

# NOTES ON A COLLECTION OF REPTILES FROM ZAMBIA AND ADJACENT AREAS OF THE DEMOCRATIC REPUBLIC OF THE CONGO

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## ABSTRACT

The Port Elizabeth Museum collection holds nearly 500 reptile specimens from Zambia and adjacent south-eastern Democratic Republic of the Congo. These are reviewed, and biological and distribution data on 5 chelonians, 27 lizards and 38 snake species from Zambia are presented. These include information on 2 chelonians, 11 lizards and 19 snake species recorded from the poorly-known northern Mwinilunga District, Northwestern Province. Among the important findings are: the second largest specimen of and second Zambian locality for the dwarf terrapin, *Pelusius nanus*, with details on the first documented data on reproduction and sperm retention; the close proximity, without intergradation, of *Lygodactylus heenei* and *L. angularis* supporting elevation of the former to specific status; a range extension of about 345km and the most northerly record (Chingola) for the gecko *Lygodactylus chobiensis*; a north-westerly range extension of more than 300km (to Chingola) for the gecko *Hemidactylus mabouia* (both these records may be translocations); the third and fourth records for Zambia, and the most southern to date, for the gecko *Pachydactylus tuberculatus*; the first detailed biological information on the rare skink, *Mabuya ivensii*, which was first collected from Zambia during these collections; asynchronous reproduction in Sakeji populations of both *Mabuya maculilabris* and *M. wahlbergii*; a southern range extension to Shimabala for the rare skink *Eumecia anchietae*; a range extension for the skink *Lygosoma afrum* to Sampfy town; the first record of *Ichnotropis capensis* in the Copperbelt, and a north-westerly range extension of more than 300km to Chingola; the absence of asynchronous reproductive cycling between *Ichnotropis capensis* and *I. bivittata* in July at Sakeji; support for the specific status of *Limnophis bangwolicus* based on differences in colouration of the supralabials and subcaudals; new record sizes for both sexes of *Dipsadoboa shrevei shrevei*; a new record size for female *Psammophis brevirostris leopardinus*; and probable sympatry between *Naja annulifera* and its sister species *N. anchietae* at Livingstone.

**Keywords:** Herpetofauna, Zambia, Democratic Republic of the Congo

## INTRODUCTION

For the student of African herpetology, in many ways, Zambia remains an enigma. Bordered by the rich tropical rainforest of the Congo drainage in the west and by a series of rift valley lakes and isolated escarpments in the east, Zambia has a wealth of habitats and hosts a diverse herpetofauna. It could thus be expected to have attracted scientific attention, and yet it remains one of the most poorly documented herpetofaunas on the continent.

Among the first reports, Peracca (1896; 1910) listed material collected in the former Barotseland (now the Western Province of

Zambia), including the description of *Psammophis jallae*. He later documented material collected by Duchess Elene d'Aosta (Peracca, 1912), while Boulenger (1907) reported on a collection made in the Eastern Province. Angel (1920, 1921, 1922) commented on further Barotseland specimens and described a number of new species, including *Tetradactylus ellenbergeri*. It was not until 1934 that the first checklist of the herpetofauna of Zambia appeared, tucked away in Pitman's (1934) *Report on a faunal survey of Northern Rhodesia*. Subsequent reports included those of Loveridge (1933) on a small collection from the Northern

Province, and of Mertens (1937) on the herpetofauna of the Lake Bangweulo area. Vesey-FitzGerald's (1958) review of the Zambian snakes was followed by Broadley and Pitman (1960) on snakes collected in the Northern Province, and Wilson's (1965) account of a large collection of snakes from the Eastern Province. The herpetofauna of the Nyika plateau was reviewed by Stewart and Wilson (1966).

Broadley (1971a; 1973) was the first to attempt a modern summary of the Zambian herpetofauna, followed by reports on a large collection from the Northwestern Province (Broadley, 1991a, 1991b). Since then the remaining literature has consisted of anecdotes on individual species (e.g. Haagner, 1994) and additions to the Zambian herpetofauna (e.g. Broadley, 1983a; Branch & Haagner, 1993).

The Mwinilunga region in northwestern Zambia forms a pedicle wedged between Angola and Democratic Republic of the Congo (DRC) and was until recently one of the most poorly known regions in Zambia. A collection of reptiles and amphibians collected by Broadley (1991a,b) partly redressed this situation. However, Broadley's collections were made during the wet summer months and did not survey the herpetofauna present during the dry winter season. Between 7-25 July 1991, two of us (GH & AH) undertook a general collecting trip to the same area. Specimens were also obtained from areas of the adjacent Democratic Republic of the Congo. Several short trips were also made into the Central, Copperbelt and Luapula Provinces, where sporadic collecting was done. Additional specimens, collected subsequently around Chingola and from the Luiwa Plains are included. Miscellaneous historical material present in the Port Elizabeth Museum, particularly early collections by E Knowles-Jordan (1927-28, 39 specimens) and H Bredo (1943-45, 84 specimens), supplement the report (Additional material). Much of Knowles-Jordan's material consists of chelonians, including types, previously housed in the Albany Museum, Grahamstown.

#### METHODS

Most material, except for a small series donated to the A J L Lambiris Herpetological Collection (AJL) in Kwazulu-Natal, has been deposited into the herpetological collection of the Port

Elizabeth Museum (PEM). Some comparative material from the Natural History Museum, Bulawayo (NZM), and the Transvaal Museum, Pretoria (TM), was examined. Details regarding the collecting localities are provided in the gazetteer (Appendix 1 and Fig.2). All localities listed in "Material examined" and "Additional material" are Zambian, unless otherwise noted. Snake ventral counts employ the Dowling (1951) system.

Biological data were mainly collected from recent material. The number of eggs counted in gravid snakes is presented as 12(7/5), representing total (right/left oviduct). Prey was identified to the lowest possible taxon, but in the case of the lizards, of which the diet consisted mainly of invertebrates, prey items were only identified to higher taxonomic categories (Alexander, 1968).

#### OBSERVATIONS

##### CHELONIA:

##### PELOMEDUSIDAE

*Pelusios nanus* Laurent 1956

**Material examined:** PEM R7248 (adult female), R7223 (hatchling and egg) - Sakeji School, Northwestern Province (1124AB). The female was retained alive in captivity. She had a carapace length of 119.4mm, plastron length of 104.5mm and weighed 259.2gm at the time of her death.

**Reproduction:** In April 1992, 10 months after capture, the female laid five eggs. Biometrics for the eggs are presented elsewhere (Haagner, 1994). It was the first report for reproduction in the species and the first of sperm retention in an African pelomedusid.

**Notes:** This is the second largest known specimen (Broadley, 1991a), and the second Zambian locality (Broadley, 1971a, 1991b). The species is more widespread in Angola and the DRC (Iverson, 1992).

*Pelusios rhodesianus* Hewitt 1927

**Additional material:** PEM R9590-91, 12373-75 - Mpika, Eastern Province (1131Cd), E Knowles-Jordan.

**Notes:** Broadley (1971a) records it as widespread throughout Zambia in swamps and pans. Five specimens form the types series of *Pelusios nigricans rhodesianus* Hewitt 1927. Hewitt did not specify a holotype from Knowles-Jordan's Mpika series. Broadley (1981)

designated Hewitt's figured specimen as the lectotype (AM 5432; re-accessioned PEM R12373); the remaining specimens become paralectotypes. He noted (Broadley, 1981) that the type material came from either south-east of Lake Bangweulu or from the Chambeshi River.

*Pelusios sinuatus* (A Smith 1838)

**Additional material:** PEM R9593, 12376 - Isoka, Northern Province (1032Ba); PEM R9596 - Luangwa Valley; PEM R9598 - Mpika, Eastern Province (1131Cd), E Knowles-Jordan.

**Notes:** Broadley (1971a) recorded it as widespread through Zambia in rivers and lakes. Four specimens form the types series of *Pelusios sinuatus leptus* Hewitt 1933. Hewitt did not specify a holotype from Knowles-Jordan's series and Broadley (1981) designated Hewitt's figured specimen as the lectotype (AM no number; re-accessioned PEM R12376); the remaining specimens become paralectotypes.

*Pelusios subniger* (Bonnaterre 1879)

**Additional material:** PEM R9594 - Swamps near Luangwa River, Mulilo, Eastern Province (1033Da); PEM R9599 - Luangwa Valley, Eastern Province; PEM R9600 - Chiwale, Luangwa Valley, Eastern District; PEM R9601-3 - Mpika, Eastern Province (1131Cd); PEM R9605 - Zambia, E Knowles-Jordan.

**Notes:** Broadley (1971a) recorded it as widespread throughout Zambia in swamps, pans and small dams.

#### TESTUDINIDAE

*Kinixys spekii* Gray 1863

**Material examined:** PEM R6437 - 32km NE Mufilira, south-eastern DRC (1228Ba); PEM R6539 - Sakeji School, Northwestern Province (1124Ab). PEM R6539 (adult male) - carapace length 120.8mm, plastron length 110.4mm, shell length/height ratio of 2.07. A live male from the same locality had a carapace length of 154.7mm, plastron length of 132.1mm and shell length/height ratio of 2.24. PEM R6437 (sub-adult female) - carapace length of 112.4mm, plastron length of 89.7mm, shell length/height ratio of 2.36; plastron with dark, patterns radiating out towards the sutures; prominent ridge mid-dorsally on the carapace.

**Additional material:** PEM R14946-14947 - Isoka, Northern Province (1032Ba), E Knowles-Jordan (types of *Kinixys jordani* Hewitt 1931).

PEM R15020-22, 15024-25 - Isoka, Northern Province (1032Ba), E Knowles-Jordan; PEM R15023 - Isoka Plateau (1385m), E Knowles-Jordan; PEM R15026, 15028-29, 15031 - 95km east of Isoka, Luangwa Valley, E Knowles-Jordan; PEM R15030 - Luangwa Valley, near Isoka, E Knowles-Jordan; PEM R15027 - probably Isoka, E Knowles-Jordan; PEM R15032 - Noengo, Mulilo, Isoka District, E Knowles-Jordan.

**Diet:** The adult female had the skin and pips of berries and remains of millipedes in her faeces.

**Notes:** Hewitt did not specify a holotype. Broadley (unpublished) designated Hewitt's figured female specimen (Hewitt, 1931, xxxvii, Figs.7&9) as the lectotype (AM 5794; re-accessioned PEM R14946) and this is followed here. The remaining specimen (AM 5794; re-accessioned PEM R14947) becomes the paralectotype. Hewitt (1931) mentions six other specimens from the Isoko region in the type description. These are probably included with the other specimens listed, but it is not possible to distinguish which these specimens are.

