge, 1953a, p. 368 (Misuku Mtns.; Nchenachena; Nchisi Mtn.; Cholo Mtn.).  
Ptychadena oxyrhynchus Poynton, 1964a, p. 124 (Gokwe; Salisbury; Mtoko; Machipanda; Amatongas; Lundi River Bridge; Bela Vista), and 1964b, p. 206.

One hundred and three specimens examined from: RHODESIA.

Atlantica; Bembesi; Chibakwe Bridge; Chinyamanda; Fatima; Haroni - Lusitu Confluence; Hartley; Helvetia; Hot Springs; Irisvale; Kyle Lake; Lake Macilwaine; Mabelreign; 4 mls W of Mtoko; Mount Hampden; Nyamashatu Bridge; Old Umtali; Salisbury; Sinoia; 12 mls ESE of Sipolilo; Tynwald; Umtali; Umzilizwe; Zambezi - Sebungwe Confluence; Zimbabwe.  
 ZAMBIA. Mkanda; Ndola; Ngambwe Falls; Sayiri. MALAWI. Lujeri; Mlanje Boma; Rumpi. MOZAMBIQUE. Amatongas; Boror; Chapala; Chemba; Comacha; 5 mls NE and 10 mls NNW of Dondo; Gorongoza Mountain; Inhaca Island; Mitucue Mountain; 9 mls S of Muanza; Nampula; Vila de Manica and 7 mls S & 15 mls SE; 8 mls SSE of Vila Gouveia; 5 mls NW of Vila Pery; Vila Vasco da Gama (USNM).

Literature records. RHODESIA. Gokwe; Lundi River Bridge; Marandellas; Mtoko; Salisbury. ZAMBIA. Abercorn (BM); Kasama (BM); Nsombo. MALAWI. Cholo Mtn.; Misuku Mtns.; Nchenachena; Nchisi Mtn.; MOZAMBIQUE. Amatongas; Beira; Bela Vista; Boror; Cabaceira Peninsula; Caia; Charre; Coguno; Fambani River; Machipanda; Quelimane.



Variation. Distance from nostril to tip of snout greater than inter-narial distance; gular pouch openings oblique to mandible; length of foot less than length of tibia; no outer metatarsal tubercle;  $1\frac{1}{2}$  - 2 phalanges of fourth toe free of web, less than one phalanx of fifth toe free.

Coloration. Bright red, olive or greenish above with a pale triangular patch on the snout, its base forming a distinct interorbital line; back often with darker mottling, limbs with dark transverse bars; posterior face of thighs mottled.

Maximum length. 60.5 mm.

Enemies. In Malawi, Loveridge (1953a) recovered this species from the stomachs of two Philothammus i. irregularis and four Thelotornis k. capensis.

Habitat. Widespread in savanna up to about 5,000 feet, but absent from arid areas.

Distribution. Moist savannas from Gambia to the Congo and south to Natal and Pondoland.

#### PTYCHADENA ANCHIETAE (Bocage)

Rana anchietae Bocage, 1867, Proc. Zool. Soc. London, p. 843, fig. 1:  
Benguela, Angola.

Rana abyssinica Peters, 1881, Sitzber. Ges. Freunde Berlin, p. 163 : Ailet, Bogos, Eritrea.

Rana oxyrhynchus (not A. Smith) Power, 1927c, p. 411 (Lobatsi); FitzSimons, 1935b, p. 585 (Metsimaklaba River; Kasane), and 1939b, p. 40 (Birch-enough Bridge).

Rana oxyrhynchus oxyrhynchus (not A. Smith) Loveridge, 1953b, p. 369 (Mtimbuka; Limbe; Tete), and 1953c, p. 147 (Fort Johnston; Mpatamanga Gorge; Chiromo; Tangadzi River; Chirombedzi Creek).

Ptychadena anchietae Poynton, 1964a, p. 126 (Livingstone; Victoria Falls; Kariba Lake; Mtoko; Salisbury; Umtali; Machipanda; Ponte do Pungue; Beira; Lundi River Bridge; Mahalapye; Ponte do Calichane), also 1964b, p. 206 (Salima; Chikwawa), and 1966b.

Two hundred and eighty-six specimens examined from: BECHUANALAND. Kanye. RHODESIA. Bembesi; Bomponi; Charama Plateau; Chikombedzi; Chipinda Pools; Chirundu; Chisumbanje; Essexvale; Fatima; Kaitano; Kampoti Rapids; Kamatiyi; Kariba; Kariba Lake - Charara, Chimburu, Mwenda, Sanyati and Sengwa Confluences; Kazungula; Khami River Ranch; Limpopo

River; Lonely Mine; Lukosi; Lupane; Majinji Pass; Maleme Bridge; Mambwe Pass; Matetsi River Bridge; Ma'onga River Bridge; Mpata Gorge; Mpudzi Bridge; 4 mls W. of Mtoko; Nuanetsi Gorge; Nyamakari River; 10 mls WSW of Nyamandhlovu; Nkai; Odzi; Old Umtali; Pungwe Bridge; Ruenya River Drift; Ruware; Sebungwe (West); Sengwe Gorge, Gokwe; Shashi - Shashani Confluence; Tegwani; Tivuli Spring; Turk Mine; 20 mls WNW of Victoria Falls; 13 mls SW of Wedza; Zambezi - Chewore, Matetsi and Sebungwe Confluences, also opposite Feira. ZAMBIA. Chavuma; Kalichero. MALAWI. Karonga; Likabula; Lujeri; Mlanje Mountain; Rumpi; Wankurumadzi Bridge. MOZAMBIQUE. Boane; Boroma; Cavalo; Changara; Chinamainza; 12 mls S of Erego; Gumba; Gondola - Gorongosa Pontoon; Gorongosa Mountain; Jorge; Luála River (15 mls W of Campo); Magasso; Maringa; Methambane; Mitucue Mountain; Nabaunama Dam; Namuava; Ribeau Mountain; 45 mls. ENE of Tete; 7/10 mls ESE of Vila Gouveia; Viola.

Literature records. BECHUANALAND. Kasane; Lobatsi; Mahalapye; Metsimaklaba River. RHODESIA. Birchenough Bridge; Lundi River Bridge; Mtoko; Salisbury; Umtali. ZAMBIA. Kariba Lake; Livingstone; Victoria Falls. MALAWI. Chikwawa; Chirombedzi Creek; Chiroro; Fort Johnston; Limbe; Mpatamanga Gorge; Mtimbuka; Salima; Tangadzi River; MOZAMBIQUE. Machipanda; Ponte do Calichane; Ponte do Pungue; Tete.

Variation. Distance from nostril to tip of snout subequal to internarial distance; gular pouch openings oblique to mandible; length of foot less than length of tibia; outer metatarsal tubercle sometimes feebly developed;  $1\frac{1}{2}$  - 2 phalanges of fourth toe free of web, less than one phalanx of fifth toe free.

Coloration. More or less uniform reddish or grey brown above, but with a pale triangular patch on snout in front of eyes; posterior face of thighs dark with pale markings forming longitudinal lines.

Maximum length. 52 mm.

Enemies. The Namuava specimen was being swallowed by a Psammophis s. sudanensis when found. Loveridge found specimens in the stomachs of a Psammophis s. sibilans and a Naja h. annulifera collected along the Zambezi near Tete.

Habitat. Widespread in savanna, but characteristic of the major river valleys, where it is the commonest frog.

Distribution. Eastern Africa from Eritrea south to Natal, west to Angola, absent from the Kalahari.



## PTYCHADENA SUBPUNCTATA (Bocage)

Rana subpunctata Bocage, 1866, Jour. Acad. Sci. Lisboa, 1, p. 73 : Duque de Braganca, Angola.

Rana chobiensis FitzSimons, 1932, Ann. Tvl. Mus. 15, p. 39. Chobe River at Kasane, Bechuanaland (also Kabulabula), and 1935b, p. 385, fig. 22.

Ptychadena subpunctata Poynton, 1964a, p. 127 (Sevuti River; Maun; Victoria Falls).

Twenty-one specimens examined from: BECHUANALAND. 15 mls NE of Gomare; Maun; Sepopa; Sevuti River; Shakawe. RHODESIA. 20 mls WNW of Victoria Falls. ZAMBIA. Chavuma; Ikhalenge; Ngambwe Falls.

Literature records. BECHUANALAND. Kabulabula; Kasane; Maun; Sevuti River. RHODESIA. Victoria Falls. ZAMBIA. Abercorn (BM); Kalabo (P); Kalenga (P); Kasama (BM); Nyamkolo (BM).

Variation. Distance from nostril to tip of snout greater than inter-narial distance; gular pouch openings oblique to mandible; length of foot subequal to, or greater than, length of tibia;  $1\frac{1}{2}$  - 2 phalanges of fourth toe free of web, less than one phalanx of fifth toe free.

Coloration. Grey brown above, sometimes with a pale vertebral stripe, dorso-lateral skin ridges usually whitish, dark dorsal spots usually present, limbs with dark blotches; posterior surface of thigh with strongly contrasting light and dark longitudinal stripes; abdomen with numerous small dark spots.

Maximum length. 64.5 mm.

Habitat. Flood plains bordering the upper Zambezi, the Chobe and the Okovango Swamps.

Distribution. Angola, Katanga, northern and western Zambia, northern Bechuanaland, north-western Rhodesia.

## PTYCHADENA MASCARENIENSIS MASCARENIENSIS (Dumeril &amp; Bibron)

Rana mascareniensis Dumeril & Bibron, 1841, Erpet. Gen., 8, p. 350 : Madagascar; Boulenger, 1897, p. 801 (Kondowe to Karonga; Nyika Plateau), and 1907b, p. 481 (Beira); Parker, 1931, p. 898 (Caia; Charre).

Rana mascareniensis mascareniensis Loveridge, 1933, p. 369 (Nyamkolo); Pitman, 1934, p. 308 (Broken Hill; Chinsali; Luangwa Valley); Mertens, 1937, p. 19 (Nsombo; Muchishye); Witte, 1951, p. 6 (Mbete Bay); Loveridge, 1953b, p. 370 (Dedza), and 1953c, p. 148 (Fort Johnston; Lake Chilwa; Chirombedzi Creek).

Ptychadena mascareniensis mascareniensis Poynton, 1964a, p. 128 (Sevuti River; Beira; Chimonso; Macia), and 1964b, p. 207 (Palm Beach).

Twenty-seven specimens examined from: BECHUANA LAND. 15 mls NE of Gomare; Sevuti River. CAPRIVI. Lake Liambezi. RHODESIA. Zambezi-Chewore Confluence. MALAWI. Mchenga. MOZAMBIQUE. Beira; Boane; Inhaca Island.

Literature records. BECHUANA LAND. Sevuti River. ZAMBIA. Abercorn (BM); Broken Hill; Chibutubutu (P); Chinsali; Luangwa Valley; Mbete Bay; Mpulungu (BM); Muchishye; Nsombo; Nyamkolo (BM). MALAWI. Chirombedzi Creek; Dedza; Fort Johnston; Kondowe to Karonga; Lake Chilwa; "Nyika Plateau"; Palm Beach. MOZAMBIQUE. Beira; Caia; Charre; Chimonso; Macia.

Variation. Distance from nostril to tip of snout subequal to, or slightly greater than internarial distance; gular pouch openings parallel to mandible; length of foot subequal to, or greater than length of tibia; no outer metatarsal tubercle; 2 - 2½ phalanges of fourth toe free of web, one phalanx of fifth toe free.

Coloration. Pale grey-brown with darker dorsal blotches and a broad pale vertebral stripe; posterior face of thigh with rather irregular light longitudinal stripes; a light longitudinal hairline on upper surface of tibia; white below, throat sometimes with brown stippling.

Maximum length. 51 mm.

Enemies. Loveridge (1933) recovered a juvenile from the stomach of a Psammophis s. sibilans at Nyamkolo.

Habitat. Flood plains and swamps bordering permanent rivers and lakes.

Distribution. Savanna areas of central Africa, extending south to northern Bechuanaland, the Zambezi basin and the Mozambique Plain, reaching its southern limit in Zululand.

#### PTYCHADENA POROSISSIMA (Steindachner)

Rana porosissima Steindachner, 1867, Reise Novara, Amph., p. 18, pl. i, figs. 9 - 13 : Angola.

Rana mascareniensis mascareniensis (not Dumeril & Bibron) FitzSimons (part) 1958a, p. 213 (Nyamziwa; Pungwe River Causeway).

Ptychadena porosissima Poynton, 1964a, p. 129 (Victoria Falls; Salisbury; Rusape; Chishawasha; Gwelo), and 1964b, p. 207 (Nyika Plateau).



Thirteen specimens examined from: RHODESIA. Inyanga National Park; Mare Dam; Mount Hampden; Soti Source; Stapleford. ZAMBIA. Nyambeza Plain; Nyika Plateau.

Literature records. RHODESIA. Chishawasha; Gwelo; Nyamziwa; Pungwe River Causeway; Rusape; Salisbury; Victoria Falls. ZAMBIA. Abercorn (BM); Sandaula Plain (P). MALAWI. Nyika Plateau.

Variation. Distance from nostril to tip of snout subequal to internarial distance; gular pouch openings oblique to mandible; length of foot slightly less than length of tibia; outer metatarsal tubercle poorly developed or absent; 3 phalanges of fourth toe free of web, 1 -  $1\frac{1}{2}$  phalanges of fifth toe free.

Coloration. Pale grey brown with dark dorsal spots and a pale vertebral stripe; hind limbs with dark transverse bands and a light longitudinal line on upper surface of tibia; posterior face of thigh with pale spots or mottling; white below.

Maximum length. 44 mm.

Habitat. Montane grassland and upland savanna.

Distribution. Eastern Africa from Uganda south to the Eastern Cape Province, west to Angola.

#### PTYCHADENA UPEMBAE UPEMBAE (Schmidt & Inger)

Rana upembae Schmidt & Inger, 1959, Explor. Parc. Nat. Upemba, Miss. G. F. de Witte, Amphib., 56, p. 111, fig. 50 : Upemba National Park, Katanga. Ptychadena upembae upembae Poynton, 1964b, p. 207.

Six specimens examined from: ZAMBIA. Chipengali; Great East Road - 24 E of Fort Jameson; Luembe; Mfuwe; Sayiri. MALAWI. Livingstonia.

Literature records. ZAMBIA. Kasama (BM); Sandaula Plain (P).

Variation. Distance from nostril to tip of snout subequal to internarial distance; gular pouch openings oblique to mandible; length of foot less than length of tibia; outer metatarsal tubercle poorly developed or absent; 3 phalanges of fourth toe free of web, 1 -  $1\frac{1}{2}$  phalanges of fifth toe free.

Coloration. Similar to P. porosissima, but without a light line on upper surface of tibia.

Maximum length. 45 mm.

Habitat. Savanna,

Distribution. Katanga, Zambia and northern Malawi.

PTYCHADENA UZUNGWENSIS (Loveridge)

Rana mascareniensis uzungwensis Loveridge, 1932, Bull. Mus. Comp. Zool., 72, p. 384: Dabaga, Uzungwe Mountains, Tanganyika, and 1953a, p. 372 (Lichenya Plateau, Mlanje Mountain).

Ptychadena uzungwensis Laurent, 1954b, p. 9, pl. i, fig. 1 & pl. iv, fig. 4 (Marandellas); Poynton, 1964a, p. 131 (Salisbury; Chimanimani Mountains), and 1964b, p. 208.

Rana mascareniensis mascareniensis (not Dumeril & Bibron) FitzSimons (Part), 1958a, p. 213 (Nyamziwa; Pungwe River Causeway).

Fifty-nine specimens examined from: RHODESIA. Chimanimani Mountains; Chipinga; Haroni - Lusitu Confluence; Mare Dam; Lower Mtarazi River; Soti Source; Stapleford; Umzilizwe River; Zimbabwe. ZAMBIA. Ikalele; Sayiri. MALAWI. Chisenga; Fort Hill; Livingstonia; Nyika Plateau (Chelinda); Zomba Plateau. MOZAMBIQUE. Chimanimani Mountains (Martin's Falls); Vila de Manica; 8 mls SSE of Vila Gouveia.

Literature records. RHODESIA. Chimanimani Mountains; Marandellas; Nyamziwa; Pungwe River Causeway; Salisbury. ZAMBIA. Abercorn (BM); Kasama (BM). MALAWI. Lichenya Plateau.

Variation. Distance from nostril to tip of snout slightly greater than internarial distance; gular pouch openings oblique to mandible; a pair of dorsal skin folds extend on to the snout in front of eyes; length of foot slightly less than length of tibia; outer metatarsal tubercle usually absent; 3 phalanges of fourth toe free of web, 1 - 2 phalanges of fifth toe free.

Coloration. Grey-brown above, with confluent dark dorsal spots tending to form crossbands and usually a pale vertebral stripe (often narrow); limbs with numerous dark transverse bands, no light line on upper surface of tibia; posterior face of thigh mottled; white below.

Maximum length. 40 mm.

Habitat. Montane grassland and vleis, also upland savanna (Brachystegia woodland).

Distribution. Highlands of Angola, Katanga, Rwanda, Tanganyika, Zambia, Malawi, Rhodesia and adjoining Mozambique.



## PTYCHADENA TAENTIOSCELIS Laurent

Ptychadena taentioscelis Laurent, 1954, Ann. Mus. Roy. Congo Belge, (8),

34, p. 25, pl. iv, fig. 6 and pl. v., fig. 1 : Lukula, Katanga;

Poynton, 1964a, p. 132 (Andara), also 1964b, p. 208 and 1966b.

Rana mascareniensis mossambica (not Peters) Mertens, 1955, p. 29 (Andara).

Twenty-six specimens examined from: ZAMBIA. Chongwe River; Kalomo; Luangwa - Mtikila Confluence; Ngambwe Falls; Sayiri. MOZAMBIQUE. Nampula.

Literature records. CAPRIVI. Andara. ZAMBIA. Kalabo (P); Kalenga (P); Kasama (BM); Liuwa Plain (P); Nkana (MMK); Sandaula Plain (P).

Variation. Distance from nostril to tip of snout greater than inter-narial distance; gular pouch openings oblique to almost parallel to the mandible; a pair of dorsal skin folds usually extending into snout; length of foot slightly greater than length of tibia; outer metatarsal tubercle feebly developed or absent; 3 phalanges of fourth toe free of web, 1 to nearly 2 phalanges of fifth toe free.

Coloration. Grey-brown or yellow-brown, with dark dorsal blotches; dorso-lateral skin folds white, sometimes a pale vertebral stripe; faint transverse banding on limbs; no light line on upper surface of tibia; posterior face of thigh with conspicuous light and dark longitudinal stripes, a prominent continuous dark line running almost from knee to knee along femurs below vent; white below.

Maximum length. 35.5 mm.

Habitat. Savanna.

Distribution. Nigeria east to the Congo, Tanganyika, Zambia, Caprivi, Mozambique and Zululand.

## PTYCHADENA CHRYSOGASTER GUIBEI Laurent

Rana Mossambica Peters (part), 1854, p. 626, and 1882, p. 149 (Cabaceira).

Rana ansorgii (not Boulenger) Parker, 1931, p. 898 (Amatongas); Loveridge, 1953b, p. 373 (Chiradzulu Mtn.; Likabula River; Lichenya Plateau), and 1953c, p. 148 (Lake Chilwa; Chirombedzi Creek).

Ptychadena chrysogaster guibei Laurent, 1954, Ann. Mus. Roy. Congo Belge,

34, p. 23 : Muita, Angola; Poynton, 1964a, p. 133 (Victoria Falls), also 1964b, p. 208, and 1966b.

Forty-six specimens examined from: ZAMBIA. Sayiri.  
MALAWI. Njakwa; Vwaza Marsh. MOZAMBIQUE. 8 and 10 mls NE of  
Beira; 5 mls NE of Dondo; Manga; Mossuril; Ribaus Mountain; Vila  
de Manica and 7 mls E; 5 mls NW of Vila Pery.

Literature records. RHODESIA. Victoria Falls. ZAMBIA. San-  
daula Plain (P). MALAWI. Chiradzulu Mtn.; Chirombedzi Creek; Lake  
Lichenya Plateau; Likabula River. MOZAMBIQUE. Amatongas; Cabaceira.

Variation. Distance from nostril to tip of snout less than inter-  
narial distance; gular pouch openings oblique to mandible; length of  
foot equal to or greater than length of tibia; outer metatarsal tubercle  
present; 3 - 3½ phalanges of fourth toe free of web, 1½ - 2 phalanges of  
fifth toe free.

Coloration. Grey-brown with dark dorsal blotches, a broad light  
vertebral band and white dorso-lateral skin folds, short transverse dark  
bars on limbs, a light line on tibia present or absent; posterior face  
of thighs with light and dark longitudinal stripes; white below.

Maximum length. 41 mm.

Habitat. Grassy vleis in savanna.

Distribution. Northern Angola, Katanga, Zambia, Malawi, northern  
and central Mozambique.

#### PTYCHADENA GRANDISONAE Laurent

Ptychadena grandisonae Laurent, 1954, Ann. Mus. Roy. Congo Belge, 34,  
p. 11, pl. 1, fig. 2, pl. iii, figs. 1 - 2 & pl. iv, figs 1 & 9:  
Muita, Angola.

One specimen examined from ZAMBIA. Ikelenge.

Literature records. ZAMBIA. Abercorn (BM).

Variation. Distance from nostril to tip of snout subequal to inter-  
narial distance; gular pouch openings almost parallel to the mandible;  
length of foot less than length of tibia; outer metatarsal tubercle  
present; 2½ - 3 phalanges of fourth toe free of web, one phalanx of fifth  
toe free.

Coloration. Grey-brown with confluent dark blotches tending to form  
transverse bands, a pale vertebral stripe, dorso-lateral skin folds white;  
limbs with dark transverse bands, no light line on tibia; posterior face of thigh  
with light and dark longitudinal stripes; yellow below.



Maximum length. 46.5 mm.

Distribution. Eastern Angola, northern and western Zambia, Katanga, Burundi.

PTYCHADENA KEILINGI (Monard)

Rana (Ptychadena) keilingi Monard, 1937, Bull. Soc. Neuchatel, Sci. nat., 62, p. 53, figs. 14 - 16 : Dala, Angola.

Ptychadena keilingi Laurent, 1964c, p. 141, fig. 37 (N. E. Angola localities).

Three specimens examined from: ZAMBIA. Ikalanga.

Variation. A prominent rostral protuberance present; distance from nostril to tip of snout greater than internarial distance; length of foot subequal to length of tibia;  $3\frac{1}{2}$  phalanges of fourth toe free of web;  $2\frac{1}{2}$  phalanges of outer toe free.

Coloration. Grey brown with dark dorsal spots, a light vertebral stripe, white dorso-lateral skin folds; limbs with conspicuous dark transverse bands, no light line on tibia; posterior face of thigh with light and dark longitudinal stripes.

Maximum length. 41 mm.

Distribution. North-eastern Angola and north-western Zambia.

## PTYCHADENA MOSSAMBICA (Peters)

Rana mossambica Peters, 1854 (part), Monatsb. Akad. Wiss. Berlin, p. 626:

Cabaceira; Quelimane; Tete; Boror, and 1882, p. 149, pl. xcdi, fig. 1; Pitman, 1934, p. 308 (Mutinsase River).

Rana trinodis (not Boettger) Pfeffer, 1893, p. 90 (Quelimane); Bocage, 1896, p. 101.

Rana mascareniensis (not Dumeril & Bibron) Bocage, 1896, p. 96 (Mozambique); FitzSimons, 1939b, p. 40 (Birchenough Bridge).

Rana vernayi FitzSimons, 1932, Ann. Tvl. Mus., 15, p. 39: Metsimaklaba River, Bechuanaland, and 1935b, p. 383, figs. 20 & 21 (Tsotsoroga Pan).

Rana mascareniensis mossambica Loveridge, 1953b, p. 371 (Nchisi Mtn.; Mtimbuka; Chowe; Kasumbadedza; Marimba), and 1953c, p. 148 (Gande).

Ptychadena vernayi Poynton, 1964a, p. 135 (Livingstone; Salisbury; Ponte do Pungue; Lundi River Bridge; Bela Vista; Magude), and 1964b, p. 209.

Ptychadena mossambica Poynton, 1966b.

One hundred and forty-five specimens examined from: CAPRIVI.

Lake Liambezi. RHODESIA. Bembesi; Bengi Spring; Chipinda Pools; Chisumbanje; Imbezu Park; Kariba Lake - Charara, Chewore and Chimburu Confluences; Kotwa; Lochard; Lukosi; Lupane; Mabelreign; Majinji Pan; Mount Hampden; Mzarabani Reserve; Old Umtali; Rekomitjie Research Station; Sabi - Lundi Confluence; Salisbury; Sinoia; Umzilizwe River; Zambezi - Chewore Confluence. ZAMBIA. Chakwenga River; Mufuwe; Lower Iushwishi River; Nyambeza Plain. MALAWI. Lilongwe; Njakwa. MOZAMBIQUE. Beira; Boane; Manga; Mossuril; Muda - Lamego; Vila Machado; Xiluvo.

Literature records. BECHUANALAND. Metsimaklaba River; Tsotsoroga Pan. RHODESIA. Birchenough Bridge; Lundi River Bridge; Salisbury. ZAMBIA. Livingstone; Mutinsase River. MALAWI. Chowe; Gande; Kaumbadedza; Marimba; Mtimbuka; Nchisi Mtn. MOZAMBIQUE. Bela Vista; Boror; Cabaceira; Magude; Ponte do Pungue; Quelimane; Tete.

Variation. Distance from nostril to tip of snout less than internarial distance; gular pouch openings oblique to mandible; length of foot less than length of tibia; outer metatarsal tubercle feebly to very well developed;  $2\frac{1}{2}$  - 3 phalanges of fourth toe free of web; one phalanx of fifth toe free.



Coloration. Grey-brown or yellow-brown, usually with a broad light vertebral stripe, dark dorsal spots and crossbands on limbs usually poorly defined; a light line on upper surface of tibia sometimes present; posterior face of thigh mottled, sometimes with longitudinal stripes; white below.

Maximum length. 48 mm.

Habitat. Widespread in savanna up to 5,000 feet, but most abundant in the major river valleys, where it is often found in association with Ptychadena anchietae. It breeds in shallow water of temporary pools or swamps.

Distribution. South-eastern Africa from southern Tanganyika to northern Zululand, west to the Caprivi and south-eastern Bechuanaland.

#### PTYCHADENA FLOWERI (Boulenger)

Rana floweri Boulenger, 1917, Ann. Mag. Nat. Hist., (8), 20, p. 417 :

Rosaires, Blue Nile, Sudan; Loveridge, 1953a, p. 369 (Kasumbadedza).

Abrana cotti Parker, 1931, Proc. Zool. Soc. London, p. 898: Charre, Mozambique.

Ptychadena floweri Poynton, 1964a, p. 136, and 1964b, p. 209.

Sixteen specimens examined from: MAIAWI. Mchenga. MOZAMBIQUE. Beira; Boror; Muda - Lamago; Sofala.

Literature records. MOZAMBIQUE. Charre; Kasumbadedza.

Variation. Distance from nostril to tip of snout less than internarial distance; gular pouch openings oblique to mandible; length of foot less than length of tibia; 2 to almost 3 phalanges of fourth toe free of web, not more than one phalanx of fifth toe free.

Coloration. Grey-brown with dark dorsal blotches and crossbands on the hind limbs; posterior face of thigh usually mottled or stippled, rarely with irregular longitudinal stripes; white below.

Maximum length. 49 mm.

Habitat. The flood plains and swamps bordering large rivers and lakes at low altitudes.

Distribution. Eastern Africa from Egypt south to central MOZAMBIQUE.

## Subfamily PHRYNOBATRACHINAE

Genus PHRYNOBATRACHUS Gunther

Phrynobatrachus Gunther, 1862, Proc. Zool. Soc. London, p. 190. Type by monotypy: P. natalensis Gunther = Stenorhynchus natalensis A. Smith.

## PHRYNOBATRACHUS NATALENSIS (A. Smith)

Stenorhynchus natalensis A. Smith, 1849, Ill. Zool. S. Africa, Rept.,

App., p. 23: "the country around Port Natal" = Durban, South Africa.

Phrynobatrachus natalensis Peters, 1882, p. 156 (Tete); Bocage, 1896, p. 101; Boulenger, 1902, p. 15 (Mazoe); Chubb, 1909a, p. 592 (Matopos; Kana River; Gwamayaya River), and 1909b, p. 34 (Gwanda and Lomagundi Districts; Umsitu River); Boulenger, 1910, p. 529 (Fwambo); Hewitt & Power, 1913, p. 170 (Marandellas); Power, 1927c, p. 413 (Lobatsi); Parker, 1931, p. 899 (Amatongas); Pitman, 1934, p. 308 (Chinsali; Luangwa Valley; Livingstone; Nkana; Broken Hill); FitzSimons, 1935b, p. 390 (Metsimaklaba River), and 1937, p. 271; Hewitt, 1937b, p. 12 (Chirinda Forest); Mertens, 1937, p. 20 (Nsombo; Muchishye); FitzSimons, 1939b, p. 41 (Mount Silinda; Birchenough Bridge); Loveridge, 1953b, p. 379 (Misuku Mtns.; Nchisi Mtn.; Chiradzulu Mtn.; Limbe; Likabula River), and 1953c, p. 149 (Chiromo; Masanjere Creek; Cholo; Mpatamanga Gorge); ~~Tasman~~, 1956, p. 5; Inger, 1959, p. 521 (Victoria Falls); Poynton, 1964a, p. 137 (Ponte do Calichane; Guija; Gokwe; Landi River Bridge; Mtoko; Tete; Salisbury; Kariba Lake), also 1964b (Mlanje Mtn.; Zomba Plateau), and 1966b.

Phrynobatrachus acridoides (not Cope) Boulenger, 1897, p. 801 (Nyika Plateau; Misuku Mtns.); ? Loveridge, 1929, p. 104 (Victoria Falls); Pitman, 1934, p. 308.

Phrynobatrachus maculatus FitzSimons, 1932, Ann. Tvl. Mus., 15, p. 40 : Rain Forest, Victoria Falls, Rhodesia, and 1935b, p. 391 (Kasane; Nata River); Hoffman, 1944, p. 176 (Chitala).

Phrynobatrachus duckeri Loveridge, 1953b, Bull. Mus. Comp. Zool., 110, p. 377 : Chitala, Malawi).

Two hundred and twenty-four specimens examined from: BECHUANA-LAND. Kasane. RHODESIA. Ambi Falls; 5 mls S of Beatrice; Beitbridge; Bembesi; Bulawayo and 12 mls S; Charama Plateau; Chido; Chibakwe Bridge; Chinyika Reserve; Chipinda Pools; Chisumbanje; Darwendale; Fatima; 10 mls N and 10 mls S of Featherstone; Fern Valley; Figtree; Gungunyana;



Horseshoe Block; Hot Springs; Kapami; Kariba; Kariba - Charara and Sengwa Confluences; Khami; Kotwa; Kyle Lake; Lake MacIlwaine; Lower Mtarazi River; Lukosi; Lupane; Lusulu; Malame Bridge; Malimbasingi; Malonga Bridge; Mambwe Pass; Mare Dam; Marlborough; Matetsi River Bridge; Matopos; Mount Hampden; Mount Silinda; 25 mls WSW and 32 mls NE of Mtoko; Ngambwe Falls; Nkai; Nuanetsi Gorge; Nyamashatu River; Nyamapanda; Odzi; Pachanza; Plumtree; Rusape; Ruwa; Sabi - Makuni Confluence; Salisbury; Sengwe Gorge; Sinoia; Sinoia Caves; 12 mls ESE of Sipolilo; Soti Source; Turk Mine; Umtali; Umzilizwe Bridge; Vumba Mountain; Wankie; Wankie National Park (Main Camp); Westacre; Zambezi - Chewore and Matetsi Confluences; Zewa. ZAMBIA. Chavuma; Chikoa; Chikwa; Chipengali; Chongwe River; Fort Jameson; Ikelenge; Isombo Stream; Kalichero; Kalikali; Katete; Kompoti Rapids; Livingstone; Lower Lushishi River; <sup>Luembwe;</sup> Lundazi; Mkanda; Mtikila; Mwekera; Petauke Old Boma; Sasare; Sitwe. MALAWI. Cape Maclear; Cholo Mountain; Mpatamanga Gorge; Wankurumadzi Bridge; Zomba Plateau. MOZAMBIQUE. Amatongas; Boane; Chapala; Chemezi; Chinmainza; 12 mls S of Eregu; Fermerenga; Garuso; Gorongoza Mountain; Inchope; Metuchira; Mhanda; Mitucue Mountain; Ribaue Mountain; Vila de Manica - 7 mls E and 15 mls SE; 8 mls SSE of Vila Gouveia; 5 mls NW of Vila Pery; 10 mls SW of Zobue.

Literature records. BECHUANALAND. Kasane; Lobatsi; Metsimaklaba River; Nata River. RHODESIA. Birchencough Bridge; Gokwe; Gwamayaya River; Gwanda District; Kana River; Lomagundi River; Lundi River Bridge; Marandellas; Matopos; Mazoe; Mount Silinda; Mtoko; Salisbury; Victoria Falls. ZAMBIA. Broken Hill; Chinsali; Fwambo; Katwe; Kalabo (P); Livingstone; Luangwa Valley; Muchishye; Nkana; Nsombo; Sandaula Plain (P); Umsitu River. MALAWI. Chiradzulu Mtn.; Chiromo; Chitale; Cholo; Likabula River; Limbe; Masanjere Creek; Misuku Mtns.; Mlanje Mtn.; Mpatamanga Gorge; Nchisi Mtn.; Nyika Plateau; Zomba Mtn. MOZAMBIQUE. Amatongas; Guija; Ponte do Calichane; Tete.

Variation. Skin of back fairly smooth to very warty, the warts usually subcircular; tips of fingers and toes usually swollen, but never flattened into discs; 2 - 3 phalanges of fourth toe free of web.

Coloration. Grey-brown with darker mottling, with or without a yellow or green vertebral stripe or band, or scattered green spots; white below, uniform or mottled with dark brown.

Maximum length. 35 mm.

Habitat. Widespread and common in savanna, but absent from arid areas and most of the Mozambique Plain, where it is replaced by P. acridoides. Frequently found in evergreen forests.

Distribution. Most savanna areas of Africa from Gambia west to the Sudan and Ethiopia, south to the eastern Cape Province, absent from the South West Arid and the Kalahari.

PHRYNODACTYLUS ACRIDOIDES (Cope)

Staurois acridoides Cope, 1867, Journ. Acad. Nat. Sci. Philadelphia, (6), p. 198 : Zanzibar.

Phrynobatrachus natalensis (not A. Smith or Gunther) Boulenger, 1907b, p. 428, pl. xxii, fig. 2 (Coguno; Beira).

Phrynobatrachus boulengeri Witte, 1919, Rev. Zool. Afr. 6, p. 225 : Beira and Coguno, Mozambique.

Phrynobatrachus acridoides Barbour & Loveridge, 1928, p. 203 (Beira; Masieni); Parker, 1931, p. 899 (Amatongas; Charre; Fambani River); Cott, 1932, p. 480; Poynton 1964a, p. 140 (Inhambane; Macia), also 1964b, p. 210 (Chikwawa; Palm Beach), and 1966b.

Phrynobatrachus perpalmatus (not Boulenger) Loveridge, 1953b, p. 376 (Chitala River; Mtimbuka; Kasumbadedza), and 1953c, p. 148 (Nkazi River; Tangadzi River; Chiromo; Lake Chilwa).

One hundred and forty-four specimens examined from: RHODESIA. Chisumbanje; Haroni - Lusitu Confluence; Nyamakari. ZAMBIA. Lundazi; Mkanda. MALAWI. Fort Johnston; Liwonde; Mchenga; Mpatamanga Gorge; Wankurumadzi Bridge. MOZAMBIQUE. Amatongas; Beira and 8 - 10 mls NE; Boane; Boroma; Boror; Chapala; 5 mls NW, 5 mls NE and 10 mls NNW of Dondo; Gorongosa Pontoon; Grudja; Gumba; 8 mls S of Inhaminga; Jofane; Luala River, 15 mls W of Campo; Luala River Bridge; Manda; Metuchira; Mhanda; Mitucue Mountain; 9 mls S of Muanza; Nabaunama Dam; Nampula; 5 mls N of Nicuadala; Polane; Ribane Mountain; Savane; 45 mls ENE of Tete; Vila Fontes; 15 mls NE of Vila de Manica; Xiluvo.