#### SAURIA:

##### GEKKONIDAE

*Lygodactylus angularis* Günther 1893

**Material examined:** PEM R6268, 6270-71, 6273, 6275, 12484-85, 12493 - Chingola, Copperbelt Province (1227Bd); PEM R6269, 6272, 6276 - Chililabombwe, Copperbelt Province (1227Bd), PEM R12504-507 - Kitwe, Copperbelt Province (1228Cc), PEM R12508 - Ndola, Copperbelt Province (1227Bd): 6 males, 8 females and 3 sub-adults; snout/vent length of largest female 38mm (PEM R6274, R6275), and of largest male 81(37+44)mm. Nasals usually 3 (2 in PEM R6272), internasals 1, postmentals 2, lamellae under fourth toe 5, mental without clefts, rostral and first labial contacting the nostril. Unfortunately only three specimens had original tails giving a SV/tail ratio of 0.971 (range 0.857-1.058). Most specimens with yellow infusion on the throat with dark parallel lines. Throat pattern of PEM R6274 is diffuse, lower labials mottled with maroon and cream, back reddish grey, belly cream with scattered flecks, extending on ventral surface of tail, and under the limbs.

**Additional material:** PEM R7895 - Luangwa East, Eastern Province (1332Ad); PEM R1995 - Mbala, Northern Province (0831CD), H Bredo.

**Diet:** Only three of ten stomachs were empty.

The largest number of prey items in a single stomach was 8 (7 weevils and 1 pupae), whereas one stomach (PEM R6269) contained three prey species. The majority of prey items were Coleoptera (5), Diptera (5) (including maggots and pupae), Hemiptera (.), termites (2), Hymenoptera (4), Isoptera (1). Some of the stomachs also contained sand.

**Reproduction:** All females with 1 ova each per oviduct, ranging from 2.3-5.5mm in July to 4.6-4.8mm in December. During July only one male (PEM R6268) had mature testes; in two other males the testes were small and inactive. The smallest sexually mature male had a SVL of 32 mm. Other adult males had inactive testes during August (PEM R7895) and January (PEM R12504). During January a communal nest was found in an old car wreck with 18 fresh eggs and several hatched shells. Twelve undamaged eggs were collected and measured: length, mean 6.88mm, SD 0.13mm; width, mean 5.73mm, SD 0.13mm; not weighed. Although the eggs were retained and incubated, they failed to hatch. An adult female laid two eggs on 8 January, but these failed to hatch and were accessioned (PEM R12507). Their measurements fell within the ranges given above.

**Notes:** Although these arboreal geckos were collected basking on buildings and suburban trees during the day, they were often observed at night catching insects around outdoor lights, where they easily outnumbered *Hemidactylus mabouia*.

*Lygodactylus heeneri* Witte 1933

**Material examined:** PEM R6266 - 32km north-east of Mufilira, south-eastern DRC (1228Ba): 1 female measuring 70(38+32)mm with 3 nasals, rostral and first labial contacting the nostril, internasals 1, mental without clefts, postmentals 2, lamellae under fourth toe 6, preanal pores 7. Dorsum and base of tail with grey/brown vermiculations, throat pattern diffuse.

**Diet:** The stomach contained a small beetle and remains of a grasshopper.

**Note:** As the above population occurs in very close proximity to *L. angularis* without signs of intergradation, *L. heeneri* is best treated as a full species (Broadley, pers. comm.). It extends into adjacent Zambia at Sakeji (Broadley, 1991a).

*Lygodactylus capensis capensis* (A Smith 1849)

**Material examined:** PEM R12615 - Lealui pontoon, Zambezi River, Western Province, (1522Bb); PEM R12616-17 - Mongo, Western Province (1523Ac); PEM R12618, 12620-Situnda Pan, Luiwa Plains National Park, Western Province (1422Da); PEM R12608 - Mumbwa, Central Province (1527Ab): 3 males and 3 females with 2 nasals, internasals 2, mental with lateral cleft, postmentals 3, preanal pores 6, lamellae under fourth toe 5, throat with irregular grey stippling.

**Additional material:** PEM R1996, 2197-98 - Lusaka, Central Province (1528Ad).

**Diet:** Only two stomachs were empty. The majority of prey items were Diptera (2) (including 1 maggot), Hymenoptera (3), Coleoptera (1), Orthoptera (2) and Isoptera (1). Simbotwe and Garber (1979) reported that Hymenoptera comprised 60% and Orthoptera 40% of the diet in *L. capensis* from the Dambwa Forest Reserve (1725Dd). The stomachs of two specimens (PEM R12615-16) contained skin pieces indicating keratophagy.

**Reproduction:** Only one female was gravid, with a single egg measuring 3.4x2.4mm.

*Lygodactylus chobiensis* FitzSimons 1932

**Material examined:** PEM R6267 - Chingola, Copperbelt Province (1227Bd); PEM R8864, 9030-31-Shesheke, Western Province (1724Cb); PEM 12607 - Chirundu border post, Southern Province (1628Cc); PEM R12612-14 - Kalabo town, Western Province (1422Dc); PEM R12619 - Situnda Pan, Luiwa Plains National Park, Western Province (1422Da); PEM R12626-Kalala Lodge, Lake Itzhi-Tezhi, Southern Province (1526Cc); PEM R12627 - Ngoma Camp, Kafue National Park, Southern Province (1525Dd); PEM R12628 - Musangwa lodge, Lake Itzhi-Tezhi, Southern Province (1526Cc); PEM R13810, 13838 - Gwabi Lodge, Kafue River, Southern Province (1528Dd): 18 adult specimens, largest male measuring 87(44+43)mm and the largest female 72(40+32)mm, and 2 hatchlings. Mental without clefts, rostral excluded from nostril. Colour pattern: faintly mottled background, with 2 series of 6-7 pale cream spots along either side of midbody. Vague dark brown stripe from nostril through the eye to the fore limb. Throat with double dark lines parallel to lower jaw.

**Additional material:** PEM R2193-96 - Lusaka, Central Province (1528Ad).

**Diet:** Only four stomachs contained food items. The majority of prey items were Diptera (2), Hymenoptera (2), Orthoptera (2), Isoptera (1).

**Reproduction:** Two females (PEM R2193-94) with small developing ova (<1mm); males with small, inactive testes (largest 3.6x2.1mm) during June. One female (PEM R8864) laid two eggs in the bag several days after collecting during January 1994. These measured 6.94x4.93mm, were incubated on damp tissue paper and hatched during the first week of March 1994. The hatchlings (PEM R9030-31) on average measured 26.56(14.8+11.7)mm. Haagner (1992) recorded similar egg sizes from a female collected at Kariba, Zimbabwe.

**Parasites:** None. Simbotwe (1983) reported nematodes (*Pharyngodon* sp.) from the stomach of a Lochinvar National Park specimen (1527Cd).

**Notes:** This species is largely restricted to the upper and middle Zambezi valley, but Broadley (1971a) also recorded it at Lusaka. The Chingola specimen is a range extension of about 345km and appears to be the most northerly record for the species. The possibility of accidental human translocation for the Lusaka and Chingola specimens cannot be ruled out (Broadley, pers. comm.).

*Hemidactylus mabouia* (Jonnés 1818)

**Material examined:** PEM R6330, 12486-88 - Chingola, Copperbelt Province (1227Bd); PEM R12492 - Lufwanyama farm, District Chingola, Copperbelt Province (1227Da); PEM R13874 - Gwabi Lodge, Kafue River, Southern Province, Sambia (1528Dd); PEM R12624-25 - Lufupa Camp, Kafue National Park, Northwestern Province, (1426Ca); PEM R12634 - Kalala Lodge, Lake Itzhi-Tezhi, Central Province (1526Cc); PEM R12606 - Kabulonga, Lusaka, Central Province (1528Ad); PEM R13874 - Gwabi Lodge, Kafue River, Southern Province (1528Dd): 7 adult males, the largest measuring 114(54+60)mm, and 2 adult females, the largest measuring 99(55+44)mm. Collected on buildings at night; several others seen but not collected. PEM R7153-54 is in a poor condition and partly mummified. One female (PEM R12606) has a partly regenerated bifurcate tail (sections measuring 16mm and 7mm respectively).

**Additional material:** PEM R7153-54 - Isoka, Northern Province (1032Ba); PEM R7152 - Luangwe valley, Eastern Province Zambia (1332Ad); PEM R1998 - Lusaka, Central Province (1528Ad).

**Diet:** Six specimens had identifiable prey items including Isoptera (3), Diptera (2), Lepidoptera (2), Coleoptera (2). PEM R7153 with a large (22mm) flying ant (Hymenoptera); PEM R12624 with two small spiders. The stomachs of two specimens (PEM R12625 and R12606) with pieces of skin, indicating keratophagy.

**Reproduction:** The testes of a male collected in July (PEM R6330) measured 6.73mm, whereas those of R7153 measured only 3.27mm in August, and of R12625 3.8mm in October. Two females collected in October with two eggs each, measuring 9.7x6.2mm.

**Parasites:** Stomach of female (PEM R12606) contained a nematode (14mm).

**Notes:** Although Broadley (1971a, 1977c) recorded this species as widespread in the low-lying areas of Zambia, no previous records appear to exist for the Copperbelt Province. The Chingola records indicate a north-westerly range extension of more than 300km.

*Pachydactylus punctatus* Peters 1954

**Material examined:** PEM R8865 - 27km west of Livingstone, Southern Province (1725Da); young adult female measuring 57(31+26)mm. Colour: above light brown with dark spots and confluent blotches. Below white with light upper labials.

*Pachydactylus tuberculatus* (Boulenger 1894)

**Material examined:** PEM R6329 - Nchelenge town, Luapula Province (0929Bc): adult female, total length 140(70+70)mm with original tail, collected while it was catching insects on a building under a light at night.

**Additional material:** PEM R1994 - Mbala, Northern Province (0831Cd), H Bredo: adult male with snout-vent length 52mm.

**Diet:** The female's stomach held 18 mosquitoes (Diptera) and 8 ants (Hymenoptera), whereas the male's stomach held a grasshopper.

**Reproduction:** The female had one egg in each oviduct, of 11.34x7.03mm and 9.45x7.43mm. The male's testes measured 4.6x2.9mm.

**Notes:** Broadley (1971a) recorded this species from the Northern Province at Nyamkolo (0831Ca) and Chiengi (0829Ca). These are only the third and fourth records for Zambia, and the Nchelenge record is the most southern to date.

**AGAMIDAE**

*Acanthocercus atricollis* (A Smith 1849).