Literature records. MALAWI. Chikwawa; Chiromo; Chitala River; Lake Chilwa; Mtimbuka; Nkazi River; Palm Beach; Tangadzi River. MOZAMBIQUE. Amatongas; Beira; Charre; Coguno; Fambani River; Inhambane; Kasumbadedza; Macia; Masieni.

Variation. Skin of back usually smooth, except for paired elongate ridges extending from behind the eyes to the sacral region; tips of fingers and toes usually flattened into small circular discs; 2 - 3 phalanges of fourth toe free of web.

Coloration. Grey-brown or red-brown, uniform or with a green or yellow vertebral stripe or broad band, dorsal ridges often dark or dark-edged, white below, uniform or stippled with brown, especially on the throat.



Maximum length. 30 mm.

Enemies. One recovered from the stomach of a Psammophis s. sudanensis at Kiluvo. Loveridge (1953b) recovered them from the stomachs of a Thelotornis k. oatesi at Mtimbuka and a Psammophis s. sibilans near Tete.

Habitat. A characteristic amphibian of the extensive swamps on the Mozambique Plain, where its distinctive call is heard from every stretch of stagnant water during the rains.

Distribution. East African lowlands from Kenya south to Northern Zululand, extending inland to the Malawi, Chicca and Luangwa troughs and the Eastern border of Rhodesia.

PHRYNOBATRACHUS PERPALMATUS Boulenger

Phrynobatrachus perpalmatus Boulenger, 1898, Proc. Zool. Soc. London, p. 479, pl. xxxviii, fig. 1 : Lake Mweru, Zambia; Loveridge, 1933, p. 375 (Nyamkolo); Pitman, 1934, p. 308; Witte, 1951, p. 7 (Sumbu).

No specimens examined.

Literature records. ZAMBIA. Lake Mweru; Nyamkolo; Sumbu.

Variation. Tips of fingers and toes flattened into small circular discs; toes broadly webbed to base of discs, or falling slightly short of the disc on the fourth toe.

Coloration. Various shades of brown and green.

Maximum length. 28 mm.

Habitat. An aquatic species, common in swamped grasslands interspersed with reeds at Nyamkolo (Loveridge, 1933).

Distribution. Savannas and rain forests of central Africa, extending from the Sudan south to the Congo, northern Zambia and western Tanganyika.

PHRYNOBATRACHUS GUTTUROSUS (Chabanaud)

Arthroleptis gutturosus Chabanaud, 1921, Bull. Comp. Etudes Hist. Sci.

Afr. Occ. Fr., p. 452, pl. 2, figs 2 - 4: Sanikolé, Liberia.

Phrynobatrachus gutturosus Poynton, 1964b, p. 210 (Rumpi).

Four specimens examined from: MALAWI. Rumpi.

Variation. Males with femoral glands and a distinct transverse posterior fold to the gular pouch; fingers and toes without well defined discs; webbing extending beyond the basal subarticular tubercle of the fourth toe, reaching the middle subarticular tubercle in three Rumpi specimens.

Coloration. Grey-brown above with darker blotches; white below, with patches of brown stippling, especially on throat and chest.

Maximum length. 21.4 mm.

Habitat. Savanna.

Distribution. Recorded from Liberia, Katanga and Malawi.

#### PHRYNOBATRACHUS MOOREI (Boulenger)

Arthroleptis moorii Boulenger, 1898, Proc. Zool. Soc. London, p. 479, pl. xxxviii, fig. 2 : "Kinyankolo" = Nyamkolo, Zambia.

(Phrynobatrachus) moorii Loveridge, 1957, p. 350, footnote 267.

Known only from the type and apparently very close to P. u. mababiensis. Loveridge (1957) transferred the Nyamkolo specimens which he listed as moorii in 1933 (p. 383) to P. u. mababiensis after examining the type of moorei and, therefore, considered them to be distinct sympatric species.

#### PHRYNOBATRACHUS UKINGENSIS UKINGENSIS (Loveridge)

Arthroleptis ukingensis Loveridge, 1932, Bull. Mus. Comp. Zool., 72, p. 835; Madehani, Ukinga Mountains, Tanganyika.

Phrynobatrachus ukingensis ukingensis Loveridge, 1953a, p. 379 (Misuku Mtns.); Poynton, 1964b, p. 211.

No specimens examined.

Literature records. MALAWI. Misuku Mountains.

Variation. Tips of the fingers more or less spatulate, most of the toes with tiny discs; toes with only a trace of webbing at the base, 4 phalanges of the fourth toe free of web.

Coloration. Olive-brown above with darker mottling, sometimes with a pale vertebral hairline; white below with some darker speckling.



Maximum length. 22mm.

Enemies. Loveridge (1953) recovered one from the stomach of a Crotaphopeltis tornieri and two others from an Atheris n. rungweensis.

Habitat. Marshy ground in and around montane evergreen forest.

Distribution. Mountains of southern Tanganyika and northern Malawi.

PHRYNOBATRACHUS UKINGENSIS MABABIENSIS FitzSimons

Arthroleptis minutus (not Boulenger) Loveridge, 1929, p. 107 (Victoria Falls); Pitman, 1934, p. 309.

Phrynobatrachus mababiensis FitzSimons, 1932, Ann. Tvl. Mus., 15, p. 40 : Tsotsoroga Pan, Mababe Flats, Bechuanaland, and 1935b, p. 390, fig. 26.

Arthroleptis moorii (not Boulenger) Loveridge, 1933, p. 383 (Nyankolo); Pitman, 1934, p. 309.

Phrynobatrachus chititlaensis Hoffman, 1944, Soolog. Wavers. Nas. Mus. Bloemfontein, 1, p. 177, figs. 5 - 6 : "Chititla" = Chitala River, Malawi; Mitchell, 1946, p. 30; Tasman, 1956, p. 5.

Arthroleptis sp. Hoffman, 1944, p. 176 (Chitala).

Arthroleptis parvulus (not Boulenger) Mertens, 1955, p. 27 (Andara).

Phrynobatrachus ukingensis nyikae Loveridge, 1953, Bull. Mus. Comp. Zool., 110, p. 380: Nyika Plateau above Nchenachena at 7,000 feet, Malawi.

Phrynobatrachus ukingensis mababiensis Loveridge, 1953b, p. 381 (Nchenachena; Nchisi Mtn.; Chitala River; Dedza; Mtimbuka; Limbe; Likabula River; Kasumbadedza), and 1953c, p. 149 (Fort Johnston; Nkazi River; Tangadzi River); FitzSimons, 1958a, p. 213 (Nyanziwa); Poynton, 1964a, p. 141 (Sevuti River; Livingstone; Kariba Lake; Mtoko; Lundi River Bridge), also 1964b, p. 211, and 1966b.

Phrynobatrachus cryptotis Schmidt & Inger, 1959, Explor. Parc. Nat. Upemba, Miss. G. F. de Witte, Amphibians, 56, p. 143, pl. v, fig 5 E Upemba National Park, Katanga; Inger, 1959, p. 521 (Victoria Falls).

Three hundred and seven specimens examined from: CAPRIVI. Lake Iiambezi. RHODESIA. Birchenough Bridge; Bundi Valley; Chibakwe Bridge; Chipinda Pools; Chipinga; Chinyika Reserve; Chiwaka River; Darwendale; Fern Valley; Figtree; Haroni - Lusitu Confluence; Kariba; Kariba Lake - Bumi and Charara Confluences; Kazungula; Limpopo River; London Farm; Lower Mtarazi River; Majinji Pan; Malimbasinghi; 12 mls S of Mambo Pass; Mana Pools; Malonga Bridge; 25 mls WSW of Mtoko and 32 mls NE; Nyanashatu Bridge; Rusape; Shapi Pan; Sinoia; Soti Source;

Stapleford; Tynwald; Umvukwes; Vumba Mountain; Wankie National Park (Main Camp); Zambezi - Chewore and Sebungwe Confluences, also opposite Feira. ZAMBIA. Chipengali; Fort Jameson; Kanjanjesi; Katete; Luembwe; Mkanda; Mfuwe; Nyambwe Falls; Nyika Plateau; Sasare; Sayiri; Sitwe. MALAWI. Cholo Mountain; Fort Johnston; Liwonde; Lujeri; Mlanje Mountain. MOZAMBIQUE. Amatongas; Boane; Canda; Chapala; Comacha; Fermerenga; Garuso; Inhaca Island; 8 mls S of Inhaminga; Luaia River Bridge; Manga; Metambanhe; Metuchira; Mhanda; Mitucue Mountain; Muda - Lamego; 9 mls S of Muanza; Namaacha; Ribaue Mountain; Xiluvo.

Literature records. BECHUANALAND. Sevuti River; Tsotsoroga Pan. CAPRIVI. Andara. RHODESIA. Lundi River Bridge; Mtoko; Nyamziwa. ZAMBIA. Livingstone; Victoria Falls; Nyankolo; Sandaula Plain (P). MALAWI. Chitala River; Dedza; Fort Johnston; Likabula River; Limbe; Mtimbuka; Nchenachena; Nchisi Mtn.; Nhazi River; Nyika Plateau; Tangadzi River. MOZAMBIQUE. Kasumbadedza.

Variation. Males with femoral glands; tips of fingers and toes not expanded into discs; webbing poorly developed, at least  $3\frac{1}{2}$  phalanges of fourth toe free of web.

Coloration. Olive brown with symmetrical dark dorsal blotches; sometimes a pale vertebral line or dorsal band, sometimes a light line running down the tibia and over the heel onto the foot; white below, sometimes spotted or heavily mottled dark brown.

Maximum length. 22 mm.

Discussion. Phrynobatrachus cryptotis does not seem to be distinguishable from P. u. mababiensis; it has a light line on tibia and heel, but this marking is present in 23 of the mababiensis examined, some of these coming from localities in southern Mozambique. In many cases specimens both with and without this light line occur in the same series.

Enemies. One was recovered from the stomach of a Philothammus honlogaster from Chipengali, another from a young Meizodon s. semiornata from Muda - Lamego.

Habitat. Swampy ground in savanna, evergreen forest and montane grassland, from sea level to 6,500 feet.

Distribution. South-eastern Africa, from Tanganyika south to the eastern Cape Province, west to Katanga, Angola and northern Bechuanaland.



## PHRYNOBATRACHUS PARVULUS Boulenger

Arthroleptis parvulus Boulenger, 1905, Ann. Mag. Nat. Hist. (7), 16, p. 109, pl. iv, figs. 3 - 3b : Bange Ngola, N. E. Angola.

Arthroleptis schoutedeni Witte, 1921, Rev. Zool. Bot. Afr., 2, p. 13, pl. iv, fig. 3: Lofoi, Katanga, and 1934, p. 178 (Victoria Falls); Pitman, 1934, p. 309 (Chinsali).

? Arthroleptis sp. Pitman, 1934, p. 309 (Broken Hill).

No specimens examined.

Literature records. ZAMBIA. Broken Hill; Chinsali; Kasama (BM); Victoria Falls.

Variation. Tips of fingers and toes not expanded into discs; webbing poorly developed, at least  $3\frac{1}{2}$  phalanges of fourth toe free of web.

Coloration. Grey-brown above with darker blotches, a silvery streak from eye to arm insertion; posterior quarter of abdomen with dark spots.

Habitat. Savanna.

Distribution. Northern Angola, Lower Congo, Katanga, northern and western Zambia.

## Genus CACOSTERNUM Boulenger

Cacosternum Boulenger, 1887, Ann. Mag. Nat. Hist., (5), 20, p. 51. Type by monotypy : C. nanum Boulenger.

## CACOSTERNUM BOETTGERI (Boulenger)

Arthroleptis boettgeri Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., p. 118, pl. xi, fig. 6 : "Kaffraria" = eastern Cape Province, South Africa.

Cacosternum boettgeri Boulenger, 1910, p. 533 (Livingstone); Power, 1927c, p. 415 (Lobatsi); Pitman, 1934, p. 308; FitzSimons, 1935b, p. 393 (Metsimaklaba River); Tasman, 1956, p. 6; Poynton, 1964a, p. 146 (Rukute Farm; Salisbury; Umvuma; Gwelo).

Forty-nine specimens examined from: RHODESIA. Bambesi; Bulawayo and 16 mls NW and 12 mls S; Heany; Mabelreign; Mount Hampden; 10 mls W of Salisbury; Zimbabwe. ZAMBIA. Bilibili Hot Springs.

Literature records. BECHUANALAND. Lobatsi; Metsimaklaba River.

RHODESIA. Gwelo; Rukute Farm; Salisbury; Umvuma. ZAMBIA. Livingstone.

Variation. Inner metatarsal tubercle small, rounded to conical; outer metatarsal tubercle absent to well developed; palmar tubercles poorly developed.

Coloration. Pinkish brown or bright green above, usually with dark symmetrical blotches, or a pale vertebral band, sometimes uniform; white with dark spots below.

Maximum length. 22.5 mm.

Habitat. Poorly drained grasslands which become flooded during the rains, usually found in association with Pyxicephalus spp.

Distribution. All southern Africa except for the Mozambique Plain, the Limpopo and Zambezi basins, the Kalahari and true deserts; also highlands of northern Tanganyika, Uganda, Kenya and Somalia.

Genus NOTHOPHRYNE Poynton

Nothophryne Poynton, 1963, Ann. Natal Mus., 15, p. 324. Type by monotypy: N. broadleyi Poynton.

NOTHOPHRYNE BROADLEYI Poynton

Nothophryne broadleyi Poynton, 1963, Ann. Natal Mus., 15, p. 326 : Dzole (8,900 feet), Mlanje Mountain, Malawi, also 1964b, p. 212 and 1966b.

Eleven specimens examined from: MALAWI. Mlanje Mountain. MOZAMBIQUE. Ribaue Mountain.

Variation. Tympanum just discernible, horizontal diameter slightly less than half diameter of eye; dorsum with numerous rounded or elongate warts; finger tips slightly expanded in the Ribaue specimens, but not in the type series; toes not webbed.

Coloration. Red-brown above with a light interocular bar bordered by dark bands, a dark X-shaped marking over the scapular region and dark blotches posteriorly, one paratype has a light vertebral stripe; hind limbs with prominent dark transverse bands; cream below, with irregular dark brown blotches.

Maximum length. 27.4 mm.



Habitat. The type series was taken under stones on the bare syenite summit of Dzole Peak at 8,900 feet. The Ribaue specimens were near the summit of the mountain at 5,000 feet in Brachystegia woodland.

Distribution. Highlands of northern Mozambique and Mlanje Mountain in Malawi.

Subfamily ARTHROLEPTINAE

Genus ARTHROLEPTIS A. Smith

Arthroleptis A. Smith, 1849, Illus. Zool. S. Africa, Rept., App., p. 24.

Type by monotypy: A. wahlbergi A. Smith.

Schoutedenella Witte, 1921, Rev. Zool. Afr., 9, p. 18. Type by monotypy: S. globosa Witte.

Goracodichus Laurent, 1940, Rev. Zool. Bot. Afr., 34, p. 85. Type by original designation: Arthroleptis whytii Boulenger.

ARTHROLEPTIS STENODACTYLUS Pfeffer

Arthroleptis stenodactylus Pfeffer, 1893, Jahrb. Hamburg Wiss. Anst., 10, p. 93, pl. i, fig. 2: Kihengo, Tanganyika; Parker 1931, p. 899 (Amatongas); Hewitt 1937 b, p. 12 (Chirinda Forest); Fitz-Simons, 1939b, p. 41 (Chirinda Forest); Poynton, 1964a, p. 163 (Kariba Lake; Gokwe; Chishawasha; Machipanda; Chimanimani Mtns.; Lundi River Bridge; Macia; Ponta do Ouro), also 1964b, p. 212 (Zomba Plateau; Chikwawa), and 1966b.

Arthroleptis whytii Boulenger, 1897, Proc. Zool. Soc. London, p. 802, pl. xlv, fig. 3: Misuku Mountains, Malawi (restricted by Loveridge, 1953b), also Kondowe to Karonga; Nyika Plateau, 1907b, p. 482 (Beira), and 1910, p. 529; Hewitt, 1911a, p. 223.

Arthroleptis stenodactylus stenodactylus Loveridge, 1933, p. 377 (Ikombo); Pitman, 1934, p. 308 (Kapamba River); Loveridge, 1953b, p. 391 (Chitala River; Blantyre; Likabula River; Mzimba; Zomba), and 1953c, p. 150 (Fort Johnston; Port Herald).

Arthroleptis variabilis (not Matschie) Hoffman, 1944, p. 176 (Chitala).

Arthroleptis stenodactylus lonnbergii Nieden. Hoffman, 1944, p. 176 (Chitala).

Arthroleptis stenodactylus whytii Loveridge, 1953b, p. 389 (Misuku Mtns.; Nchisi Mtn.; Cholo Mtn.; Mlanje Mtn.).

Arthroleptis wahlbergi (not A. Smith), Tasman, 1956, p. 5.

One hundred and thirty-eight specimens examined from:

RHODESIA. Bomponi; Charama Plateau; Chibakwe Bridge; Chinyamanda; Chirinda Forest; Dora; Jersey Tea Estate; Kaitano; Lower Mtarazi River; Makuti; 32 mls NE of Mtoko; Pachanza; Pungwe Gorge; Rekomitjie Research Station; Stapleford; Toronto; Umtali; Umzilizwe River; Vumba Mountain. ZAMBIA. Chipengali; Fort Jameson; Ikelenge; Kalikali; Kanjanjesi; Katete; Kaungashi; Lusungazi; Mlanda; Ndola; Nyimba. MALAWI. Lujeri; Nkata Bay; Rumpi; Vipya Plateau. MOZAMBIQUE. Amatongas; 10 mls NE of Beira; Dondo and 5 mls NW & 5 mls NE; Haruso; Gorongosa Pontoon; Inchope; 5 mls NE of Inhaminga; Luaia River Bridge; Maforga; Manga; Metuchira; Mitucue Mountain; Morrumbala Mountain; Muda - Lamago; Mungari (USNM); Ribaus Mountain; Vila Gamito (USNM); Vila de Manica and 15 mls SE; <sup>25 mls NE of</sup> Vila Pery de Andrada; Vila Pery; Viola; Xiluvo.

Literature records. RHODESIA. Chimanimani Mountains; Chirinda Forest; Chishawasha; Gokwe; Lundi River Bridge; ZAMBIA. Abercorn (BM; P); Ikombo; Kapamba River; Kariba Lake. MALAWI. Blantyre; Chikwawa; Chitala River; Cholo Mtn.; Fort Johnston; Kondowe to Karonga; Likabula River; Misuku Mtns.; Mlanje Mtn.; Mzimba; Nchisi Mtn.; Nyika Plateau; Port Herald; Zomba; Zomba Plateau. MOZAMBIQUE. Amatongas; Beira; Machipanda; Macia; Ponta do Ouro.

Variation. First finger longer than, to slightly shorter than, second, in males about half the length of the third; finger tips not, or but slightly swollen; inner metatarsal tubercle very prominent, narrow and flange-like, width about third the length, length greater than that of inner toe.

Coloration. Pale gray, yellowish or red-brown above, uniform or with the dark dorsal "hour-glass" pattern of Arthroleptis faintly indicated; white below, ♂ with a blackish throat, ♀ sometimes with dark mottling on throat and chest.

Maximum length. 44 mm.

Enemies. At Vila de Manica specimens had been eaten by two Philothamnus hoplogaster and a Crotaphopeltis hotamboeia, while two more were recovered from the stomach of a Thelotornis k. capensis from Mitucue Mountain. Loveridge (1953b) recovered one from the stomach of a Psammophis s. sudanensis.

Habitat. Evergreen forest and savanna woodland (especially Brachystegia) from sea level to 5,000 feet.

Distribution. Eastern Africa from Kenya south to Zululand, west to the eastern Congo and Zambia.



## ARTHROLEPTIS TROGLODYTES Poynton

Arthroleptis troglodytes Poynton, 1963, Ann. Natal Mus. 15, p. 327 :

Chimanimani Mountains, Rhodesia, and 1964a, p. 161.

Sixteen specimens examined from: RHODESIA. Chimanimani Mountains.

Variation. First finger slightly shorter than second, in males slightly less than half the length of the third, tips of fingers and toes slightly swollen; inner metatarsal tubercle flattened, length less than that of inner toe; subarticular tubercles weakly developed.

Coloration. Anterior part of head light with slight dark speckling, remainder of dorsum brown with the typical Arthroleptis pattern broken up and largely obscured by light and dark mottling; limbs with dark cross-bands; white below.

Maximum length. 26.4 mm.

Habitat. Half the type series came from damp crevices in the wall of a cave, the rest were under stones on the slopes of the Bundi Valley. Forest patches in the vicinity seemed to be inhabited only by Arthroleptis x. xenodactyloides.

Distribution. Endemic to the Chimanimani Mountains on the eastern border of Rhodesia.

## ARTHROLEPTIS REICHEI Nieden

Arthroleptis reichei Nieden, 1910, Sitzb. Ges. Naturf. Freunde Berlin,

p. 437: Crater Lake, Ngosi Volcano, Poroto Mountains, Tanganyika;

Loveridge, 1953b, p. 386 (Misuku Mountains); Poynton, 1964b, p. 213.

No. specimens examined.

Literature records. MAIAWI. Misuku Mountains.

Variation. First finger shorter than second; tips of fingers and toes slightly to strongly dilated; inner metatarsal tubercle rather blunt, about two-thirds the length of the first toe.

Coloration. Grey or yellowish above, with a dark white-edged curved interorbital bar, numerous light-bordered dark spots laterally and on limbs; throat plumbeous, rest of underside greenish-yellow vermiculated with brown.

Maximum length. 34 mm.

Habitat. Montane evergreen forest.

Distribution. Mountains of southern Tanganyika and northern Malawi.

ARTHROLEPTIS ADOLFIFRIEDERICI FRANCEI Loveridge

Arthroleptis macrodactyla (not Boulenger) Gunther, 1894, pp. 619, 620  
(Shire Highlands).

Arthroleptis adolfifriederici francei Loveridge, 1953, Bull. Mus. Comp.  
Zool. 110, p. 387 : Ruo Gorge Forest, Mlanje Mountain, Malawi; Poynton,  
1964b, p. 213.

Twenty-three specimens examined from: MALAWI. Ruo Gorge  
Forest.

Literature records. MALAWI. Ruo Gorge Forest.

Variation. First finger slightly shorter than second; tips of  
fingers slightly, and toes strongly, swollen; inner metatarsal tubercle  
slightly shorter than first toe.

Coloration. Grey, buff or red-brown, with the dark vertebral hour-  
glass pattern usually present, sometimes very faint; more or less greyish  
below.

Maximum length. 46 mm.

Habitat. Abundant in drifts of dead leaves on the steep slopes of the  
Ruo Gorge Forest on Mlanje Mountain, none were seen at the lower end of  
the forest near the Injeri Power Station.

Distribution. Endemic to Mlanje Mountain, Malawi.

ARTHROLEPTIS GLOBOSA (Witte)

Schoutedenella globosa Witte, 1921, Rev. Zool. Afr., 2, p. 18, pl. v,  
figs 1 - 1c.

Two specimens examined from: ZAMBIA. Muchinga Escarpment  
near Serenje.

Literature records. ZAMBIA. Abercorn (BM).

Variation. First finger shorter than second, third finger elongated  
in adult males; tips of fingers obtuse or slightly swollen; tips of toes



obtusely pointed or swollen; subarticular tubercles prominent; oval narrow inner metatarsal tubercle as long as first toe or a little shorter.

Coloration. Brown above, uniform or with dark vertebral hourglass markings; cream below.

Discussion. This species seems to be closely related to A. xenodactyloides, being similar to the typical form in most respects, but having a long third finger like A. x. nyikae. Much more material is required from Zambia before the relationships of these forms can be clarified.

Distribution. Katanga and northern Zambia.

ARTHROLEPTIS XENODACTYLOIDES XENODACTYLOIDES Hewitt

Arthroleptis xenodactyloides Hewitt, 1933, Occ. Pap. Nat. Mus. S. Rhod.,

2, p. 49 : Chirinda Forest, Rhodesia, and 1937b, p. 12, pl. 1;

FitzSimons, 1939b, p. 42 (Chirinda Forest); Tasman, 1956, p. 6.

Arthroleptis boulengeri (not Witte) Loveridge, 1953b, p. 384 (Misuku Mountains; Nchisi Mountain; Zomba Plateau; Chiradzulu Mountain; Cholo Mountain; Likabula River), and 1953c, p. 150 (Fort Johnston; Limbe; Chirombedzi Creek).

Arthroleptis xenodactyloides xenodactyloides Poynton, 1964a, p. 162

(Gorongosa Mountain; Chimanimani Mountains), also 1964b, p. 213 and 1966b.

One hundred and twenty-two specimens examined from: RHODESIA.

Bridal Veil Falls; Chimanimani Mountains; Chirinda Forest; Engwa; Lower Mtarazi River; 4 mls E of Melsetter; Ngorima Reserve; Penhalonga; Pungwe Gorge; Vumba Mountain. MALAWI. Chisenga; Cholo Mountain; Likabula; Mlanje Mountain; Livingstonia; Lujeri; Matipa Forest (Misuku Mountains); Vipya Plateau. MOZAMBIQUE. Amatongas; 10 mls NE of Beira; 5 mls NW of Dondo; 12 mls S of Erego; Gorongosa Mountain; Mitucue Mountain; Morrumbala Mountain; 10 mls N of Mugeba; Ribaue Mountain; Vila Gouveia (USNM).

Literature records. RHODESIA. Chimanimani Mtns.; Chirinda Forest. MALAWI. Chiradzulu Mtn.; Chirombedzi Creek; Cholo Mtn.; Fort Johnston; Likabula River; Limbe; Livingstonia; Lujeri; Misuku Mtns.; Nchisi Mtn.; Vipya Plateau; Zomba Plateau. MOZAMBIQUE. Gorongosa Mountain.

Variation. First finger shorter than second, in males less than one third length of third finger; tips of toes swollen and expanded, wider than subarticular tubercles of the digits; inner metatarsal tubercle small, length much less than that of inner toe.

Coloration. Dark red-brown, with a darker vertebral hourglass pattern and sometimes a pair of pale dorso-lateral stripes; white below, more or less stippled or marbled with brown.

Maximum length. 24 mm.

Enemies. Recovered from a Lycodonomorphus rufulus from Engwa and a Thelotornis k. capensis from Mitucue Mountain.

Habitat. Evergreen forest from sea level to 6,000 feet, also wet montane grassland up to 8,000 feet.

Distribution. Northern and central Mozambique, Malawi and the eastern highlands of Rhodesia.

ARTHROLEPTIS XENODACTYLOIDES NYIKAE Loveridge

Arthroleptis xenodactyloides nyikae Loveridge, 1953, Bull. Mus. Comp.

Zool., 110, p. 383 : Nchenachena Falls, Nyika Plateau, Malawi; Poynton, 1964b, p. 213 (Nyika Plateau in Malawi and Zambia).

Two specimens examined from: MALAWI. Nchenachena; Nkonjera Mountain.

Literature records. ZAMBIA. Nyika Plateau. MALAWI. Nyika Plateau.

Variation. First finger shorter than second, third finger very long in males (up to one third of body length); tips of digits not, or only slightly, dilated; inner metatarsal tubercle larger than the subarticular tubercles.

Coloration. Usually dark grey above, with or without a darker vertebral hourglass pattern; black below, with white stippling.

Maximum length. 23 mm.

Habitat. In dead leaves among boulders at the base of the Nchenachena Falls.

Distribution. Endemic to the Nyika Plateau.

Subfamily HEMISINAE

Genus HEMISUS Gunther

Hemisus Gunther, 1858, Cat. Batr. Sal. Brit. Mus., p. 47. Type by monotypy : Engystoma guttatum Rapp.



## HEMISUS MARMORATUM (Peters)

Engystoma marmoratum Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 628:

Cabaceira, Mozambique.

Hemissus marmoratus Peters, 1882, p. 173, pl. xxv, figs. 1, 1a & pl. xxvi, fig. 10 (Boror); Bocage, 1896, p. 102; Mitchell, 1946, p. 31. .

Hemissus marmoratum Boulenger, 1907b, p. 480 (Beira), and 1910, p. 535; Hewitt, 1913, p. 480 (Tsessebe); Angel, 1921, p. 44 (Lealui); Parker, 1931, p. 905 (Charre; Fambani River); Themido, 1941, p. 28 (Massangulo); Tasman, 1956, p. 14; Poynton, 1964a, p. 166 (Victoria Falls; Kariba Lake; Tete; Mtoko; Rukute Farm; Gokwe; Musami; Kutama; Chishawasha; Lundi River Bridge; Francistown), also 1964b, p. 214 (Salima), and 1966b.

Hemissus marmoratum marmoratum Pitman, 1934, p. 310; FitzSimons, 1935b, p. 394 (Bushman Mine; Metsimaklaba River).

Hemissus Marmoratus marmoratus Loveridge, 1953b, p. 392 (Mtimbuka; Chowe; Blantyre; Chitala; Cholo; Limbe; Zomba).

Hemissus sudanensis (not Steindachner) Pfeffer, 1893, p. 103 (Quelimane).

One hundred and forty-five specimens examined from: BECHUANA-  
LAND. Kasane. RHODESIA. Bembesi; Bulawayo and 7 & 9 mls S; Charama  
Plateau; Chinyamanda; Chipinda Pools; Essexvale; Honde Valley; Kariba  
- Charara Confluence; Kazungula; Kotwa; Lusulu; Majinji Pan; Marlborough;  
Matowa; Msoro; 32 mls NE of Mtoko; Nyamandhlovu; Nyampanda; Old Umtali;  
Rekomitjie Research Station; Saffron Walden; Salisbury and 10 mls W; Thorn  
Park; 10 mls E of Umvuma; 15 mls W of Victoria Falls; Zambesi - Chewore  
Confluence; Wankie National Park (Nyamandhlovu Pan). ZAMBIA. Chakwenga  
River; Chikwa; Fort Jameson; Ikelenge; Kalikali; Kampoti Rapids;  
Katete; Kondolilo Falls; Luembwe; Lusungazi; Manda; Sesheke.  
MOZAMBIQUE. 5 mls NE of Dondo; Luala River Bridge; Manga; Magasso;  
Muda - Lamago; Nabaunara Dam; Vila de Manica; Xiluvo.

Literature records. BECHUANA LAND. Bushman Mine; Francistown; Met-  
simaklaba River; Tsessebe. RHODESIA. Chishawasha; Gokwe; Kutama;  
Lundi River Bridge; Mtoko; Musami; Rukute Farm; Victoria Falls. ZAMBIA.  
Kariba Lake; Lealui. MALAWI. Blantyre; Chitala; Cholo; Chowe; Limbe;  
Mtimbuka; Salima; Zomba. MOZAMBIQUE. Beira; Boror; Cabaceira; Charre;  
Fambani River; Massangulo; Quelimane; Tete.

Variation. Inner metatarsal tubercle longer than the free portion of  
the second toe; toes webbed at base.

Coloration. Grey brown above, uniform or with darker mottling or irre-  
gular light blotches; white below.

Maximum length. Males 34 mm; females 50 mm.

Enemies. One was recovered from the stomach of a Herpestes ichneumon at Salisbury.

Habitat. Widespread in savanna, absent from the central Kalahari.

Distribution. Most savanna areas of Africa from the borders of the Sahara south to Zululand.

Subfamily RHACOPHORINAE

Genus CHIROMANTIS Peters

Chiromantis Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 627. Type by monotypy: C. xerampelina Peters.

CHIROMANTIS XERAMPELINA Peters

Chiromantis xerampelina Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 627: Tete and Sena, Mozambique, and 1882, p. 170, pl. xxvi, fig. 1; Pfeffer, 1893, p. 91 (Quelimane); Bocage, 1896, p. 102; Chubb, 1909a, p. 592 and 1909b, p. 34 (Victoria Falls); Boulenger, 1910, p. 529 (Palapye; Livingstone); Hewitt, 1911a, p. 222; Hewitt & Power, 1913, p. 170 (Francistown); Parker, 1931, p. 899 (Charre); Pitman, 1934, p. 309 (Luangwa Valley); FitzSimons, 1935b, p. 392 (Tsotsoroga; Titumi; Tsessebe), and 1939b, p. 42 (Birchough Bridge); Loveridge, 1953b, p. 340 (Chitala River; Mtimbuka; Cholo Mountain; Fort Johnston; Lake Malombe; Monkey Bay; Port Herald; Ruo District); Poynton, 1964a, p. 157 (Mtoko; Umtali; Lundi River Bridge; Antelope; Plumtree; Gaberones; Guija; Magde), also 1964b, p. 214 (Chiromo; Salima; Zomba Mountain; Chikwawa), and 1966b.

Chiromantis umbelluzianus Ferreira, 1921, Jorn. Sci. Lisboa (3), 2, p. 205, pls. i - ii: Umbeluzi Bridge, Lourenco Marques District, Mozambique; Hoffman, 1944, p. 180 (Chitala); Mitchell, 1946, p. 33.

Seventy-three specimens examined from: BECHUANALAND. Nata. RHODESIA. Bindura; Bulawayo and 12 mls S; Chibue; Chipinda Pools; Fatima; Fort Victoria; Ganderowe Falls; Gwanda; Inyamura; 15 mls W of Kariba; Kariba Lake - Charara Confluence and Sengwa Sound; Lukosi; Makuti; 5 mls W and 32 mls NE of Mtoko; Nyampanda; Ruware; Sabi - Lundi Confluence; Sinoia; Wankie; Wankie National Park (Main Camp); Westacre; Zambezi River (opposite Feira). ZAMBIA. Chakwenga River; Chipengali;



Chikowa; Chikwa; Fort Jameson; Kalichero; Kalikali; Kasusu; Katete; Livingstone; Luembwe; Mazabuka; Mfuwe; Mkanda; Mulanga; Nsefu; Sitwe. MOZAMBIQUE. Amatongas; 10 mls NNW of Dondo; Jofane; Magasso; Mitucue Mountain; 9 mls S of Muanza; Mida - Lamago; Mungari (USNM) and 12 mls SW; Ribaue Mountain; 45 mls ENE of Tete; Vila Fontes; Xiluvo.

Literature records. BECHUANALAND. Francistown; Gaberones; Palapye; Titumi; Tsessebe; Tsotsoroga. RHODESIA. Antelope; Birchenough Bridge; Lundi River Bridge; Mtoko; Plumtree; Umtali; Victoria Falls. ZAMBIA. Livingstone; Luangwa Valley. MALAWI. Chikwawa; Chiromo; Chitala River; Cholo Mountain; Fort Johnston; Lake Malombe; Monkey Bay; Mtimbuka; Port Herald; Ruvo District; Salima; Zomba Mountain. MOZAMBIQUE. Charre; Guija; Magude; Quelimane; Sena; Tete; Umbeluzi Bridge.

Variation. Webbing usually reaching just beyond subarticular tubercle of outer finger.

Coloration. Mottled grey or brown, or uniform white above; white below.

Maximum length. 87 mm.

Enemies. Near Magasso I saw a Pyxicephalus adspersus leap out of a shallow pool to snatch a Chiromantis from a low branch.

Habitat. Dry savanna, very common in the Zambezi and Limpopo valleys.

Distribution. East African lowlands from Kenya south to Zululand.

#### Subfamily HYPEROLINAE

#### Genus LEPTOPELIS Gunther

Leptopelis Gunther, 1858, Cat. Batr. Sal. Brit. Mus., p. 89. Type by monotypy: Hyla aubryi Dumeril.

#### LEPTOPELIS FLAVOMACULATUS (Gunther)

Hyperolius flavomaculatus Gunther, 1864, Proc. Zool. Soc. London, p. 310, pl. xxvii, fig. 1: Rovuma Bay, Tanganyika.

Hylambates johnstoni Boulenger, 1897, Proc. Zool. Soc. London, p. 803, pl. xliii, fig. 4: Kondowe to Karonga, Malawi (restricted by Loveridge, 1953a), also Nyika Plateau.

Leptopelis johnstoni Hewitt, 1937b, p. 12 (Chirinda Forest); FitzSimons, 1939b, p. 43 (Chirinda Forest).

Leptopelis flavomaculatus Loveridge, 1953b, p. 343; Poynton, 1964a, p. 168 (Lusitu - Nyhodi Confluence), also 1964b, p. 214, and 1966b.

Thirty-one specimens examined from: RHODESIA. Chirinda Forest; Haroni - Lusitu Confluence; Lower Pungwe Bridge; Ngorima Reserve (E). MOZAMBIQUE. Amatongas; Garuso; Gorongoza Mountain; 5 mls N of Nicuadala.