**Material examined:** PEM R6360-66, 6369-70, 6372-73 - Sakeji School, Northwestern Province

(1124Ab); PEM R7125 - Musenga village, Copperbelt Province (1227Db); PEM R6367-68, 6371 - Sanolumbwa village, 46km north-east of Sakeji, south-eastern DRC (1124Ba): 6 males, 4 females and 5 juveniles. Largest male measured 351(146+205)mm and weighed 137.8gm; the largest female measured 305(135+170)mm and weighed 87.6gm. Two largest males (PEM R6371, 6368) with distinct bulge with heavily keratinized scales at base of tail, absent in juveniles and most females, although the largest female (PEM R6365 - snout-vent length 135mm) has enlarged scales at the base of the tail, but lacks the swelling. The reason for this sexual dimorphism is unknown, but may be related to aggressive male interaction. Juveniles with higher (0.823, SD. 0.036, range 0.776-0.864) SV/tail length ratio than adult females (0.819, SD. 0.035, range 0.794-0.844) and adult males (0.762, SD. 0.047, range 0.733-0.833).

**Additional material:** PEM R12315-17 - Isoka, Northern Province (1032Ba).

**Diet:** Only one adult specimen had an empty stomach; the largest number of prey species in any stomach was 5, and one stomach (PEM R6371) contained numerous black ants (6gm in total weight). The prey items included Coleoptera (5), Diptera (1), Hymenoptera (6), Orthoptera (3), Lepidoptera (3), Iscptera (1) and a small spider. Most important prey items were ants and caterpillars, which were present in all stomachs.

**Parasites:** The stomach of one large male (PEM R6371) contained numerous nematodes.

**Reproduction:** All adult males with mature testes; three adult females with numerous ova in July (mean 15, maximum 23) measuring 2-3mm in diameter.

*Agama armata* Peters 1854

**Material examined:** PEM R6263 - Sampfya Mission, Luapula Province (1129Bc): young male, length 111(50+61)mm; collected under building rubble; gular pattern reticulated.

**Additional material:** PEM R442-4, 447 - Mbala, Northern Province (0831Cd), H Bredo; PEM R12307-15 - Isoka, Northern Province (1032Ba), E Knowles-Jordan; PEM R2000-2003, Lusaka, Central Province (1528AD).

**Diet:** The stomach contained the remains of a cricket (Orthoptera).

**Parasites:** The stomach contained one small (8mm) nematode.

**Notes:** Jacobsen (1992) revised the *Agama aculeata armata* complex and elevated *A. armata* to full specific status, distinguishing it from *A. aculeata* on the basis of its dark reticulate gular pattern. However, there seems to be intergradation between the two patterns in Zimbabwe, and *distanti* may be a subspecies of *A. armata* (Broadley et al., 1998).

#### CHAMAELEONTIDAE

*Chamaeleo dilepis dilepis* Leach 1819

**Material examined:** PEM R6249-50, AJL 3608 - Sakeji School, Northwestern Province (1124Ab): 1 adult male and 2 adult females. The male (AJL 3608) measured 158(86+72)mm; largest female (PEM R6250) measured 225(120+105)mm. Other specimens were observed but not retained.

**Additional material:** PEM R551, 1285, 9000-2 - Lusaka, Central Province (1528AD); PEM R1287, 1289, 1302-4 - Mpokoros, Northern Province (0930Ac); PEM R1307-13 - Mbala, Northern Province (0831Cd); H Bredo.

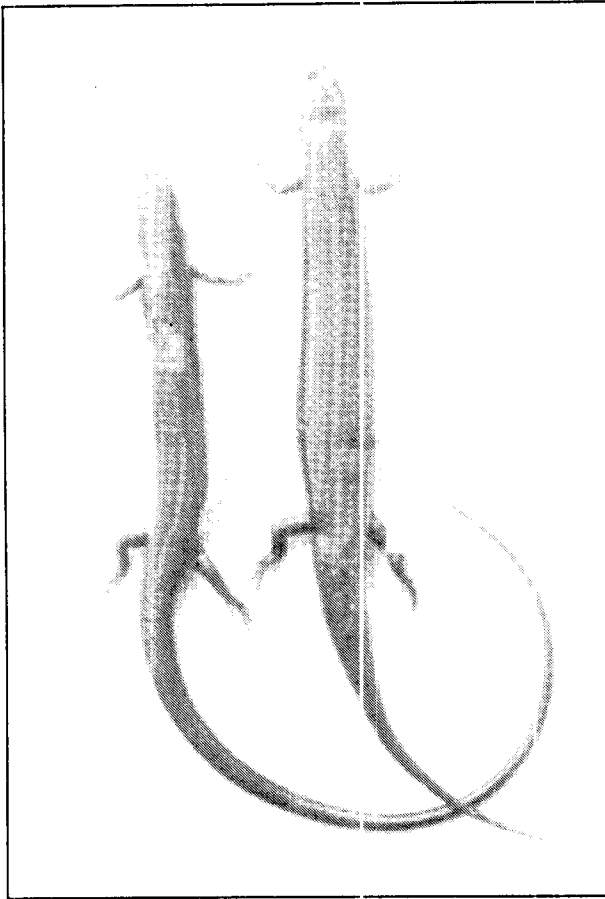
**Diet:** All stomachs contained food. Prey items included Coleoptera (1), Orthoptera (3), Hemiptera (1), and a small spider; grasshoppers were recorded in all stomachs.

**Reproduction:** The male's testes were 5.2mm in length and inactive; no female with mature ova.

#### SCINCIDAE; LYGOSOMINAE

*Mabuya ivensii* (Bocage 1879)

**Material examined:** PEM R6342, 6344-50, NMZB 11826-27, AJL 3602, 3606 - Sakeji School, Northwestern Province (1124Ab), PEM R6343 - Salolumba village, 46km north-east of Sakeji, south-eastern DRC (1124Ba); 8 males, 12 females, 7 juveniles. The SV/tail ratio of juveniles 1.93-2.08 (mean 2.03). Adults are sexually dimorphic: males with an average snout-vent length of 93.5mm, the largest male (PEM R6348) having a total length of 385(120+265)mm, giving a SV/tail ratio of 1:2.21; females with an average SVL of 115.6mm, the largest having a SVL of 148mm (PEM R6344; Fig.1). This specimen had a partly-regenerated tail of 125mm and weighed 52.4gm. The largest female with an original tail would have measured approximately 444mm in total length. The previous maximum size for the species was a female of 407(138+ 269)mm from Alto Cuilo, Angola (Laurent, 1964). A full description on scutellation and colour is given in Branch and Haagner (1993).



**Figure 1.** Adult male *Mabuya ivensii* (left - PEM R6348) and female (PEM R6344), showing sexual dimorphism and elongate habitus.

**Diet:** Only one of the 21 specimens had an empty stomach (two specimens were too damaged for their gut contents to be analysed). The maximum number of prey items in any stomach was five (in three stomachs). The commonest prey items were beetles, although grasshoppers were present in 61.11% of stomachs containing food. Prey items included: Coleoptera (13), Curculionidae (1), Orthoptera (11), Hemiptera (3), Lepidoptera larvae (3), Diptera (3), Odonata (2), Isoptera (2) and Araneae (7). A newly-metamorphosed, unidentified striped hypercliid (9mm snout-urostyle length) was found in the stomach of one female (PEM R6352). Two large females (PEM R6354, 6346) contained extensive skin pieces (belly, flanks and limbs). It appeared to be conspecific, indicating keratophagy. Manacas (1963) noted spiders, hemipterans and beetles in the stomachs of two adults from Luso (= Luena).

**Parasites:** Gut nematode loads were very low, and only three specimens had single

nematodes in their stomachs.

**Reproduction:** Not one of 11 females contained obviously enlarged eggs or developing ova. Manacas (1963) noted that a female collected in October contained 4 well-developed embryos, suggesting that the species is viviparous.

**Notes:** The species appears to be partially aquatic. Laurent (1964) records that local people often found the lizard in their fish traps, and Manacas (1963) noted that the species lived in muddy terrain along river banks. Zambian specimens were regularly observed along the Sakeji stream, either foraging or basking on bankside vegetation. When disturbed they readily leaped into water and swam underwater with lateral undulations of the body and tail, escaping down-stream into submerged marginal vegetation. However, with the obvious exception of a frog, most prey items are terrestrial, indicating that the species does not forage in water despite its apparent aquatic habits. Smaller specimens entered water less readily, and scattered into the leaf litter when approached. Previously restricted to Angola, these are the first records of the species in Zambia and DRC. Branch and Haagner (1993) presented a morphological analysis of the *M. ivensii* group, rejecting the subspecies *septemlineata* Laurent 1964 and the monotypic genus *Lubuya* Horton 1972.

*Mabuya maculilabris* (Gray 1845)

**Material examined:** PEM R6307-08, R6310-17, R6319-28 - Sakeji School, Northwestern Province (1124Ab); PEM R6309, R6318 - Sanolumba village, 46km north-east of Sakeji, south-eastern DRC (1124Ba); PEM R6374 - 32km north-west of Mafulira border post, south-eastern DRC (1228Ba): 7 males, 14 females and 2 subadults; the largest male measuring 228 (84+144)mm and the largest female 229(88+141)mm. No apparent sexual size dimorphism was noticed. Supraciliaries 5, midbody scale rows 29-34, 14-16 lamellae under fourth toe, supralabials 7, supralabials anterior to subocular 4, dorsals with 4-6 keels. Specimens uniform brown above, speckled with dark brown and white, speckling extending onto dorsum. Ventrums cream to yellow with some brown speckling on throat.

**Diet:** Five of the stomachs examined were empty, one was badly damaged, but the remainder contained a variety of food items. Prey items included: Orthoptera (7), Hymenoptera (5),

Coleoptera (2), Lepidoptera (1), Blattariae (2), Isoptera (2), Mantodea (1), Odonata (1), Diptera (1), Hemiptera (1), Araneae (1), and a snail.

**Reproduction:** All the mature males examined had mature testes with an average length of 8.93mm (SD. 0.72mm, range 8.0-10.0mm). Most of the females had developing ova of various sizes. Two females (PEM R6308 and AJL 3609) contained 5 and 6 enlarged ova (10-11x 6-7mm), respectively, in each oviduct. The mean number of ova per female was 8.6 (SD. 2.3, range 5-12). The presence of ova of varying sizes in females suggests that breeding is not synchronised or seasonal.