Literature records. RHODESIA. Chirinda Forest; Lusitu - Nyhodi Confluence; MALAWI. Kondowe to Karonga; Nyika Plateau.

Variation. Tips of fingers and toes expanded into discs, more than two-thirds diameter of tympanum; web, excluding margin, not reaching distal subarticular tubercle of outer finger, not passing middle subarticular tubercle of fourth toe on inner side; length of inner metatarsal tubercle subequal to length of inner toe.

Coloration. Juveniles green above with scattered yellow spots; white below. Adults green, yellowish or purplish brown above, with a dark median blotch (often lighter mesially) extending from the level of the tympanum to the end of the urostyle; yellow dorsal spots present or absent; a dark lateral band extending from snout through eye onto the flank; cream below.

Maximum length. 63 mm.

Ecology. Males usually call from a height of ten feet or more in forest trees, the call being a protracted cat-like "Meeow" which is quite unmistakable.

Habitat. Evergreen forest from sea level to 5,000 feet (on Gorongoza Mountain).

Distribution. Eastern Africa from Kenya south to central Mozambique and adjoining Rhodesia, west to the Malawi trough.

#### LEPTOPELIS ANGOLENSIS Bocage

Hylambates angolensis Bocage, 1893, Jour. Sci. Lisboa (2), 3, p. 119 :

Caconda, Angola, and 1895, p. 179, pl. xvii, figs. 1, 1a.

Leptopelis angolensis Poynton, 1964b, p. 214 (Zomba), and 1966b (Zomba; Mpulungu).

One specimen examined from: MALAWI. Zomba.

Literature records. ZAMBIA. Mpulungu. MALAWI. Zomba.

Description. Tympanum less than half the diameter of the eye; fingers without webbing; webbing barely reaching subarticular tubercle of outer toe, not reaching middle subarticular tubercle of fourth toe; length of inner metatarsal tubercle slightly greater than length of inner toe.



Coloration. Uniform green above, a white line above the vent and on outer edges of limbs; white below.

Maximum length. 69 mm. (Bocage, 1895).

Distribution. Angola, northern Zambia and Malawi.

#### LEPTOPELIS CONCOLOR Ahl

Leptopelis concolor Ahl, 1929, Sitzb. Ges. Naturf. Freunde Berlin, p. 129: "Wito" = Witu, Kenya; Poynton, 1964a (part), p. 169 (Xiluvo; 5 mls NE of Dondo), and 1966b.

Seventeen specimens examined from: MOZAMBIQUE. Chapala; 5 mls NE and 10 mls NW of Dondo; 5 mls N of Nicuadala; Xiluvo.

Variation. Tympanum almost as large as the eye; tips of fingers and toes with conspicuous discs, disc of third finger as large as tympanum; webbing on fingers rudimentary, not, or only just, reaching middle sub-articular tubercle of fourth toe on outer side; length of inner metatarsal tubercle greater than length of inner toe; males without pectoral glands.

Coloration. Pale brown above with a dark triangle in the occipital region, its base lying between the eyes and its apex pointing backwards and sometimes meeting a dark U-shaped marking on the back which encloses a more or less uniform pale median zone; a light line above the vent and on the heels and outer edges of the feet; white below.

Maximum length. 48 mm.

Ecology. This species is sympatric with L. v. cinnamomeus at all five localities from which it is known in Mozambique and is also sympatric with L. flavoviridis near Nicuadala. The males call from low trees and bushes about 3 - 5 feet from the ground, the distinctive call consisting of three separate notes in rapid succession - "meow - meow - meow".

Habitat. Savanna woodland.

Distribution. The east African coastal plain from Kenya south to central Mozambique.

#### LEPTOPELIS ? VIRIDIS CINNAMOMEUS (Bocage)

Hylambates cinnamomeus Bocage, 1893, Journ. Sci. Lisboa (2) 3, p. 120: Quilengues, Angola, and 1895, p. 180.

Leptopelis johnstoni, (not Boulenger), Parker, 1931, p. 900 (Charre; Pambani River); Cott, 1932, p. 479, pl. i, fig. 3.

Leptopelis concolor (not Ahl) Poynton, 1964a (part), p. 169, fig. 97

(Fambani; Charre; Quelimane; Zambezi Mouth; Ponte do Pungue; Beira; Magude; Lourenco Marques).

Leptopelis viridis cinnamomeus Poynton, 1966b.

Forty-seven specimens examined from: RHODESIA. Jersey Tea Estates. MOZAMBIQUE. Chapala; 5 mls NE and 10 mls NNW of Dondo; Inchope; Inhamitanga; Mada - Lamago; 5 mls N of Nicuadala; Ribaue Mountain; Vila Bocage; Vila Fontes; Xiluvo.

Literature records. MOZAMBIQUE. Beira; Charre; Fambani; Lourenco Marques; Magude; Ponte do Pungue; Quelimane; Zambezi Mouth.

Variation. Tympanum almost as large as the eye; tips of fingers and toes with conspicuous discs, disc of third finger smaller than tympanum; webbing on fingers rudimentary, not, or just reaching, middle subarticular tubercle of fourth toe; length of inner metatarsal tubercle equal to or more than length of inner toe; males with pectoral glands.

Coloration. Usually light brown above, sometimes light green, usually with a solid dark brown patch in the middle of the back, no dark occipital triangle present, but occasionally a dark interocular bar in north Mozambique specimens; cream below.

Maximum Length. 65 mm.

Ecology. This species frequents open country and the males call from long grass or bushes at a height of 3 - 5 feet from the ground, the call is a short "meow", abruptly cut off and quite different from the drawn out call of L. flavomaculatus.

Habitat. Hyparrhenia grassland on flood plains at low altitudes, extending into savanna woodland. Males have been found calling on Banana plants at Vila Bocage and Vila Fontes.

Distribution. Angola, west through northern Zambia to Mozambique and the eastern lowlands of Rhodesia and the Transvaal, reaching its southern limit in Zululand. This distribution pattern, with eastern and western populations segregated except for a possible tenuous link through northern Zambia, suggests that the Mozambique form may be distinct.

#### LEPTOPELIS BOCAGEI (Gunther)

Cystignathus bocagii Gunther, 1864, Proc. Zool. Soc. London, p. 481, pl. xxx, fig. 2 : Duque de Braganca, Angola.

Leptopelis angolensis (not Bocage) Pitman, 1934, p. 309 (Broken Hill).



Leptopelis bocagei haasi Mertens, 1937, Abhand. Senckenb. Naturf. Ges., 435, p. 21, fig. 2 : Nsombo, Lake Bengweulu, Zambia.

Hylambates bocagii Hoffman, 1944, p. 180, fig. 7 (Chitala).

Leptopelis bocagii Loveridge, 1953b, p. 342 (Nchisi Mtn.; Cholo Mtn.; Blantyre; Limbe; Zomba).

Leptopelis bocagei Witte, 1951, p. 9 (Mpulungu); Inger 1959, fig. 12 (distribution map); Poynton, 1964a, p. 172 (Kutama; Salisbury; Chishawasha; Mtoko; Gokwe; Lundi River Bridge), also 1964b, p. 215, and 1966b.

Forty specimens examined from: RHODESIA. Mabelreign; Matopos; Mount Hampden; 32 mls NE of Mtoko; Saffron Walden; Salisbury and 10 mls W; Selukwe; Umtali. ZAMBIA. Fort Jameson; Isombo Stream; Kasusu; Msekera; Siantamba.

Literature records. RHODESIA. Chishawasha; Gokwe; Kutama; Lundi River Bridge; Mtoko; Salisbury. ZAMBIA. Broken Hill; Mpulungu; Nsombo. MALAWI. Blantyre; Chitala; Cholo Mtn.; Limbe; Nchisi Mtn.; Zomba.

Variation. Tips of fingers and toes not dilated, fingers not webbed; webbing not reaching middle subarticular tubercle of fourth toe; length of inner metatarsal tubercle greater than length of inner toe.

Coloration. Usually brown above, a few adults retain the juvenile green coloration; a dark interorbital bar, dark dorsal blotch usually broken up; cream below.

Maximum length. 65 mm.

Enemies. The Selukwe specimen was recovered from the stomach of a Naja haje annulifera.

Ecology. The call and breeding habits of this burrowing species have not yet been recorded, but it is only in evidence for a few weeks at the beginning of the rains.

Habitat. Brachystegia woodland on the Zambian and Rhodesian plateaux.

Distribution. Plateau areas of central Africa from Kenya and the north-eastern Congo south to Rhodesia, west to Angola and northern South West Africa (see Inger, 1959).

Genus HYIAMBATES Dumeril

Hylambates Dumeril, 1853, Ann. Sci. Nat., (3) 19, p. 162. Type by monotypy : H. maculatus Dumeril.

HYIAMBATES MACULATUS Dumeril

Hylambates maculatus Dumeril, 1853, Ann. Sci. Nat., (3), 19, p. 165, pl. vii : Zanzibar; Peters, 1854, p. 626, and 1882, p. 159, pl. xxvi, fig. 4 (Cabaceira Peninsula); Parker, 1931, p. 900 (Amatongas; Gaia); Loveridge, 1953b, p. 343 (Chikwawa; Kasumbadedza); Poynton, 1964a, p. 173 (Beira; Macia; Lourenco Marques; Ponte do Calichane), also 1964b, p. 215, and 1966b.

Thirty-one specimens examined from: RHODESIA. Majinji Pan; Nyamakari; Sabi - Lundi Confluence; Vumba Mountain (Leopard Rock Dams). MOZAMBIQUE. Beira; Boroma; Garuso; Inhamitanga.

Literature records. MALAWI. Chikwawa. MOZAMBIQUE. Amatongas; Beira; Cabaceira Peninsula; Gaia; Kasumbadedza; Lourenco Marques; Macia; Ponte do Calichane.

Variation. Inner metatarsal tubercle poorly developed; fingers and toes with discs; fingers not webbed; toes webbed, web reaching middle subarticular tubercle of fourth toe.

Coloration. Grey brown above, with large dark brown dorsal blotches which are bordered with silver; hind limbs with dark crossbands; inside of thighs and groin scarlet and black; white below with some brown stippling laterally.

Maximum length. 68 mm.

Habitat. Breeds in shallow pools, pans and lagoons on the coastal plain, usually hibernates in the axils of banana leaves.

Distribution. The east African coastal plain from Kenya south to Natal, extending west to Malawi and eastern Rhodesia, reaching an altitude of 4,600 feet on Vumba Mountain.

Genus KASSINA Girard

Kassina Girard, 1853, Proc. Acad. Nat. Sci. Philadelphia, p. 421. Type by monotypy : Cystignathus senegalensis Dumeril & Bibron.



## KASSINA INGERI Laurent

Kassina ingeri Laurent, 1963, Fieldiana, Zool., 44, No. 18, p. 137:

Kalabo, Barotseland, Zambia.

One specimen examined from: ZAMBIA. Ikelenge.

Literature records. ZAMBIA. Kalabo; Kalengo (P).

Variation. Vocal sac in male longitudinally oval, with a well defined anterior border and less wrinkled skin laterally than in K. senegalensis; skin smooth dorsally, folded on the throat, coarsely granular on the belly; tips of digits pointed; webbing vestigial; inner metatarsal tubercle well developed; outer metatarsal tubercle absent; subarticular tubercles well developed.

Coloration. Blackish above with darker dorsal spots, but none in the vertebral region; yellowish below with a grey network between the skin granules, throat blackish in male, limbs yellow marbled with grey or black.

Maximum size. 48 mm.

Distribution. Western Zambia.

## KASSINA WITTEI (Laurent)

Kassinula wittei Laurent, 1940, Revue Zool. Bot. Afr., 33, p. 314, figs.

1b & 2: Kansenia, Katanga.

None examined.

Literature records. ZAMBIA. Kasama (BM).

Variation. Males with a straight transverse fold posterior to a short vocal sac.

Coloration. Light dorsal bands each bisected by a narrow dark line,

Maximum length. 22 mm.

Distribution. Katanga, northern Zambia.

## KASSINA SENECALENSIS (Dumeril &amp; Bibron)

Cystignathus senegalensis Dumeril & Bibron, 1841, Erépet. Gen., 8, p. 418:

Galam Lakes, Senegal.

Cystignathus argyreivittis Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 626:

Cabaceira & Boror, Mozambique.

Cassina senegalensis Gunther, 1864, p. 307 (Zambezi Expedition), and 1894, p. 618 (Shire Highlands); Chubb, 1909a, p. 592 (Kana River), and 1909b, p. 34 (Gatooma); Boulenger, 1910, p. 532; Power, 1926a, p. 1 (Lobatsi), and 1927c, p. 413.

Cassina argyreivittis Peters, 1882, p. 157, pl. xxi, fig. 2, and pl. xxvi, fig. 3.

Kassina senegalensis Parker, 1931, p. 900 (Fambani River); Pitman, 1934, p. 310 (Nkana); Mitchell, 1946, p. 30; Loveridge, 1953b, p. 344 (Zomba Mountain); <sup>Tasman, 1956, p. 7;</sup> Poynton, 1964a, p. 175 (Kwaai River; Francistown; Livingstone; Misami; Mtoko; Tete; Umtali; Machipanda; Driefontein; Antelope; Lundi River Bridge; Lourenco Marques), also 1964b, p. 215 (Chikwawa), and 1966b.

Cassina angeli Witte, 1933, Revue Zool. Bot. Afr., 23, p. 172 : Lukafu, Kundelungu, Katanga.

Kassina senegalensis senegalensis FitzSimons, 1935b, p. 392 (Bosoli; Metsimaklaba River; Gaberones; Mabeleapudi).

One hundred and forty-one specimens examined from: BECHUANALAND. 32 mls W of Kanye; Kwaai River; Lothlekane; Tselenyane Pan. RHODESIA. Baddeley; 5 mls S of Beatrice; Bembesi; Bulawayo and 12 mls S; Bundi Valley; Chibakwe River Bridge; Chinwara Ranch; <sup>10 mls S of</sup> Cyrene; Featherstone; Gatooma; Inyanga National Park; Kariba - Charama Confluence; London Farm; Lukosi; Lupane; Mabelreign; Majinji Pan; Malipati Drift; Mount Hampden; 32 mls NE of Mrewa; Msore; Old Umtali; Rekomitjie Research Station; Sabi-Lundi Confluence; Saffron Walden; Silverstreams; Stapleford; Umzilizwe Bridge; Vumba Mountain; Wankie National Park (Guvalala Pan); Warren Hills; Zimbabwe. ZAMBIA. Bwana Mkubwa; <sup>Chipengali;</sup> Dundumwenzi; Kalenga; Kasusu; Nyambeza Plain; Sandaula Plain. MALAWI. Fort Johnston. MOZAMBIQUE. Amatongas; Chapala; 5 mls NE of Dondo; Magasso; Metuchira; Muda - Lamego; Xiluvo.

Literature records. BECHUANALAND. Bosoli; Francistown; Gaberones; Kwaai River; Lobatsi; Mabeleapudi; Metsimaklaba River. RHODESIA. Antelope; Driefontein; Gatooma; Kana River; Lundi River <sup>B</sup>ridge; Mtoko; Misami; Umtali. ZAMBIA. Livingstone; Nkana. MALAWI. Chikwawa; Zomba Mountain. MOZAMBIQUE. Boror; Cabaceira; Fambani River; Lourenco Marques; Machipanda; Tete.

Variation. Vocal sac of male longitudinally oval, without a well defined anterior border and with many folds of wrinkled blackish skin laterally; anterior portion of belly not granular.

Coloration. Olive to slate grey above with up to five dark longitudinal stripes, which vary in width and are often broken up into rows of spots (particularly the lateral and dorso-lateral stripes); white below.



Maximum length. 52 mm.

Habitat. Widespread in savannas, absent from the central Kalahari.

Distribution. Most savanna areas of Africa from Senegal east to Ethiopia, south to the eastern Cape Province, west to northern South West Africa.

Genus AFRIXALUS Laurent

Afrixalus Laurent, 1944, Revue Zool. Bot. Afr., 38, p. 113. Type by designation of Loveridge (1957): Megalixalus fornasinii congius Laurent = Hyperolius dorsalis Peters.

AFRIXALUS BRACHYCNEMIS BRACHYCNEMIS (Boulenger).

Megalixalus brachycnemis Boulenger, 1896, Ann. Mag. Nat. Hist., (6), 17, p. 403, pl. xvii, fig. 2 : Chiradzulu, Malawi; Parker, 1931, p. 900 (Caia; Fambani River); Hoffman, 1944, p. 180 (Limbe; Chitala); Mitchell, 1946, p. 32.

Rappia fulvovittata (not Cope) Boulenger, 1897, p. 801 ("Nyika Plateau").

Afrixalus brachycnemis brachycnemis Loveridge, 1953b, p. 346 (Chitala River; Ruw River; Shire River; Zambezi River at Tete; Limbe), and 1953c, p. 145 (Nkazi River); Poynton, 1964a, p. 180 (Quelimane; Tete; Umtali; Machipanda; Ponte do Pungue; Landi River Bridge; Lourenco Marques; Ponte do Calichane), also 1964b, p. 216 (Cholo; Chikwawa; Palm Beach), and 1966b.

One hundred and eleven specimens examined from: RHODESIA.

Gungunyana; Inyazura; Nyamakari; Pungwe Bridge; Sabi - Lundi Confluence; Tsuru; Umzilizwe River. MALAWI. Cholo Mountain; Lujeri. MOZAMBIQUE. Amatongas; Beira; Cavale; Garuso; Guro; Inhaca Island; Inhamitanga; Magasso; Mossuril; Nampula; 15 mls SE of Vila de Manica; 8 mls SSE of Vila Gouveia.

Literature records. RHODESIA. Lundi River Bridge; Umtali. MALAWI. Chikwawa; Chiradzulu; Chitala River; Cholo; Limbe; Nkazi River; Palm Beach; Ruw River; Shire River. MOZAMBIQUE. Caia; Fambani River; Lourenco Marques; Machipanda; Ponte do Calichane; Ponte do Pungue; Quelimane; Tete.

Variation. Subarticular tubercles of two outer fingers double; webbing between fingers rudimentary; small black asperities, if present, usually restricted to upper eyelid, never present on back and limbs.

Coloration. Pale yellow above, uniform, or with a pair of dark lateral bands which are stippled with white and/or a pair of dark dorsal stripes; white below.

Maximum length. 27 mm.

Enemies. One was recovered from the stomach of a Philothamnus hoplogaster at Xiluvo.

Habitat. Coastal lowlands, reaching altitudes of 4,000 feet in Rhodesia and Malawi. It hibernates in banana axils and breeds in reedbeds.

Distribution. Eastern Africa from Kenya south to Zululand, extending inland to Malawi, eastern Rhodesia and eastern Transvaal.

#### AFRIXALUS FORNASINII FORNASINII (Bianconi)

Euchnemis Fornasini Bianconi, 1849, Nuovi Ann. Sci. Nat., (2), 10 (1848), p. 107, pl. v, fig. 1, and 1850, Spec. Zool. Mossamb., Rept., p. 23, pl. v, fig. 1: Inhambane, Mozambique.

Hyperolius bivittatus Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 627: Boror, Mozambique.

Hyperolius fornasinii Gunther, 1864, p. 307 (Zambezi Expedition).

Megalixalus fornasinii Peters, 1882, p. 160, pl. xdv, fig. 2 & pl. xxvi, fig. 6 (Boror; Inhambane); Bocage, 1896, p. 101; Boulenger, 1897, p. 801 (Kondowe to Karonga; "Nyika Plateau"), and 1910, p. 531; Hewitt, 1911a, p. 224; Parker, 1931, p. 900 (Caia; Charre; Fambani River; Delagoa Bay; Chiromo); Cott, 1932, p. 474, fig. 1, pl. xli, figs. 1 - 2; Hoffman, 1944, p. 179 (Chiromo); Mitchell, 1946, p. 32.

Afrixalus fornasinii fornasinii Loveridge, 1953b, p. 345 (Mtimbuka; Kausi Village; Cholo Mtn.; Chikwawa), and 1953c, p. 145 (Gande; Lake Malombe; Port Herald; Mpatamanga Gorge); Poynton, 1964a, p. 183 (Amatongas; Ponte do Pungue; Beira; Lourenco Marques), also 1964b, p. 216 (Palm Beach), and 1966b.

Fifty-three specimens examined from: RHODESIA. Bomponi Farm; Ngorima Reserve (E); Nyamakari; Pungwe Bridge. MALAWI. Lujeri. MOZAMBIQUE. Beira; Cavalo; Chapala; 5 mls NE of Dondo; Garuso; Maforga; Manga; Morrumbala Mountain; <sup>Nampula;</sup> 5 mls N of Nicuadala; Vila Bocage; 8 mls SSE of Vila Gouveia; Xiluvo.

Literature records. MALAWI. Chikwawa; Chiromo; Cholo Mountain; Gande; Kausi; Kondowe to Karonga; Lake Malombe; Mpatamanga Gorge; Mtimbuka; "Nyika Plateau"; Palm Beach; Port Herald. MOZAMBIQUE. Amatongas; Beira; Boror; Caia; Charre; Delagoa Bay; Fambani; Inhambane; Lourenco Marques; Ponte do Pungue.



Variation. Subarticular tubercles of two outer fingers never clearly divided, usually entire; web reaching subarticular tubercle in middle of outer finger; body and limbs covered above by small black asperities.

Coloration. Dull yellow to dark brown above, with a pair of broad silvery-white dorso-lateral bands, which converge on the snout (at night these bands are often hardly discernible, the whole frog being yellowish-brown); yellow below.

Maximum length. 39 mm.

Habitat. Coastal lowlands. It hibernates in banana axils and breeds in reedbeds.

Distribution. East African coastal plain from Kenya south to Natal (Durban), inland to Malawi and the eastern border of Rhodesia.

#### AFRIXALUS WITTEI (Laurent)

Megalixalus wittei Laurent, 1941, *Revue Zool. Bot. Afr.*, 35, p. 127, fig. 4: Lukafu, Katanga.

One specimen examined from: ZAMBIA. Kalomo District (1224 Cd).

Literature records. ZAMBIA. Kalabo (P).

Description. Similar to A. f. fornasini, but with a light median dorsal band which has a dark border.

Distribution. Katanga, western Zambia.

#### Genus HYPEROLIUS Rapp.

Hyperolius Rapp, 1842, *Arch. Naturg.*, 8, Abt. 1, p. 289. Type by monotypy H. marmoratus Rapp.

Rappia Gunther, 1864, *Zool. Rec.* 1, p. 130. New name for Hyperolius Rapp, thought to be preoccupied by Uperolia Gray.

#### HYPEROLIUS PUNCTICULATUS (Pfeffer)

Rappia puncticulata Pfeffer, 1893, *Jahrb. Hamburg. Wiss. Anst.* (1892) 10, p. 31, pl. ii, fig. 2: Zanzibar.

Rappia argus (not Peters) Boulenger, 1897, p. 801 ("Nyika Plateau").

Hyperolius puncticulatus puncticulatus Loveridge, 1953b, p. 358 ("Nyika Plateau"; Misuku Mtns.; Nchenachena; Likabula River; Ruw River), and 1953c, p. 146 (Limbe); Poynton, 1964a, p. 186.

Hyperolius puncticulatus choloensis Loveridge, 1953, Bull. Mus. Comp. Zool., 110, p. 359, fig. 1 : Cholo Mountain, Malawi.

Hyperolius puncticulatus mitchelli Loveridge, 1953, Bull. Mus. Comp. Zool., 110, p. 360, fig. 2 : Shore of Lake Nyasa a few miles north of Mtimbuka, Malawi.

Hyperolius puncticulatus Poynton, 1964b, p. 216 (Cholo; Zomba Plateau).

Twenty-four specimens examined from: MALAWI. Lujeri; Nkata Bay; Vipya Plateau. MOZAMBIQUE. Beira; Boane; Braganca (USNM); Maforga.

Literature records. MALAWI. Cholo Mountain; Likabula River; Misuku Mtns.; Mtimbuka; Nchenachena; "Nyika Plateau"; Ruw River; Zomba Plateau.

Variation. Canthus rostralis fairly angular, straight; snout fairly pointed; skin smooth above; webbing reaching or passing distal subarticular tubercle of outer finger, reaching distal subarticular tubercle of fourth toe on both sides.

Coloration. Light to dark brown above, with a black-edged yellow<sup>band</sup>/running from tip of snout to eye, sometimes continuing as a dorso-lateral band or series of spots; no yellow markings in middle of back or on limbs, but dark dorsal spots may be present; white below.

Maximum length. 35 mm.

Enemies. Loveridge (1953b) recovered one from the stomach of a Grotaphopeltis tornieri.

Habitat. Breeds in swamps and calls from waterlily pads, reeds or sedges.

Distribution. Eastern Africa from Kenya south to northern Natal, extending inland to Malawi.

#### HYPEROLIUS ARGUS Peters

Hyperolius argus Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 628: Boror, Mozambique; Gunther, 1864, p. 307 (Zambezi Expedition); Peters, 1882, p. 164, pl. xxi, fig. 6; Parker, 1931, p. 902, pl. i, figs. 2 - 8 (Caia; Fambani); Cott, 1932, p. 477, pl. ii, fig. 1; Mitchell, 1946, p. 32; Poynton, 1964a, p. 187 (Beira), also 1964b, p. 217 (Chiromo), and 1966b.



Hyperolius flavoviridis Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 628; Boror, Mozambique, and 1882, p. 163, pl. xxi, figs. 4, 5 (Cabaceira Peninsula); Pfeffer, 1893, p. 98 (Quelimane).

Hyperolius Tettensis Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 628: Tete, Mozambique.

? Rappia platycephala Pfeffer, 1893, Jahrb. Hamburg Wiss. Anst. (1892), 10, p. 96, pl. ii, fig. 2 : Quelimane, Mozambique; Bocage, 1896, p. 102.

? Rappia flavoviridis Pfeffer, 1893, p. 96 (Quelimane); Bocage, 1896, pp. 96 (Lourenco Marques) and 101.

? Rappia argus Bocage, 1896, p. 96 (Lourenco Marques).

Hyperolius fulvoviridis Mitchell (lapsus for flavoviridis), 1946, Nyasaland Agric. Quart. Journ., 6, p. 31 : Chiromo, Malawi.

Hyperolius argus argus Loveridge, 1953b, p. 356 (Chiromo).

Four specimens examined from: MOZAMBIQUE. Beira; Grudja; Maringa.

Literature records. MALAWI. Chiromo. MOZAMBIQUE. Beira; Boror; Cabaceira Peninsula; Caia; Fambani; Lourenco Marques; Quelimane; Tete.

Variation. Canthus rostralis fairly rounded and straight, snout pointed; skin smooth above; webbing reaching or passing distal subarticular tubercle of outer finger, reaching distal subarticular tubercle of fourth toe on both sides.

Coloration. Males green, with or without dark dorsal dots and a dark line on the canthus rostralis, with or without a yellow line (not bordered with black) running from nostril to groin (broken by eye) on each side. Females: pale grey to brown with orange, yellow or white dorsal markings consisting of a black-bordered band on the canthus rostralis and large asymmetrical black-bordered rounded blotches on the back, and sometimes on the limbs also. Subadults show the male pattern.

Maximum length. 32 mm.

Habitat. Rivers and swamps on the Mozambique Plain. Common in water hyacinth (Pistia stratiotes) in backwaters of the rivers (C. R. Owen, pers. comm.).

Distribution. The east African coastal plain from Zanzibar south to (?) Lourenco Marques, inland to Tete and the lower Shire Valley in Malawi.

## HYPEROLIUS PICTUS Ahl

Hyperolius pictus Ahl, 1931, Das. Tierreich, 55, p. 301, fig. 176 : Ngori Volcano, S. Tanganyika; Poynton, 1964b, p. 217 (Nyika Plateau, Malawi and Zambia).

Hyperolius marginatus (not Peters) Loveridge, 1953b, p. 348 (Nyika Plateau).

Twenty-six specimens examined from: MALAWI. Nyika Plateau.

Literature records. ZAMBIA. Nyika Plateau. MALAWI. Nyika Plateau.

Variation. Canthus rostralis fairly rounded and straight, snout pointed; skin smooth above and on throat, coarsely granular on belly; outer finger with terminal phalanx and disc free of web, fourth toe with almost two phalanges and disc free of web.

Coloration. Very variable; uniform dark red-brown, or with a darker lateral band with lighter mottling, or with irregular light and dark longitudinal stripes; yellow or cream below.

Maximum length. 38 mm.

Habitat. Dambos in montane grassland.

Distribution. Mountains of south-western Tanganyika and the Nyika Plateau.

## HYPEROLIUS BOCAGEI Steindachner

Hyperolius Bocagei Steindachner, 1867, Reise Novara, Zool., 1, Amphib., p. 51, pl. v., fig 11 : Duque de Braganca, Angola.

No material examined.

Records. ZAMBIA. Abercorn (BM); Kasama (BM).

Distribution. Northern Angola, west through Katanga to northern Zambia.

## HYPEROLIUS TUBERILINGUIS A. Smith

Hyperolius tuberilinguis A. Smith, 1849, Ill. Zool. S. Africa, Rept., App., p. 26 : "Country to the eastward of the Cape Colony"; Poynton, 1964a, p. 189 (Ponte do Pungue; Lourenco Marques; Magude; Ponte do Calichane), also 1964b, p. 218 (Cholo; Chikwawa; Palm Beach), and 1966b.



Euchnemis salinae Bianconi, 1849, *Nuovi Ann. Sci. Nat.* (2), 10, (1848), and 1850, *Spec. Zool. Mossamb.*, Rept., p. 194, pl. v, fig. 2: Inhambane, Mozambique.

Hyperolius salinae Gunther, 1864, p. 307 (Zambezi Expedition); Peters, 1882, p. 169.

Hyperolius modestus (not Gunther, 1858) Gunther, 1864, p. 307 (Quelimane).

Rappia concolor (not Hallowell) Boulenger, 1882, p. 124 (Shire Valley); Bocage, 1896, p. 101.

Hyperolius concolor (not Hallowell) Peters, 1882, p. 164; Parker, 1931, p. 902 (Caia; Charre).

Rappia Salinae Bocage, 1896, p. 102.

Hyperolius mossambicus Parker, 1931, *Proc. Zool. Soc. London*, p. 904, pl. 1, fig. 1: Fambani River, Mozambique; Cott, 1932, p. 479.

Hyperolius kivuensis smaragdinus Laurent, 1947, *Ann. Mag. Nat. Hist.*, (11) 14, p. 292: Charre, Mozambique. (Also Caia; Quelimane).

Hyperolius concolor tuberilinguis Loveridge, 1953b, p. 354 (Chibotela; Mtimbuka; Chikwawa), and 1953c, p. 146 (Nchalo).

Ninety specimens examined from: RHODESIA. Ngorima Reserve (E); Nyamakari Farm. MALAWI. Cholo Mountain; Fort Johnston; Muzeri; Nkata Bay. MOZAMBIQUE. Amatongas; 10 mls NE of Beira; Chapala; 5 & 10 mls NNW mls NE of Dondo; Garuso; Inhaca Island; Macuti; Maforga; Muda - Lamago; Nabsunama Dam; Namsacha; 5 mls N of Nicuadala; Savane; Vila Bocage; 8 mls SSE of Vila Gouveia; Xiluvo.

Literature records. MALAWI. Chibotela; Chikwawa; Cholo; Mtimbuka; Nchalo; Palm Beach; Shire Valley. MOZAMBIQUE. Caia; Charre; Fambani River; Inhambane; Lourenco Marques; Magude; Ponte do Calichane; Ponte do Pungue; Quelimane.

Variation. Canthus rostralis very prominent, straight; skin smooth to granular above; webbing reaching subarticular tubercle of outer finger or rudimentary, reaching from proximal to distal subarticular tubercle of the fourth toe on inner side.

Coloration. Uniform green to brown, ?? and some ♂♂, or pale brown with a dark interorbital triangle, its apex pointing posteriorly and linking up with a dark more or less pentagonal marking, in these specimens the canthus is emphasised by a pale hairline with a darker band below it, which may continue onto the flanks. These markings are found in juveniles and are retained by some males (var. mossambicus Parker).

Maximum length. 39 mm.

Enemies. One was recovered from the stomach of a Lycodonomorphus rufulus from Inhaca Island, another from a Xiluvo Philothamnus hoplogaster.

Habitat. Very common in reeds bordering swamps and rivers on the Mozambique Plain.

Distribution. The coastal plain, from southern Tanganyika south to Natal, extending inland to northern Zambia, Malawi and the eastern border of Rhodesia.

#### HYPEROLIUS KIVUENSIS Ahl

Hyperolius kivuensis Ahl, 1931, Das. Tierreich, 55, p. 280, fig. 151:

Lake Kivu, Congo; Loveridge, 1953b, p. 352 (Nyamkolo), and 1957, p. 326 (footnote 222).

Hyperolius rhodoscelis (not Boulenger) Loveridge, 1933, p. 404 (Nyamkolo); Pitman, 1934, p. 309.

Hyperolius kivuensis smaragdinus (not Laurent) Witte, 1951, p. 10 (Sumbu).

No material examined.

Literature records. ZAMBIA. Abercorn (BM, as tuberilinguis); Nyamkolo (Loveridge; BM, as tuberilinguis); Sumbu.

Coloration. Green or chrome yellow above, a purplish brown dotted line extends from nostril to eye, broadens just posterior to the eye and then narrows on the flank, merging into an area of widely separated dots on the thigh; outer face of thigh with a narrow green or yellow stripe; inner surface of thigh vermillion, which extends onto the tibia; upper surface of the foot yellow mottled with vermillion; throat white, chest and belly cream, soles of hands and feet orange. Juveniles brown, with dark-edged light vertebral and lateral stripes.

Maximum length. 34 mm.

Distribution. The areas bordering lakes Kivu and Tanganyika in the Rift Valley, i.e. south-west Uganda, eastern Congo (Kivu and Katanga), Rwanda, Burundi, western Tanganyika and northern Zambia.

#### HYPEROLIUS PUSILLUS (Cope)

Crumenifera pusillus Cope, 1862, Proc. Acad. Nat. Sci. Philadelphia, p. 343: Umvoti, Natal.

Hyperolius microps Gunther, 1864, Proc. Zool. Soc. London, p. 311, pl. xxvii, fig. 3: Ruvuma Bay, Tanganyika/Mozambique Border; Parker, 1931, p. 905 (Fambani River); Cott, 1932, p. 479.

Hyperolius pusillus Loveridge, 1953c, p. 147 (Elephant Marsh; Chiromo); Poynton, 1964a, p. 191 (Beira; Ponte do Calichane) and 1964b, p. 218.



Fifteen specimens examined from: RHODESIA. Chipinda Pools; Majinji Pan. MOZAMBIQUE. Beira; Xiluvo.

Literature records. MALAWI. Chiromo; Elephant Marsh. MOZAMBIQUE. Beira; Fambani River; Ponte do Calichane; Rovuma Bay.

Variation. *Canthus rostralis* fairly rounded and concave, snout broad and bluntly pointed; webbing not passing subarticular tubercle of outer finger, fourth toe with disc and one or two phalanges free of web.

Coloration. Translucent pale green with a dark streak on the canthus rostralis and usually scattered dark spots on the back and limbs.

Maximum length. 20 mm.

Habitat. Pans and swamps on the Mozambique Plain. This species calls while sitting on lily pads, the eggs being laid between the overlapping leaves.

Distribution. The East African coastal plain from Kenya south to Pondoland, inland to the lower Shire Valley, south-eastern Rhodesia and eastern Transvaal.

#### HYPEROLIUS NASUTUS NASUTUS Gunther

Hyperolius nasutus Gunther, 1864, Proc. Zool. Soc. London, p. 482, pl.

xxxiii, fig. 3 : Duque de Braganca, Angola; Pitman, 1934, p. 309 (Luangwa Valley); Loveridge, 1941c, p. 290 (Mount Silinda), and 1953b, p. 362 (Chibotela; Nchisi Mtn.); FitzSimons, 1958a, p. 212 (Nyamziwa).

Rappia nasuta Gunther, 1894, pp. 619, 620 (Shire Highlands); Hewitt, 1911a, p. 224 (Marandellas); Hewitt & Power, 1913, p. 170.

Rappia granulata Boulenger, 1901, Ann. Mus. Congo, (1), 2, fasc. 1, p. 4, pl. ii, fig. 3 : Pweto, Lake Mweru, Katanga.

Rappia oxyrhynchus Boulenger, 1901, Ann. Mus. Congo, (1), 2, fasc. 1, p. 5, pl. ii, fig. 4 : Pweto and Lofoi, Katanga.

Hyperolius granulatus Loveridge, 1933, p. 410 (Nyamkolo); Pitman, 1934, p. 309.

Hyperolius nunctulatus (Dodge). Mertens, 1937, p. 20 (Nsombo).

Hyperolius sp. FitzSimons, 1939b, p. 44 (Umzilizwe River).

Hyperolius nasutus nasutus Poynton, 1964a, p. 192 (Maun; Mangula Mine; Salisbury; Kutama; Mtoko; Inyanga; Umvuma; Gokwe; Driefontein; Beira), also 1964b, p. 219 (Cholo), and 1966b.

Seventy-six specimens examined from: RHODESIA. 10 mls N of Beatrice; Bembesi; Bundi Valley; Dowa Division; Fort Victoria; Inyanga National Park; Kandarianze Pan; Kazungula; London Farm; Lusulu; Mabel-reign; Marandellas; Mare Dam; Mount Hampden; Reenen; Salisbury; Silver-streams; Soti Source; Umfesi; Umtali; Umzilizwe River; Vumba Mountain; Warren Hills. ZAMBIA. 25 mls N of Kasempa; Kasusu; Lunga Game Reserve; Shimwe. MALAWI. Kambwe; Kota Kota; Lujeri; Vwaza Marsh. MOZAMBIQUE. Chapala; Garuso; Maforga; 8 mls SSE of Vila Gouveia.

Literature records. BECHUANA LAND. Maun. RHODESIA. Driefontein; Gokwe; Kutama; Mangula Mine; Marandellas; Mount Silinda; Mtoko; Nyamziwa; Salisbury; Umvuma; Umzilizwe River. ZAMBIA. Abercorn (BM); Luangwa Valley; Nsombo; Nyankolo; Sandaula Plain (P). MALAWI. Chibotela; Cholo; Nehisi Mtn. MOZAMBIQUE. Beira.

Variation. *Canthus rostralis* fairly rounded and concave, snout prolonged into a long pointed tip which projects well beyond the mouth; hand without webbing or up to  $\frac{1}{2}$  webbed, fourth toe with disc and one to two phalanges free of web.

Coloration. Pale green or pale yellow, usually with fine dark stippling and a pair of white dorso-lateral stripes, sometimes with an additional pair of light dorsal stripes.

Maximum length. 24.5 mm.

Habitat. Widespread in savanna and montane grassland, often found calling in reedbeds in association with *H. swynnertoni* and *H. marmoratus* subsp.

Distribution. Eastern Africa from Ethiopia south to Natal, west through the Congo, Zambia and northern Bechuanaland to Angola.

HYPEROLIUS ? QUINQUEVITTATUS QUINQUEVITTATUS Bocage

*Hyperolius quinquevittatus* Bocage, 1866, Journ. Sci. Lisboa, 1, p. 77 :

Duque de Braganca, Angola.

Five specimens examined from: ZAMBIA. Ikelenge; Zambia/Katanga/Angola Border.

Literature records. ZAMBIA. Abercorn (BM).

Description. These specimens differ from *H. q. mertensi* only in their slightly more extensive webbing (just passing middle subarticular tubercle of outer toe) and better developed dark dorsal stripes, with a continuous dark line on the tibia.

Distribution. Northern Angola, Katanga, northern Zambia.



## HYPEROLIUS QUINQUEVITTATUS MERTENSI Poynton

Hyperolius mertensi Poynton, 1964, Senckenb. Biol., 45, p. 220 : Nyika Plateau, Zambia.

Fourteen specimens examined from: ZAMBIA. Nyika Plateau (Types). MALAWI. Nyika Plateau.

Variation. Canthus rostralis fairly rounded and concave, snout pointed; skin smooth above, granular over belly; webbing of hand vestigial, reaching middle subarticular tubercle of outer toe.

Coloration. Green to pale yellow above, with or without one or two pairs of rather ragged black dorsal stripes, which may be broken up; a broad black lateral band extends from nostril through eye to groin; white below.

Maximum length. ♂ 22.8 mm.; only ♀ 24.7 mm.

Habitat. Montane grassland.

Distribution. Endemic to the Nyika Plateau.

The *HYPEROLIUS* *MARMORATUS* Superspecies

Laurent (1951a), in a preliminary survey of this wide-ranging and complex group, recognised three species: tuberculatus (Mocquard), monotypic; marmoratus Rapp with 31 races and viridiflavus (Dumeril & Bibron) with 17 races. In a more recent review of the East African forms, Laurent (1965a) treated them all as races of H. marmoratus.

Poynton (1964a, p. 193) treated swynnertoni, aposematicus and angolensis as full species, for he considered that their colour patterns could not be readily derived from neighbouring forms of H. marmoratus (*sensu strictu*). H. swynnertoni is a very large form and its mottled or vermiculate pattern bears no resemblance to those of the neighbouring forms taeniatus and broadleyi, both of which are conspicuously striped, as there is no sign of intergradation this form can be considered specifically distinct.

H. m. rhodesianus has a spotted pattern and the underside may have prominent red markings, which Poynton thought distinguished it from H. marmoratus. However, the nearest form found east of rhodesianus is H. m. marginatus (at Lusulu Ranch), which sometimes has red stippling on the throat, while two Lusulu specimens have a few scattered dark spots on the dorsum. I am provisionally treating rhodesianus as a race of H. marmoratus.

H. m. angolensis was excluded from H. marmoratus by Poynton because of its large size (maximum 33.5 mm), but it is actually no larger than H. m. broadleyi, which is appreciably larger than its neighbouring form H. m. taeniatus.

H. m. aposematicus is larger than H. m. angolensis, but its variable pattern is very similar and they appear to be conspecific. Poynton doubted whether aposematicus and rhodesianus were conspecific because intergrades have not been found, but there seem to be no suitable breeding sites in the Kalahari sand area separating the Matetsi River from Victoria Falls.

It seems better to treat these doubtful forms as races of H. marmoratus, pending the accumulation of the evidence required to establish their true status.

For distribution of the Hyperolius marmoratus superspecies see Fig. 14 below.

*HYPEROLIUS* *SWYNNERTONI* FitzSimons

Hyperolius marmoratus (not Rapp) FitzSimons (part), 1939b, p. 43 (Chirinda Forest).

Hyperolius swynnertoni FitzSimons, 1941, Ann. Tvl. Mus., 20, p. 280, pl. xii, figs 1 - 3: Chirinda Forest, Rhodesia; Loveridge, 1941c, p. 287; Poynton, 1964a, p. 200.



Hyperolius marmoratus swynnertoni Laurent, 1951a, p. 384, and 1965a, p. 2.

Fifty specimens examined from; RHODESIA. Bundi Valley (Chimanmani Mountains); Silverstreams; Umzilizwe Bridge.

Literature records. RHODESIA. Chirinda Forest.

Variation. Canthus rostralis rounded and concave, snout truncated; skin smooth above and on throat, granular on belly; webbing just reaching or passing distal subarticular tubercle of outer finger, reaching distal subarticular tubercle of fourth toe on both sides.

Coloration. Light grey above, vermiculated, mottled or spotted with bright yellow, with or without black stippling or suffusions. Juveniles and some males uniform brown with a light dorso-lateral hairline.

Maximum length. 38.5 mm.

Discussion. Laurent (1951a; 1965a) has considered this form to be a race of H. marmoratus, but in Melssetter District it occurs within a few miles of populations of H. marmoratus broadleyi with no sign of intergradation. It is a larger form than broadleyi, which does not exceed 33.5 mm.

Habitat. Breeds in reedbeds along rivers in montane grassland or Brachystegia woodland. The types were taken in a clearing in evergreen forest.

Distribution. Melssetter and Chipinga Districts of Rhodesia at altitudes between 3,000 and 6,000 feet.

#### HYPEROLIUS MARMORATUS Rapp

Diagnosis Canthus rostralis rounded and concave, snout truncated; webbing just reaching or passing distal subarticular tubercle of outer finger, reaching the distal subarticular tubercle of the fourth toe.

This species has a distinct juvenile colour pattern, which is a more or less uniform brown or yellow, usually with a pale dorso-lateral hairline. Some males usually retain this juvenile pattern, the proportion varying in different populations of the same form. As many forms cannot be positively identified from specimens of the "brown" phase, it is essential that adult ♀♀ are collected at every locality.

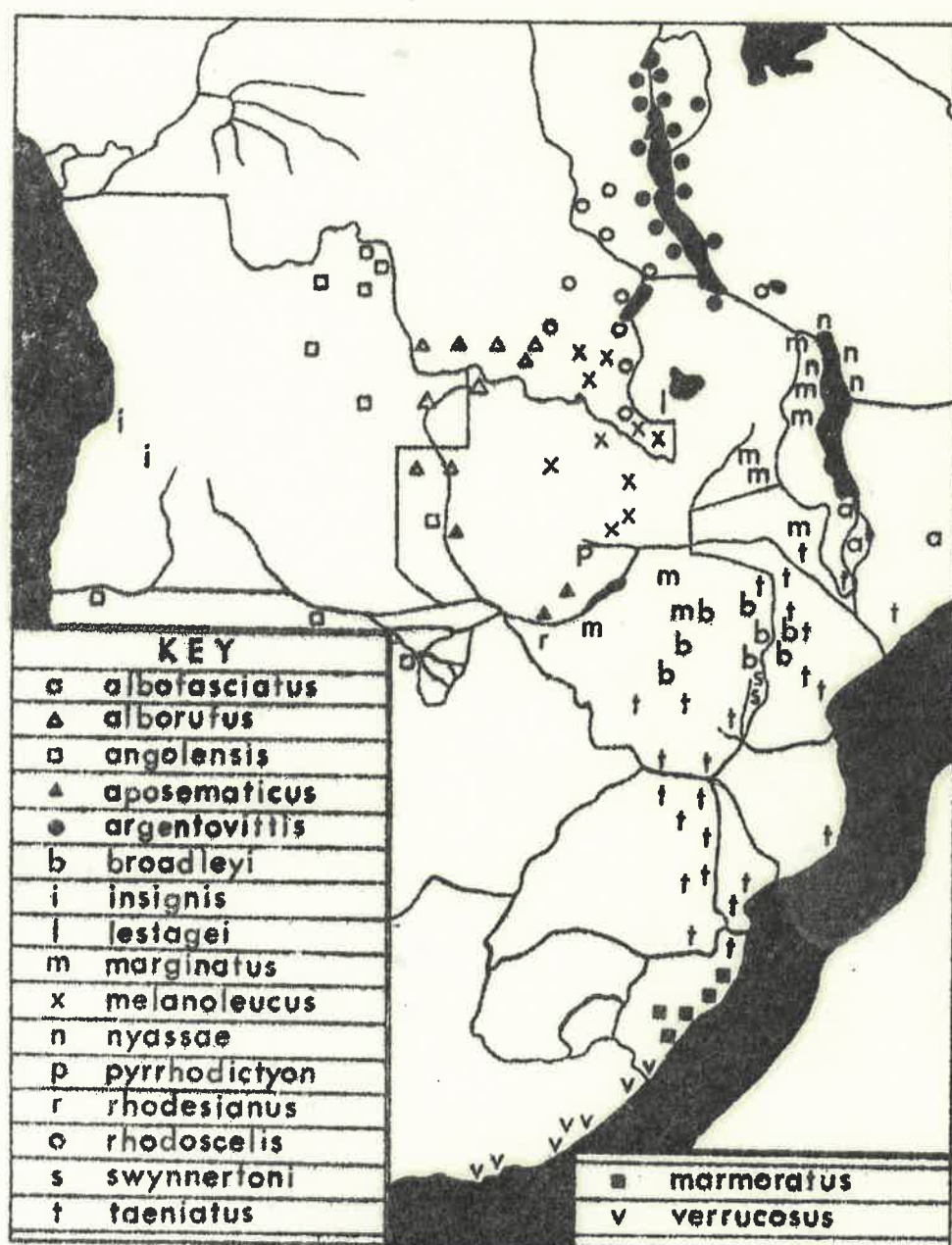


Fig. 14. Distribution of the Hyperolius marmoratus superspecies in southern Africa.



## HYPEROLIUS MARMORATUS RHODESIANUS Laurent

Hyperolius marmoratus rhodesianus Laurent, 1947, Ann. Mag. Nat. Hist., (11) 14, p. 294: Matetsi, Rhodesia, also 1951a, p. 384 and 1965a, p. 2.

Hyperolius rhodesianus Poynton, 1964a, p. 201.

Fifteen specimens examined from: RHODESIA. Matetsi River Bridge.

Literature records. RHODESIA. Matetsi.

Coloration. Bright yellow above with large lime green dorsal spots, which may have grey centres; below, white or reddish with large white spots, or with a red reticulation.

Maximum length. 28 mm.

Habitat. Reedbeds bordering the Matetsi River and a tributary entering it just below the main road bridge. No suitable breeding sites were found between Matetsi and the Victoria Falls (where H. m. aposematicus) occurs.

Distribution. Only known from Matetsi, Rhodesia.

## HYPEROLIUS MARMORATUS PYRRHODICTYON Laurent

Hyperolius aposematicus (not Laurent) Poynton (part), 1964a, p. 201 (Lochinvar).

Hyperolius marmoratus pyrrhodictyon Laurent, 1965, Breviora (Mus. Comp. Zool.), 216, p. 5: Mazabuka, Zambia.

Fifteen specimens examined from: ZAMBIA. Lochinvar (juveniles).

Coloration. No dorsal markings; throat and belly with a red network. These markings are restricted to the throat or entirely absent in the topotypic juveniles which I have examined.

Maximum length. 32 mm.

Discussion. The ventral coloration of this form is matched by some specimens of H. m. rhodesianus and also by some of the frogs referred to aposematicus by Poynton (1964a).

Distribution. Kafue Flats, Zambia.

## HYPEROLIUS MARMORATUS APOSEMATICUS Laurent

? Rapnia cinctiventris (not Cope) Peracca, 1896, p. 4 (Kazungula).

Hyperolius marmoratus aposematicus Laurent, 1951, Ann. Soc. Zool. Belg., 92, p. 35 : Lealui, Barotseland, Zambia, also 1951a, p. 384, figs. 4 - 6, and 1965a, p. 2.

Hyperolius aposematicus Poynton (part), 1964a, p. 201 (Livingstone).

Five specimens examined from: ZAMBIA. Dimba; Kavula River; Livingstone; Victoria Falls.

Literature records. ZAMBIA. Kazungula; Lealui; Livingstone.

Coloration. Coarse to fine brown or black vermiculation or spotted; brown adult males with uniform coloration, but small juveniles with a darker sacral patch; ventrum uniform white or speckled or marbled with red.

Maximum length. 35 mm.

Distribution. Eastern Barotseland, extending down the Zambezi to Victoria Falls.

## HYPEROLIUS MARMORATUS ALBORUFUS Laurent

Hyperolius marmoratus alborufus Laurent, 1964, Publ. Cult. Comp. Diam.

Angola, 57, p. 153: Camembo, Mexico, Angola, and 1965a, p. 1.

Hyperolius aposematicus (not Laurent) Poynton (part), 1964a, p. 201 (Balovale).

Five specimens examined from: ZAMBIA. Balovale Boma; Balovale District (1322 CB); Ikelenge (Zambezi Rapids).

Coloration. Dorsum and upper surface of tibia with asymmetrical confluent red blotches; the forearms, circumanal region, the sides of the tibia, tarsus and outer toe with small black dots.

Distribution. The upper Zambezi region, including the Balovale and Mwinilunga Districts of Zambia, the Mexico District of Angola and the Luabala District of Katanga.



## HYPEROLIUS MARMORATUS ANGOLENSIS Steindachner

Hyperolius marmoratus var angolensis Steindachner, 1867, Reise Novara, Amph., P. 50, pl. ii, figs. 19 - 23 : Angola.

Hyperolius marmoratus (not Rapp) Loveridge (part), 1941c, p. 287 (Lake Ngami).

Hyperolius marmoratus angolensis Laurent, 1951a, p. 390, and 1964c, p. 152, fig. 39 (NE Angola locs.).

Hyperolius angolensis Poynton, 1964a, p. 202.

Fourteen specimens examined from: BECHUANALAND. Sepopa.

Literature records. BECHUANALAND. Lake Ngami. ZAMBIA. Sandaula Plain (P).

Coloration. Red-brown with white vermiculation or stippling, or with a white vertebral stripe, a broken white lateral stripe and white spots between the stripes; uniform white below.

Maximum length. 33.5 mm.

Distribution. Northern South West Africa, northern Bechuanaland, eastern Angola and western Barotseland.

## HYPEROLIUS MARMORATUS MELANOLEUCUS Laurent

Hyperolius marmoratus (not Rapp) Pitman, 1934, p. 309 (Nkana).

Hyperolius cinctiventris (not Cope) Pitman (part), 1934, p. 309 (Nkana).

Hyperolius melanoleucus Laurent, 1941, Rev. Zool. Bot. Afr., 34, p. 157, pl. viii, figs. D, E, F: Lukafu, Katanga.

Hyperolius aposematicus (not Laurent), Poynton (part), 1964a, p. 201 (Chilanga; Lusaka).

Hyperolius marmoratus melanoleucus Laurent, 1965a, p. 2. (Lusaka; Mwambashi River; Mkushi District).

? Hyperolius marmoratus nyassae (not Ahl) Laurent, 1965a, p. 3 (Serenje).

Five specimens examined from: ZAMBIA. Chilanga; Kaungashi; Lusaka East.

Literature records. ZAMBIA. Chilanga; Lusaka; Mkushi District; Mwambashi River; Nkana.

Coloration. Black with vertebral and dorso-lateral white stripes which have some side branches, often including an interocular bar, and isolated spots, in females the white markings have red centres; white below with red spots.

Maximum length. 34 mm.

Distribution. South-eastern Katanga and the Ndola, Mkushi, Broken Hill and Kasempa Districts of Zambia.

HYPEROLIUS MARMORATUS RHODOSCELIS (Boulenger)

Rappia rhodoscelis Boulenger, 1901, Ann. Mus. Congo (1), 2, p. 3, pl. ii, fig. 1 : Pweto, Lake Mweru, Katanga.

Rappia undulata Boulenger, 1901, Ann. Mus. Congo (1), 2, p. 4, pl. ii, fig. 2: Pweto, Lake Mweru, Katanga.

Hyperolius undulatus Pitman, 1934, p. 309; Mertens, 1937, p. 21 (Muchishye).

? Hyperolius rossii (not Calabresi) Mertens, 1937, p. 21 (Nsombo).

? Hyperolius lestagei Laurent, 1943, Ann. Mus. Congo (1) 4, p. 109, fig. 28 : Lake Bangweulu.

? Hyperolius marmoratus lestagei Laurent, 1951a, p. 386, and 1965a, p. 1.

Hyperolius marmoratus rhodoscelis Laurent, 1951a, p. 386, and 1965a, p. 1.

One specimen examined from: ZAMBIA. Mweru-Wantipa.

Literature records. ZAMBIA. Lake Bangweulu; Muchishye; Nsombo.

Coloration. No dorsal pattern apart from a white dorso-lateral line; belly vermillion becoming bluish laterally.

Distribution. The Luapula River drainage in eastern Katanga and northern Zambia, also Lake Rukwa in Tanganyika (see Laurent, 1965a).

HYPEROLIUS MARMORATUS ARGENTOVITTIS Ahl

Hyperolius argentovittis Ahl, 1931, Das Tierreich, 55, p. 345, fig. 220 : Ujiji, Tanganyika.

Hyperolius callichromus Ahl. Loveridge, 1933, p. 403 (Nyamkolo); Pitman, 1934, p. 309.

Hyperolius marmoratus argentovittis Laurent, 1951a, p. 389; Witte, 1951, p. 10, pl. i, figs. 2 - 5 (Mbete Bay); Laurent, 1965a, p. 1.

No material examined.

Literature records. ZAMBIA. Mbete Bay; Mpulungu (P, P.E.M.); Nyamkolo.

Coloration. Black above with white vertebral and dorso-lateral stripes which may be broken up, outer surface of tibia blotched or mottled black and white.



Maximum length. 36 mm.

Habitat. Sedges growing in deep water at Nyamkolo (Loveridge, 1933).

Distribution. The shores of Lake Tanganyika in Tanganyika, Burundi, the Congo and Zambia.

HYPEROLIUS MARMORATUS NYASSAE Ahl

Hyperolius nyassae Ahl, 1931, Das Tierreich, 55, p. 339, fig. 213 :

"Langenburg" = Manda, Tanganyika.

Hyperolius fuelleborni Ahl, 1931, Das Tierreich, 55, p. 349, fig. 224:

"Langenburg" = Manda, Tanganyika.

Hyperolius marmoratus nyassae Laurent, 1951a, p. 385; Poynton, 1964b, p. 220; Laurent, 1965a, p. 2 (not p. 3).

Seven specimens examined from: MALAWI. Livingstonia.

Coloration. Top of head and back with irregular black blotches, which may be confluent and tend to form longitudinal bands; brown juvenile pattern includes dark sacral blotches.

Distribution. Northern shores of Lake Malawi (Nyasa).

HYPEROLIUS MARMORATUS MARGINATUS Peters

Hyperolius marginatus Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 627:

Macanga, Mozambique, and 1882, p. 165, pl. xxii, fig. 8.

Rappia marginata Bocage, 1896, p. 101.

? Rappia cinotiventris (not Cope) Boulenger, 1907a, p. 5 (Mterize River); Pitman (part), 1934, p. 309.

Hyperolius marmoratus marginatus Poynton, 1964a, p. 199 (Mangula Mine; Rukute Farm), also 1964b, p. 219 and 1966b.

One hundred and fifteen specimens examined from: RHODESIA. Lusulu; 10 mls W of Salisbury; Sinoia Caves. ZAMBIA. Chipengali; Mfuwe; Nsefu Game Reserve; Sayiri. MALAWI. Fort Hill; Mzimba; Nchenachena; Nkata Bay; Rumpi.

Literature records. RHODESIA. Mangula Mine; Rukute Farm. ZAMBIA. Mterize River. MOZAMBIQUE. Makanga.

COLORATION. Brown above, often with a black margin, the flanks stippled with red, sometimes also stippled with black; outer face of tibia uniform brown; white below, the throat sometimes stippled with red. The juvenile pattern may include a dark interorbital triangle and sacral blotches.

Maximum length. 33 mm.

Distribution. Western Malawi, south-eastern Zambia and the highlands in Mozambique to the north of Tete; also the southern Zambezi escarpment in Rhodesia, extending south-east almost to Salisbury.

HYPEROLIUS MARMORATUS ALBOFASCIATUS Hoffman

Rappia cinctiventris (not Cope) Gunther, 1894, p. 619 (Shire Highlands).

Rappia marmorata (not Rapp) Gunther, 1895, p. 526 (Mandala).

Hyperolius albofasciatus Hoffman, 1944, Soolog. Navors. Was. Mus. Bloemfontein, p. 178, fig. 8 : "Umbe" = Limbe, Malawi; Mitchell, 1946, p. 32.

Hyperolius cinctiventris (not Cope) Hoffman, (part), 1944, p. 178 (Limbe).

Hyperolius symmetricus (not Mocquard) Mitchell, 1946, p. 32 (Zomba Plateau).

Hyperolius horstokif (sic, not Schlegel) Mitchell (part), 1946, p. 32, (Zomba Plateau; Limbe).

Hyperolius marmoratus albofasciatus Loveridge, 1953b, p. 350 (Mtimbuka; Ruo River; Limbe; Fort Johnston; Monkey Bay; Zomba), and 1953c, p. 146; Poynton, 1964b, p. 220 (Chitala; Lake Chilwa; Cholo); Laurent, 1965a, p. 4 (Lake Chilwa); Poynton, 1966b.

Fifty-two specimens examined from: MALAWI. Blantyre; Cholo Mountain; Liwonde; Lujeri Estate; Zomba Plateau. MOZAMBIQUE. Chapala.

Literature records. MALAWI. Chitala; Cholo; Fort Johnston; Lake Chilwa; Limbe; Mandala; Monkey Bay; Mtimbuka; Ruo River; Zomba; Zomba Plateau.

Coloration. Black above with white vertebral and dorso-lateral stripes, which may be irregular or broken up; outer face of tibia uniform black, or with transverse bars or mottling, lower flanks mottled with black and red; white below.

Maximum length. 35 mm.

Habitat. Reedbeds among the Shire River and bordering small dams on Cholo Mountain. On bracken and lichen-covered boulders on Zomba Plateau (Mitchell, 1946).

Distribution. Southern shores of Lake Malawi, south to the Shire Highlands, east to the Niassa Platform of Mozambique.



## HYPEROLIUS MARMORATUS BROADLEYI Poynton

Rappia marmorata (not Rapp) Chubb, 1909b, p. 34 (Salisbury; Umtali); Boulenger (part), 1910, p. 530 (Salisbury); Hewitt & Power, 1913, p. 170 (Marandellas; Chishawasha).

Rappia undulata (not Boulenger) Hewitt & Power, 1913, p. 170 (Marandellas).

Hyperolius marmoratus (not Rapp) Loveridge (part), 1941c, p. 287; Fitz-Simons, 1930, p. 44 (part, Umtali), and 1958a, p. 211 (Nyamziwa; Pungwe Causeway)

Hyperolius marmoratus broadleyi Poynton, 1963, Ann. Natal Mus., 15, p. 328: Umtali, Rhodesia, and 1964a, p. 198 (Mtoko; Driefontein).

Two hundred and eleven specimens examined from: RHODESIA. Baddeley; 10 mls S of Beatrice; Biriwiri; Bomponi Farm; Chinyamanda; Engwa; Fern Valley; Gaerezi Bridge; Haroni - Lusitu Confluence; Honde Valley; Inyangani Tea Estates; Inyazura; London Farm; Marandellas; Mare Dam; Melfort; Mount Dombo; Mount Hampden; 7 mls E and 4 mls W of Mtoko; Mutambara; Nyahodi Bridge; Nyamakari; Odzani Dam; Old Umtali; Penhalonga; Pungwe Bridge; Selous; Somabula; Soti Source; Stapleford; Tandaai; Troutbeck; Umfesi; Umtali; Vumba Mountain; Zewa; Zimbabwe. MOZAMBIQUE. Chemozi; Garuso; Gorongosa Mountain; Maforga; Vila de Manica; Vila Paiva de Andrada.

Literature records. RHODESIA. Chishawasha; Driefontein; Marandellas; Mtoko; Nyamziwa; Pungwe Causeway; Salisbury.

Coloration. Similar to H. m. albofasciatus except that the white vertebral and dorso-lateral stripes are bisected by median red lines and the outer face of the tibia has white cross-bands and blotches which have red centres.

Maximum length. 33.5 mm.

Habitat. Assembles in vast numbers to breed in reedbeds bordering rivers and dams from 2,000 to 7,000 feet.

Distribution. The south-eastern half of the Rhodesian Plateau, the eastern highlands and the Manica Platform, as far east as Gorongosa Mountain.

## HYPEROLIUS MARMORATUS TAENIATUS Peters

Euchnemis viridiflavus (not Dumeril & Bibron) Bianconi, 1850.

Hyperolius taeniatus Peters, 1854, Monatsb. Akad. Wiss., Berlin, p. 627: Boror, Mozambique; Gunther, 1864, p. 307 (Zambezi Expedition); Peters, 1882, p. 166, pl. xxii, fig. 7.

- Hyperolius marmoratus (not Rapp) Peters, 1854, p. 627 (Quelimane; Boror); FitzSimons (part), 1930, p. 44 (Magude; Guija; Inhaca Island; Mazambo); Parker, 1931, p. 902 (Charre; Fambani River); Cott, 1932, p. 479, pl. ii, fig. 2; FitzSimons (part), 1939b, p. 43 (Birchenough Bridge); Loveridge (part), 1941c, p. 287.
- Hyperolius citrinus Gunther, 1864, Proc. Zool. Soc. London, p. 311, pl. xxvii, fig. 2 : Zambezi Expedition (restricted); Peters, 1882, p. 163.
- Hyperolius granulosus Peters, 1866, Monatsb. Akad. Wiss. Berlin, p. 891; Capanga, Mozambique, and 1882, p. 161, pl. xxi, fig. 3.
- Hyperolius variegatus Peters, 1882, Sitzber. Ges. Naturf. Freunde Berlin, p. 8 : Cabaceira, Quelimane & Boror, Mozambique, and 1882, p. 167.
- Rappia marmorata (not Rapp) Pfeffer, 1893, p. 94 (Quelimane); Bocage, 1896, p. 96 (Lourenco Marques); Boulenger, 1907b, p. 482 (Beira), and (part) 1910, p. 530 (Delagoa Bay).
- Rappia granulosa Bocage, 1896, p. 101.
- Rappia variegata Bocage, 1896, p. 101.
- Rappia cinctiventris (not Cope) Boulenger, 1907b, p. 482 (Beira).
- Hyperolius cinctiventris (not Cope) FitzSimons, 1930, p. 44 (Magude; Lourenco Marques; Masieni); Hoffman (part), 1944, p. 178 (Chiromo).
- Hyperolius sugillatus (not Cope) FitzSimons, 1930, p. 44 (Guija).
- Hyperolius undulatus (not Boulenger) FitzSimons, 1930, p. 44 (Guija).
- ? Hyperolius breviceps Ahl (part), 1931, Das. Tierreich, 55, p. 316, fig. 190: Tschimbo, Mozambique.
- Hyperolius bayoni (not Boulenger) Parker, 1931, p. 902 (Charre; Fambani River); Cott, 1932, p. 479.
- Hyperolius horstockii horstockii (not Schlegel) Hoffman, 1944, p. 179 (Chiromo).
- Hyperolius horstockii (sic, not Schlegel) Mitchell (part), 1946, p. 32, (Lower Shire).
- Hyperolius marmoratus taeniatus Laurent, 1951a, p. 385; Poynton, 1964a, p. 197 (Ponte do Calichane; Lundi River Bridge; Inhambane; Ponte do Pungue; Mtoko; Tete; Vila Pery), and 1964b, p. 219 (Chiromo; Port Herald; Chikwawa); Laurent, 1965a, p. 2; Poynton, 1966b.
- Hyperolius marmoratus marmoratus (not Rapp) Loveridge, 1953c, p. 145 (Chiromo; Port Herald).

One hundred and forty-two specimens examined from: RHODESIA. Balla Balla; Beitbridge; Chipinda Pools; Chisumbanje; Msoro; 10, 25 and 35 mls NE. of Mtoko; Sabi - Lundi Confluence; Tsuro; Turgwana Bridge. MOZAMBIQUE. Amatongas; 10 mls NE of Beira; Boane; 5 mls NE of Dondo; Grudja; Guro; Macuti; Maforga; Mida - Lamago; Namaacha; 20 mls E of Vila Gouveia; Xiluvo.



Literature records. RHODESIA. Lundi River Bridge; Mtoko. MALAWI. Chikwawa; Chiromo; Port Herald. MOZAMBIQUE. Boror; Cabaceira; Capanga; Charre; Fambani River; Guija; Inhambane; Lourenco Marques; Magude; Masieni; Mazambo; Ponte do Calichane; Ponte do Pungue; Quelimane; Tete; Tschimbo; Vila Pery.

Coloration. Four black longitudinal bands alternate with three white bands of equal width, the latter may be bisected by red or orange lines; outer face of tibia mottled in black and white. The juvenile pattern shows faint longitudinal stripes.

Maximum length. 29.5 mm.

Habitat. Found breeding in reedbeds bordering rivers and swamps on the Mozambique Plain, when enormous numbers may be present.

Distribution. The Mozambique Plain, extending south to Zululand (where it intergrades extensively with H. m. marmoratus) and west to the Shire Valley, north-eastern and south-eastern Rhodesia (where it intergrades with H. m. broadleyi), eastern Transvaal and Swaziland.

The wide ecological tolerance of most amphibians has been pointed out by Poynton (1964) and many reptiles, especially snakes, are equally versatile and show similar "blanket" distributions. Thus both classes provide good subjects for the zoogeographer. The majority of the reptiles and amphibians of south-east Africa inhabit savanna. The forms that occupy restricted habitats are listed below.

#### HABITATS

##### EVERGREEN FOREST

(a) Arboreal forms: Lygodactylus rex; L. a. angularis; Chamaeleo p. melanocephalus; C. mlanjensis; C. marshalli; Brookesia platyceps; B. nchisiensis; Mabuya maculilabris; Holaspis g. laevis; Boiga blandingi; Dendroaspis j. jamesoni; Atheris n. rungweensis; Leptopelis flavomaculatus.

With the exception of the chamaeleons, the lizards live on tree-trunks, although all except Holaspis have been collected on houses at the forest edge and Lygodactylus a. angularis lives on rocks in Malawi. The chamaeleons have been collected on low shrubs and grass and it is not known whether any of them live in the canopy. Atheris n. rungweensis is often found in low shrubs bordering marshy areas. Leptopelis flavomaculatus usually calls from a height of ten feet or more, but juveniles are often found closer to the ground.

(b) Terrestrial forms: Scelotes a. ater; Typhlops gracilis; Boaedon olivaceus; Natriciteres v. "sylvatica"; N. v. bipostocularis; Crotaphopeltis tornieri; Miodon c. christyi; Naja melanoleuca (also aquatic); Bitis g. gabonica; Bitis nasicornis; Scolecophorus k. kirki; Bufo urunguensis; B. anotis; Probreviceps "rhodesianus"; Phrynobatrachus perpalmatus; Arthroleptis stenodactylus (also savanna); A. reichei; A. a. franci; A. globosa; A. x. xenodactyloides.

Most of these species can survive the destruction of their habitat, as long as there remains some sort of thick cover that provides cool damp conditions at ground level and a layer of leaf mould in which to burrow. Arthroleptis x. xenodactyloides can occupy wet montane grass-land if there is thick cover, as on Gorongosa Mountain.

(c) Aquatic forms: Boulengerina a. stormi is endemic to Lake Tanganyika, but the typical form occurs in rivers and streams of the equatorial evergreen forest. Naja melanoleuca is semi-aquatic.

The following savanna reptiles and amphibians are frequently found in forest: Scelotes a. arnoldi; Duberria l. rhodesiana; Bufo regularis; Rana angolensis; R. g. rhodesiana; R. darlingi. Tree snakes of the genera Philothamnus, Dispholidus, Thelotornis and Dendroaspis are common along the forest edge and the last three, especially Dendroaspis angusticeps, are probably common in the canopy.



## SAVANNA AND GRASSLAND

Reptiles and amphibians are little affected by variation in savanna - grassland vegetation types. There is, for example, nothing comparable with the distinctive avifauna of the Brachystegia woodlands. The habitats of many lizards and some snakes are determined by the nature of the substrate.

(a) Arboreal forms: Hemidactylus mercatorius; H. platycephalus; Lygodactylus stvensoni (also rocks); L. angolensis; L. bradfieldi (also rocks); L. c. capensis; L. c. grotei; Phelsuma d. dubia; P. v-nigra; Agama m. mossambica; A. cyanogaster; Chamaeleo melleri; C. d. dilepis; Mabuya s. sparsa; M. s. wahlbergi; M. s. striata; Philothamnus heterolepidotus; P. i. irregularis; P. n. natalensis; P. s. semivariatus; Dispholidus t. typus; D. t. kivuensis; D. t. punctatus; Thelotornis k. capensis; T. k. oatesi; Hemirhagerrhis n. nototaenia; Dendroaspis p. polylepis; D. angusticeps; Chiromantis xerampelina; Leptopelis angolensis; L. concolor; L. v. cinnamomeus.

(b) Rupicolous forms: Hemidactylus tasmani; Afroedura t. transvaalica; A. t. loveridgei; Homopholis wahlbergi (also trees); Pachydactylus a. affinis; P. a. tigrinus; P. bibroni (also trees); P. tetensis; Agama atra; A. kirki; Mabuya g. margaritifer; M. lacertiformis; M. p. punctatissimus; M. p. mlanjensis; Gerrhosaurus v. validus; Cordylus w. regius; C. w. mossambicus; Platysaurus mitchelli; P. m. maculatus; P. m. lineicauda; P. torquatus; P. wilhelmi; P. p. blakei; P. p. pungweensis; P. i. rhodesianus; P. i. subniger; P. i. nyassae; P. imperator; Bufo v. fenoulheti; B. v. grindleyi.

This rupicolous fauna is typical of the granite areas, but paragneiss, syenite and sandstone outcrops may also be well populated if weathered to produce suitable fissured refuges. The discontinuity of habitable rock outcrops results in many isolates and consequent diversification among the more specialised rupicolous forms of Cordylus and Platysaurus.