**Notes:** Commonly seen basking beside water and foraging in vegetable gardens and on school buildings. Loveridge (1933) collected specimens among thatching grass in Tanzania, whereas Robertson *et al.* (1963) found them mainly on or close to buildings. Broadley (1974) reviewed the *Mabuya maculilabris* complex, validating *M. boulengeri* as a full species, and considered typical *M. m. maculilabris* to be restricted to continental Africa. He recognised four insular races: (*M. m. infralineata*, Europa Island; *M. m. albotaeniata*, Pemba Island; *M. m. comorensis*, Comoro Islands; and *M. m. casuarinae*, Casuarina Island). Brygoo (1982, 1983) elevated both *comorensis* and *infralineata* to full species. Specimens from Fogo Island, Primeras Group, northern Mozambique are referable to *casuarinae*. Typical *M. maculilabris* occurs on the adjacent mainland (Branch, unpub. obs.). Both *M. casuarinae* and *M. albotaeniata* are here treated as full species, and *M. maculilabris* thus reverts to binomials.

#### *Mabuya varia* (Peters 1867)

**Material examined:** PEM R6304-06 - Sakeji School, Northwestern Province (1124Ab); PEM R8849 - 15km north-west of Shesheke, Western Province (1724Ad); PEM R12503 - Farm 4304, District Chingola, Copperbelt Province (1227Db); PEM R12629, R12631 - Kalala Lodge, Lake Itzhi-Tezhi, Central Province (1526Cc): 13 specimens, of which the largest measured 137(65+72)mm. Supraciliaries 5, midbody scale rows 34-37, supralabials 8, supralabials anterior to subocular 5, lamellae under fourth toe 18-20, dorsals with three keels. A common terrestrial species.

**Additional material:** PEM R7141-46 - Isoka, Northern Province (1032Ba), E Knowles-Jordan; PEM R471-79, 481 - Mbala, Northern

Province (0831Cd); PEM R480 - Mpulungu, Northern Province (0831Cc), H Bredo; PEM R8849, 15km north-west of Shesheke, Southern Province (1724Ad).

**Diet:** Main prey items included: Orthoptera (6), Isoptera (4), Hymenoptera (1), a small grub and a black spider. The stomach of PEM R6304 contained 32 immature termites; PEM R12629 had 21 worker termites in its stomach.

**Reproduction:** All three females contained ova measuring 9-10mm in diameter. Two of the females each had 7(4/3) ova; the others had 5 each. A female collected during January contained minute ova (<1mm); the testes of a male collected in October measured 4.7x2.9mm.

**Notes:** Lambiris (1994) also reported the species from Chombe village, Luna valley, Central Province (1429Db).

#### *Mabuya megalura* Peters 1878

**Additional material:** PEM R1991-93 - Mbala, Northern Province (0831Cd), H Bredo: 1 adult male measuring 158(50+108) and 2 females, the largest measuring 208(62+146)mm. Supralabials anterior to subocular 4, midbody scale rows 26-28, dorsal scales with 3-4 keels, lamellae under fourth toe 17-18.

**Diet:** Two skins contained a grasshopper in the stomach.

**Reproduction:** The largest female (PEM R1993) had 7(3/4) developed ova (9.2x7.2mm) and the male had large active testes measuring 5.6x3.8mm in April. The smaller female (PEM R1992), SVL 42mm, was not sexually mature.

**Notes:** These remain the only specimens collected in Zambia (Broadley 1966a).

#### *Mabuya wahlbergii* (Peters 1869)

**Material examined:** PEM R6285, 6288 - Sampfya Mission, Luapula Province (1129Bc); PEM R6286, 6298, 12491 - Chingola, Copperbelt Province (1227Bd); PEM R6287, 6289-94, 6296-97, 6299, AJL 3607 - Sakeji School, Northwestern Province (1124Ab); PEM R6295 - Chistenga River, 209km west of Solwezi, Northwestern Province (1124Dd); PEM R6300 - Mbendele River, 42km north of Kariba, Southern Province (1628Bc); PEM R12609 - 13km west of Mumbwa town, Central Province Zambia (1526Bb); PEM R12610-11 Kalabo, Western Province (1422Dc); PEM R6302 - 32km north-east of Mufilura border post, south-eastern DRC (1228Ba); PEM R6303 - Sanolumba village, 46km north-east of Sakeji,



south-eastern DRC (1124Ba), a total of 23 specimens. Three size classes are apparent: juveniles, average SVL 44.8mm (SD. 1.47, range 44-47mm); subadults, average SVL 55.3mm (SD. 4.16, range 52-60mm), and adults, average SVL 77.7mm (SD. 3.55, range 72-85mm). The largest male measured 192(76+116)mm and the largest female measured 153(85+68 - tail broken)mm. Dorsum grey-brown above, pale dorsolateral stripes broad and ill-defined; midbody scale rows 35-39, dorsals 5-6 keels, supraciliaries 5, lamellae under fourth toe 19-24, supraciliaries anterior to subocular 5 (6 in PEM R1997), subocular not reaching the lip in two specimens (PEM R1997, R12610).

**Additional material:** PEM R7140 - Isoka, Northern Province (1032BA), E Knowles-Jordan; PEM R1997 - Lusaka, Central Province (1528Ad); PEM R452-3, 456-64, 466-7 - Mbala, Northern Province (0831Cc), H Bredo.

**Diet:** Juveniles were not examined. Only three of 13 stomachs were empty. The main prey items were: Hemiptera (5), Hymenoptera (3), Orthoptera (3), Coleoptera (2), Isoptera (1), Mantodea (1). An adult male (PEM R6289) contained a large piece of skin, indicating keratophagy. One stomach contained about 200 termite workers, but, in terms of mass or frequency in stomachs, the termites were relatively insignificant in the diet. Simbotwe and Garber (1979) reported that Isoptera comprised 91.4% of the diet in *M. striata* from the Dambwa Forest Reserve (1725Dd). However, such prey may be seasonally important.

**Reproduction:** During July all four adult males had mature testes (7-8mm long). Among mature females in July 2 contained no ova, possibly indicating they had recently given birth; 1 (PEM R6295) was not gravid, but contained 14 small (2mm) ova (6 in left and 8 in right oviduct); and 4 females had developing embryos - PEM R6296 had 3 ova (10.5x8.5mm) with small embryos; PEM R6297 had 2 full-term embryos (25+29mm) in each oviduct; PEM R6294 had 6 advanced embryos (21+23mm), 4 in the right oviduct and 2 in the left; and PEM R6287 had 7(4/3) ova (12x6mm), all, except 2 in right oviduct (which were infertile), contained small embryos. An additional female (PEM R12610) collected in October had several small ova (<2mm). The wide variation in reproductive state and embryonic development indicates that reproduction is asynchronous.

**Parasites:** Two females contained 2 and 6 ne-

matodes respectively. Simbotwe (1979, 1983) reported nematodes (*Thelandros* sp., *Abbreviata* sp., *Spirura* sp. and *Pharyngodon morgani*) from this species.

**Notes:** This terrestrial species was common on buildings, logs and trees and in and around houses. A young *Lamprophis fuliginosus* (SVL 380mm) collected in Chingola, regurgitated an adult *Mabuya wahlbergii* (SVL 78mm) which had been ingested head first. Broadley (1977a) recognized a number of races of *M. striata* and reported intergrades between *M. s. wahlbergii* and *M. s. striata* in the Northern Province near Lake Mweru. All races may now best be treated as separate species (Broadley, pers. comm.). The specific status of *M. wahlbergii* is also supported by molecular data (Mausfeld & Vences, pers. comm.).

*Mabuya margaritifer* (Peters 1854)

**Additional material:** PEM R9544-45 - Luangwa Valley, Eastern Province.

**Notes:** Broadley and Bauer (1998) have recently separated *M. margaritifer* from *M. quinque-taeniata*.

*Eumecia anchietae anchietae* Bocage 1870

**Material examined:** PEM R6337-6340 - Sakeji School, Northwestern Province (1124Ab), R12089 - Shimabala, 30km south of Lusaka, Central Province (1528Ca): 1 male measuring 169(131+38 - tail broken)mm, and 4 females, of which the largest measured 589(227+342)mm. The SV/ tail length ratio for two females with intact tails averaged 0.64. Supraciliaries 5, supralabials 7, midbody scale rows 22-24, 3 toes on the hind limb, dorsals with 1 faint keel.

**Diet:** All stomachs contained prey items. These included Orthoptera (3), Mantodea (1), Coleoptera (1) and Homoptera (1).

**Reproduction:** A male (PEM R6337), SVL 131mm, had mature testes. One female (PEM R6339; SVL 164mm) had 6(2/4) small (<3mm) developing ova. The largest female (PEM R6340) contained 9(4/5) ova (5mm in diameter). The remaining female (PEM R6338; SVL 141mm) contained 7(4/3) ova with obvious embryonic development. The species is viviparous with unique matrotrophic placentation (Flemming & Branch, 1998). Another female (PEM R12089; SVL 176mm), collected in December, had very small (<1mm) developing ova.

**Notes:** The Shimabala (1528Ca) specimen appears to be the most southern distribution for

the species, extending the known range slightly from Broadley's (1971a) Lusaka record. This poorly-known species appears to be one of the largest skinks (at least in terms of total length) in the world. Laurent (1964) recorded a massive female of SVL 300mm, indicating a possible total length of approximately 750mm.

*Lygosoma afrum* (Peters 1854)

**Material examined:** PEM R6426 - Sampfya town, Luapula Province (1129Bc); 1 sub-adult measuring 142(89+53)mm, mass 10.4gm.

**Notes:** The only other Zambian records are to the north on the Tanzanian border with one isolated specimen from the Luangwe Valley (Broadley, 1966b).

*Lygosoma sundevallii* (A. Smith 1849)

**Additional material:** PEM R485 - Mweru Wantipa, Northern Province (0829Db), H Bredo.

**Notes:** Widespread in Zambia (Broadley, 1971a).

*Panaspis wahlbergii* (A. Smith 1849)

**Material examined:** PEM R6331-33 - Sampfya Mission, Luapula Province (1129Bc); PEM R12630, 12632 - Kalala lodge, Lake Itzhi-Tezhi, Central Province (1526Cc): 2 adult males measuring 77(41+36)mm and 3 adult females, the largest measuring 89(42+47)mm. Supraciliaries 4-5, supralabials 7-8, supralabials anterior to subocular 4-5, lamellae under 4th toe 17-19, midbody scale rows 28-29. A male (PEM R12630) collected in October had a bright orange throat. A juvenile (PEM R12632) appeared newly born and measured 33.5 (14.2+19.3)mm.

**Additional material:** R1872 - Mbala, Northern Province (0831Cd), H Bredo.

**Diet:** All stomachs contained food items, including Isoptera (in three stomachs, one containing 27 worker ants), and 1 small jumping spider. An adult female (PEM R6333) contained the shed skin of a foot. The pattern matched that of the specimen, which appeared to have freshly shed. This would seem to be conspecific and would indicate keratophagy.

**Reproduction:** The male had mature testes and the females contained 4(2/2) and 5(3/2) ova, measuring 2-3mm in diameter, but no obvious embryos.

**Notes:** Very common amongst dry leaf litter, active mostly during mid-morning and late afternoon. The taxonomy is confused, and the 'species' includes a number of cryptic species

(Jacobsen & Broadley, in press). The Zambian material has been treated conservatively as *P. wahlbergii*.

## LACERTIDAE

*Latastia johnstoni* Boulenger 1907

**Additional material:** PEM R7148-50 - Isoka, Northern Province (1032Ba), E Knowles-Jordan. Specimens in poor condition and partly dehydrated; 2 adult males and 1 female, the largest measuring 111(54+57 - tail broken)mm. Nasals usually 2 (3 in PEM R7149), supraciliaries 5, supralabials anterior to sub-ocular usually four (5 in PEM R7149), 47-51 dorsal scale rows, lamellae under fourth toe 22-26.

**Reproduction:** The female had two well-developed ova (4.8x3.6mm), but the males' testes appeared inactive (3.2x2.1mm).

*Nucras boulengeri* Neumann 1900

**Additional material:** PEM R7147 - Isoka, Northern Province (1032Ba), E Knowles-Jordan. Specimen in poor condition and partly dehydrated: 56+82mm. Supralabials anterior to sub-ocular 4, supraciliaries 4, nasals 5, internasals 1, postmentals 2, lamellae under fourth toe 20, midbody scale rows 40.

**Notes:** This remains the only specimen known from Zambia (Broadley, 1971a) and the most southern record for the species.

*Ichnotropis bivittata bivittata* (Bocage 1866)

**Material examined:** PEM R6280, R6284 - Sakeji School, Northwestern Province (1124Ab): 1 adult male measuring 126(42+84)mm and 1 adult female, SVL 40mm. Supralabials 8, midbody scale rows 38-39, lamellae under 4th toe 17-18.

**Diet:** The female contained a large grasshopper and 16 ant mandibles; the male contained 5 ant mandibles.

**Reproduction:** The male's testes measured 4.2x2.7mm; the female contained no developing ova.

**Notes:** PEM R6280 was removed from the stomach of a *Thelotornis oatesi* (PEM R6195). This species was known from only one specimen from Mbala, Northern Province (0831Cd), until 1957, when Frank Ansell collected another (NMZB 1511) in the Northwestern Province. The above are only the third and fourth specimens for Zambia. Adults of both *I. bivittata* and *I. capensis* were collected from Sakeji during July, and it may be significant that *I. bivittata* had

only eaten ants and *I. capensis* contained only termites (Broadley, pers. comm.).

*Ichnotropis capensis* (A. Smith 1838)

**Material examined:** PEM R6277-80, 6282-83 - Sakeji School, Northwestern Province (1124Ab); PEM R12489-90 - Chingola, Copperbelt Province (1227Db); PEM R12621 - Situnda Pan, Luiwa Plains National Park, Western Province (1422Da); PEM R12622-23 - Siyenge Pans, Luiwa Plains National Park, Western Province (1422Dd): 12 adult males, the largest measuring 189(64+125)mm; 5 adult females, the largest intact specimen measuring 164(61+103)mm. Another female (PEM R1999) had a SVL of 68 mm. Light brown dorsum with well developed lateral lines, absent in one female (PEM R6277). Supralabials 8, supralabials anterior to subocular 4, midbody scale rows 38-40, lamellae under fourth toe 19-22, prefrontal not in contact with anterior supracular.

**Additional material:** PEM R6394-97 - Isoka, Northern Province (1032Ba), E Knowles-Jordan; PEM R1999 - Lusaka, Central Province (1528Ad); PEM R2817-18 - Mbala, Northern Province (0831Cd), H Bredo; PEM R12318-21 - Balovale, Northwestern Province (1323Ca).

**Diet:** Only two stomachs were empty. Prey items included: Isoptera (6), Orthoptera (7), Coleoptera (3) and Araneae (3). Four specimens from Sakeji all contained numbers of worker termites: PEM R6278 with 48, R6283 - 32, R6281 - 29 and R6279 with 27. The last also contained a small cricket and one Chingola specimen (PEM R12489) contained 22 worker termites, 6 termite heads and one soldier. Simbotwe and Garber (1979) reported that Isoptera comprised 99.6% of the diet of *I. capensis* from the Dambwa Forest Reserve (1725Dd).

**Reproduction:** An adult Sakeji female (PEM R6277) contained no developing ova during July; a female from Lusaka (PEM R1999) had 6(3/3) ova (6.8x4.2mm) in December; and 2 females (PEM R2817-18) from Mbala had 7(4/3) and 6(3/3) ova, respectively, (4.3-4.6x 2.9-3.8mm) in December. Males collected during January had a rich bronze-brown colour and their testes appeared inactive (flaccid, 3.2-4.6x2.6-3.2mm). Three males collected during October (PEM R12621-23) were in breeding colouration (bright orange flanks, dorsolateral white line, dorsum rusty brown,

ventrum cream) with large testes (6.0-6.8x 2.8-3.1mm).

**Parasites:** None found. Simbotwe (1979) reported nematodes (*Parathelandros* sp.) from the stomach of a specimen from Dambwa Forest Reserve (1725Dd).

**Notes:** Although Broadley (1971a) recorded this species as widespread in western Zambia, no previous records appear to exist for the Copperbelt Province. The Chingola records indicate a north-westerly range extension of more than 300km. Broadley (1979) recorded asynchronous reproductive cycling between the 'annual' lizards *I. capensis* and *I. squamulosa*. The presence of adults of both *I. capensis* and *I. bivittata* in July at Sakeji mitigates against the same phenomenon occurring between the latter two species.

#### GERRHOSAURIDAE

*Gerrhosaurus bulsi* Laurent 1954

**Material examined:** PEM R6251-54, 6256, 6258, 6260-62, AJL 3744 - Sakeji School, North-western Province (1124Ab); PEM R6255, 6257, 6259, AJL 3610 - Sandolumba village, 46km north-east of Sakeji, south-eastern DRC (1124Ba): 14 specimens; largest male 441(181+260)mm, largest female 505(184+321)mm. Eight adults with 24 dorsal scale rows and 4 with 26; supralabials anterior to subocular 3; femoral pores 14-18; lamellae beneath fourth toe 15 (16 in PEM R6252). Proximal supracaudal scales mucronate and spiny with the exception of PEM R6258 which lacks strongly spinose scales. Grey to golden brown above, some with bluish colouring on the sides of the neck and head, ventrum cream-white. The first development of the bluish colour was noticed on a subadult male (SVL 130mm).

**Diet:** Only three stomachs were empty. The main food items included Hemiptera (5), Orthoptera (4), Coleoptera (2), Isoptera (2), as well as vegetable material, including small red berries, fruit pips and plant stems. One female (PEM R6254) had large yellow fat bodies.

**Reproduction:** In July 3 males had mature testes (7.5-9.0mm), whereas 3 females had small clusters (5-8) of developing ova (2-3mm) in their ovaries.

**Parasites:** Four stomachs contained up to 8 nematodes.

**Notes:** These large plated lizards were very common in the woodland and were often found basking near their burrows. The largest female

(PEM R6262) exceeds the previous maximum size of 495mm reported for the species, although not the maximum SVL of 200mm (Broadley 1991a). Broadley (1999) notes that the taxon *G. multilineatus* Bocage is based on a hybrid specimen. The name is therefore unavailable.

*Tetradactylus ellenbergeri* (Angel 1922)

**Additional material:** PEM R1982-86 - Mbala, Northern Province (0831Cd); H Bredo: 1 adult male (PEM R1983), measuring 259(69+190 - tail regenerating)mm, and 4 adult females, the longest (PEM R1984) measuring 260(57+203)mm. Another female (PEM R1986) has a larger SVL of 72mm. Broadley (1971a) recorded a specimen from Mambwe (0931Bb) with a SVL of 74mm. All specimens had 12 longitudinal rows of dorsals, ventrals in 6 longitudinal rows, a single nasal, and monodactyle and minute hindlimbs.

**Diet:** All stomachs contained food, including Orthoptera (4), Hymenoptera (1), Homoptera (1), Coleoptera (1) Lepidoptera (1), Anaeae (6), and a snail (1). PEM R1983 contained all 5 different insect prey items from the above list.

**Reproduction:** All females, collected in April, had ova in various stages of development: PEM R1985 had three small ova <1.0mm in diameter; those in PEM R1987 measured 2.17x1.84mm, and in PEM R1982 3.69x3.07mm. The largest female (PEM R1986) contained 2 eggs, 1 per oviduct, measuring 11.62x5.71mm. The only male had well developed testes, measuring 4.65mm.

**Notes:** The Zambian distribution of this species is only known from Mambwe (0931Bb), Luangwe Game Reserve (1332Ad), Lusaka (1528Ad) and Ikelenge (1124Ab) (Broadley, 1971a). The Mbala specimens represent a north-western range extension within Zambia.

#### CORDYLIDAE

*Chamaesaura miopropus* Boulenger 1894

**Material examined:** PEM R6335-36 - Sakeji School, Northwestern Province (1124Ab); PEM R6334 - Sandolumba village, 46km north-east of Sakeji, south-eastern DRC (1124Ba): 1 adult male (PEM R6336) measuring 489(89+400)mm, and 2 adult females, largest measuring 573(120+453)mm. All possess minute forelimbs, 4.4-4.5% of SVL, and monodactyle hindlimbs, 6.8-7.5% SVL; supralabials anterior to subocular usually 3 (2 in PEM R6335), midbody

scale rows 23-24.

**Diet:** One stomach (PEM R6336) contained a small grasshopper and the remains of a wasp.

**Reproduction:** The male had elongate testes (3.9x2.1mm) and only the largest female (PEM R6335) had small developing ova (< 2mm) in the ovaries.

**Notes:** Although *C. miopropus* has usually been treated as a northern race of *C. macrolepis* (Broadley, 1966a; 1971a) it is geographically well-isolated and best treated as a separate species, distinguished by the presence of vestigial forelimbs.

#### SERPENTES:

##### TYPHLOPIDAE

*Rhinotyphlops mucruso* (Peters 1854)

**Additional material:** PEM R714-19, 1319-20, 1323, 12091 - Mbala, Northern Province (0831Cd), H Bredo: 10 specimens of which the largest measured 334(326+8)mm. Seven specimens had a uniform brown dorsal colour with a cream vent (illustrated in Broadley, 1971a), whereas the remaining 3 (PEM R716, 1323, 12091) had a more typical blotched pattern with a cream vent.