(c) Arenicolous forms (those marked with an \* are not confined to sandy regions): Chondrodactylus angulifer; Ptenopus garrulus; Colopus wahlbergi; Mabuya h. depressa; M. occidentalis; M. l. longiloba; Riopa s. sundevalli\*; R. afer; Scalotes aeneus; S. angolensis; S. limpopoensis; S. brevipes; S. i. mossambicus; S. arenicola; Scolecoseps boulengeri; Typhlacontias g. gracilis; T. g. ngamiensis; Acontias plumbeus\*; A. g. occidentalis; Typhlosaurus aurantiacus; T. l. lineatus; T. l. "jappi"; T. "relicus";

Insert <sup>1</sup>: C. c. rhodesianus;

T. gariepensis; Gerrhosaurus auritus; Bremias lugubris; E. namaquensis; E. l. lineocellata; Ichnotropis squamulosa\*; I. c. capensis\*; Meroles suborbitalis; Zygaspis quadrifrons\*; Z. "niger"; Amphisbaena v. violacea; Chirindia swynnertoni; Monopeltis mauricei; M. anchietae; M. ocularis; M. c. capensis\*; M. habenichti; M. sphenorhynchus; Tomuropeltis longicauda; T. pistillum; Typhlops braminus; T. fornasinii; T. schinzi; T. boylei; Lycophidion semiannule; Prosymna jani; Ouberria variegata; Calamelaps ventrimaculatus; Amblyodipsas microphthalmus; Xenocalamus m. mechowii; X. m. inornatus\*; X. transvaalensis; X. b. bicolor; X. b. lineatus; X. b. maculatus; Aparallactus nigriceps; Aspidelaps scutatus\*; Elapsoidea s. fitzsimonsi\*; Bitis caudalis\*.

This arenicolous herpetofauna is polarised into a western group centred on the Kalahari (with a few south-west arid forms) and an eastern assemblage on the Mozambique Plain alluvium. Very few forms are common to both areas, Tomuropeltis pistillum and Xenocalamus b. bicolor indicate a link through the Zambezi trough, while Mabuya l. longiloba and Aspidelaps scutatus have reached southern Mozambique via the Limpopo depression.

(d) Aquatic forms: Cycloderma frenatum; Pelomedusa subrufa; Pelusios nanus; P. c. castaneus; P. c. rhodesianus; P. bechuanicus; P. subniger; P. sinuatus; Crocodylus cataphractus; C. niloticus; Varanus n. niloticus; Python sebae (not confined to this environment); Lycodonomorphus bicolor; L. l. mlanjensis; L. rufulus; L. w. whytei; Natriciteres olivacea; Limnophis b. bangweolicus; Philothamnus hoplogaster; P. ornatus; P. heterolepidotus; P. i. irregularis; Xenopus l. laevis; X. l. poweri; X. muelleri; Rana occipitalis; R. angolensis; R. j. johnstoni; R. j. inyangae; R. g. bravana; Ptychadena floweri. These forms are largely confined to rivers and swamps.

#### DIET

Poynton (1964a) noted that the amphibian food supply consists of whatever insects of the right size happen to be available. Pyxi-cephalus adpersus and Rana occipitalis also prey upon small vertebrates, especially frogs.

Most lizards are largely insectivorous, although the two species of Varanus feed largely on small vertebrates, molluscs and crabs. Among the smaller forms, all species of Mabuya and Gerrhosaurus tend to prey upon smaller lizards, while the larger geckos (e.g. Chondrodactylus angulifer and Homopholis wahlbergi) occasionally show the same habits. Some lizards are partially vegetarian, especially the larger forms of Gerrhosaurus.



The snakes are more specialized in feeding habits and can be classified by major food items as follows:

TERMITES: Typhlops spp. and Leptotyphlops spp.

SLUGS: Duberria spp.

CENTIPEDES: Aparallactus spp.

BIRD'S EGGS: Dasypeltis spp.

FISH: Lycodonomorphus bicolor; Limnophis b. bangweolicus; Boulengerina a. stormsi; Naja melanoleuca (in part); Pelamis platurus (marine).

AMPHIBIANS: Lycodonomorphus l. mlanjensis (+ fish); L. rufulus; L. w. whytei; Boaedon olivaceus; Natriciteres olivacea (+ fish); N. variegata subsp.; Meizodon s. semiornata; Philothamnus spp.; Amplorhinus multimaculatus; Crotaphopeltis spp.; Dromophis lineatus; Hemachatus haemachatus; Causus spp.

LIZARDS: Lycophidion spp. (skinks); Mehelya nyassae; Philothamnus s. semivariatus; Chamaetortus a. alicus; Dipsadoboa shrevei; Telescopus s. semiannulatus; Hemirhagerrhis n. nototaenia; Psammophylax spp.; Psammophis spp.; Calamelaps u. miolepis (+ Typhlops).

AMPHISBAENIDS: Calamelaps ventrimaculatus (Zygaspis); Xenocalamus spp. (Monopeltis and Tomuropeltis). Chilorhinophis gerardi should perhaps be included here.

SMALL SNAKES: Mehelya c. capensis (also lizards and toads); Miodon c. christyi.

RODENTS: Boaedon f. fuliginosus (also lizards); Pseudaspis cana (also lizards); Bitis spp. (also toads).

VERTEBRATES IN GENERAL: Python sebae; Boiga blandingi; Dispholidus typus subsp. (largely chameleons and birds); Thelotornis kirtlandi subsp. (largely lizards); Rhamphiophis spp.; Psammophis sibilans (largely lizards and rodents); Aspidelaps scutatus; Elapsoidea sundevalli subsp.; Naja spp.; Dendroaspis spp.; Atractaspis spp. (reptiles and rodents).

#### BREEDING

In the Palearctic Region the two reptiles which extend furthest north (Lacerta vivipara and Vipera berus) are both viviparous (Darlington, 1957), an adaption which allows the female to utilise all available warmth for incubation. Many south temperate reptiles are also viviparous. The snakes Pseudaspis cana, Duberria lutrix, Amplorhinus multimaculatus and Hemachatus haemachatus are good examples and it is significant that the montane species Psammophylax variabilis is viviparous, although the closely related lowland species P. tritaeniatus is oviparous. Bitis is the only African genus of viviparous snakes which does not show a basically south temperate

distribution pattern.

The viviparous skinks of the genus Mabuya are well represented in temperate areas (e.g. M. capensis and M. punctatissimus). The only group of oviparous reptiles which is often common at high altitudes is the Gekkonidae (e.g. Lygodactylus bernardi). On rock outcrops in Rhodesia the family Cordylidae is well represented by the oviparous genera Gerrhosaurus (G. validus) and Platysaurus, but in temperate areas they are replaced by the viviparous form Cordylus c. rhodesianus, which reaches the summit of Inyangani Mountain.

#### COMPETITION BETWEEN AMPHIBIANS AND LIZARDS

Poynton (1964a) concluded that "land-breeding anurans are obviously more successful than lizards in a humid environment, and amphibious anurans are seldom less abundant in savanna or even semi-arid environments."

Amphibians are certainly the most abundant vertebrates in evergreen forests, especially at ground level, where large populations of Arthroleptis spp. are usually present. Above ground level reptiles are often represented by chameleons (Chamaeleo and Brookesia spp.) and geckos (Lygodactylus spp.), but tree frogs (Leptopelis and Hyperolius spp.) may be numerous where there are streams. The fossorial forest fauna may include a few amphibians (Scolecophorus) and reptiles (Scelotes and Acontias spp.).

In savanna the amphibians are largely concentrated in the moister areas along streams and in swamps, where lizards are poorly represented. Away from water the situation is more complex. At ground level, lizards are dominant during the day, but at night toads (Bufo spp.) are the most important insectivorous vertebrates. Above ground level, the lizards are again dominant during the day, while at night the arboreal niches are divided between geckos on the tree trunks and tree frogs on the small branches and leaves. Rock outcrops are almost exclusively occupied by lizards, the only amphibians commonly represented are toads.

Arid areas are well populated by lizards, which are the most conspicuous terrestrial vertebrates during the day. At night the nocturnal geckos emerge and toads may also be present. After rain large numbers of fossorial amphibians (Pyxicephalus and Breviceps spp.) appear at night, only to vanish underground again after a few weeks spent feeding and breeding.



### 3. ZOOGEOGRAPHY.

#### THE ZOOGEOGRAPHY OF THE ETHIOPIAN REGION.

Darlington (1957), in the most recent analysis of world zoogeography, accepted the six main faunal regions originally proposed for birds by P. L. Sclater in 1858, but did not recognise any formal subdivisions. Wallace (1876) divided the Ethiopian region into three subregions, corresponding to West Africa, East Africa and South Africa. W. L. Sclater (1896) working on mammals, recognised a Cape Subregion which extended to the Congo watershed on the west and the Tana watershed on the east. Hewitt (1910), after studying lizard distributions, accepted "Sclater's Line" as a valid northern boundary for a southern African faunal region.

Schmidt (reptiles, 1923), Noble (amphibians, 1924) and Chapin (birds, 1932) recognised only two subdivisions of the Ethiopian Region - a West African Forest Province (or Subregion) and a Savanna Province. These workers were largely concerned with the fauna of the Congo.

Moreau (1952) showed that African birds are strongly specific to five major biomes. - arid country, savanna, lowland evergreen forest, montane evergreen forest and sub-alpine moorland. His biotic divisions of the Ethiopian Region have been widely accepted with minor modifications (e.g. Davis, 1962, fig. 1).

Poynton (1960; 1961a; 1961b; 1962a; 1962c; 1964a) has demonstrated the existence of a distinctive south temperate amphibian fauna centred on the south-west Cape and a precipitous subtraction of tropical forms on the Mozambique Plain where the 18°C mean July surface isotherm cuts the coast at about Latitude 28°S. The area lying between the main concentrations of tropical and temperate forms is a complex transition zone similar to that found between the Oriental and Palearctic Regions in Burma and China (Darlington, 1957). Poynton (1961a) found that birds and lizards showed a similar pattern, but had fewer "Cape forms", while 80% of the lizards were classified as transitional. In a summary of a symposium on "The Biogeography of South-east Africa", held at Pietermaritzburg in 1960, Poynton (1961b) showed that a clear tropical/south temperate differentiation is also apparent in plants, freshwater fish, mammals and invertebrates (including Diptera and Lepidoptera).

A symposium on animal distributions was held at Port Elizabeth in July, 1961 under the auspices of the Zoological Society of Southern Africa and much valuable zoogeographical data can be found in the published proceedings (Ann. Cape Provincial Museums, 2).

Carcasson (1964), in a survey of the zoogeography of African butterflies, recognised three continental subregions.

(1) A Sylvan Subregion divided into a Lowland Forest Division and a Highland Forest Division. The dividing line between the two is around 5,000 feet at the equator, progressively descending to sea level at 33° south (Knysna Forest). There is naturally a wide zone of vertical overlap between the two divisions, particularly at the equator, where highland species do not normally descend below 3,000 feet, and lowland species do not rise above 6,000 feet. This 3,000 feet overlap becomes narrower as the distance from the equator increases and disappears altogether in Natal, where lowland forest elements are absent beyond 30°S, even at sea level.

(2) A Sub-region of Open Formations consisting of a Northern Division, which includes the Sudanese Zone (Savanna and Arid) and the Somali Arid Zone, and a Southern Division which includes savanna zones and the Kalahari.

(3) A Cape Sub-region subdivided into four zones - the Namib Desert, the Karroo, the Western Cape winter rainfall area and a Cape grassland zone (highveld of the eastern plateau).

Carcasson noted that many Cape genera and some species occur in montane grassland areas north of the Zambezi, where a few Palearctic forms are also found.

The presence of a distinct flora and fauna in the south-west Cape is now well documented and Poynton (1960, etc.) has proposed the recognition of a Cape Faunal Region, but the status of the south-west arid zone remains controversial and the relationships of the Cape Flora and Fauna and those of montane areas further north have not been fully analysed. It is therefore necessary to review the composition and distribution of this south temperate assemblage.

The Gondwanaland elements in the Cape are probably restricted to plants and invertebrates, although it is possible that the amphibian genus Haleophryne should be included (Balinsky, 1962).

Yellowwoods (Podocarpus) and the Proteaceae probably belong to the old austral temperate flora (Levyns, 1962; Van Zinderen Bakker, 1962). Other important families in the Cape south temperate flora are the Ericaceae, Restionaceae and Compositae.

The Karroo Flora is of uncertain age, but it has more affinities with the Cape Flora than with the Tropical African Flora (Adcocks, 1953; van Zinderen Bakker, 1962). Like the Cape Flora it is able to withstand severe frosts, so it can be considered a south temperate flora.



The Karroo Flora is circumscribed in distribution, but some elements of the Cape Flora (e.g. Ericaceae) extend north through montane grassland areas of the eastern escarpment to the Ethiopian highlands. The temperate evergreen forests also extend along the escarpment to Ethiopia (e.g. Podocarpus), although some south temperate elements are replaced by Palearctic ones. For example Mlanje Mountain is the northern limit for the "southern cedars" of the genus Widdringtonia and also the southern limit for Juniperus procera. \* The alpine vegetation of the East African mountains contains a number of genera belonging to the Holarctic Alpine Flora, some of them extend south to Basutoland (van Zinderen Bakker, 1962).

Stuckenberg (1962) has mapped the distribution of some montane palaeogenic elements in the South African invertebrate fauna and shown that they occupy two centres. The Cape Centre is the richest, while the Eastern Highlands Centre has three subcentres (1) the Basutoland - Drakensberg Highlands and the Eastern Plateau slopes, (2) the Amatola Range, (3) the Eastern Transvaal. The two main centres are separated by the dry Great Fish River Valley. In the discussion of this paper Harrison pointed out that associated montane species of Mayflies and Chiromiids extend north to the Ethiopian highlands.

Lawrence (1962) showed that many South African cryptozoic invertebrates inhabiting temperate evergreen forests have distinct affinities with those of Australia, New Zealand, South America or Madagascar, but are poorly represented in Africa north of the Limpopo. He concluded that "if only these relict forms were to be taken into consideration, southern Africa would have to be redefined as a new zoological province or subregion outside the Ethiopian one and differing from it as much as the Mediterranean subregion at its northern extremity differs faunistically from the rest of the continent."

Poynton (1964a) included 23 species in the Cape amphibian fauna. The following genera show south temperate distribution patterns: Heleophryne; Microbatrachella (south-west Cape only); Cacosternum (also highlands of South West Africa and East Africa); Arthroleptella; Anhydrophryne (Amatola Mountains only).

The following reptile genera and species groups show south temperate distribution patterns, those endemic to the South West Arid are indicated by an "A" in parentheses: Chondrodactylus (A); Ptenopus (A); Narudasia (A); Palmatogecko (A); Phyllodactylus (also islands in Mediterranean; Madagascar; Australia; S. America); Rhoptropus (A); Rhoptropella (A); Chamaeleo pumilus group (represented on the East African Highlands by the C. bitaeniatus group); Cordylus; Tetradactylus

\* Except for a single specimen recently found in the Inyanga District of Rhodesia (Chase, pers. comm.).

(Also Angola Highlands); Anglosaurus (A); Tropidosaura; Meroles (A); Aporosaura (A); Chanaesaura (also East African Highlands); Pseudo-cordylus; Lamprophis; Pseudaspis (extends north to Kenya Highlands); Duberria (four races of D. lutrix link the south-west Cape with the Ethiopian Highlands); Pythonodipsas (A); Amplorhinus; Choristocalamus; Aspidelaps; Elaps; Hemachatus.

The endothermic vertebrates do not show well developed temperate faunas (Warrington, 1957). They are relatively free of thermal limitations and their distribution is largely governed by ecological factors.

Most southern African birds belong to dominant tropical groups. The only endemic family is the Promeropidae (Sugar-birds), with one species endemic to the south-west Cape and another on the eastern highlands of South Africa and Rhodesia. The Malachite Sunbird (Nectarina famosa) occurs from the south-west Cape to Ethiopia and the Wailing Cisticola (Cisticola lais) is associated with it as far as Kenya. Two raptors which have a similar distribution are the Augur or Jackal Buzzard (Buteo rufofuscus) and the Cape Eagle Owl (Bubo capensis), while one Palearctic species, the Lammergeier (Gypaetus barbartus) has a south-temperate race which formerly ranged from the south-west Cape to Ethiopia. Some temperate forest birds extend from the Cape to Kenya or Ethiopia, i.e. Olive Pigeon (Columba arquatrix); Cape Robin (Cossypha caffra); Starred Robin (Pogonocichla stellata) and Olive Thrush (Turdus olivaceus).

The only family of mammals with a south temperate distribution is the Chrysochloridae (Golden Moles), which is well represented in the South-west Cape and South-West Arid and has a few relict species in the East African highlands, the Congo and Cameroons. The rodent subfamily Petromurinae (Dassie Rat) is endemic to the South-West Arid. The Cape fauna includes the Bontebok (Damaliscus d. dorcas) the extinct Blaauwbok (Hippotragus leucophoea) and three endemic species of murids (Davis, 1962).

The south temperate zone is connected with the Ethiopian highlands by a complex temperate transition zone and there is interdigitation and mingling of temperate and tropical faunas throughout eastern Africa. In some cases a group may be represented in both the north and south temperate regions, although absent from tropical areas or represented by relicts which are usually restricted to evergreen forests. The lizard genus Lacerta is dominant in the Palearctic Region, extending north beyond the Arctic Circle. Four relict species occur in the Ethiopian Region - L. australis in the south-western Cape, L. rupicola in the Soutpansberg (N. Transvaal), L. jacksoni in East African montane forests and L. echidna (including L. langi Schmidt) in the lowland evergreen forest, where it is an arboreal form (Schmidt, 1923).



Chapin (1932) and Moreau (1952) have stressed the differences between the avifaunas of montane evergreen forest and the lowland evergreen forest. Moreau considered 18 genera and 104 species to be endemic to the montane forest biome, which has only 12 species in common with the lowland forest. This differentiation supports the inclusion of all montane evergreen forest forms in the south temperate transitional fauna.

Lowland forest mammals often extend into montane forest, sometimes with subspecific differentiation, e.g. Gorilla gorilla.

There are some small genera of amphibians which are endemic to montane forests, i.e. Scolecophorus; Nectophrynoides; Arthroleptides; Callimula; Probreviceps; Parhoplophryne; Hoplophryne. The commonest montane forest amphibians belong to lowland forest genera (e.g. Arthroleptis; Leptopelis) or species, and this is even more true of the forest reptiles.

It seems best to divide the Ethiopian Region into two subregions separated by an extensive transition zone. When mapped (Fig 15), this arrangement makes it easy to visualise the expansions and contractions of faunas during the Pleistocene, when great fluctuation in the African biomes took place (Flint, 1959; van Zinderen Bakker, 1962; Moreau, 1963; Carcasson, 1964). The main centres of evolution and dispersal in each subregion are areas that have remained climatically stable and they can be grouped under the major biomes.

#### THE ETHIOPIAN SUBREGION.

The greatest concentrations of tropical forms are found in areas with a mean midwinter month temperature above 18°C (Poynton, 1960, etc.; van Zinderen Bakker, 1962). The biomes and evolutionary centres are as follows:

##### The Tropical Evergreen Forest Biome.

Most zoogeographers have recognised a West African Forest Province. This has three evolutionary centres corresponding to the divisions proposed by Noble (1924) and Schmidt & Inger (1959). The Liberian centre is isolated from the Gabon centre by the Dahomey Gap. During arid non-pluvial periods the Middle Congo region has also been invaded by savanna separating the Gabon and Congo forest blocks.

##### The Savanna Biome.

The Northern Savanna centre largely corresponds with the Sudanese Subprovince of Chapin (1932). This zone has moved north-south with the expansion and contraction of the Sahara Desert and the Lowland Forest in turn (Moreau, 1963). The only possible dispersal routes for its fauna have been eastwards to Ethiopia and south-east through the Rift Valley region (e.g. Lygodactylus gutturalis, see Pasteur, 1964, fig. 20).

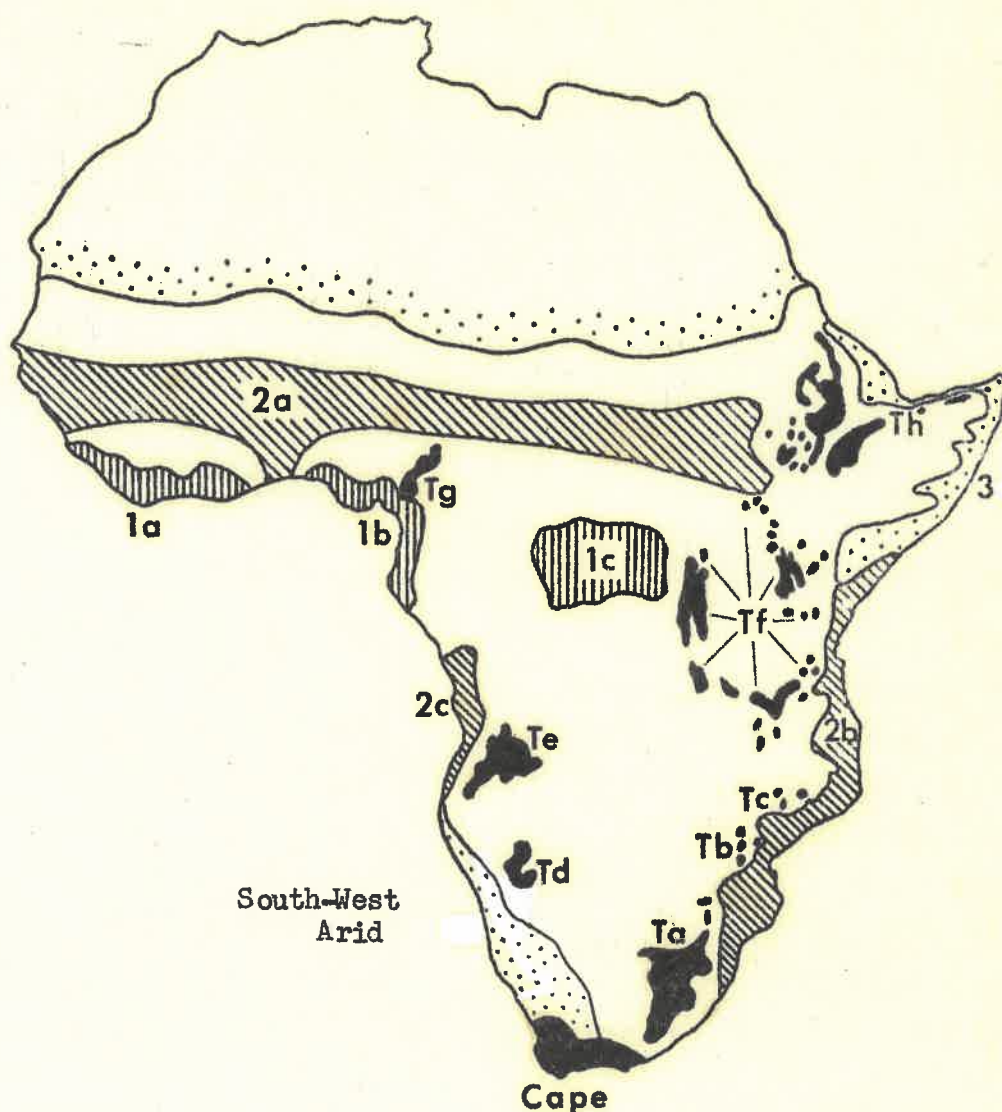


Fig. 15.

### EVOLUTIONARY CENTRES OF THE ETHIOPIAN REGION

#### ETHIOPIAN SUBREGION (TROPICAL)

1. EQUATORIAL FOREST BIOME 
  - a. Liberian Subcentre
  - b. Gaboon Subcentre
  - c. Congo Subcentre
2. SAVANNA BIOME 
  - a. Northern Subcentre (Senegal to Sudan)
  - b. Eastern Subcentre (Kenya to Zululand)
  - c. Western Subcentre (Lower Congo-Angola)
3. ARID BIOME 
  - Somali Subcentre

#### CAPE SUBREGION (TEMPERATE)

##### CAPE CENTRE (CAPE MACCHIA and TEMPERATE FOREST BIOMES)

##### Temperate Transitional Subcentres:

- Ta South African Highlands.
- Tb Rhodesian Highlands and Gorongosa Mountain.
- Tc South Malawi - North Mozambique Highlands.
- Td South-west African Highlands.
- Te Angola Highlands.
- Tf East African Highlands.
- Tg Cameroon Highlands.
- Th Ethiopian Highlands.

##### SOUTH-WEST ARID CENTRE.



The Eastern Savanna centre on the coastal plain has given rise to a large proportion of the African Savanna herpetofauna. It has been a stable area climatically, but there have been considerable fluctuations in vegetation types, which have promoted speciation. The lower Zambezi area seems to have been at the core of this evolutionary centre.

The Western Savanna centre largely corresponds with the Lower Congo area of Noble (1924) and is the western portion of Chapin's Southern Congo Savanna District. Many Western Savanna forms are restricted to the Gabon-Lower Congo-northern Angola area (e.g. Dasypeltis palmarum, see Gans, 1959, map 29). There are several closely related species pairs, with one centred in the west, the other in the east, for example:

<u>Western Savanna</u>	<u>Eastern Savanna</u>
<u>Lygodactylus angolensis</u>	<u>L. c. capensis</u>
<u>Scelotes angolensis</u>	<u>S. t. tetradactylus</u>
<u>Gerrhosaurus nigrolineatus</u>	<u>G. flavigularis</u>
<u>Causus bilineatus</u>	<u>Causus rhombeatus</u>
<u>Pyxicephalus tuberculatus</u>	<u>P. delalandei cryptotis</u>
<u>Phrynobatrachus parvulus</u>	<u>P. ukingensis mababiensis</u>

#### The Somali Arid Biome.

Chapin (1932) recognised Somali Arid and South West Arid Districts and these have been retained as biotic divisions by most subsequent authors, e.g. Moreau (1952) and Davis (1962). They are both important centres of endemism, but the fauna of the Somali Arid is tropical and much younger than that of the non-tropical South-West Arid (Parker, 1942).

A Sudanese Arid Division is sometimes recognised, e.g. Moreau (1952) and L. Brown (1965), but this is better treated as part of the transition zone between the Palearctic and Ethiopian Regions.

#### THE CAPE SUBREGION

The subdivisions of the Cape Subregion are more difficult to define. The arrangement adopted here is in some ways a compromise between the views of Poynton (1960, etc.) and Carcasson (1964).

The main concentrations of temperate forms are found in areas with a mean midwinter month temperature below 13°C (Poynton, 1960, etc.). This isotherm circumscribes the central plateau areas of southern Africa, and Poynton (1964c) recognised a dry temperate western division separated by the 50 cm isohyet from a moist eastern division. These temperate zones are actually separated by an important transition zone extending from the upper Limpopo depression south through the western Orange Free State to the Albany District of the eastern Cape Province. This has in the past been a corridor for the southward penetration of tropical forms, e.g. Pyxicephalus spp. (Poynton, 1964a, maps 25 and 26) and Dispholidus t. typus (FitzSimons, 1962, map 37).

Three major biomes can be recognised in the Cape Subregion, but they interdigitate extensively in the South-west Cape and this has promoted speciation.

#### The Cape Macchia Biome.

This is the "Cape Floral Region", covering the Cape Fold Mountains, which is a winter rains area. In the past it extended further north into Little Namaqualand, but this biome has recently gained ground to the east at the expense of the Temperate Forest Biome, which is now poorly represented west of the Knysna Forests.

#### The South-West Arid Biome.

This can be defined as a non-tropical zone with an annual rainfall of less than ten inches. It is a winter rainfall area and consequently has strong affinities with the Cape Macchia Biome. Many Cape forms have relict populations in Little Namaqualand, especially on the Kamiesburg. The Karroo flora occupies areas with an annual rainfall of about 5 - 10 inches, while the Namib Desert has less than 5 inches of rain, but benefits from drenching sea mists caused by the cold Benguela current. The Namib includes a wide variety of habitats ranging from sand dunes to bare rock outcrops. This is one of the oldest deserts in the world and its endemic fauna is adapted to a wide variation in temperature from day to night, consequently thermal fluctuations from temperate to sub-tropical are unlikely to have had much effect in this zone and the Namib can be classed as "temperate" even if portions of it at present fall outside the 13°C mean July isotherm (Poynton, 1960). The Karroo is in some respects a transition zone between the Cape Floral Region and the Namib Desert. In dry periods it has encroached on the Cape Flora in the south and also pushed eastwards into the highveld areas (Adcocks, 1953; van Zinderen Bakker, 1962).

#### The Temperate Forest Biome.

This biome consists today of scattered fragments of forest extending from Knysna to Ethiopia, with many local subcentres of endemism. It seems advisable to treat the main centre as the southern forests which are now largely restricted to the Knysna - Humansdorp region, but which formerly extended across to the south-west Cape (Lawrence, 1953; Adcocks, 1953, map 1). The endemic fauna of these forests consists largely of invertebrates (Lawrence, 1953; Stuckenberg, 1962) and a few amphibians - two species of Heleophryne, Breviceps fuscus and Arthroleptella lightfooti (Poynton, 1964a). The temperate forests further north form a series of transitional subcentres in which the old palaeogenic invertebrate elements



gradually decrease, while younger elements, often derived from the Tropical Evergreen Forest fauna, become more numerous. East Africa is the centre of dispersal for Temperate Forest Birds (Moreau, 1952) and butterflies (Carcasson, 1964). The more primitive temperate forms are <sup>in the south,</sup> not always found, in the Microhylidae the relatively primitive sylvicolous genus Probreviceps occurs in Tanganyika and eastern Rhodesia and has given rise to the sylvicolous forms of Breviceps, which are only found south of the Limpopo.

Carcasson (1964) included the temperate grassland zone (the Eastern Highlands Centre of Stuckenberg, 1962) in his Cape Subregion and the fauna and flora of this zone certainly has close affinities with that of the south-west Cape. On the other hand, this is a summer rainfall area and the temperate grassland biome is a relatively young one of tropical origin. It is an important evolutionary subcentre, but it seems best to treat it as the first of a series of Temperate Transitional subcentres which usually have a mosaic of two biomes, a Temperate Grassland Biome (including elements of the Cape Flora) and the Temperate Evergreen Forest Biome.

The Kalahari has often been regarded as part of the South-West Arid (e.g. Moreau, 1952), but it is really a transition zone with much of its endothermic vertebrate fauna recently derived from the Somali Arid. Ansell (1960) and <sup>D</sup>enson & White (1960) have listed Kalahari mammals which are at most subspecifically distinct from Somali Arid forms. These include Bat-eared Fox (Otocyon megalotis); Black-backed Jackal (Canis mesomelas); Aardwolf (Proteles cristatus); Dikdik (Madoqua kirkii); Oryx (Oryx gazella) and Red Hartebeest (Alcephalus buselaphus). Benson & White (1960) have listed many birds endemic to the south-western arid regions which are represented by subspecies or closely related species in the Somali Arid.

The reptiles of the Kalahari are a mixture of widespread savanna forms, South-West Arid forms and an endemic transitional fauna derived from the South-West Arid. Eremias is the only lizard genus which is well represented in both Somali and South-West Arid centres, but is absent from intervening areas (Zambezi Valley to central Tanganyika). The Kalahari amphibians are widespread tropical savanna forms.

The greater part of Africa, especially the plateau areas, consists of complex transition zones carrying the subtraction margins of the various tropical and temperate faunas as well as many transitional faunas, which tend to be specialised for a restricted habitat, e.g. the Brachystegia avifauna. This "tidal zone" has a rich fauna in some areas where varied topography has provided suitable niches for isolated populations left behind by a retreating fauna.

The Transitional Faunas can usually be classified as Tropical or Temperate without much difficulty, but it should be noted that temperate transitional forests frequently occur in tropical transitional savanna areas (e.g. in coastal areas of Natal and the eastern Cape Province). This is because evergreen forests "create their own climate" and have a lower mean temperature than adjacent open country (Lawrence, 1953).

Description of the Temperate Transitional subcentres of endemism is simplified by the relatively well defined limits of temperate biomes. The South African Highlands include all the temperate grassland and forest areas south of the Iimpopo, the Drakensberg area being most important, although local centres of endemism are found to the north (Soutpansberg; Woodbush) and south (Amatola Range). The Rhodesian Highlands are depauperate, but represent the northern limit for many south temperate forms and the southern limit for many East African temperate forest forms. The Temperate Transitional subcentres further north largely correspond with the Eastern, Cameroonian and Abyssinian Montane Districts of Chaplin (1932), but an Angola Highlands subcentre is now generally recognised (Garasson, 1964; Benson & Irwin, 1965). The Damara and Highlands Jack temperate forest and have few Temperate Transitional endemic forms, e.g. *Phynomeria amoenus* and two races of *Buteo virens*, but relict populations of a few Cape forms survive, e.g. *Rana fuscolineata*, *R. s. greyi* and *Cacosternum boettgeri* (Poynton, 1964).

The Tropical Transitional subcentres of endemism are difficult to define because they mostly lie in the "tidal zone" of the sub-tropical areas where a transitional form has adapted itself to a particular vegetation type. It will tend to change its range in sympathy with the movements of the vegetation type, on the other hand a specialised rupicolous form will be static. During the Pleistocene extensive migrations of vegetation types took place on the plateau areas, where small climatic changes affect a huge area (van Zinderen Bakker, 1964). Due to the relative instability of Tropical Transitional subcentres there is little to be gained by trying to identify them all. The following are readily distinguishable:-

#### Tropical Riverine Forest Biome.

- (a) A Ugandan subcentre (Garasson, 1964).
- (b) An Eastern Coastal subcentre (Garasson, 1964) centred on the Usambara - Uluguru Mountains of north-east Tanganyika.

#### Tropical Savanna Biome.

- (a) A Zambesian subcentre (Garasson, 1964), very similar to the Rhodesian Highland District of Chaplin (1932). This would include the *Brachystegia avellana* and many woodland butterflies.
- (b) A South-eastern subcentre (Poynton, 1964).



This is a narrow, but important transition zone which extends along the coast from Lake St. Lucia to Port Elizabeth. The open country in this area was formerly much broken up by belts of temperate forest (Adcocks, 1953, map 1), which prompted diversification.

## THE ZOOGEOGRAPHY OF SOUTH-EAST AFRICA - HERPETOFAUNA.

South-east Africa is dominated by the Tropical Savanna fauna radiating from the eastern subcentre on the Mozambique Plain. The rest of the region is a complex transition zone, carrying the subtraction margins of the Tropical Forest fauna, the Northern, Eastern and Western Savanna faunas, the Cape fauna and the South-west Arid fauna. There is also a large proportion of forms endemic to the transition zone. The composition of the herpetofauna of south-east Africa is shown in Table 17 below.

TROPICAL EVERGREEN FOREST (7 reptiles; 1 amphibian)

Few western lowland forest forms have been recorded from south-east Africa, but it is probable that the list will be augmented when the forest patches of western and northern Zambia become better known.

Two venomous snakes, Naja melanoleuca and Bitis g. gabonica, have an exceptionally wide range through forested or formerly forested areas, both of them extending south to Zululand. Mabuya maculilabris has a discontinuous distribution in Zambia and Malawi. Dendroaspis j. jamesoni and Bitis nasicornis have relict populations in the swamp forests of Lake Bangweulu, while Boaedon olivaceus, Boiga blandingi and Phrynobatrachus perpalmatus only reach the Lake Mweru - Abercorn area.

The Mwinilunga District of Zambia contains riparian and gallery evergreen forest, which harbours many forest mammals (Ansell, 1960) and birds (Irwin, pers. comm.). The herpetofauna of this area is poorly known, so it is likely that Dendroaspis j. jamesoni and other forest forms will eventually be found there.

TROPICAL EVERGREEN FOREST TRANSITIONAL (7 reptiles; 6 amphibians)

The main western lowland forest fauna has given rise to a number of related eastern forest forms, which appear to have dispersed from a centre in north-east Tanganyika. It is notable that the line of demarcation between the western lowland evergreen forest avifauna and the derived eastern forest avifauna (as shown by Benson & Irwin, 1965, maps 1-4) coincides with the division between the western evergreen forest herpetofauna and the eastern forest transitional herpetofauna.

Holaspis g. laevis has a patchy distribution from north-east Tanganyika south to the Amatongas Forest.

Miodon c. christyi occurs around the periphery of the main Congo forests from Uganda south to Katanga and Zambia.

Arthroleptis x. xenodactyloides has a wide range in both lowland and montane forests of Malawi, Mozambique and eastern Rhodesia.

Leptopelis flavomaculatus occurs in similar habitats, but ranges north to Kenya.



TABLE 17. COMPOSITION OF THE HERPETOFAUNA OF SOUTH-EAST AFRICA.