**Notes:** Wilson (1965) noted that only 24.3% of 74 specimens had the typical blotched colouration, with the remainder being uniform brown. Previously treated as a northern race of *R. schlegelii*, this form is best treated as a full species (Broadley, pers. comm.). The genus *Rhinotyphlops* was revived by Roux-Esteve (1974) and recently validated by Wallach (1994).

*Rhinotyphlops gracilis* (Sternfeld 1910)

**Additional material:** PEM R713 - Mbala, Northern Province (0831Cd), H Bredo: 1 adult specimen, 501(495+6)mm, uniform brown in colour.

**Notes:** Referable to the genus *Rhinotyphlops* (Wallach, 1994; Wallach, in. litt.). Restricted to the northern provinces (Broadley, 1971a).

##### LEPTOTYPHLOPIDAE

*Leptotyphlops kafubi* (Boulenger, 1919)

**Material examined:** PEM R12483 - Chingola, Copperbelt Province (1227Bd): 1 specimen (66+7mm) of undetermined sex. Rostrum separated from supraocular by nasal, supraocular larger than prefrontal, tail length 9.6% of total length. Colour: uniform brown above with light brown ventrum.

**Notes:** Found during August in damp soil under large stone in domestic garden. Previously

treated as *L. emini* (Broadley 1971a), this species, which is widespread in the North-western and Copperbelt Provinces, has recently been revived (Broadley and Broadley 1999).

#### COLUBRIDAE

*Lamprophis fuliginosus* (Eoie 1827)

**Material examined:** PEM R6184-85 - Sakeji School, Northwestern Province, (1124Ab); PEM R7047, R12502 - Chingola, Copperbelt Province (1227Bd); PEM R7134-35, 8049, 9533, 9534 - Musenga town, 12km east of Chingola, Copperbelt Province (1227Db); sight record (captured and measured); Situnda Pan, Luiwa Plains National Park, Western Province (1422Da): 2 adult males, largest 590(482+108)mm; 2 adult females, largest 1122(988+134)mm; 3 sub-adult females and 4 juveniles. Adults and sub-adult olive green dorsally, juveniles grey-green with cream bellies. The juveniles appeared to have been the previous season's (November-December 1990) hatchlings, as the largest measured 228(196+32)mm. Midbody scale rows 26-29; ventrals 191-196 in males, 201-220 in females; subcaudals 56-61 in males, 48-49 in females.

**Additional material:** R754 - Mbala, Northern Province (0831Cd); H Bredo.

**Diet:** A young snake (SVL 380 mm) collected in Chingola, regurgitated an adult *Mabuya wahlbergii* (SVL 78mm) which was ingested head first and well-digested. Except for PEM R9534, which had a well digested rodent in the stomach and rodent hair in the hind gut, all other stomachs were empty. The adult female had large fat deposits.

**Reproduction:** The adult males had mature testes and the single female was gravid with 11 (6/5) ova (24x14mm). A large female (PEM R12502) collected during January contained numerous small ova (<2mm).

**Parasites:** One nematode was present in the stomach of the sub-adult female.

**Notes:** The Chingola female (PEM R12502) may be the largest house snake yet collected in Zambia. It is considerably bigger than the average specimen encountered.

*Lycophidion multimaclatum* Boettger 1888

**Material examined:** PEM R11663 - Kafulafuta, Copperbelt Province (1328Bd). One juvenile and one subadult male, the latter measuring 273 (236+37)mm. Colouration: dark ventrals and dense white stippling along the back.

Ventrals 162-165, paired subcaudals 35-36, midbody scale rows 17, anal entire, supralabials 8 (3rd, 4th and 5th entering orbit), infralabials 8 (first 5 in contact with the anterior sublinguals).

**Additional material:** PEM R1976 - Mweru Wantipa, Northern Province (0829Db), H Bredo.

**Reproduction:** The testes of the largest male were inactive and flaccid and measured 7.2mm

**Notes:** Broadley (1996) revived *L. multimaclatum* as a full species from *L. capense*. It is known only from western and northern areas of Zambia. The Kafulafuta records fills a gap between Lusaka and Chingola records (Broadley, 1996).

*Natriciteres bipostocularis* Broadley 1962

**Additional material:** PEM R1973 - Mpokoroso, Northern Province (0930Ac), H Bredo: 1 young snake measuring 232(157+75)mm. Midbody scale rows 17, ventrals 136, subcaudals 72, supralabials 8 (4th and 5th entering orbit), infralabials 8 (first four in contact with anterior sublinguals); postoculars 2, temporals 1+2. The specimen had dark vertebral and lateral stripes and dark brown dorsolateral stripes.

**Notes:** The isolated populations of the *N. variegata* complex are best treated as separate species (Broadley, pers. comm.)

*Natriciteres olivacea* (Peters 1854)

**Additional material:** PEM R879 - Lake Cheshi, Northern Province (0829Dd); PEM R1975 - Mweru Wantipa, Northern Province (0830 Cc), both H Bredo: 1 adult male, 329(273+56)mm and 1 adult female, 377(371+6 - tail truncated and healed)mm. Ventrals 140 in male, 142 in female; subcaudals 31 in male; supralabials 8 (4th and 5th entering orbit); infralabials 10 (first 5 in contact with anterior sublinguals).

**Reproduction:** The female (PEM R1975) contained 7(4/3) eggs (21.2x10.6mm) and the male's testes measured 10.2x6.9mm.

*Limnophis bicolor* Günther 1865

**Material examined:** PEM R6172-82, 6554 - Sakeji School, Northwestern Province (1124Ab); 8 males, largest 460(355+109)mm; 4 females, largest 501(407+94)mm. Ventrals 132-137 in males, 132-137 in females; subcaudals 51-54 in males, 40-46 in females; supralabials 8 (9 in PEM R6181, 6172), 3rd and 4th entering orbit; infralabials 10 (first 4-5 in contact with anterior sublingual); preocular 1 (rarely 2); postoculars

2 (3 on one side of PEM R6554); temporals 1+2 (1+3 in R6178); anal divided; midbody scale rows 19; parietals narrowly separated from the 6th supralabial in all specimens by anterior temporals; supralabials creamy in colour with dark anterior borders.

**Diet:** PEM R6179 had a partly digested tadpole in the stomach.

**Reproduction:** All females with small developing ova, ranging from <2mm to the largest at 5.3x2.8 mm (in PEM R6174, which had 18(11/7) ova). The male's testes were inactive and flaccid. The hemipenis (based on the well-everted organs of PEM R6178, 6176, 6177) measured from 10-13.5mm in length, reaching the 9th subcaudal when reflected along the tail; it is undivided, with the distal third to a quarter of the organ forming a thin terminal awn; ornamentation undifferentiated, without enlarged basal spines, the body of the organ covered in 16-18 longitudinal rows of ossified, non-webbed spines, that reduce in size gradually towards the awn and base, and largest approximately a third along the organ from the base; sulcus undivided with slightly raised lips, running to the tip of the awn.

**Note:** Broadley (1971a) initially considered the race *L. b. bangweolicus* to inhabit the Upper Zambezi flood plain. However, he later recorded (Broadley 1991a) a single specimen of *L. bicolor* from Ikelenge in the Mwinilunga District, noting that it was typical of *bicolor* in all respects, except that the parietal was narrowly separated from the 6th supralabial by the anterior temporal. As the two races in north-western Zambia were in close proximity, with populations of *bangweolicus* occurring to the north and south of Ikelenge locality, he provisionally treated *L. bangweolicus* as a full species (Broadley, 1991a & b), returning the typical race to binomials. The large series (12 specimens) from Sakeji in the Mwinilunga District confirms and amplifies Broadley's findings. Subtle differences in coloration occur between the species. The supralabials of *L. bicolor* are barred with dirty cream centres and black borders; in *L. bangweolicus* the supralabials are diffusely striped, with a pale cream central stripe bordered above and below with olive. The subcaudals in *L. bicolor* are also uniform yellow-cream, whereas those in *L. bangweolicus* have fine, dark margins.

*Limnophis bangweolicus* (Mertens 1936)

**Additional material:** PEM R22, Merwu Wantipa, Northern Province (0830 Cc), H Bredo; PEM R7249-50 (previously UM10090-91) - Kalobo, Western Province (1422Dc): 2 adult females, largest 495(401+94)mm; 1 adult male, 435(333+102)mm. Ventrals 133 and 138 in females, and 150 in the male; subcaudals 43 in both females, and 60 in the male.

**Diet:** Both Kalobo snakes had well-digested fish remains in the stomach.

**Reproduction:** The large Merwu female, collected in January, contained 5(2/3) large ova (28x15mm); the Kalobo female, collected in December, was sexually mature, but the ovaries contained only small follicles (<3mm); the Kalobo male, collected in December, was also sexually mature, with large testes (12x5mm) and convoluted, milky efferent ducts.

**Note:** Broadley (1991a) questioned whether the marked difference in head shape between the two species (see Laurent, 1964) reflected differences in feeding habits. The gut contents presently support this, but further information is required.

*Grayia tholloni* Mocquard 1897

**Additional material:** PEM R23, Lake Chesi, Merwu Wantipa, Northern Province (0830 Cc), H Bredo: 1 male; scutellation details have been presented elsewhere (Broadley, 1983a). Recorded from only one other Zambia locality (Isombo; Broadley, 1991a).

*Scaphiophis albopuntatus* Peters 1870

**Additional material:** PEM R24, 'Chansa Mansanka' (probably Mansanka Flats, just east of Mweru Wantipa), Northern Province (0830Cc), H Bredo: juvenile female, ventrals 189; subcaudals 53.

**Notes:** Broadley (1994) revised the genus, reviving *S. raffreyi* for Ethiopian populations; Northern Zambia is the southern limit of the species.

*Prosymna ambigua ambigua* Bocage 1897

**Material examined:** PEM R855 - Mbala, Northern Province (0831Cd), H Bredo: 1 large male measuring 251(206+41)mm. Uniform dark grey-brown above and dark vent. Ventrals 137, subcaudals 32, supralabials 7 (3rd and 4th entering orbit) infralabials 7 (first 3 in contact with anterior sublinguals).

**Reproduction:** The testes were turgid and large (17.2x4.6mm).

**Notes:** The Mbala population has been known for sometime (Vesey-FitzGerald, 1958; Broadley & Pitman, 1960; Broadley, 1971a, 1980). Despite his initial reservation (Broadley, 1971a), Broadley (1980) first recognized *stuhmanni* as an eastern race of *ambigua*, and then elevated it to a full species (Broadley, 1992). Trinomials are retained because of the western race, *P. a. bocagii*. The Mbala population represents the only locality for *P. ambigua* in Zambia.