DIVISION	REPTILES		AMPHIBIANS	
	No.	%	No.	%
<u>TROPICAL (ETHIOPIAN SUBREGION)</u>				
Tropical Evergreen Forest (Western)	7	2.5	1	1.0
Tropical Forest Transitional (Eastern)	7	2.5	6	5.5
Northern Savanna	4	1.5	2	2.0
Eastern Savanna	84	28.5	40	37.0
Western Savanna	18	6.0	10	9.0
Savanna Transitional	67	22.5	27	25.0
Introduced (East Coast)	3	1.0	-	-
TOTAL TROPICAL	190	64.5	86	79.5
<u>TEMPERATE (CAPE SUBREGION)</u>				
Cape (Macchia + Grassland)	11	3.5	2	2.0
Temperate Grassland Transitional	23	8.0	16	15.0
Temperate Forest Transitional	9	3.0	4	3.5
South-west Arid	13	4.5	-	-
Arid Transitional (Kalahari)	36	12.5	-	-
TOTAL TEMPERATE	92	31.5	22	20.5
Eclectic Forms (Savanna + Cape)	6	2.0	-	-
Marine and littoral forms	6	2.0	-	-
GRAND TOTAL	294	100%	108	100%

As demonstrated by Poynton (1964a), the areas occupied by a fully developed tropical fauna have a mean midwinter month (July) surface temperature above  $18^{\circ}\text{C}.$ , while the main concentrations of Cape and Temperate Transitional forms are found in regions with a mean July surface temperature below  $13^{\circ}\text{C}.$  The intermediate areas, with mean midwinter month temperatures of  $13^{\circ} - 18^{\circ}\text{C}.$ , are subtropical transition zones where the main constituents of the fauna are Tropical dominants and Tropical Transitional forms. The approximate position of these critical isotherms in south-east Africa is shown in Fig. 16 below.

The South-west Arid fauna is concentrated in areas which have an annual rainfall of less than ten inches.

The present subdivision of the herpetofauna will require revision when more ecological and distributional data become available.

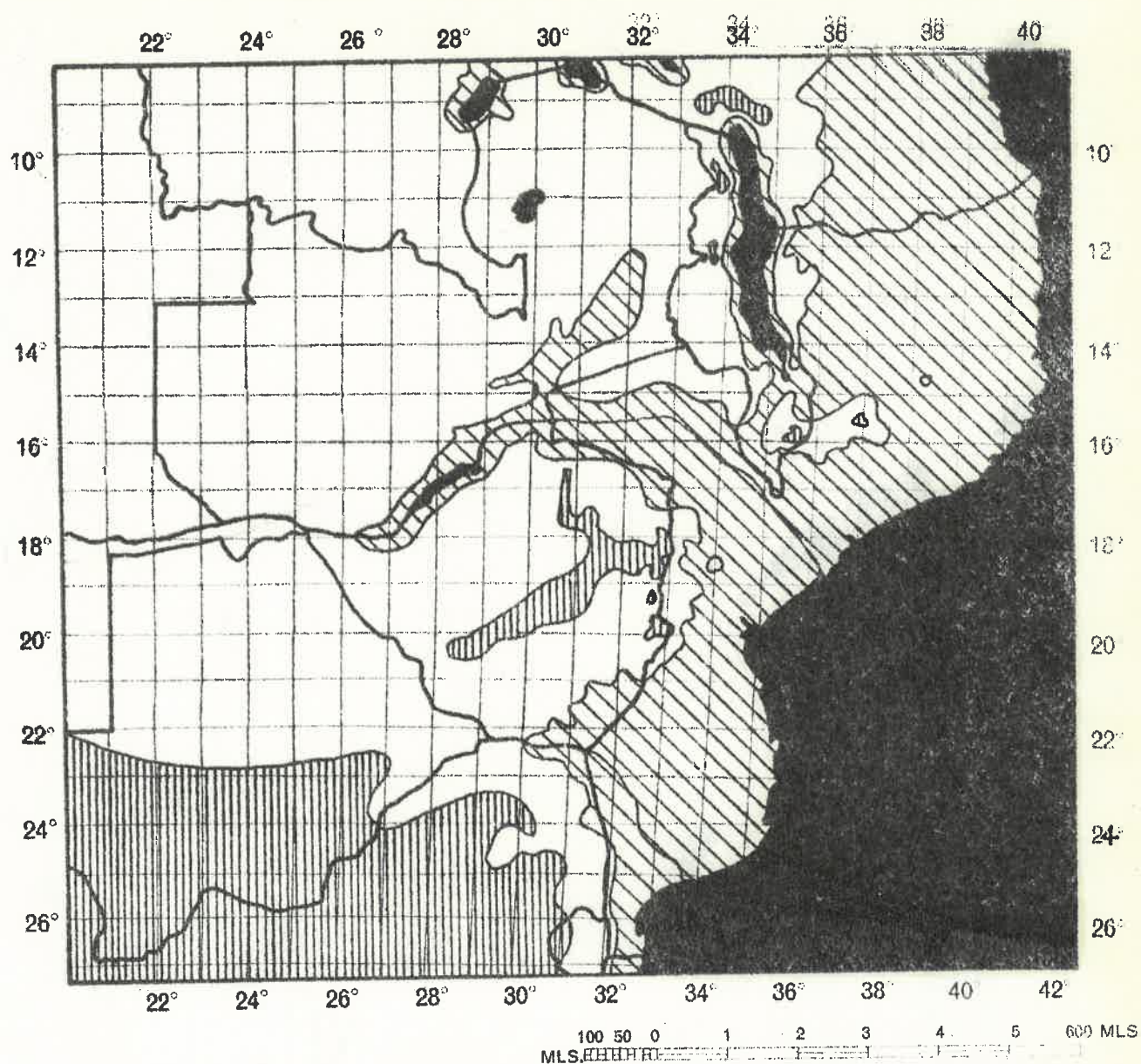
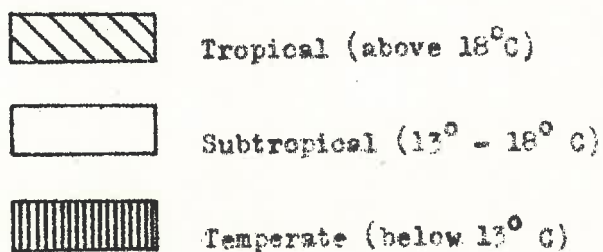


Fig. 16. Thermal divisions of south-east Africa, based on mean mid-winter month (July) temperature. Isotherms plotted from data from the Rhodesian Meteorological Department, the South African Weather Bureau and Poynton (1960, etc.).





Boulengerina a. stormsi is a subspecies endemic to Lake Tanganyika, having forsaken the forest habitat of the typical form.

Typhlops gracilis and Bufo urunguensis occur at the southern end of Lake Tanganyika, the former is not confined to forest.

Rana albolabris lemairi and Arthroleptis globosa seem to be marginal forest forms in Zambia, Katanga and Angola.

Mlanje Mountain has four forest endemics - Lygodactylus rex; Chamaeleo mlanjensis; Brookesia platyceps and Arthroleptis a. francei. The primitive forest-dwelling forms of Lygodactylus have an even more southerly representative in L. methueni of Woodbush Forest in the Transvaal (FitzSimons, 1943).

#### NORTHERN SAVANNA (4 reptiles; 2 amphibians)

Only one Northern Savanna form has a wide range in south-east Africa. Philothamnus i. irregularis apparently reached the Mozambique Plain by way of the Malawi trough and has penetrated south to Zululand and west to Damaraland. It seems to have advanced more slowly northwards from the lower Zambezi, for it is rare and local in south-east Tanganyika (Loveridge, 1959b).

Philothamnus heterolepidotus and Bromophis lineatus have extended south through the Papyrus swamps of western Zambia, the latter reaching the Kazungula area.

Phrynobatrachus gutturosus has reached northern Malawi, but Crocodylus cataphractus and Rana occipitalis only occur in the extreme north of Zambia.

#### EASTERN SAVANNA (84 reptiles; 40 amphibians)

Most Eastern Savanna forms have a wide distribution centred on Mozambique; many extend from Kenya to Zululand and penetrate far to the west. Some also have wide ranges in the northern savanna (marked with a + sign). Forms with limited ranges are marked with an \*, most of these are restricted to coastal alluvium.

Testudo p. bahcocki

Kinyas b. belliana

Cycloderma frenatum\*

Pelusios c. castaneus\*

Pelusios subniger

Pelusios sinuatus

Crocodylus niloticus +

Hemidactylus mercatorius

Hemidactylus platycephalus

Lygodactylus c. capensis

Lygodactylus c. grotei \*

Homopholis wahlbergi

Agama kirki  
Agama m. mossambica  
Agama cyanogaster  
Chamaeleo melleri \*  
Chamaeleo d. dilepis  
Brookesia brachyura \*  
Mabuya boulengeri  
Mabuya megalura \*  
Mabuya planifrons \*  
Mabuya q. margaritifera  
Mabuya varia  
Mabuya s. striata  
Riopa afer  
Ablepharus wahlbergi  
Scalotes aeneus \*  
Scalotes t. tetradactylus \*  
Scolecoseps boulengeri \*  
Gerrhosaurus v. validus  
Gerrhosaurus major  
Gerrhosaurus flavigularis  
Cordylus t. tropidosternum  
Gastropholis vittata \*  
Nucras boulengeri \*  
Latastia johnstoni \*  
Ichnotropis squamulosa  
Varanus n. niloticus +  
Varanus e. albigularis  
Tomuropeltis pistillum  
Typhlops s. mucroso  
Leptotyphlops longicauda  
Leptotyphlops e. emini  
Leptotyphlops conjuncta  
Leptotyphlops scutifrons  
Python sebae +  
Lycodonomorphus w. whytei  
Boaedon f. fuliginosus +  
Lycophidion c. capense  
Lycophidion semiannule \*  
Mehelya c. capensis  
Mehelya nyassae  
Natriciteres olivacea +  
Meizodon s. semiornatus  
Philothamnus hoplogaster  
Philothamnus n. natalensis \*  
Philothamnus s. semivariatus

Scaphiophis s. olivaceus

Phrynosoma m. macleayi



Scaphiophis a. albopunctatus \*  
Prosymna s. lineata  
Prosymna a. ambigua  
Chamaetortus a. aulicus  
Telescopus s. semiannulatus  
Discholidus t. typus  
Thelotornis k. capensis  
Hemirhagerrhis n. nototaenia  
Psammophylax t. tritaeniatus  
Rhamphiophis o. rostratus  
Psammophis s. sibilans +  
Psammophis s. sudanensis  
Psammophis angolensis  
Calamelaps u. miolapis  
Xenocalamus b. bicolor  
Aparallactus l. lunulatus  
Aparallactus guentheri  
Aparallactus capensis  
Oasypeltis m. medici  
Elapsoides s. decosteri  
Naja h. annulifera  
Naja m. mossambica  
Dendroaspis p. polylepis  
Dendroaspis angusticeps  
Atractaspis bibroni  
Causus defilippii  
Atheris superciliaris  
  
Xenopus muelleri +  
Bufo regularis +  
Bufo pusillus +  
Bufo garmani +  
Bufo carens  
Bufo t. beiranus  
Brevicens m. mossambicus  
Phrynomerus b. bifasciatus  
Pyxicephalus adspersus +  
Pyxicephalus d. cryptotis  
Pyxicephalus marmoratus +  
Rana angolensis  
Rana g. bravana  
Hildebrandtia o. ornata  
Ptychadena oxyrhynchus +  
Ptychadena anchietae

Ptychadena m. mascareniensis +  
Ptychadena porosissima  
Ptychadena taenioscelis +  
Ptychadena c. guibei  
Ptychadena mossambica  
Ptychadena floweri  
Phrynobatrachus natalensis +  
Phrynobatrachus acridoides +  
Phrynobatrachus u. mababiensis  
Arthroleptis stenodactylus (also in Evergreen Forests)  
Hemius marmoratum  
Chiromantis xerampelina  
Leptopelis concolor  
Leptopelis v. cinnamomeus  
Hylambates maculatus  
Kassina senegalensis +  
Afraxalus b. brachynemis  
Afraxalus f. fornasinii  
Hyperolius puncticulatus  
Hyperolius argus  
Hyperolius tuberilinguis  
Hyperolius pusillus  
Hyperolius n. nasutus  
Hyperolius m. taeniatus

WESTERN SAVANNA (18 reptiles; 10 amphibians)

Those Western Savanna forms which have a wide range in south-east Africa are marked with an \*.

Pelusios nanus  
Pelusios c. rhodesianus \*  
Lygodactylus angolensis \*  
Scelotes angolensis  
Gerrhosaurus nigrolineatus \*  
Ichnotropis b. bivittata (reaches Tanganyika)  
Lycophidion c. multimaculatum  
Dipsadoboa shrevei (reaches Tanganyika)  
Discholidus t. punctatus  
Thelotornis k. oatesi \*  
Rhamphiophis acutus  
Psammophis s. leopardinus  
Aenocaulemus m. mechowi  
Elapsoidea s. guentheri  
Naja h. anchietae  
Naja n. crawshayi



Atractaspis c. congica  
Causus bilineatus  
Phrynomerus affinis  
Pyxicephalus tuberculosus \*  
Rana darlingi \*  
Ptychadena subpunctata  
Ptychadena keilingi  
Phrynobatrachus parvulus  
Leptopelis angolensis  
Leptopelis bocagei \*  
Hyperolius bocagei  
Hyperolius g. quinquevittatus

SAVANNA TRANSITIONAL (67 reptiles; 27 amphibians)

The ebb and flow of the Tropical Savanna faunas during the climatic fluctuations of the Pleistocene has repeatedly left isolated populations in the "tidal zone", some of which have diverged from the parent stocks and persisted to produce a complex Tropical Transitional fauna. The last expansion of the Tropical Savanna fauna is very recent, to judge by the herpetofauna of Inhaca Island, which is a recent continental island separated from the mainland by a channel only half a mile wide. Inhaca lacks representatives of the families Agamidae, Lacertidae and Amphisbaenidae, all of which are well represented in similar habitats at Lourenco Marques on the mainland opposite. In this respect Inhaca agrees with the older continental islands to the north - Pemba, Zanzibar and Mafia (Moreau & Packenham, 1940). The two commonest mainland skinks are Mabuya s. striata and M. varia, neither is present on Inhaca Island, both occur on Zanzibar and M.s. striata also on Pemba and Mafia. The most interesting feature of the Inhaca herpetofauna is the presence of Xenopus l. laevis, which occurs at Namaacha, due west on the slopes of the Lebombo Range at 2,000 feet, but is replaced at intervening lower altitudes by the tropical species Xenopus muelleri. The latter occurs throughout East Africa, including Zanzibar and Mafia Islands, extending south to Lake St. Lucia. It is evident that X. muelleri is extending its range at the expense of X. l. laevis, but reached the Lourenco Marques area after the isolation of Inhaca Island, which therefore retains a relict population of X. l. laevis. The herpetofauna of the much larger Bazaruto Island, midway between Beira and Inhambane, should prove very interesting.

Lygodactylus chobiensis is the most southern representative of the L. picturatus group, which apparently originated in the northern savanna. The centre of distribution for L. chobiensis is the upper and middle Zambezi (see Pasteur, 1964, fig. 20).

Six forms are largely restricted to the Kivu - Lake Tanganyika section of the rift valley:

Lycodonomorphus bicolor (endemic to Lake Tanganyika)

Dispholidus t. kivuensis

Chilorhinophis g. tanganyikae

Phrynobatrachus moorei

Hyperolius kivuensis

Hyperolius m. argentovittis

Psammophylax t. fitzgeraldi is confined to plateau areas of northern Zambia (on both sides of the Luangwa trough) and Malawi.

Bufo t. taitanus is widely distributed in plateau regions of Zambia, Malawi and Mozambique, extending north to Kenya.

Breviceps m. poweri has a wide range in south Katanga, Zambia and western Malawi.

Pachydactylus tuberculosus has an extraordinary trans-continental distribution in a narrow belt extending from the lower Congo through Katanga and northern Zambia to Tanganyika, reaching the east coast at Tanga.

A group of poorly known forms seems to occupy a central area covering eastern Angola, Katanga and north-western Zambia:

Ablepharus seydeli

Gerrhosaurus bulsi

Typhlops s. schmidtii

Hypoptophis wilsoni

Amblyodipsas k. katangensis

Bufo lemairei

Ptychadena u. upembae

Ptychadena grandisonae

Kassina ingeri

Kassina wittei

Afraxalus wittei

Hyperolius m. pyrrhodictyon

Hyperolius m. aposematicus

Hyperolius m. alborufus

Hyperolius m. angolensis (also northern Bechuanaland)

Hyperolius m. melanoleucus

Hyperolius m. rhodoscelis

Another group is largely restricted to the Okovango basin and the Barotse plains, which were formerly part of the same drainage system:

Pelusios bechuanicus (also Kafue Flats)

Tomuropeltis longicauda

Limnophis b. bangweolicus (also Lake Bangweulu)

Xenocalamus m. inornatus (also north-west Rhodesia)

Bufo ngamiensis



Philothamnus ornatus seems to have dispersed from Barotseland to southern Angola, northern Zambia and north-eastern Rhodesia.

Chelorhinophis g. gerardi is known from Katanga, western Zambia and the northern half of Rhodesia.

Prosymna angolensis occurs in southern Angola, northern South West Africa and Barotseland.

A small group of rupicolous forms centred on the Chicoma trough has spread to rocky areas of Zambia, south Malawi and Rhodesia:

Hemidactylus tasmani

Pachydactylus tetensis (reaches south-west Tanganyika)

Mabuza lacertiformis

A non-rupicolous gecko, Pachydactylus o. oshaughnessyi, has a similar distribution pattern.

Hyperolius m. marginatus seems to have a discontinuous distribution. It is widespread in northern Malawi, eastern Zambia and the western Mozambique pedicle north of Tete. After a break in the arid Zambezi valley it reappears along the southern Zambezi escarpment and almost reaches Salisbury.

Typhlops rondoensis has been recorded only from south Tanganyika and the Niassa Platform, while the only known specimen of Chelorhinophis c. carpenteri came from the eastern edge of the Niassa Platform.

Hyperolius m. nyassae occurs along the northern shores of Lake Malawi, while H. m. albofasciatus extends from the southern end of the Lake through the Shire Highlands to the southern part of the Niassa Platform.

Platysaurus i. nyassae is restricted to south-west Malawi and adjacent Mozambique, P. mitchelli is endemic to Mlanje Mountain and P. m. maculatus and P.m. lineicauda are endemic to the Niassa Platform.

Afroedura t. loveridgei, Platysaurus torquatus and P. imperator are restricted to an area extending from Tete to Mtoko. The first two forms occur on both sides of the Zambezi, but P. imperator does not reach Tete.

Lygodactylus stevensoni and Hyperolius m. rhodesianus are endemic to western Rhodesia.

Mabuza s. wahlbergi has a wide range covering the Rhodesian and Zambian plateaux, the Gwembe - Luangwa - Chicoma troughs, northern Bechuanaland and Damaraland.

Eleven forms are endemic to the Rhodesian Plateau and Manica Platform: Acontias g. broadleyi

Cordylus w. regius

Cordylus w. mossambicus

Platysaurus ocellatus

Platysaurus p. blakei

Platysaurus p. pungweensis

Platysaurus l. rhodesianus (also north Transvaal)

Platysaurus l. subniger

Chirindia swynnertoni

Hyperolius swynnertoni

Hyperolius m. broadleyi

Seven other forms have wide distributions in the central plateau areas of Rhodesia and the Transvaal, some of them extending west to Damaraland and others south to Natal:

Afroedura t. transvaalica (south to Soutpansberg)

Pachydactylus a. affinis

Nucras t. ornata (west to Damaraland and south to Natal)

Cordylus t. jonesi (+ south Mozambique)

Psammophis s. subtaeniatus (west to South West Africa & Angola)

Bufo v. fenoulheti (+ south Mozambique)

Breviceps m. adspersus (west to South West Africa, south to Natal)

Pachydactylus a. tigrinus is endemic to the Limpopo Depression.

Seventeen forms are largely restricted to the coastal alluvium of southern Mozambique and Zululand. Those marked with an \* extend westwards into the Transvaal, while those marked \*\* reach Rhodesia: Mabuya h. depressa \*\*

Scelotes brevipes \*

Scelotes l. mossambicus

Scelotes arenicola

Acontias plumbeus \*\* (also relict at East London)

Typhlosaurus aurantiacus \*

Typhlops fornasinii

Typhlops s. schlegeli \*

Amphisbaena v. violacea \*

Monopeltis habenichti

Monopeltis sphenorhynchus \*\*

Prosymna jani

Duberria variegata

Amblyodipsas microphthalma \*

Xenocalamus transvaalensis \*\*

Xenocalamus b. lineatus

Aparallactus nigriceps

Pyxicephalus natalensis occurs on the Transvaal highveld, but descends to sea level in Natal and the Eastern Cape Province. In south Mozambique it occurs at 2,000 feet (Namaacha).



Platysaurus wilhelmi inhabits suitable rock outcrops in the south-east Transvaal, south-west Mozambique and Zululand.

#### INTRODUCED - EAST COAST (3 reptiles)

Phelsuma v-nigra was introduced into Quelimane from the Comoro Islands about 1860, but this gecko has not been collected on the African mainland for over a hundred years and the colony may have died out.

The Madagascar species Phelsuma d. dubia seems to be well established on Zanzibar, the Tanganyika coast and Mozambique Island.

The Indian species Typhlops braminus is well established on the east African coast from Somalia south to Inhambane.

#### CAPE FAUNA (MACCHIA + GRASSLAND) (11 reptiles; 2 amphibians)

Five Cape forms are widely distributed on the Rhodesian Plateau: Typhlops delalandei

Lycodonomorphus rufulus (also Gorongosa Mountain)

Pseudaspis cana (also Kalahari, north to Kenya)

Xenopus l. laevis (also Malawi)

Cacosternum boettgeri (north to Kenya)

Naja nivea extends north into the southern Kalahari and Agama atra reaches the southeastern corner of Bechuanaland.

Mabuya capensis is widespread in the southern Kalahari, but also has relict populations in Barotseland and on the Inyanga highlands.

Amphorhinus multimaclatus, Psammophis crucifer and Bitis a. atropos are all widely distributed in montane grassland on the eastern escarpment of Rhodesia, but Hemachatus haemachatus is found only at Inyanga.

Duberria l. lutrix just extends into southern Mozambique, being replaced by other races further north.

#### TEMPERATE TRANSITIONAL

##### 1. TEMPERATE GRASSLAND (23 reptiles; 16 amphibians)

Five forms are common to the South African and Rhodesian highlands:

Mabuya p. punctatissimus (west to Bechuanaland)

Typhlosaurus c. cregoi (?)

Chamaesaura m. macrolepis

Psammophis brevirostris

Rana f. fasciata

The following forms are endemic to the Rhodesian highlands:

(a) with southern affinities:

Typhlosaurus c. bicolor

Cordylus c. rhodesianus

Bufo g. inyangae

Bufo v. grindleyi

Rana g. rhodesiana (also Gorongosa Mountain)

Arthroleptis troglodytes

(b) with races both to the north and south.

Duberria l. rhodesiana (also Gorongosa Mountain)

(c) with northern affinities (races on Mlanje Mountain)

Lygodactylus b. bernardi

Scelotes a. arnoldi

Rana j. inyangae

Typhlops obtusus and Lycodonomorphus l. mlanjensis occur on the highlands of both south-eastern Malawi and eastern Rhodesia, while Ptychadena uzungwensis has a wider range which includes Angola and southern Tanganyika.

Five forms are endemic to the South-east Malawi - North Mozambique highland subcentre:

Lygodactylus b. bonisi (Mlanje Mountain)

Mabuya p. mlanjensis (Mlanje Mountain)

Scelotes a. mlanjensis (Mlanje Mountain)

Rana j. johnstoni (Mlanje Mountain)

Nothophryne broadleyi (Mlanje and Ribaue Mountains)

Three forms have a wide range in the highlands of Malawi and south-west Tanganyika on both sides of the rift valley:

Duberria l. shirana

Psammophylax v. variabilis

Rana f. fuelleborni

Six forms are endemic to the Nyika Plateau:

Chamaeleo g. nyikae

Mabuya hildae

Eumecia a. johnstoni

Bufo t. nyikae

Arthroleptis x. nyikae

Hyperolius q. mertensi

The following occur in the highlands of northern Malawi and south-west Tanganyika:

Chamaesaura m. miopropus (also Zambia)

Phrynobatrachus u. ukingensis

Hyperolius pictus



Mabuia p. spilogaster extends from the highlands of South West Africa into south-western Bechuanaland.

Three Angola highland forms are widely distributed on the Zambian plateau:

Eumecia a. anchietae (north to Kenya)

Tetradactylus ellenbergeri

Xenopus l. poweri

## 2. TEMPERATE EVERGREEN FOREST (9 reptiles; 4 amphibians)

Lygodactylus a. angularis is apparently a primitive forest form which is now adapting itself to new habitats following the destruction of most of the evergreen forest in Malawi and northern Zambia.

Scelotes a. ater occurs in forested or formerly forested areas in the highlands of northern Zambia and Malawi.

Brookesia nchisiensis, Crotaphopeltis tornieri, Atheris n. rungweensis and Arthroleptis reichei are restricted to montane forests of Tanganyika and northern Malawi.

Natriciter<sup>e</sup> variegata is a marsh snake usually found at the forest edge or in clearings. The typical form is found in West Africa, N. v. bipostocularis occurs from Abercorn west to Angola and N. v. "sylvatica" inhabits highland areas from Tanganyika south to Mount Silinda.

Scolecophorus k. kirki is a montane forest-edge form found along the rift valley from south-west Tanganyika to Cholo Mountain.

Chamaeleo marshalli is widespread in wet evergreen forests on the eastern escarpment of Rhodesia. Bufo anotis appears to be endemic to Chirinda Forest and Probreviceps "rhodesianus" is known only from Stapleford, being separated by a gap of 650 miles from the most southerly of the Tanganyika forms (P. macrodactylus rungweensis).

Chamaeleo p. melanocephalus occurs in evergreen forest on the lower slopes of the Natal Drakensberg, where I have collected it at 5,000 feet near Cathedral Peak. This form also occurs along the coast from Lourenco Marques to Pondoland. The viviparous chamaeleons of the C. pumilus group have a basically south temperate distribution, so melanocephalus is provisionally placed as a Temperate Transitional form in spite of the fact that it does extend into subtropical and tropical areas.

The length of isolation for the various temperate transitional subcentres is difficult to establish, but there was apparently a recent temperate connection across the Limpopo, for most of the isolates on the Rhodesian highlands are indistinguishable from the South African populations.

The connection between the Rhodesian highlands and the south Malawi highlands dates back to a time before the Zambezi cut through the Cahorabassa Gorge upstream from Tete. The highland ridge must then have extended east through the Furancungo highlands to the Kirk Range and linked up with the Zomba Plateau and Mlanje Mountain; this would have antedated the capture of the Lake Malawi drainage system by the Shire River cutting back to the Nkula Falls. Although the "Zambezi Gap" is a formidable barrier to temperate forms today, it is probable that during Pleistocene interpluvials the escarpment was cut back very rapidly by erosion and even during pluvials the area west of Tete would still ~~XXXX~~ be in the rain shadow of the Shire Highlands.

There are no major barriers to east - west connections between highland areas north of the Zambezi. Benson & Irwin (1965) have discussed the discontinuous distributions of a number of montane evergreen forest birds which indicate former links between the highland areas of eastern Africa and the Cameroon and Angola highlands in the west. Carcasson (1964, fig. 4) has mapped the probable extensions of highland forest and grassland during a pluvial maximum.

#### SOUTH-WEST ARID (13 reptiles)

Most of the South-west Arid reptile fauna is confined to regions with an annual rainfall of less than 10 inches in southern Angola, South West Africa and the western Cape Province. The following forms occur in the Kalahari Gemsbok National Park on the south-west border of Bechuanaland, those marked with an \* extend <sup>T</sup>further east into the Kalahari.

Chondrodactylus angulifer

Ptenopus garrulus \*

Pachydactylus rugosus

Mabuya occidentalis \*

Mabuya l. longiloba \* (also west Rhodesia and south Mozambique)

Mabuya s. sparsa

Typhlosaurus gariensis

Nucras t. tessellata

Eremias namaquensis \*

Merops suborbitalis

Rhamphophis multimaculatus

Psammophis notostictus

Bitis caudalis \* (also south-west Rhodesia and north-west Transvaal)



ARID TRANSITIONAL (36 reptiles)

This group occupies a vast area of semi-desert with an annual rainfall of 10 to 20 inches. This includes a large part of northern South West Africa, the central and southern Kalahari, the Limpopo - Sabi Depression and the western part of the Sul do Save Province in southern Mozambique. Some outlying forms are endemic to the Kalahari sands of Barotseland, which now has an annual rainfall of 20 to 40 inches, but was presumably invaded by Kalahari xerophilous forms during an arid non-pluvial period.

The following forms are widespread:

Testudo oculifera (not Rhodesia)

Pachydactylus p. punctatus (extends north-east to Malawi)

<sup>h</sup>Pachydactylus c. capensis (not Rhodesia)

Pachydactylus bibroni (north to Tanganyika)

Riopa s. sundevalli (north to Kenya)

Nucras intertexta

Eremias lugubris

Eremias l. lineocellata

Ichnotropis c. capensis (north to Malawi)

Zygaspis quadrifrons (north to Katanga)

Monopeltis anchietae

Monopeltis c. capensis

Prosymna bivittata

Psammophis l. trinasalis

Psammophis j. jallae

Aspidelaps scutatus

Elapsoides s. fitzsimonsi

The following forms are largely restricted to Bechuanaland and South West Africa:

Lygodactylus bradfieldi

Rhoptropus braconnieri

Colopus wahlbergi

Agama makarikarika (also western Orange Free State)

Typhlacontias g. ngamiensis

Acontias g. occidentalis

Typhlosaurus l. lineatus

Gerrhosaurus auritus

Monopeltis mauricei

Typhlops schinzi

Typhlops boylei

Xenocalamus b. maculatus

Monopeltis ocularis and Calamellaps ventrimaculatus occur both in Bechuanaland and Barotseland, the former extends south to the northern Cape Province.

Typhlacontias g. gracilis, Typhlosaurus l. "jappi" and Zygaspis "niger" are endemic to Barotseland and adjoining Angola.

Scelotes limpopoensis and Typhlosaurus "relicus" are endemic to the Limpopo - Sabi Depression.

Kalahari Sand Movements: Relict patches of Kalahari sand in the Umvuma area indicate that the aeolian sands formerly extended further east than they do today. Reptile distributions provide additional evidence for this.

Rupicolous lizards of the genera Cordylus and Platysaurus only live on fissured rock outcrops. Large areas of the Rhodesian Plateau and Manica Platform provide ideal habitats, but the primitive forms are all found east of the Odzi - Sabi Rivers. The absence of relict populations of primitive Cordylids further west could be due to the submergence of rock outcrops by aeolian sands. This hypothesis is supported by the fact that two species of Platysaurus with relict populations in the Transvaal (P. guttatus and P. fitzsimonsi) are the only ones in the genus which have a brille in the lower eyelid (Broadley, 1964a), an adaption commonly found in deserticolous forms.

The recent discovery of Monopeltis c. capensis at Mpudzi Bridge near Umtali is significant because the only Monopeltis collected in the south-eastern lowveld of Rhodesia is M. sphenorhynchus. The previous Rhodesian records of M. c. capensis are all from the north-west, so it is likely that the Mpudzi population is derived from the west, especially as Umvuma lies on this route.

Mabuya l. longiloba is widely distributed in South West Africa and the Kalahari, but the former extension of Kalahari conditions to the east coast is indicated by relict populations at Great Salt Pan in the northern Transvaal (where Ptenopus garrulus and Typhlacontias l. lineatus also occur) and in southern Mozambique. There is also a relict population of Elapsoidea s. fitzsimonsi on the south-eastern border of Rhodesia.

It is probable that Kalahari forms pushed far to the east during several non-pluvials. The arenicolous forms of Typhlosaurus show an interesting sequence. The least specialised form is T. aurantiacus in south Mozambique. T. "relicus" of south-east Rhodesia resembles aurantiacus in cephalic scalation, but has the sharp-edged rostral and well defined striped pattern of T. lineatus. The Great Saltpan population of T. lineatus may prove to be subspecifically distinct, for the few specimens available are striped ventrally, the striping being limited to the dorsum in all Kalahari material. These data suggest at least three "Kalahari invasions", T. aurantiacus being derived from a very early isolate which may date back to the Pliocene, T. "relicus" being derived from a later isolate and the Great Saltpan population of T. lineatus having been isolated very recently.



Typhlops schlegeli is one of the few reptiles which has two subspecies on the Mozambique Plain. This species is absent from the Kalahari and consequently the extension of the aeolian sands to the east coast would inhibit gene-flow between northern and southern populations of T. schlegeli, thus allowing divergence to the subspecific level.

A final piece of evidence is provided by the pronounced widening of the Mozambique Plain in the Inhambane area. This is built up of the Kalahari sand stripped from Rhodesia and the northern Transvaal by the Sabi - Lundi and Limpopo systems, deposited as a delta and subsequently uplifted.

#### ECLECTIC FORMS (6 reptiles)

The following forms have a "blanket" distribution which includes both the temperate south-western Cape and tropical Africa. All occur at altitudes varying from sea level to 6,000 feet or more. Most of them are found throughout most of Africa with the exception of desert and rain-forest areas:

Pelomedusa subrufa

Agama hispida (not in Northern Savanna)

Grotaphopeltis hotamboeia

Dasypeltis s. scabra (a race in South West Africa)

Causus rhombeatus (absent from most of the Mozambique Plain)

Bitis a. arietans (a race in Somalia)

#### MARINE AND LITTORAL FORMS (6 reptiles)

The following marine reptiles occur in Mozambique waters:

Chelonia mydas

Eretmochelys imbricata

Caretta caretta

Dermochelys coriacea

Pelamis platurus

Ablepharus b. africanus is restricted to coral rag on the coast of East Africa and the offshore islands.

## CONCLUSIONS

1. The distribution patterns shown by the reptiles and amphibians of south-east Africa confirm that the herpetofauna is polarised into tropical and temperate groups.

2. The Temperate herpetofauna apparently includes some genera which have evolved in southern Africa, especially reptiles in the South-west Arid, but most of the south temperate genera originated in the tropics, where they have subsequently been replaced by more advanced forms.

Wellington (1957) concluded that the Old World Tropics was the main evolutionary centre for the vertebrates and in Africa the Tropical Savanna forms have largely eliminated the primitive forms except in climatically less favourable areas (temperate zones) or the other "backwaters" provided by evergreen forests.

3. Seven main biomes can be recognised in the Ethiopian Region and they grade into one another as shown in the diagram below. The biomes shift with climatic changes and these fluctuations have most effect in the transition zones.

MEAN MIDWINTER MONTH TEMPERATURE	A N N U A L R A I N F A L L		
	more than 40"	10" to 40"	less than 10"
Above 18°C. ETHIOPIAN SUBREGION	TROPICAL EVERGREEN FOREST	SAVANNA (including Deciduous Woodlands & Steppes)	TROPICAL ARID
Below 13°C. CAPE SUBREGION	TEMPERATE EVERGREEN FOREST	TEMPERATE GRASSLAND CAPE MACCHIA	TEMPERATE ARID

4. For zoogeographical studies it is preferable to map major centres of evolution rather than attempt to divide the regions into formal biotic provinces. The main dispersal routes can then be plotted across the transition zones.

5. The most important dispersal routes in south-east Africa are as follows:

(a) The Mozambique Plain for southward dispersal of Tropical forms (both Savanna and Evergreen Forest).

(b) The eastern escarpment for movements of Cape and Temperate Transitional forms in both directions.

(c) The Limpopo Depression for eastward dispersal of South-west Arid and Kalahari forms during dry periods. At other times this area



has acted as a corridor for the south-westward penetration of the Eastern Savanna forms.

(d) The Zambezi Trough for westward penetration of Eastern Savanna forms, some of which have reached northern South West Africa and southern Angola via the Chobe - Okovango region. There has been relatively little movement in the opposite direction.

(e) The Malawi Trough has probably been invaded by Eastern Tropical Savanna forms from both north and south.

6. A large proportion of Tropical Savanna forms show great ecological versatility and have wide and continuous distributions. Variation in such forms is largely clinal and they are monotypic or have few valid races (which often correspond with the northern, eastern and western savanna evolutionary centres, e.g. Naja haje).

7. Temperate forms and evergreen forest forms have discontinuous distributions with many geographical isolates showing varying degrees of taxonomic differentiation.