*Dromophis lineatus* (Dumeril & Bibron 1854)

**Additional material:** PEM R025 - Mweru Wantipa, Northern Province (0829Db), H Bredo: 1 adult female, 404(288+116)mm. Ventrals 152, subcaudals 84, supralabials 8 (4th and 5th entering orbit), infralabials 9 (first three in contact with anterior sublinguals), postoculars 2, temporals 1+2.

**Diet:** There were lizard scales and insect remains (possibly secondary prey) in the hind gut.

*Psammophis angolensis* (Bocage 1872)

**Material examined:** PEM R6207 - Sakeji School, Northwestern Province (1124Ab); PEM R7132 - Musenga town, 12km east of Chingola, Copperbelt Province (1227Db): 2 adult males, largest 422(312+110)mm. Midbody scale rows 11, ventrals 133-137, subcaudals 58-67.

**Diet:** One specimen contained an adult *Panaspis wahlbergii*.

**Reproduction:** Both males had mature testes, measuring 14-16mm.

*Psammophis mossambicus* Peters 1882

**Material examined:** PEM R6225-29, 6231-36, 6238-43, 6245-48 - Sakeji School, Northwestern Province (1124Ab); PEM R7123-24, 8048, 8065-67, 12096 - Musenga town, 12km east of Chingola, Copperbelt Province (1227Db); PEM R12494 - Lufwanyama farm, District Chingola, Copperbelt Province (1227Da); R6230, R6244 - Sanolumba village, south-eastern DRC (1124Ba); PEM R12095 - Chingola, Copperbelt Province (1227Bd), PEM R6555 - Kitwe, Copperbelt Province (1228Cc): 34 specimens; 23 males, largest 1741(1280+461)mm; 8 females, largest 1391(1020+371)mm, and 3 juveniles. All specimens with 17 midbody scale rows; ventrals 169-176 in males, 175-177 in females; subcaudals 89-103 in

males, 92-96 in females; supralabials 8 (4th and 5th entering orbit); infralabials 9 (first four in contact with anterior sublinguals); anal divided, postoculars 2, postnasals 2, temporals 2+2. Coloration of nearly all specimens a uni-form olive green/grey with 3 males showing a change to yellow on the posterior third of the body; ventrals black bordered. One gravid female (PEM R6230) from DRC with yellow coloration to the ventrum, from the area above vent to the tail tip.

**Additional material:** PEM R988 - Mbala, Northern Province (0831Cd), H Bredo.

**Diet:** Many of the Musenga specimens had eaten; one male (PEM R8067) had a well-digested frog in the stomach, possibly a ranid; another male (PEM R12095) a half-digested rodent in the stomach and rodent hair in the hindgut; PEM R7124 and 12096 also had rodent hair in the hindgut; a juvenile had the hind foot of a small rodent in the stomach and rodent hair and lizard scales in the hindgut; a large female (PEM R7123) had the tail of a large tree agama (*Acanthocercus atricollis*) in the stomach.

**Reproduction:** Three females were gravid: PEM R6230 contained 18(12/6) well-developed ova (27.2x16.2mm). The other two females had 11(6/5) ova (25.1x12.5mm) and 13(7/6) ova (12.6x8.4mm), respectively. An adult female (PEM R6555), collected alive in Kitwe (1228Cc) laid 14 eggs on 8 October; length - mean 25.72mm, SD. 1.21mm, range 24.6-28.8mm; width - mean 15.77mm, SD. 1.55mm, range 13.2-19.2mm; mass - mean 3.42gm, SD. 0.73gm, range 3.1-5.0gm. These were incubated on moist vermiculite but failed to hatch.

**Parasites:** Nine snakes had nematodes (1-15) in their guts, one with 3 in the body cavity.

**Notes:** These snakes were common in the woodland and 24 of the specimens were collected in just 3 days. Males did not have active testes and it is not obvious why there should be such a large difference in the sex ratio of the specimens collected (23 males : 8 females). Brandstätter (1996) demonstrated that *P. phillipsii* is restricted to West Africa, and used *Psammophis* cf. *brevirostris tettensis* Peters (1882) as a replacement name for the olive grass snake. This was not a suitable combination as Broadley (1977) had demonstrated that the olive grass snake occurred in sympatry with *brevirostris*. Moreover, *Psammophis sibilans* var. *mossambica* Peters (1882) has page preference over *tettensis*. The correct available

name is thus *Psammophis mossambicus* (Branch 1998).

*Psammophis brevirostris leopardinus*

Bocage 1887

**Material examined:** PEM R6220-21, 6223-24, 6237, 6239 - Sakeji School, Northwestern Province (1124Ab); PEM R6222 - Sanolumba village, 46km northeast of Sakeji, south-eastern DRC (1124Ba): 2 males, largest 978(711+267)mm, 5 females, largest 1001(767+234 - tail tip truncated)mm. All with 17 midbody scale rows, ventrals 155 and 161 in males and 151-165 in females, subcaudals 81 (one specimen with a truncated tail) in males and 76 in 2 females. Olive green/brown dorsum with a distinct double yellow chain pattern, bordered with black. Ventrums light yellow, cream or even light green.

**Additional material:** PEM R967, 1979 - Mporokoso, Northern Province (0930Ac).

**Diet:** One male (PEM R6222) contained the remains of a ranid.

**Reproduction:** The males had mature testes and both females were gravid. PEM R6224 contained 14(8/6) ova (18.6x11.4mm) and R6220 with 11(6/5) ova (15.8x10.2mm).

**Note:** Two specimens (PEM R6237, 6239) were unusual, lacking the obvious chain pattern on the back and superficially resembling *P. mossambicus*; however, they had low ventral counts (152-154). The largest female (PEM R6224) exceeds the previous maximum SVL reported by Broadley (1977b). Brandstätter (1996) demonstrated that *P. sibilans* is restricted to north-east Africa. *P. brevirostris* thus becomes a full species, with *P. b. leopardinus* as a northern race. Brandstätter's (1996) distribution map of *P. b. leopardinus* shows an isolated population in northern Zambia, but overlooked Broadley's (1991a) description of material from the Mwinilunga District that bridges this gap.

*Rhamphiophis acutus acutus* (Günther 1888)

**Material examined:** PEM R6154-67 - Sakeji School, Northwestern Province (1124Ab): 9 males, largest 1006(831+175)mm, and 5 females, largest 703(567+136)mm. Ventrals 177-185 in males; 166-176 in females; subcaudals 59-66 in males, 53-62 in females; midbody scale rows: 17 (rarely 19) at neck, 17 (midbody) 13 (vent); pre-oculars 2, postoculars 2, temporals 2+3 (1+2 in PEM R6156); supralabials 8 (9 in PEM R6160) with 4th and 5th entering orbit;

infralabials 9 (10 in PEM R6158) with first 4 in contact with anterior sublinguals; anal divided.

**Diet:** One female (PEM R6154) had rodent hair in the stomach and hind gut; PEM R6167 contained grass. The remaining guts were empty.

**Reproduction:** All the males had mature testes and all 5 females were gravid. PEM R6167 was damaged when killed and the number or size and the ova could not be determined. The four remaining females had the following ova: 10(4/6) measuring 19.3x 14.2mm; 13(7/6) measuring 12.3x10.7mm; 13(7/6) measuring 8.3x7.2mm; and 15(7/8) measuring 12.5x8.6mm.

**Parasites:** One male (PEM R6158) had a nematode in its gut.

**Note:** The Sakeji population clearly represents the typical race and not the subspecies *jappi* which was described from the Zambezi floodplains in western Zambia (Broadley, 1971b).

*Psammophylax tritaeniatus* (Günther 1868)

**Material examined:** PEM R6149-51 - Sakeji School, Northwestern Province (1124Ab); PEM R6152 - Sanolumba village, 46km north-east of Sakeji, south-eastern DRC (1124Ba); PEM R7133 - Musenga town, 12km east of Chingola, Copper-belt Province (1227Db): 4 males, largest 661 (539+122)mm; 2 females, largest 611(492+119)mm. Ventrals 147-151 in males, 159 in both females; subcaudals 53-58 in males, 54-60 in females; supralabials 8 (4th and 5th entering orbit); infralabials 9 (first 4 in contact with anterior sublinguals).

**Additional material:** R1980 - Mbala, Northern Province (0831Cd).

**Reproduction:** The largest female (PEM R6149) contained 11(8/3) large ova (12.2x7.3mm) and the smaller female (252+46=298mm) contained 9(6/3) ova (2-3mm).

**Parasites:** One male (PEM R6152) had 5 nematodes in its stomach.

*Philothamnus hoplogaster* (Günther 1863)

**Material examined:** PEM R6186 - Sakeji School, Northwestern Province (1124Ab); PEM R12633 - Situnda Pan, Luiwa Plains National Park, Western Province (1422Da): 1 female, 441(309+132)mm; 1 male 671(480+191)mm. Ventrals 148-156, subcaudals 76-90; midbody scale rows 15, supralabials 7-8 (4th and 5th entering orbit); infralabials 9 (first 4 in contact with the anterior



sublinguals), cloacal divided, preocular 1; postoculars 2; temporals 1+1.

*Philothamnus heterolepidotus* (Günther 1863)

**Material examined:** PEM R6187 - Sakeji School, Northwestern Province (1124Ab): 1 male, 500 (372+128)mm, with 15 midbody scale rows, 174 ventrals and 98 subcaudals. Supralabials 9 (3th, 4th and 5th entering orbit); infralabials 9 (first 5 in contact with anterior sublinguals); preocular 1, postoculars 2, temporals 1+1.

*Philothamnus angolensis* Bocage 1882

**Material examined:** PEM R6190-92 - Sakeji School, Northwestern Province (1124Ab); PEM R7132, 8047, 8050, 10881-87 - Musenga town, 12km east of Chingola, Copperbelt Province (1227Db); PEM R6193-94 - Sanolumba village, 46km north-east of Sakeji, south-eastern DRC (1124Ba): 8 males, largest 992(658+334)mm; 5 females, largest 1034(728+306)mm; 2 juveniles, 1 measuring 508(356+152)mm. Midbody scale rows 15; ventrals 145-147 in males, 154-159 in female; subcaudals 101-108 in males, 93-99 in females; supralabials 9 (4th, 5th and 6th entering orbit); infralabials 10 (first 4-5 in contact with anterior sublinguals); preocular 1, post-ocular 2, temporals 1+1 (n=4) or 1+2 (n=1).