8. Although nearly half the forms which make up the herpetofauna of south-east Africa are classed as Transitional, these forms generally have limited geographical and ecological ranges.

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GAZETTEER FOR SOUTH-EAST AFRICA.

This gazetteer includes most localities in Bechuanaland, the Caprivi Strip, Rhodesia, Zambia, Malawi and Mozambique at which herpetological material has been collected. A few early names have not been traced, especially those in Mozambique listed by Sternfeld (1911). Recent additions to the gazetteer will be found in the addenda at the end.

The quarter-degree grid reference has been explained by Poynton (1964a) and others. The notation of such a reference for Umtali (1832 Dc) is illustrated below.

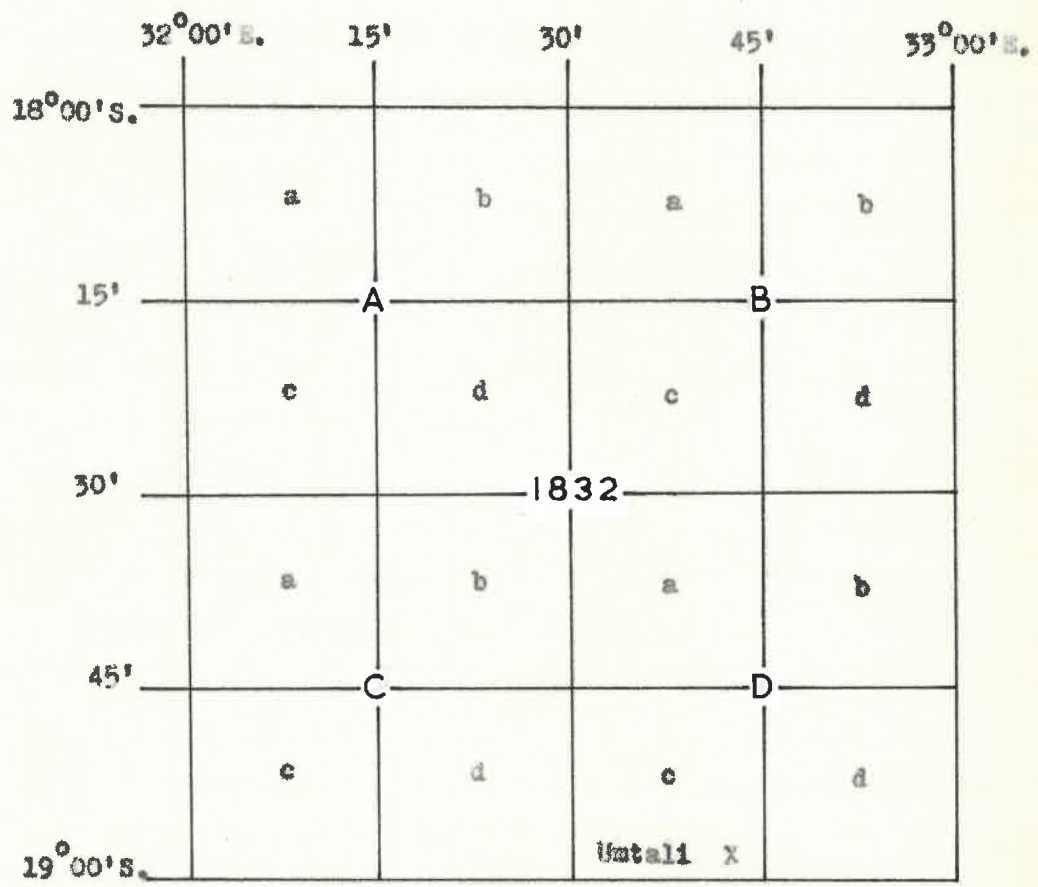


Fig. 17. Quarter-degree grid notation for Umtali.

G A Z E T T E E R

LOCALITIES IN SOUTH-EAST AFRICA FROM WHICH HERPETOLOGICAL  
MATERIAL HAS BEEN COLLECTED, WITH QUARTER-DEGREE GRID REFERENCES.

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Abercorn	Zambia	0831 Cd
Aberfoyle	Rhodesia	1832 Bd
Achnashie Farm	Rhodesia	1932 Aa
Alala Plateau	Zambia	1329 Dc
Alto Ligonha (+ 10 mls. E of)	Mozambique	1538 Cb
Alto Ligonha - 4 mls W of	Mozambique	1538 Ca
Alto Molocue (+ 8 mls. SW of)	Mozambique	1537 Da
Amandas	Rhodesia	1730 Bd
Amatongas	Mozambique	1933 Bb
Ambi Falls	Rhodesia	1630 Bc
Ancuabe	Mozambique	1239 Dd
Angoche Island	Mozambique	1639 Bb
Angwa-Mukwishi Confluence	Rhodesia	1630 Ac
Antelope	Rhodesia	2128 Ab
Antelope Mine, 30 mls. S of	Rhodesia	2128 Ad
Antelope Road	Rhodesia	2028 Cb
Auob-Nossob Confluence	Bechuanaland	2620 Bc
Atlantica	Rhodesia	1730 Dd
Baddeley	Rhodesia	1832 Ac
Balaka	Malawi	1434 Dd
Balla Balla	Rhodesia	2029 Ac
Balmoral Farm	Zambia	1528 Ca
Balovale	Zambia	1323 Ca
Bancroft	Zambia	1227 Bd
Bandula	Mozambique	1933 Aa
Bangweulu Lake	Zambia	1129 B
Banket	Rhodesia	1730 Ad
Baralong Farm	Bechuanaland	2525 Da
Battlefields	Rhodesia	1829 Db
Bazaruto Island	Mozambique	2135 Cb
Bazeley Bridge	Rhodesia	1932 Ab
Beatrice	Rhodesia	1830 Bb
Beatrice (+ 5 & 10 mls. S of)	Rhodesia	1830 Bd
Bedza	Rhodesia	1932 Bd
Beira	Mozambique	1934 Dd
Beira - 8 mls. NE of	Mozambique	1934 Db
Beitbridge	Rhodesia	2229 Bd



Belas	Mozambique	1833 Cc
Bela Vista	Mozambique	2632 Bc
Belingwe	Rhodesia	2029 Bd
Bembesi	Rhodesia	1928 Dd
Bengi Springs (Nuanetsi)	Rhodesia	2131 Bd
Bikita	Rhodesia	2031 Ba
Bilibili Hot Springs	Zambia	1626 Cb
Bindura	Rhodesia	1731 Ad
Bindura - 30 mls. N of	Rhodesia	1631 Cd
Binga	Rhodesia	1727 Cb
Birchenough Bridge	Rhodesia	1932 Cd
Birchenough Bridge 50 mls NNW	Rhodesia	1932 Ac
Birchenough Bridge 12 & 20 mls W	Rhodesia	1932 Cc
Birchenough Bridge 25 & 30 mls W	Rhodesia	1931 Dd
Biriwiri River	Rhodesia	1932 Dc
Blantyre	Malawi	1535 Cc
Beane (+ 10 mls. S of)	Mozambique	2632 Ab
Bodiben	Bechuanaland	2022 Bc
Bomponi	Rhodesia	1932 Bb
Boroma	Mozambique	1633 Ab
Boror	Mozambique	1736 Cc
Bosola	Bechuanaland	2027 Dc
Bottlele River	Bechuanaland	2024 A-C
Bridal Veil Falls	Rhodesia	1932 Dd
Broken Hill	Zambia	1428 Ad
Bronley	Rhodesia	1831 Ab
Bua River Drift	Malawi	1333 Bb
Bubye River Bridge	Rhodesia	2130 Cb
Buffels Drift	Rhodesia	2032 Ba
Bulawayo	Rhodesia	2028 Ba
Bulawayo - 15 mls. W of	Rhodesia	2028 Ab
Bulawayo - 9 mls. S of	Rhodesia	2028 Bc
Bulaya	Zambia	0330 Ca
Buma Hill (Nyika)	Malawi	1033 Dc
Bundi Valley	Rhodesia	1933 Cc
Bunga Forest (Vumba Mountain)	Rhodesia	1932 Bb
Burma Valley	Rhodesia	1932 Bb
Bushman Mine	Bechuanaland	2026 Da
Bushtick Mine	Rhodesia	2028 Bb
Butsingwano River	Bechuanaland	2221 Aa
Buzi River @ 2000'	Mozambique	2032 Bd
Bwalo	Zambia	1332 Bd
Bwana Mkubwa	Zambia	1328 Ba

Cabaceira Peninsula	Mozambique	1440 Dd
Cafumpe	Mozambique	1933 Ba
Caia	Mozambique	1735 Cd
Campo	Mozambique	1736 Cd
Campo - 15 mls. N. of	Mozambique	1736 Cb
Canda - 5 mls. N of	Mozambique	1833 Bd
Cape Delgado	Mozambique	1040 Da
Cape Maclear	Malawi	1434 Bb
Cashel	Rhodesia	1932 Db
Castle Beacon (Vumba Mountain)	Rhodesia	1932 Ba
Cavalo	Mozambique	1834 Ac
Cement	Rhodesia	2028 Ba
Centenary Block	Rhodesia	1631 Ca
Central Estates (Umvuma)	Rhodesia	1930 Ab
Chakwenga River	Zambia	1529 Da
Chambeshi-Lukulu Confluence	Zambia	1031 Cc
Changa	Zambia	1628 Ad
Changadzi River Bridge	Rhodesia	1932 Cd
Changara	Mozambique	1633 Cd
Changara - 12 mls. SSE	Mozambique	1633 Cd
Chapala	Mozambique	1537 Dc
Chapungu	Rhodesia	1832 Bc
Charama Plateau	Rhodesia	1828 Ba
Charre	Mozambique	1735 Ac
Chavuma	Zambia	1322 Ba
Chelinda (Nyika)	Malawi	1033 Db
Chemba	Mozambique	1734 Ab
Chemezi	Mozambique	1833 Cc
Chera Mountain	Rhodesia	1832 Bb
Chete Gorge	Rhodesia	1727 Bc
Chete Hills	Zambia	1727 Bc
Cheyire Bridge	Rhodesia	1932 Cb
Chiawa	Zambia	1529 Cc
Chibakwe River Bridge	Rhodesia	1731 Da
Chibalashi River	Zambia	1128 Bb
Chibelele Camp	Zambia	1628 Bb
Chibi	Rhodesia	2030 Ad
Chibotela (Chibotero)	Malawi	1334 Ad
Chibula	Zambia	1130 Ca
Chibuto	Mozambique	2433 Da
Chibutubutu (Kasama)	Zambia	1031 Ca
Chibuwe	Rhodesia	2032 Ad
Chicamba Dam	Mozambique	1933 Aa
Chido	Rhodesia	1932 Ba



Chiengi	Zambia	0829 Ca
Chifumbazi	Mozambique	1432 Bb
Chigubo	Mozambique	2233 Dc
Chikata Rapids	Zambia	1324 Ca
Chikombedzi	Rhodesia	2131 Cb
Chikowa	Zambia	1332 Ac
Chikwa	Zambia	1132 Db
Chikawa	Malawi	1634 Bb
Chilanga	Zambia	1528 Ca
Chileka	Malawi	1534 Db
Chilimanzi	Rhodesia	1930 Db
Chilola	Zambia	1627 Dd
Chilonga Stream	Zambia	1224 Ab
Chilongwelo Farm	Zambia	0831 Cc
Chilubi Island	Zambia	1129 Bb
Chimanimani Mountains	Rhodesia	1933 Cc
Chimanimani Mtns. Dead Cow Camp	Rhodesia	1932 Dd
Chimanimani Mtns. Martins Falls	Mozambique	1933 Cc
Chimene River	Zambia	1727 Ca
Chimonzo	Mozambique	2533 Aa
Chimoyo	Rhodesia	1732 Ad
Chimwala	Malawi	1435 Ca
Chimwara Ranch	Rhodesia	1827 Cb
Chinakila	Zambia	0931 Ac
Chinamainza	Mozambique	1632 Ac
Chindi	Malawi	1635 Cc
Chingola	Zambia	1227 Db
Chiniziva	Mozambique	1835 Cc
Chinsali	Zambia	1032 Ca
Chimunka	Malawi	0933 Cb
Chinyamanda	Rhodesia	1932 Bd
Chinyamzara Hill	Rhodesia	1832 Db
Chinyanjera Mountain	Rhodesia	1832 Dc
Chinyika Reserve	Rhodesia	1731 Cd
Chipengali	Zambia	1332 Ba
Chipepo	Zambia	1627 Dd
Chipinda Pools	Rhodesia	2131 Bd
Chipinga	Rhodesia	2032 Ba
Chipoka	Malawi	1334 Dc
Chipondionwi	Rhodesia	1832 Dc
Chipongwe	Zambia	1528 Cb
Chipopera	Zambia	1331 Dd
Chiramba	Mozambique	1634 Dc

Chiradzulu Mountain	Malawi	1535 Ca
Chire River Bridge	Zambia	1033 Cd
Chiredzi	Rhodesia	2131 Ba
Chirinda Forest	Rhodesia	2032 Bc
Chirombedzi Creek	Malawi	1535 Cd
Chiromo	Malawi	1635 Ca
Chirundu	Zambia/Rhodesia	1628 Bb
Chirundu - 40 mls. NE	Zambia	1529 Ca
Chisamba	Zambia	1428 Cd
Chisansa	Zambia	0831 Cd
Chishela Dambo	Zambia	0830 Ca
Chishawasha	Rhodesia	1731 Cc
Chisi Lake	Zambia	0829 Dd
Chisumbanja	Rhodesia	2032 Cc
Chitala River	Malawi	1334 Cb
Chitora River	Rhodesia	1932 Bc
Chiundaponde	Zambia	1230 Bc
Chiuta Lake	Malawi	1435 Db
Chiwaka River	Rhodesia	1931 Dd
Chiweshe Reserve	Rhodesia	1731 Aa
Chizera	Zambia	1325 Aa
Chocha	Zambia	0829 Bd
Cholo Mountain	Malawi	1635 Aa
Choma	Zambia	1626 Dd
Chongwe River	Zambia	1528 Bc
Chowe	Malawi	1435 Ca
Chukudu	Bechuanaland	2223 Ad
Chukutsa Pans	Bechuanaland	2125 Ac
Chunga	Zambia	1426 Ca
Chupanga	Mozambique	1835 Ba
Clearwater Estate	Rhodesia	2032 Ba
Cleveland Dam	Rhodesia	1731 Cc
Clifton Estates	Rhodesia	1730 Ac
Cloudlands (Vumba Mountain)	Rhodesia	1932 Ba
Coguno	Mozambique	2434 Bc
Colleen Bawn	Rhodesia	2129 Aa
Comacha	Mozambique	1733 Cb
Concession	Rhodesia	1730 Bd
Gondo	Rhodesia	1932 Aa
Covane	Mozambique	2133 Bd
Criterion Mine	Rhodesia	2028 Bc
Cruzado	Mozambique	1834 Da
Dadaya	Rhodesia	2029 Bd



Damara Pan	Bechuanaland	2222 Ab
Darwendale	Rhodesia	1730 Da
Debeeti	Bechuanaland	2326 Cd
Dedza	Malawi	1434 Ad
Deka	Rhodesia	1826 Ad
Delagoa Bay	Mozambique	2532 Dc
Dett	Rhodesia	1826 Da
Devon Farm (Umtali)	Rhodesia	1932 Bc
Devuli River Bridge	Rhodesia	1932 Cc
Dikgomo di Kae	Bechuanaland	2424 Dc
Dimba Dambo	Zambia	1625 Db
Dombo	Rhodesia	1832 Ad
Domboshawa	Rhodesia	1731 Ca
Domio	Mozambique	1833 Cc
Dondo	Mozambique	1934 Da
Dondo - 5 mls. NW of	Mozambique	1934 Da
Dondo - 10 mls. NNW of	Mozambique	1934 Bc
Donnington Farm	Rhodesia	1830 Ba
Dora	Rhodesia	1932 Ba
Dorowa	Rhodesia	1931 Bb
Dott's Drift	Rhodesia	2032 Ca
Dovenby Estate	Rhodesia	2028 Ba
Dowa Division	Rhodesia	1831 Bd
Driefontein	Rhodesia	1930 Bc
Dube Ranch	Rhodesia	2128 Da
Dumela	Mozambique	2231 Ad
Dundumwenzi	Zambia	1626 Ca
Dzorora	Rhodesia	2032 Bc
Eagles Nest	Rhodesia	1831 Bb
Eastlands Farm	Rhodesia	1932 Ba
Eiffel Flats	Rhodesia	1829 Bd
Eldorado	Rhodesia	1730 Ac
Elephant Marsh	Malawi	1634 Bd
Empandene	Rhodesia	2027 Db
Enchisa	Mozambique	2632 Ac
Engwa	Rhodesia	1932 Bd
Enkeldoorn (+ 10 mls. SW of)	Rhodesia	1930 Bb
Erego	Mozambique	1637 Aa
Erego - 12 mls. S of	Mozambique	1637 Aa
Erin Forest Reserve	Rhodesia	1832 Bc
Essexvale	Rhodesia	2028 Bd

Fairfield (Umvuma)	Rhodesia	1930 Bc
Fakeji Stream	Zambia	1124 Ad
Fambani	Mozambique	1835 Bd
Farfell	Rhodesia	2032 Bd
Fatima Mission	Rhodesia	1827 Cb
Featherstone	Rhodesia	1830 Ad
Featherstone - 10 mls. N of	Rhodesia	1830 Da
Featherstone - 10 mls. S of	Rhodesia	1830 Dd
Feira	Zambia	1530 Ca
Felixburg Road	Rhodesia	1930 Db
Fermerenga	Mozambique	1632 Ad
Fern Hill	Rhodesia	1932 Ba
Fern Valley	Rhodesia	1932 Ba
Feruka	Rhodesia	1832 Dc
Figtree	Rhodesia	2028 Ad
Filabusi	Rhodesia	2029 Ch
Fishan	Rhodesia	2132 Ac
Fitete Stream	Zambia	1428 Dc
Foley	Bechuanaland	2127 Cb
Foley - 9 mls. S of	Bechuanaland	2127 Cb
Fort Hill	Malawi	0933 Cb
Fort Jameson	Zambia	1332 Da
Fort Jameson - 30 mls. N. of	Zambia	1332 Ba
Fort Johnston	Malawi	1435 Ad
Fort Johnston - 10 mls. SW	Malawi	1435 Ca
Fort Johnston - 15 mls. SSW	Malawi	1435 Ca
Fort Johnston - 15 & 20 mls. NW	Malawi	1435 Ac
Fort Manning	Malawi	1332 Dd
Fort Rosebery	Zambia	1128 Bb
Fort Victoria	Rhodesia	2030 Bb
Fort Victoria - 40 mls. S of	Rhodesia	2030 Da
Francistown	Bechuanaland	2127 Ba
Francistown - 40 mls. NW of	Bechuanaland	2027 Cc
Francistown - 12 mls. S of	Bechuanaland	2127 Bc
Freda Mine	Rhodesia	2028 Dd
Gabani	Bechuanaland	2425 Da
Gaberones	Bechuanaland	2425 Db
Gado	Rhodesia	1829 Dd
Gaerezi Bridge	Rhodesia	1832 Bb
Gande	Malawi	1635 Aa
Ganderowe Falls	Rhodesia	1729 Ac
Garuso	Mozambique	1833 Cc



Gatooma	Rhodesia	1829 Bd
Gatsi	Rhodesia	1832 Db
Gazuma Pan	Rhodesia	1825 Bc
Gemsbok Pan	Bechuanaland	2121 Da
Ghanzi	Bechuanaland	2121 Db
Gilston Estates	Rhodesia	1830 Bb
Glass Block	Rhodesia	2029 Ca
Glenclova	Rhodesia	1931 Cd
Glendale	Rhodesia	1731 Ac
Glen Lorne	Rhodesia	1731 Ca
Goha Hills	Bechuanaland	1824 Ac
Gokomere	Rhodesia	1930 Dd
Gokwe	Rhodesia	1828 Bb
Gomare	Bechuanaland	1922 Ac
Gomare - 15 mls. NE of	Bechuanaland	1922 Ab
Gomodimo	Bechuanaland	2223 Db
Gomodimo Pan	Bechuanaland	2223 Da
Gondola	Mozambique	1933 Ba
Gondola/Gorongosa Pontoon/Bridge	Mozambique	1834 Cc
Goonda	Mozambique	1934 Cc
Gorongosa Game Reserve	Mozambique	1834 Cd
Gorongosa Mountain	Mozambique	1834 Ac
Govuro River	Mozambique	2135 Ac
Grand Reef	Rhodesia	1832 Cd
Grudja	Mozambique	1934 Cc
Gubalala Pan	Rhodesia	1826 Dc
Guija	Mozambique	2432 Db
Gumba	Mozambique	1933 Dd
Gungunyana	Rhodesia	2032 Bc
Guro	Mozambique	1733 Ad
Gwaai River Bridge	Rhodesia	1827 Ca
Gwaai River Br. 4 & 5 mls W of	Rhodesia	1827 Ca
Gwaai River Br. 7 & 10 mls. SE of	Rhodesia	1827 Cb
Gwamayaya River	Rhodesia	1828 Da
Gwanda	Rhodesia	2029 Cc
Gwanda - 50 mls. SE of	Rhodesia	2129 Bc
Gwelo	Rhodesia	1929 Bd
Gwelo - 10 mls. N of	Rhodesia	1929 Ed
Gwembe	Zambia	1627 Bc
Haroni-Lusitu Confluence	Rhodesia	2033 Aa
Hartley	Rhodesia	1830 Ac
Hawling Farm	Rhodesia	1832 Cd

Heany	Rhodesia	2028 Bb
Heathfield Farm	Rhodesia	2029 Ad
Helvetia Farm	Rhodesia	1932 Bc
Henderson Research Station	Rhodesia	1730 Db
Hippo Mine	Rhodesia	2132 Aa
Hippo Mine - 6 mls E of	Rhodesia	2132 Ab
Holdenby	Rhodesia	1832 Bd
Holderness Farm	Rhodesia	1730 Ba
Hope Fountain	Rhodesia	2028 Ec
Horseshoe Block	Rhodesia	1630 Db
Hot Springs	Rhodesia	1932 Cb
Houtberg	Rhodesia	2032 Bc
Hukuntsi	Bechuanaland	2321 Dd
Hunters Road	Rhodesia	1929 Bb
Hunyani	Rhodesia	1730 Dd
Ibo Island	Mozambique	1240 Bc
Ikelenge	Zambia	1124 Ab
Ilamba River Bridge	Rhodesia	1826 Bc
Ilha dos Portugueses	Mozambique	2532 Dd
Ikombo	Zambia	0932 Ab
Imbesu Park	Rhodesia	2028 Bb
Imbeza	Rhodesia	1832 Dc
Inchope	Mozambique	1933 Bb
Ingondoma	Rhodesia	1829 Bd
Inhaca Island	Mozambique	2632 Bb
Inhacamba Island	Mozambique	1836 Cb
Inhambane	Mozambique	2335 Cd
Inhaminga	Mozambique	1835 Ac
Inhaminga - 8 mls NE of	Mozambique	1835 Ac
Inhaminga - 8 mls. S of	Mozambique	1834 Db
Inhaminga - 15 & 15 mls. SSW	Mozambique	1834 Db
Inhamitanga	Mozambique	1835 Aa
Inhassoro	Mozambique	2135 Ca
Insiza	Rhodesia	1292 Cc
Insuza Bridge	Rhodesia	1928 Cb
Inyanga	Rhodesia	1832 Ba
Inyanga National Park	Rhodesia	1832 B
" 1832 Ba - Nyamakanga Mountain		
" 1832 Bb - Inyangombe Source		
" 1832 Bc - Wicklow; Fruitfield; Rhodes Hotel; Park H.Q.; Reenen Estate		
" 1832 Bd - Nyamiziwa Falls; Nyangwe Fort; Mare Dam; Pungwe Source & Causeway.		



Inyanga Tea Estates	Rhodesia	1832 Bd
Inyanga North	Rhodesia	1732 Bd
Inyati	Rhodesia	1928 Db
Inyangani Mountain	Rhodesia	1832 Bd
Inyangombe Falls	Rhodesia	1832 Bc
Inyantue Bridge	Rhodesia	1826 Bc
Inyazura	Rhodesia	1832 Ca
Irene	Rhodesia	1832 Dc
Irisvale	Rhodesia	2029 Ca
Isango Game Reserve	Zambia	1130 Ba
Isoka	Zambia	1032 Ba
Isombo Stream	Zambia	1124 Ae
Jalopi Bridge	Rhodesia	1826 Bc
Jamaica Inn	Rhodesia	1731 Cd
Jantia Farm	Rhodesia	1932 Db
Jeki	Zambia	1529 Da
Jemembi Hill	Rhodesia	2129 Db
Jersey Estate	Rhodesia	2032 Bc
Jofane	Mozambique	2134 Ad
Jorge	Mozambique	1933 Dd
Jumbe	Zambia	1332 Ac
Kabende	Zambia	1129 Ba
Kabendwe	Zambia	0829 Cb
Kabompo	Zambia	1324 Ca
Kabulabula	Bechuanaland	1724 Dd
Kabuyu	Zambia	1726 Ac
Kabwe	Zambia	0829 Da
Kacholola	Zambia	1430 Da
Kafue	Zambia	1528 Cc
Kafue Pilot Polder	Zambia	1527 Dd
Kafulafuta	Zambia	1328 Bd
Kaitano	Rhodesia	1631 Bc
Kakia	Bechuanaland	2423 Cd
Kalabo	Zambia	1422 Dc
Kalakamati	Bechuanaland	2027 Cb
Kalene Hill	Zambia	1124 Aa
Kalenga	Zambia	1522 Ba
Kalichero	Zambia	1332 Cb
Kalikali	Zambia	1332 Bb
Kalomo	Zambia	1726 Ab
Kalomo Boma	Zambia	1626 Cd

Kalukushi	Zambia	1223 Cc
Kamanya Plain	Zambia	1224 Dd
Kamativi	Rhodesia	1827 Ac
Kampolombo Lake	Zambia	1129 Da
Kampoti Rapids	Rhodesia	1529 Db
Kandalila Falls	Zambia	1330 Bb
Kandarianze Pan	Rhodesia	1828 Ab
Kang	Bechuanaland	2322 Dd
Kang - 35 mls. W of	Bechuanaland	2322 Cd
Kaniki	Zambia	1228 Dc
Kanjanjesi Hills	Zambia	1332 Ba
Kanke Pan	Bechuanaland	2324 Da
Kanye	Bechuanaland	2425 Cd
Kanye - 32 mls W of	Bechuanaland	2424 Dd
Kanye - 41 mls. W of	Bechuanaland	2424 Dc
Kanyu Pans	Bechuanaland	2024 Bb
Kaotwe Pan	Bechuanaland	2223 Da
Kapalala	Zambia	1229 Ad
Kepamba River	Zambia	1331 Ab
Kapami	Rhodesia	1826 Bd
Kapami - 10 mls. SE of	Rhodesia	1826 Db
Kaputa	Zambia	0829 Bc
Kariba	Rhodesia	1628 Db
Kariba Lake - Bumi Confluence	Rhodesia	1628 Cd
Kariba Lake - Charara Confluence	Rhodesia	1628 Db
Kariba Lake - Chezia Confluence	Zambia	1627 Dd
Kariba Lake - Chimburu Confluence	Rhodesia	1727 Bb
Kariba Lake - Iufua Confluence		1628 Cb
Kariba Lake - Iulongwe Confluence		1727 Ba
Kariba Lake - Mwenda Confluence	Rhodesia	1727 Bb
Kariba Lake - Sanyati Confluence	Rhodesia	1628 Da
Kariba Lake - Sebungwe Confluence	Rhodesia	1727 Cc
Kariba Lake - Sengwa Sound	Rhodesia	1628 Cc
Kariba Lake - Sengwe Confluence	Rhodesia	1728 Aa
Karoi	Rhodesia	1629 Dc
Karonga	Malawi	0933 Dd
Kasama	Zambia	1031 Aa
Kasane	Bechuanaland	1725 Cc
Kasempa	Zambia	1325 Bd
Kasempa - 15 mls. S of	Zambia	1325 Db
Kasempa - 70 mls. S of	Zambia	1425 Bd
Kasempa - 25 mls. N of	Zambia	1325 Bb



Kasha	Zambia	1625 Bb
Kasumbadedza	Mozambique	1633 Ba
Kasungu	Malawi	1333 Ab
Kasusu	Zambia	1626 Cd
Katanda	Zambia	1625 Dd
Katete	Zambia	1432 Aa
Katete - 20 mls. W of	Zambia	1431 Bb
Katima-Mulilo	Zambia	1724 Ac
Katombora	Zambia	1726 Cd
Katumbi	Malawi	1033 Dc
Katundula	Zambia	1330 Ac
Kaungashi River	Zambia	1426 Ab
Kausi Village	Malawi	1435 Ca
Kavula Stream	Zambia	1626 Ca
Kawambwa	Zambia	0929 Cc
Kazungula	Rhodesia/Zambia	1725 Cc
Kenmaur	Rhodesia	1928 Aa
Kezi	Rhodesia	2028 Cd
Kezwa	Zambia	1527 Dd
Khami Ruins & Dam	Rhodesia	2028 Ab
Khami River Ranch	Rhodesia	2028 Ad
Kildonan	Rhodesia	1730 Bc
Kitwe	Zambia	1228 Cc
Kondowe	Malawi	1034 Ca
Kongwe Hill	Zambia	1332 Bb
Kota Kota (Kariba Lake)	Zambia	1628 Cc
Kota Kota	Malawi	1234 Cd
Kotwa	Rhodesia	1632 Dc
Kube Pan	Bechuanaland	2222 Bb
Kuke Pan	Bechuanaland	2324 Bc
Kukong	Bechuanaland	2423 Ac
Kutama	Rhodesia	1730 Cd
Kwaai River	Bechuanaland	1923 Ba
Kwakasipu	Rhodesia	1832 Dc
Kyle Lake	Rhodesia	2031 Aa
Ky Ky	Bechuanaland	2520 Dc
Lake Dow	Bechuanaland	2124 Bc
Lake Dow - 15 Mls. E of	Bechuanaland	2124 Bd
Lake Chilwa	Malawi	1535 Bc
Lake Kariba	Rhodesia	1628 Da
Lake McIlwaine	Rhodesia	1730 Db

Lake Ngami	Bechuanaland	2022 Bd
Lamego	Mozambique	1934 Ad
Lavushi Hills	Zambia	1230 Bd
Lechana - 15 mls NW	Bechuanaland	2227 Aa
Lechana - 4 mls. W	Bechuanaland	2227 Aa
Lealui	Zambia	1523 Aa
Legion Mine	Rhodesia	2128 Bc
Lehututu	Bechuanaland	2321 Dd
Leopard Rock	Rhodesia	1932 Bb
Lephepe	Bechuanaland	2325 Bd
Lephepe - 10 mls. NE	Bechuanaland	2325 Cb
Lephepe - 40 mls. NW	Bechuanaland	2225 Cd
Letlaking	Bechuanaland	2425 Aa
Letlaking - 10 mls. SE of	Bechuanaland	2425 Ac
Liambezi Lake	Caprivi	1724 Cd
Lichenya Plateau	Malawi	1535 Dc
Liciro	Mozambique	1636 Ac
Liciro - 10 mls. SE of	Mozambique	1636 Ca
Liciro - 30 mls. SE of	Mozambique	1636 Cb
Lifidzi	Mozambique	1434 Ca
Likabula River	Malawi	1535 Dc
Lilongwe	Malawi	1333 Dd
Limbe	Malawi	1535 Cc
Limpasa	Malawi	1134 Ca
Limpopo-Umzingwane Confluence	Rhodesia	2230 Bb
Liuwa Plain	Zambia	1422 Ad
Livingstone	Zambia	1725 Dd
Livingstonia	Malawi	1034 Ca
Liwonde	Malawi	1535 Aa
Lobatsi	Bechuanaland	2525 Ba
Lochard	Rhodesia	1929 Cc
Lochinvar	Zambia	1527 Cc
Lokaneng	Bechuanaland	2525 Aa
Lokwabe Pan	Bechuanaland	2421 Bb
Londe	Zambia	0831 Cd
Lonely Mine	Rhodesia	1928 Dd
Lourenco Marques	Mozambique	2532 Dc
Loxley Coombe Ranch	Rhodesia	1928 Bc
Lower Gwelo	Rhodesia	1929 Ad
Lower Luswishi River	Zambia	1327 Cb
Lower Mtarazi River	Rhodesia	1832 Db
Lower Nuanetsi River	Rhodesia	2231 Ab



Lower Pungwe Bridge	Mozambique	1934 Bc
Luala River Bridge	Mozambique	1635 Bd
Luambe Game Reserve	Zambia	1232 Cd
Luangwa Bridge	Zambia	1430 Cc
Luangwa Game Reserve	Zambia	1224 Dd
Luangwa-Lusungazi Confluence	Zambia	1331 Bc
Luangwa-Mtilika Confluence	Zambia	1330 Dd
Luanshya	Zambia	1328 Ab
Lubungu Pontoon	Zambia	1326 Cd
Luembe	Zambia	1430 Ad
Lujeri	Malawi	1635 Ba
Lukashashi River	Zambia	1430 Ac
Lukosi	Rhodesia	1826 Ad
Lukosi River Bridge	Rhodesia	1826 Bc
Lukulu Swamps	Zambia	1130 Cc
Lukusuzi Game Reserve	Zambia	1232 Dc
Lulimala River	Zambia	1230 Aa
Lumane	Rhodesia	2029 Cc
Lumbo	Mozambique	1540 Ba
Lundazi	Zambia	1233 Ac
Lundazi - 15 mls. NE of	Zambia	1233 Ab
Lundi River Bridge	Rhodesia	2030 Dd
Lundi-Tokwe Confluence	Rhodesia	2131 Ab
Lupane	Rhodesia	1827 Dd
Lupane - 10, 18, 20 mls. NW of	Rhodesia	1827 Dc
Lupane - 10 mls. E. of	Rhodesia	1827 Dd
Lupane - 7, 10, 15 mls. SE of	Rhodesia	1927 Bb
Lurio	Mozambique	1436 Dd
Lusaka	Zambia	1528 Ad
Lusaka - 37 mls. W of	Zambia	1527 Bc
Lusaka - 50 mls. ENE of	Zambia	1529 Ac
Lusaka East	Zambia	1528 Ad
Lusaka West	Zambia	1528 Ac
Lusita-Nyhodi Confluence	Rhodesia	2032 Bb
Lusongwa (Luansongwe) River	Zambia	1224 Cc
Lusungazi	Zambia	1331 Bc
Lutope Gorge	Rhodesia	1828 Aa
Lutope River	Rhodesia	1828 Bc
Mabate	Bechuanaland	2228 Bb
Mabeleapudi	Bechuanaland	2022 Dc
Maboane - 10 mls. W of	Bechuanaland	2324 Da

Mabua sufhubi Pan	Bechuanaland	2522 Aa
Macanga	Mozambique	1533 Bd
Machaze	Mozambique	2033 Cd
Machaze - 15 mls. WSW of	Mozambique	2033 Cc
Macheke	Rhodesia	1831 Bb
Machile Forest Reserve	Zambia	1625 Cc
Machipanda	Mozambique	1832 Dd
Machuma	Bechuanaland	2125 Ba
Machuma - 10 mls. S of	Bechuanaland	2125 Ba
Machumbi Pan	Bechuanaland	2122 Ab
Macia	Mozambique	2533 Aa
Macloutsie	Bechuanaland	2127 Cb
Macuti	Mozambique	1934 Dd
Madinare	Bechuanaland	2127 Dd
Madinare - 10 mls. S of	Bechuanaland	2227 Bb
Mafora	Mozambique	1933 Ba
Magaiza	Mozambique	2333 Db
Magasso	Mozambique	1633 Cc
Magoye	Zambia	1627 Ba
Magude	Mozambique	2532 Ba
Mahalapye	Bechuanaland	2326 Bb
Maitengwe	Bechuanaland	2026 Bb
Majinji Pan	Rhodesia	2130 Bc
Makaha	Rhodesia	1732 Bc
Makalamabedi	Bechuanaland	2023 Bd
Makarikari Salt Pan	Bechuanaland	2026 Ac
Makheke Mountains	Bechuanaland	2929 Ab
Makore Farm	Rhodesia	1932 Ba
Makosa	Rhodesia	1631 Da
Makumbi	Rhodesia	1731 Cb
Makurupini River	Rhodesia	2033 Aa
Makuti	Rhodesia	1629 Ac
Makwa (Makhe)	Bechuanaland	2126 Cb
Makwiro	Rhodesia	1730 Cd
Malapati	Rhodesia	2231 Ab
Malei	Mozambique	1737 Aa
Maleme Dam	Rhodesia	2028 Da
Malimbasingi	Rhodesia	1828 Ac
Malimbasingi - 11 mls S of	Rhodesia	1828 Ac
Malimbasingi - 12 mls. SW of	Rhodesia	1828 Ac
Malimbasingi - 35 mls. SW of	Rhodesia	1827 Db
Malombe Lake (West)	Malawi	1435 Ca



Mamathes	Bechuanaland	2927 Ba
Mambone	Mozambique	2035 Cc
Mambova	Zambia	1725 Ca
Mambwe	Zambia	0931 Bb
Mana Pools	Rhodesia	1529 Cb
Mana Pools Road	Rhodesia	1529 Cd
Manama Mission	Rhodesia	2128 Db
Manda Mountain	Rhodesia	1832 Ca
Mandie	Mozambique	1633 Bc
Manga	Mozambique	1934 Dd
Manga Reserve (East)	Rhodesia	1832 Db
Mangula Mine	Rhodesia	1630 Cc
Mangwe Pass	Rhodesia	2028 Ca
Manhica	Mozambique	2532 Bd
Mankoya	Zambia	1424 Dd
Manyera Farm	Rhodesia	1932 Ba
Manyinga River	Zambia	1324 Ad
Manyoli Ranch	Rhodesia	2129 Bc
Mapembe Peak	Rhodesia	1932 Ab
Mapulanguene	Mozambique	2432 Ac
Maqueze	Mozambique	2433 Bc
Maramba Reserve	Rhodesia	1731 Bb
Marandellas	Rhodesia	1831 Ba
Maranke Reserve (West)	Rhodesia	1932 Ac
Mare Dam	Rhodesia	1832 Bd
Marimba	Malawi	1333 Ab
Maringa	Mozambique	2133 Bc
Marromeu	Mozambique	1835 Bd
Marshi	Zambia	1622 Ad
Marungudzi	Rhodesia	2230 Ba
Maryland	Rhodesia	1730 Cb
Masanga Hill	Rhodesia	1832 Db
Masanjere	Malawi	1635 Ac
Mashaba	Rhodesia	2030 Ab
Mashie	Zambia	1526 Cb
Masieni	Mozambique	2533 Ba
Massanga	Mozambique	1733 Aa
Massangena	Mozambique	2133 Aa
Massangulo	Mozambique	1335 Cd
Matapa Pan	Bechuanaland	2324 Bc
Matara	Mozambique	1933 Dc

Matareca	Mozambique	1833 Cb
Mateke Hills	Rhodesia	2131 Cc
Matemo Island	Mozambique	1240 Ba
Matetsi	Rhodesia	1825 Bd
Matetsi River Bridge	Rhodesia	1826 Aa
Matinedza	Rhodesia	1832 Ac
Matjemloeji	Bechuanaland	2127 Bd
Matlale	Mozambique	2432 Bd
Matope	Malawi	1534 Bd
Matopos	Rhodesia	2028 Ad
Matopos Research Station	Rhodesia	2028 Ad
Matopos South	Rhodesia	2028 Dc
Matowa Hill	Rhodesia	1732 Ba
Matundo	Mozambique	1633 Ba
Matusadona Reserve	Rhodesia	1628 Dc
Mauele	Mozambique	2434 Ac
Maun	Bechuanaland	1923 Cd
Maun - 100 mls. E of	Bechuanaland	1924 Dd
Maun - 100 mls. S of	Bechuanaland	2123 Ad
Mavue	Mozambique	2132 Ad
Maweni	Zambia	1332 Bc
Mavita	Mozambique	1933 Ca
Mavita - 15 mls. E of	Mozambique	1933 Cb
Maxixe	Mozambique	2335 Cd
Mazabuka	Zambia	1527 Dd
Mazabuka - 15 mls. E of	Zambia	1933 Cb
Mazamba	Mozambique	1834 Bd
Mazambo	Mozambique	2332 Da
Mazonwe	Rhodesia	1932 Eb
Mazoe	Rhodesia	1730 Db
Mbala	Zambia	1431 Bc
Mbati	Zambia	1130 Bb
Mbo Island	Zambia	1129 Dd
Mchenga	Malawi	1535 Bc
Mchingwe Bridge	Rhodesia	2029 Bd
Melfort	Rhodesia	1731 Cd
Melsetter	Rhodesia	1932 Dd
Menonde	Mozambique	2632 Ab
Metambanhe	Mozambique	2034 Da
Metengo Balema	Mozambique	1434 Dc
Metolola	Mozambique	1635 Da
Metolola - 15 mls SW of	Mozambique	1635 Da



Metsinaklaba River	Bechuanaland	2425 Db
Metuchira	Mozambique	1933 Bd
Mezi (Mese) River	Mozambique	1530 Ab
Mfuwe	Zambia	1331 Cd
M'Gaza	Mozambique	1735 Ab
Mhanda Mountain	Mozambique	1833 Ba
Miami	Rhodesia	1629 Db
Michiru Mountain	Malawi	1534 Db
Mikolongwe	Malawi	1535 Cc
Milambo	Zambia	1129 Db
Misuku Mountains	Malawi	0933 Cb
Mitucue Mountain	Mozambique	1436 Da
Miware Grove	Rhodesia	1630 Dd
Mkanda	Zambia	1332 Db
Mkoma Farm	Zambia	0831 Cc
Mkota Reserve	Rhodesia	1632 Dd
Mkushi	Zambia	1329 Cb
Mlanje Boma	Malawi	1635 Ba
Mlanje Mountain	Malawi	1535 Dc
Mlembo River	Zambia	1230 Ca
M'Mouve	Bechuanaland	2126 Dc
MIolo	Malawi	1635 Ac
<b>Mnena</b>	Malawi	1334 Cb
Moamba	Mozambique	2532 Ca
Moatize	Mozambique	1633 Bb
Mocimboa da Praia	Mozambique	1140 Ad
Mocuba	Mozambique	1636 Dd
Mochudi	Bechuanaland	2426 Ac
Modima Hill	Rhodesia	1932 Ba
Mohambe	Mozambique	2433 Cb
Mohembo	Bechuanaland	1821 Bd
Molepolole	Bechuanaland	2425 Ad
Monape	Mozambique	1440 Cd
Monkey Bay	Malawi	1434 Bb
Monte Cassino	Rhodesia	1831 Bb
Moodie's Pass	Rhodesia	1931 Dc
Mookane	Bechuanaland	2326 Dc
Morrumbala	Mozambique	1735 Bc
Morrumbala - 14 mls. W of	Mozambique	1735 Ad
Morrumbala Mountain	Mozambique	1735 Ad
Moshi Camp	Zambia	1426 Ac
Mossuril	Mozambique	1440 Dc

Motadi Pan	Bechuanaland	2324 Dc
Motlhatlogo	Bechuanaland	2022 Bd
Mount Darwin	Rhodesia	1631 Dc
Mount Dombo	Rhodesia	1832 Ad
Mount Hampden	Rhodesia	1730 Db
Mount Rudd	Rhodesia	2032 Ab
Mount Silinda	Rhodesia	2032 Bc
Mozambique Island	Mozambique	1540 Ba
Mpata Gorge	Rhodesia	1530 Ca
Mpatamanga Gorge	Malawi	1534 Da
Mpemba Mountain	Malawi	1534 Dd
Mpika	Zambia	1131 Cd
Mpomwa	Zambia	1332 Ad
Mporokoso	Zambia	0930 Ac
Mpudzi Bridge	Rhodesia	1932 Bc
Mpulungu	Zambia	0831 Cc
Mrewa	Rhodesia	1731 Db
Mrewa - 16 mls. NE	Rhodesia	1731 Bd
Msandile	Zambia	1332 Bc
Msango	Rhodesia	1628 Db
Msofu River	Zambia	1329 Ca
Msoro	Rhodesia	1632 Dc
Msoro	Zambia	1331 Db
Mtao Forest	Rhodesia	1930 Bc
Mtarazi Falls	Rhodesia	1832 Bd
Mtarazi Bridge	Rhodesia	1832 Db
Mterize (Mtirize) River	Zambia	1430 Bd
Mtilika River	Zambia	1330 Dd
Mtimbuka	Malawi	1435 Ac
Mtoko	Rhodesia	1732 Ac
Mtoko - 7 & 10 mls. NE of	Rhodesia	1732 Ad
Mtoko - 25 mls. NE of	Rhodesia	1732 Ab
Mtoko - 35 mls. NE of	Rhodesia	1732 Ba
Mtoko - 25 mls. WSW	Rhodesia	1731 Db
Mtorashanga	Rhodesia	1730 Ba
Mtoroshanga Pass	Rhodesia	1730 Ba
Mtundurundu Hill	Rhodesia	1831 Cb
Muanza	Mozambique	1834 Dd
Muchinga Escarpment	Zambia	1331 Ac
Mucombeze River	Mozambique	1834 Da
Muda	Mozambique	1934 Ad
Mufulira	Zambia	1228 Ca



Mufuwe Lagoon	Zambia	1331 Bb
Mugeba	Mozambique	1637 Ca
Mugeba -- 10 & 15 mls. N of	Mozambique	1637 Ac
Mukupa	Zambia	0829 Cd
Mulanga	Zambia	1625 Cc
Mulilansolo	Zambia	1032 Ab
Mulobezi	Zambia	1625 Cc
Mulungushi Dam	Zambia	1428 Db
Muluvira	Mozambique	1530 Db
Mumbo Island	Malawi	1334 Dd
Mumbwa	Zambia	1427 Cc
Mungari	Mozambique	1733 Ba
Mungari 8 & 12 mls. SW	Mozambique	1733 Ad
Mungari -- 10 & 15 mls W.	Mozambique	1733 Ab
Mungari -- 12 mls. WNW	Mozambique	1733 Ab
Munikazi River	Zambia	1130 Da
Munwa	Zambia	0829 Db
Munyaadzi River	Zambia	2131 Bd
Mupapate River Bridge	Rhodesia	1831 Bb
Murchison Falls	Malawi	1534 Bd
Muriel Mine	Rhodesia	1730 Ba
Musami	Rhodesia	1731 Dd
Musaswi River	Rhodesia	2032 Cd
Mushandike Dam	Rhodesia	2030 Ba
Mutambara	Rhodesia	1932 Da
Mutanda	Zambia	1226 Ad
Mutarara	Mozambique	1735 Ac
Mutareca	Mozambique	1833 Cb
Mutinsase River	Zambia	1331 Ad
Mutsu	Bechuanaland	2125 Bb
Mutuali	Mozambique	1437 Cc
Mutwamina Island	Zambia	1130 Cb
Mvuradona Mountains	Rhodesia	1631 Ac-d
Mwambeshi	Zambia	0831 Cd
Mwandi	Zambia	1724 Db
Mwanza	Malawi	1534 Da
Mwekera Forest Reserve	Zambia	1228 Cd
Mwengwa	Zambia	1526 Ac
Mweru Wantipa	Zambia	0829 Db
Mwesi Stream	Zambia	1626 Dc
Mwinilunga	Zambia	1124 Cb
Myawa	Malawi	0933 Dd

Mzarabani Reserve	Rhodesia	1630 Bb
Mzimba	Malawi	1133 Dc
Mzuzu	Malawi	1134 Ac
Nabaunama Dam	Mozambique	1538 Bd
Nabwalya	Zambia	1232 Ac
Naguema	Mozambique	1440 Dc
Nahunwe Confluence	Zambia	1628 Cb
Naivasha Pan	Rhodesia	2131 Da
Nakalombwe	Zambia	1526 Cc
Nalatale Ruins	Rhodesia	1929 Dc
Namaacha	Mozambique	2532 Cc
Namecuna	Mozambique	1437 Dc
Namialo	Mozambique	1439 Dd
Nampini	Rhodesia	1725 Cd
Nampula	Mozambique	1539 Ab
Nampula - 30 mls. ENE of	Mozambique	1539 Ba
Nampula - 20 mls. WNW of	Mozambique	1539 Aa
Namuava	Mozambique	1636 Dd
Namwala	Zambia	1526 Cb
Nansenga	Zambia	1526 Da
Nanzila Flats	Zambia	1626 Aa
Nata	Bechuanaland	2026 Aa
Nata - 20 mls. N of	Bechuanaland	1926 Cc
Nata - 5 mls. N of	Bechuanaland	2026 Aa
Nata - 78 mls. W of	Bechuanaland	2025 Aa
Nata - 5 mls. S, 9 mls. SE of	Bechuanaland	2026 Ac
Nata River	Bechuanaland	1926 Dc
Ncema Dam	Rhodesia	2029 Ac
Nchalo	Malawi	1634 Bb
Nchanga	Zambia	1227 Db
Nchenachena	Malawi	1034 Cc
Nchisi Island	Malawi	1535 Bc
Nchisi Mountain	Malawi	1334 Ac
Ndirande Mountain	Malawi	1535 Cc
Ndola	Zambia	1228 Dc
Nelson South	Rhodesia	1932 Ab
Nembudzia	Rhodesia	1729 Cc
New Year's Gift	Rhodesia	2032 Ba
Ngambwe Rapids	Zambia	1724 Ac
Ngamo	Rhodesia	1927 Ab
Nganda Mountain (Nyika)	Malawi	1033 Bd



Ngoma	Zambia	1525 Dd
Ngoma Kurriwa	Rhodesia	1731 Ca
Ngorima Reserve	Rhodesia	2032 Bb
Nguihaba Hills	Bechuanaland	2020 Ab
Ngose-Kabompo Confluence	Zambia	1324 Dd
Ngundu	Rhodesia	2030 Dd
Nharuchonga	Mozambique	1934 Aa
Nicudadala	Mozambique	1736 Db
Nicudadala - 5 mls. N of	Mozambique	1736 Db
Nkai	Rhodesia	1928 Bb
Nkala	Zambia	1525 Dd
Nkata Bay	Malawi	1134 Cb
N'Kate	Bechuanaland	2026 Aa
Nkazi River	Malawi	1435 Cc-d
Nkhanda	Zambia	1332 Ba
Nkula Falls	Malawi	1534 Db
Nokaneng	Bechuanaland	1922 Cb
Norton	Rhodesia	1730 Dc
Nossob River - 20 mls above	Bechuanaland	
Auob Confluence		2620 Bb
" 40 mls. above Auob Confluence		2520 Dd
" 60 mls. above Auob Confluence		2520 Dc
Notwani-Limpopo Confluence	Bechuanaland	2326 Dd
Novo Freixo	Mozambique	1436 Dc
Nsama	Zambia	0829 Dd
Nsefu	Zambia	1331 Bb
Nsumbu Island	Zambia	1130 Aa
Ntabezinduna	Rhodesia	2028 Bb
Ntamma	Zambia	1625 Dd
Nuanetsi	Rhodesia	2130 Bc
Nuanetsi Gorge	Rhodesia	2131 Cd
Nyachowa Falls	Rhodesia	1932 Ba
Nyadiri	Rhodesia	1732 Ac
Nyagari Farm	Rhodesia	1832 Dc
Nyahodi Bridge	Rhodesia	1932 Dd
Nyakasanga Gorge	Rhodesia	1629 Aa
Nyakikwa Confluence	Zambia	1224 Db
Nyalugwe	Zambia	1430 Cb
Nyarakanga	Rhodesia	1832 Ba
Nyarakari	Rhodesia	1932 Bb
Nyamandhlovu	Rhodesia	1928 Cd
Nyamandhlovu - 10 & 15 mls. NW of	Rhodesia	1928 Ca
Nyamandhlovu - 15 mls. WSW	Rhodesia	1928 Cc

Nyamapambere Bridge	Rhodesia	1832 Ca
Nyamaropa Reserve	Rhodesia	1732 Dd
Nyamashatu River	Rhodesia	1932 Ba
Nyamazi	Rhodesia	1832 Bc
Nyamaziwa	Rhodesia	1832 Bd
Nyambeza Plain	Zambia	1124 Ac
Nyamkolo	Zambia	0831 Ca
Nyampanda	Rhodesia	1632 Dd
Nyaratedzi River Bridge	Rhodesia	2030 Aa
Nyika Plateau	Malawi	1033 Db
Nyika Plateau	Zambia	1033 Da
Nyimba	Zambia	1430 Db
Odzani	Rhodesia	1832 Da
Odzani Falls & Dam	Rhodesia	1832 Dc
Odzi	Rhodesia	1832 Cd
Okwa River	Bechuanaland	2223 Ac
Old Umtali	Rhodesia	1832 Dc
Ootsi	Bechuanaland	2425 Dc
Outward Bound School	Rhodesia	1932 Dd
Pafuri	Mozambique	2231 Ad
Pachanza	Rhodesia	1631 Bd
Palane	Mozambique	1737 Cc
Palapye Road	Bechuanaland	2227 Ca
Palm Beach	Malawi	1435 Ac
Panda	Mozambique	2434 Ba
Panda-ma-Tenga	Bechuanaland	1825 Da
Panda-ma-Tenga - 88 mls. SW of	Bechuanaland	1924 Bc
Park Farm (Umtali)	Rhodesia	1932 Ba
Pendela River	Zambia	1628 Bc
Penhalonga	Rhodesia	1832 Dc
Petauke	Zambia	1431 Ab
Petauke Old Boma (pre 1934)	Zambia	1431 Aa
Piro	Mozambique	1834 Ad
Plumtree	Rhodesia	2027 Bd
Plumtree - 20 & 30 mls. NNW of	Rhodesia	2027 Ba
Pompola	Zambia	1324 Ba
Ponta do Calichane	Mozambique	2632 Aa
Ponta do Ouro	Mozambique	2632 Dd
Ponte do Pungwe	Mozambique	1934 Bc



Port Herald	Malawi	1635 Cd
Porto Amelia	Mozambique	1240 Cd
Porto Henrique	Mozambique	2632 Ad
Pounsley	Rhodesia	1832 Cd
Prince Edward Dam	Rhodesia	1731 Cc
Pungwe Gorge	Rhodesia	1832 Db
Pungwe River Causeway	Rhodesia	1832 Dc
Quedas do Revue	Mozambique	1933 Da
Queen's Mine	Rhodesia	1928 Dc
Quelimane	Mozambique	1736 Dd
Que Que	Rhodesia	1829 Dd
Que Que - 8 mls. W of	Rhodesia	1829 Dc
Querimba Island	Mozambique	1240 Bc
Quissanga	Mozambique	1240 Ad
Quitangonha Island	Mozambique	1440 Dd
Rainham Farm	Rhodesia	1730 Dd
Rakops	Bechuanaland	2124 Ab
Rakops - 20 mls. W of	Bechuanaland	2124 Aa
Ramatamusa Pan	Bechuanaland	2025 Bb
Redbank	Rhodesia	1928 Cd
Redcliff	Rhodesia	1929 Bb
Redcliff Island (Kariba Lake)	Rhodesia	1628 Db
Reenen	Rhodesia	1832 Bc
Rekomitjie Research Station	Rhodesia	1529 Cc
Revue Siding	Mozambique	1833 Cc
Ribaue	Mozambique	1438 Cd
Ribaue - 20 mls. E of	Mozambique	1438 Dc
Ribaue - 30 mls W of	Mozambique	1437 Dd
Rikatla	Mozambique	2532 Da
Rongwe Mountain	Rhodesia	2031 Cd
Rowa Division	Rhodesia	1932 Ba
Ruenya River Drift	Rhodesia	1732 Bd
Ruenya River - 10 mls. NW of	Rhodesia	1732 Bd
Rufensa	Zambia	1529 Ba
Rukute Farm	Rhodesia	1630 Cc
Rukuzi Dam	Zambia	1332 Bd
Rumpi	Malawi	1133 Bb
Rundu Farm (Sabi River)	Rhodesia	1831 Cb
Ruo Gorge	Malawi	1535 Dc
Rupisi Hot Springs	Rhodesia	2032 Ad

Rusape	Rhodesia	1832 Ca
Ruware	Rhodesia	2031 Da
Ruarwe	Malawi	1134 Aa
Ruziruhuru River (Upper)	Rhodesia	1727 Db
Sabelua	Mozambique	1635 Bd
Sabi Experimental Station	Rhodesia	2032 Ad
Sabi-Lundi Confluence	Rhodesia	2132 Ad
Sabi-Macheke Confluence	Rhodesia	1931 Bb
Sabi-Makuni Confluence	Rhodesia	1932 Ac
Sabi-Tsungwesi Confluence	Rhodesia	1932 Aa
Saffron Waldon	Rhodesia	1730 Dd
Sakeji Stream	Zambia	1124 Ac
Salima	Malawi	1334 Cd
Salisbury	Rhodesia	1731 Cc
Samo	Mozambique	1833 Da
Samfya	Zambia	1129 Bc
Sandaula Plain	Zambia	1522 Bd
San Mine	Rhodesia	1826 Bd
Santa Carolina Island	Mozambique	2135 Cc
Sanyatwe	Rhodesia	1832 Bc
Sao Martinho	Mozambique	2533 Ad
Sasare	Zambia	1331 Cd
Savane	Mozambique	1935 Ca
Sawmills	Rhodesia	1928 Ca
Sayiri	Zambia	1332 Cd
Sebena	Bechuanaland	2027 Cc
Sehitwa	Bechuanaland	2022 Bc
Sehitwa - 50 & 54 mls. NW of	Bechuanaland	1922 Cc
Sekuma Pan	Bechuanaland	2423 Dd
Selborne Estates	Rhodesia	1832 Da
Selous	Rhodesia	1830 Ab
Selukwe	Rhodesia	1929 Db
Sena	Mozambique	1735 Ac
Senanga	Zambia	1623 Ab
Sengwe Gorge	Rhodesia	1828 Aa
Sentinel Ranch	Rhodesia	2229 Ba
Sepopa	Bechuanaland	1822 Ca
Serenje	Zambia	1330 Ab
Serondela	Bechuanaland	1724 Dd
Serowe	Bechuanaland	2226 Bc
Sesheke	Zambia	1724 Ad



Sevrolela	Bechuanaland	2424 Dd
Sevuti River	Bechuanaland	1823 Db
Shabani	Rhodesia	2030 Ac
Shakalonga (Sikalonga)	Zambia	1625 Bb
Shakawe	Bechuanaland	1821 Bd
Shaleshonto	Bechuanaland	1923 Bb
Shamva	Rhodesia	1731 Bc
Shangani	Rhodesia	1929 Cd
Shangwenani	Rhodesia	2130 Dd
Shapi Pans	Rhodesia	1826 Dc
Shashi-Limpopo Confluence	Rhodesia	2229 Ab
Shashi-Shashani Confluence	Rhodesia	2128 Db
Shavanowe River Bridge	Rhodesia	1731 Da
Sheba	Rhodesia	1832 Dd
Shiloh	Rhodesia	1928 Dc
Shimwi	Zambia	1324 Bb
Shorobe	Bechuanaland	1923 Dc
Siantamba	Zambia	1626 Cb
Siatwinda	Zambia	1727 Ad
Siesta Farm	Rhodesia	2028 Bc
Silverstreams	Rhodesia	1932 Dc
Simamba	Zambia	1628 Bc
Sinazongwe	Zambia	1727 Ab
Sinjal	Mozambique	1734 Bb
Sinjembele	Zambia	1723 Ac
Sinkukwe	Rhodesia	2029 Ca
Sinoia	Rhodesia	1730 Ac
Sinoia - 20 mls. N of	Rhodesia	1730 Aa
Sinoia Caves	Rhodesia	1730 Ac
Sipolilo	Rhodesia	1630 Db
Sipolilo - 12 mls. ESE of	Rhodesia	1630 Db
Sitwe	Zambia	1033 Ca
Skyline Junction	Rhodesia	1932 Dc
Sofala (Nova)	Mozambique	2034 Ba
Solusi	Rhodesia	2028 Aa
Solwezi	Zambia	1226 Ab
Solwezi - 40 mls. E of	Zambia	1226 Bd
Somabula	Rhodesia	1929 Da
Songwe River	Zambia	1725 Dd
Soti Source	Rhodesia	1931 Ac
Springvale (Dulawayo)	Rhodesia	2028 Bb
Stanmore	Rhodesia	2029 Ca

Stapleford	Rhodesia	1832 Db
St. Swithin's Block	Rhodesia	1732 Da
Strathmore	Rhodesia	2029 Ca
Sua Pan	Bechuanaland	2026 Cc
Sunnyside	Bechuanaland	2122 Ca
Sun Yat Sen Mine	Rhodesia	2128 Bc
SWA/BP Border 24°S : 20°E	Bechuanaland	2420 Aa
Syringa	Rhodesia	2028 Ac
Tamafupi	Bechuanaland	1924 Ac
Tamafupi - 20mls. N of	Bechuanaland	1924 Aa
Tandaaai	Rhodesia	1932 Db
Tangadzi River	Malawi	1635 Ac
Tanganda River Bridge	Rhodesia	2032 Ab
Taoghe River	Bechuanaland	2022 Ab
Tarka	Rhodesia	1932 Dd
Taylors Block Ranch	Rhodesia	2028 Cc
Tegwani	Rhodesia	2027 Bd
Tengani	Malawi	1635 Cb
Tete	Mozambique	1633 Ba
Tete - 45 mls. ENE of	Mozambique	1534 Cd
Tete - 30 mls. ENE of	Mozambique	1534 Cc
Tete - 25 mls. ENE of	Mozambique	1633 Bb
Tete - 5 mls E - 5 mls. W of	Mozambique	1633 Ba
Tete - 12 & 15 mls. SSW of	Mozambique	1633 Bc
Thorn Park (Salisbury)	Rhodesia	1731 Ca
Tica	Mozambique	1934 Ad
Tierpub (Tierputs)	Bechuanaland	2121 Cd
Tilbury Estate	Rhodesia	1932 Dd
Titumi	Bechuanaland	2027 Ac
Tjolotjo	Rhodesia	1927 Dd
Tod's Hotel	Rhodesia	2129 Bc
Tokwe Bridge	Rhodesia	2030 Bc
Tokwe Bridge- 19 mls. S of	Rhodesia	2030 Da
Toronto	Rhodesia	1832 Dc
Toten	Bechuanaland	2022 Bd
Towani	Bechuanaland	2226 Dd
Trelawney	Rhodesia	1730 Cb
Triangle	Rhodesia	2131 Ab
Troutbeck	Rhodesia	1832 Bb
Tsangara Pan	Bechuanaland	1925 Cd
Tseu	Bechuanaland	2022 Ad



Tsessebe	-	2027 Dc
Tsetsera	Rhodesia	1932 Bd
Tsabong	Bechuanaland	2622 Ab
Tshane	Dechuanaland	2421 Bb
Tshutsuwa Pan	Bechuanaland	2421 Aa
Tsodilo Hill	Dechuanaland	1821 Dc
Tsotsoroga Pan	Bechuanaland	1824 Cb
Tsungwesi	Rhodesia	1832 Cc
Tsungwesi River (Lower)	Rhodesia	1932 Aa
Tsuro	Rhodesia	1632 Dc
Tuli	Rhodesia	2129 Cc
Tuli Hill Reservoir	Rhodesia	2028 Bc
Tumbi Island West	Malawi	1434 Bb
Turk Mine	Rhodesia	1928 Db
Tynwald	Rhodesia	1730 Dd
Twee Rivieren	Dechuanaland	2620 Bc
Ulungu Mountain	Zambia	1430 Ad
Umbeluzi	Mozambique	2632 Ab
Umfeseri	Rhodesia	1831 Bb
Ungusan River Bridge	Rhodesia	1928 Cd
Umiati	Rhodesia	1829 Db
Umtali	Rhodesia	1832 Dc
Umtali - 14 mls. NW of	Rhodesia	1832 Dc
Umtali - 3 & 10 mls. S of	Rhodesia	1932 Ba
Umtali - 25 mls. S of	Rhodesia	1932 Bc
Umvukwes	Rhodesia	1730 Bb
Umvuma	Rhodesia	1930 Bc
Umvuma - 10 mls. NE of	Rhodesia	1930 Ba
Umvumvumu River	Rhodesia	1932 Da
Umzilizwe River	Rhodesia	2032 Bc
Upper Pungwe Bridge	Rhodesia	1832 Dd
Upper Pungwe River	Rhodesia	1832 Bd
Urungwe Reserve	Rhodesia	1629 Cd
Valindre	Rhodesia	2028 Bc
Vanduzi	Mozambique	1833 Cd
Van Zyls Cutting	Bechuanaland	2122 Ca
Victoria Falls	Rhodesia	1725 Dd
Victoria Falls - 25 mls. W of	Rhodesia	1725 Cd
Victoria Falls - 8 mls. W of	Rhodesia	1725 Dc
Victoria Falls - 20 mls. WNW of	Rhodesia	1725 Dc

Victoria Falls - 10, 15 & 20 mls		
WSW of	Rhodesia	1725 Dc
Victoria Falls - 15 mls. SSE of	Rhodesia	1825 Bb
Vila Bocage	Mozambique	1735 Ad
Vila Bocage - 30 mls. N of	Mozambique	1735 Ab
Vila Coutinho	Mozambique	1434 Cb
Vila de Manica	Mozambique	1832 Dd
Vila Fontes	Mozambique	1735 Ad
Vila Gouveia	Mozambique	1833 Aa
Vila Gouveia - 10 & 20 mls. ESE of	Mozambique	1833 Ab
Vila Gouveia - 8 & 12 mls. SSE of	Mozambique	1833 Aa
Vila Junqueiro	Mozambique	1536 Bd
Vila Junqueiro - 15 mls. NW of	Mozambique	1536 Bd
Vila Machado	Mozambique	1934 Ac
Vila Mouzinho	Mozambique	1434 Cd
Vila Paiva de Andrada	Mozambique	1834 Ca
Vila Paiva de Andrada - 25 mls		
NE of	Mozambique	1834 Ad
Vila Pery	Mozambique	1933 Ab
Vila Pery - 5 mls NW, 10 mls. SW	Mozambique	1933 Ab
Vila Pery - 10 mls. WNW	Mozambique	1933 Ab
Viola	Mozambique	1633 Cb
Vipya Plateau	Malawi	1133 Dd
Vleiplaats	Rhodesia	2032 Ba
Vlei Topan	Bechuanaland	2424 Cd
Vumba Mountain	Rhodesia	1932 Bb
Vwaza Marsh	Malawi	1033 Cd
Waddilove Mission	Rhodesia	1831 Ad
Wankie - 5 mls. NW, 15 mls. W of	Rhodesia	1826 Ad
Wankie - 15 mls. E of	Rhodesia	1826 Bc
Wankie National Park (Balla		
Balla Pan)	Rhodesia	1826 Db
Wankie National Park, Main Camp	Rhodesia	1826 Db
"    " (Nyamandhlovu Pan)	Rhodesia	1826 Dd
Wankurumadzi Bridge	Malawi	1534 Da
Warren Hills	Rhodesia	1730 Dd
Watsomba	Rhodesia	1832 Da
Wedza	Rhodesia	1831 Cc
Wedza - 12 mls. SW of	Rhodesia	1831 Cb
Wedza Mountain	Rhodesia	1831 Da
Weltevreden Farm	Rhodesia	1932 Db



Wengesi Bridge	Rhodesia	1932 Da
Westacre	Rhodesia	2028 Ad
West Nicholson	Rhodesia	2129 Ab
West Sebungwe	Rhodesia	1727 Cc
Whitewaters (Umtali)	Rhodesia	1932 Bc
Wick Farm	Rhodesia	1832 Ad
Wiltshire Estate	Rhodesia	1831 Cc
Wolf Hills	Bechuanaland	2127 Bc
Woodlands	Rhodesia	2028 Bd
Woodvale	Rhodesia	1928 Dc
Worlds View Matopos	Rhodesia	2028 Bc
Xiluvo	Mozambique	1934 Aa
Yahokwe Mountain	Rhodesia	1832 Ba
Yongolo	Zambia	1129 Dd
Zambezi-Bumi Confluence	Rhodesia	1628 Cd
Zambezi-Charara Confluence	Rhodesia	1628 Cd
Zambezi-Chewore Confluence	Rhodesia	1529 Db
Zambezi-Matetsi Confluence	Rhodesia	1826 Ba
Zambezi Mouth	Mozambique	1836 Cd
Zambezi-Sebungwe Confluence	Rhodesia	1727 Cc
Zambezi-Senkwe Confluence	Rhodesia	1529 Db
Zana Farm	Rhodesia	1630 Db
Zembe Mountain	Mozambique	1933 Ad
Zewa Farm	Rhodesia	1832 Ba
Zezani	Rhodesia	2129 Cb
Zimba	Zambia	1726 Ac
Zimbabwe	Rhodesia	2030 Bd
Ziyambe	Rhodesia	1931 Bb
Zobue	Mozambique	1534 Cb
Zobue - 5 & 10 mls. SW of	Mozambique	1534 Cb
Zobue - 15 mls. SW	Mozambique	1534 Cd
Zobue - 25 & 35 mls. SW of	Mozambique	1534 Cc
Zomba & Zomba Plateau	Malawi	1535 Ad
Zomba - 10 mls. SW of	Malawi	1535 Ac
Zongoro Bridge	Rhodesia	1832 Dc
Zongwe River	Zambia	1727 Bc
Zumbo	Mozambique	1530 Cb
Zuruni (Melsetter)	Rhodesia	1932 Dc
Zweizwe River	Bechuanaland	1824 Cb

ADDENDA

Andara	Caprivi Strip	1821 Ab
Bambata Cave	Rhodesia	2028 Cb
Braganca	Mozambique	1434 Ad
Bushman Pits	Bechuanaland	2024 Ab
Butler North Farm	Rhodesia	1932 Bd
Chama	Zambia	1133 Aa
Chibabava	Mozambique	2033 Bc
Chipili	Zambia	1029 Ca
Chituta	Mozambique	1533 Cb
Chizarira Range	Rhodesia	1727 Dc
Cungena	Bechuanaland	2022 Ad
Danger Hill	Zambia	1131 Da
Dekar	Bechuanaland	2121 Db
Fort Usher	Rhodesia	2028 Bc
Furancungo	Mozambique	1433 Dc
" , 30 mls NNW	Mozambique	1433 Db
Fwambo	Zambia	0831 Dc
Glengles	Rhodesia	1832 Bd
Gogoi	Mozambique	2033 Ac
" , 20 mls E	Mozambique	2033 Ad
Honde Valley	Rhodesia	1832 Db
Kalambo Falls	Zambia	0831 Ca
Kalungu River Bridge	Zambia	0932 Cc
Kana River	Rhodesia	1828 Cb
Kasanka Game Reserve	Zambia	1230 Ca
Killarney Mine	Rhodesia	2029 Cb
Kwebe Hills	Bechuanaland	2023 Ca
" , 15 mls N	Bechuanaland	2023 Ac
Luano Valley	Zambia	1429 Ca
Lukungu	Mozambique	1432 Bb
Lusulu	Rhodesia	1827 Bb
Luwingu	Zambia	1029 Bd
Mandabusa	Bechuanaland	1825 Aa
Mandala	Malawi	1535 Cc
Maputo	Mozambique	2632 Cc
Masaiti	Zambia	1328 Ad
Matibi	Rhodesia	2131 Cb
Mazepa Mine	Rhodesia	2029 Cc
Mbete Bay	Zambia	0831 Cc
Missale	Mozambique	1432 Bb
Mongu	Zambia	1523 Ac
Mpimbe	Malawi	1535 Ac



Murambene	Rhodesia	2132 Ad
Muzinga River	Rhodesia	1832 Bd
Mwambeshi River	Zambia	1428 Cd
Mwenzu	Zambia	0932 Bc
Nsombo	Zambia	1029 Dd
Orkney Farm	Rhodesia	1932 Bb
Palla Road	Bechuanaland	2326 Bc
Palma	Mozambique	1040 Cd
Quissico	Mozambique	2434 Da
Ramaquabane River	Rhodesia - Bechuanaland	2027 Da
Ruvuma Bay (= Ruvuma Bay)	Mozambique	1040 Ad
Rukore	Rhodesia	1632 Da
Sehitwa - 14 mls W	Bechuanaland	2022 Bc
Sumbu	Zambia	0830 Ca
Tivuli Spring	Rhodesia	1828 Aa
Triashill	Rhodesia	1832 Ad
Tselenyane Pan	Bechuanaland	2022 Db
Tunduma	Zambia	0932 Bd
Vila Gamito	Mozambique	1432 Bb
Vila Luisa	Mozambique	2532 Db
Vila Vasco da Gama	Mozambique	1432 Cd
Vumba Mountain	Mozambique	1832 Dd