**Diet:** The stomach of a female (PEM R8047) contained a small (43mm TL) amphibian (*Bufo* sp. with tarsal fold); that of a young male (PEM R10884) contained a ranid; an adult male (PEM R10885) contained a large *Rana* (33.4gm), which comprised 26.1% of the snake's body weight.

**Reproduction:** Adult males had mature testes, measuring 23-28mm. All but one female were gravid; PEM R6194 had 9(5/4) eggs (21x8mm); PEM R10882 had 9(5/4) eggs (27.2x14.1mm); PEM R10883 had 17(9/8) eggs (28.2x15.1mm); whereas PEM R10887 had 12(7/5) eggs (26.4x14.8mm).

*Crotaphopeltis hotamboeia* (Laurenti 1768)

**Material examined:** PEM R6168 - Sonalumba village, 46km north-east of Sakeji, south-eastern DRC (1124Ba); PEM R7136, 8061-62 - Musenga town, 12km east of Chingola, Copperbelt Province (1227Db): 4 adult females, largest 546 (477+69)mm. Midbody scale rows 19, ventrals 156-163, subcaudals 34-39; supralabials 8 (3rd, 4th and 5th entering orbit), infralabials 9-11, preocular 1, postocular 2,

temporals 1+2. The supralabials in PEM R8061 were white in colour.

**Diet:** PEM R8061 contained the lower limbs of a large *Bufo* sp. (1.8gm); R8062 had the remains of a ranid in the stomach.

*Dipsadoboa shrevei shrevei* (Loveridge 1932)

**Material examined:** PEM R6153 - Sakeji School, Northwestern Province (1124Ab); PEM R7131, R8059-60 - Musenga town, 12km east of Chingola, Copperbelt Province (1227Db): 2 adult males, largest 1241(825+216)mm; 2 adult females, largest 1076(857+219)mm. Ventrals 206-207 in males, 211-212 in females, subcaudals 83-86 in males and 71-82 in females. Midbody scale rows 19, supralabials 8-9, (3rd, 4th and 5th entering orbit), infralabials 10-11 (first 5 in contact with the anterior sublinguals), preocular 1, postocular 2, temporals 1+2, anal entire. All specimens were a uniform black colour with a pale infusion to the throat.

**Diet:** One male (PEM R7131) contained a partially digested *Chamaeleo dilepis*; a male and female from Musenga both contained bird remains in their stomach and hind gut. PEM R8059 had a complete pied mannikin (*Spermestes fringilloides*) in the stomach.

**Reproduction:** The male had mature testes but the female had no enlarged ova.

**Notes:** Rasmussen (1985) recently elevated *shrevei* to a full species with *D. s. kageleri* as an East African endemic subspecies, known only from the Kilimanjaro Mountain rainforest. Both the largest male and female reported here exceed the maximum recorded sizes for the species (Rasmussen, 1985).

*Telescopus semiannulatus semiannulatus*

A Smith 1849

**Material examined:** PEM R11659 - Kafulafuta, Copperbelt Province (1328Bd): 1 young male measuring 402(331+71)mm, and 1 female measuring 714(592+122)mm. Overall yellow-brown colour with 35 dark transverse marking along the back. Scutellation: ventrals male 201, female 227; subcaudals male 69, female 62; anal divided.

**Additional material:** PEM R11649 - Isoka, Northern Province (1032Ba), E Knowles-Jordan. **Reproduction:** The male's testes were flaccid and measured 12.9mm. The female contained several small ova measuring 2-3mm in diameter.

*Dispholidus typus* (A Smith 1829)

**Material examined:** PEM R6204-05, 6208-09 - Sakeji School, Northwestern Province (1124Ab); PEM R7126 - Musenga town, 12km east of Chingola, Copperbelt Province (1227Db); PEM R6203, 6206 - Sanolumba village, 46km north-east of Sakeji, south-eastern DRC (1124Ba): 3 adult males, 2 adult females and 1 juvenile. Largest male 1255(955+300)mm; largest female 1410(1070+340)mm. Midbody scale rows 19, ventrals 171-181 in males, 176-183 in females, 199 in a juvenile (PEM R6203); subcaudals 101-109 in males, 103-104 in females. The juvenile has typical *Thelotornis* type coloration on the body with white upper labials. Adult males are black with yellow spots on each dorsal and head shield, ventrum cream. One female (PEM R6206) had a pink/brown above, with a white throat and pinkish ventrum. The other female was a dull olive grey colour above and below.

**Diet:** The juvenile had the remains of a lizard *Chamaeleo* cf. *dilepis* in its stomach.

**Reproduction:** Males had mature testes; one female had no ova; another female (PEM R6206) contained 15 well-developed ova (32x17mm), and a large female (PEM R6208; 1070+355mm) had 18 (6/12) ova (31x18mm).

*Thelotornis oatesii* (Günther 1881)

**Material examined:** PEM R6195-98 - Sakeji School, Northwestern Province (1124Ab): 2 adult males, largest 1015(635+370)mm; 2 adult females, largest 1304(842+462)mm. Midbody scale rows 19; ventrals 158-164 in males, 144-168 in females; subcaudals 139-143 in males, 145-147 in females; cloacal divided; supralabials 8-9 (4th and 5th entering orbit); infralabials 11-12 (first 4 in contact with anterior sublinguals); preocular 1; postoculars 2-3; temporals 1+2. Top of head greenish with speckled pink and distinct Y-marking, labials white with black lining.

**Diet:** One gravid female (PEM R6197) contained a partially digested *Chamaeleo* cf. *dilepis* and a large grasshopper in the stomach, and enlarged ventrals from an unidentified snake in the hind gut. Another large female (PEM R6198) had scales from an unidentified skink in the hind gut. One adult male (PEM R6196) also contained the remains of a chameleon (*Chamaeleo* cf. *dilepis*) in the stomach, and scales and toes from a *Gerrhosaurus bulsi* (approx. SVL 90mm) in the hind gut. The other male (PEM R6195)

contained an adult male *Ichnotropis b. bivittata* (PEM R6280).

**Reproduction:** The males were mature, with large, though non-turgid testes, with thick coiled efferent ducts. All 3 females were gravid, containing 7-8 developing ova. The larger female (PEM R6198) had 8(5/3) ova (26.7x17.3mm); another large female (PEM R6196; 704+430mm) had 7(2/5) ova (16x5mm); PEM R6197 (760+440mm) also had 7(3/4) ova (17.3x6.8mm).

**Parasites:** A male (PEM R6196) had a nematode in the stomach. Simbotwe (1983) reported nematodes (*Abbreviata* sp.) from the stomach of a Lochinvar National Park (1527Cd) specimen.

**Notes:** One female (PEM R6198) is unusual in having a very low ventral count (144; usually >158), yet the rest of the scutellation is typical for the race (Broadley, 1966; 1983b). Broadley (1979) discussed the problems relating to the geographical variation within the genus, and recognized a number of races within *T. capensis*. He has recently proposed treating all races as full species (Broadley, pers. comm.). Shine *et al.* (1996) have discussed the unusually varied diet of this highly arboreal species. Foley (1998) gives further details of reproduction.

#### ATRACTASPIDIDAE: ATRACTASPIDINAE

*Atractaspis bibronii* A Smith 1849

**Material examined:** PEM R12494 - Chingola, Copperbelt Province (1227Bd): 1 adult female, 373(349+24)mm. Ventrals 241, subcaudals 21.

**Additional material:** PEM R1093, 1097 - Mbala, Northern Province (0831Cd), H Bredo; 2 juveniles.

**Notes:** The Chingola snake was killed after biting a child on the hand. The victim showed local swelling, intense pain with black-blue discoloration at bite site; pain killer (50mg Phethadine) and Phenergan were administered. The hand remained swollen and sensitive to touch, but this subsided after a week with small local necrosis at the bite site.

#### APARALLACTINAE

*Chilorhinophis gerardi* (Boulenger 1913)

**Additional material:** PEM R7244 - Lusaka, Central Province (1528Ad); PEM R7245 - Ndola, Central Province (1228Dc); PEM R7246 - Isoka, Northern Province (1032Ba), E Knowles collection: 3 adult specimens, the largest measuring 241(283+18)mm. Ventrals 279-285, subcaudals 24-26, supralabials 4 (followed by a

pseudo-supralabial which does not border the lip); infralabials 5 (first three in contact with anterior sublinguals).

#### ELAPIDAE

*Elapsoidea guentheri* Bocage 1866

**Additional material:** PEM R1977 - Mbala, Northern Province (0831Cd), H Bredo: 1 adult female measuring 484(451+33)mm. Ventrals 141, subcaudals 18, supralabials 7 (3rd and 4th entering orbit); infralabials 7 (first three in contact with anterior sublinguals).

**Diet:** The stomach and hind gut held the remains of a large scorpion.

**Reproduction:** The female contained 10(7/3) ova, measuring 4.2x2.1mm.

**Notes:** Pitman (1934) reported a large female from Kabwe (1428Ad) with 10 eggs during January. The distribution of this species appears to be sporadic and it is currently known from only one locality in each of the Central, Northwestern, Copperbelt and Southern Provinces (Broadley, 1971a; 1971c). Mertens (1937) reported two hymenopteran larvae in a juvenile snake from Katanda (1625Dd).

*Naja annulifera* Peters 1854

**Additional material:** PEM R2367 - Livingstone, Southern Province (1725Dd): 1 adult male measuring 1579(1408+171)mm, tail truncated. Ventrals 182; dorsal scale rows 19, 19 and 15; supralabials 7 (3rd entering orbit); infralabials 8 (first 4 in contact with anterior sublinguals), postoculars 2, anal entire. Colour: uniform brown above and cream-grey ventrum.

**Diet:** The stomach was empty but there was rodent hair in the lower gut.

**Reproduction:** The testes were flaccid, measuring 39.6x6.9mm.

**Notes:** Broadley (1995) recently revived *annulifera* as a full species with *anchietae* as a western race. The specimen has neck and midbody scale counts typical of *N. annulifera*. However, two additional Livingstone specimens in the collections of the National Museums of Zimbabwe (Bulawayo) and Zambia (Livingstone) have 17 and 15 midbody scale rows, respectively, and are probably referable to *N. anchietae* (Broadley, pers. comm.). Together these specimens indicate sympatry between the sister species.

*Naja nigricollis* Reinhardt 1843

**Material examined:** PEM R6148 - Kwambali

school, Lake Mweru, 5 km S Nchelenge town, Luapula Province (0928Bc); PEM R7137, 8063-64 - Musenga town, 12km east of Chingola, Copperbelt Province (1227Db); PEM R9837 - Kafulafuta, Copperbelt Province (1328Bd): 4 males, largest 1479(1215+264)mm and 1 juvenile. Midbody scale rows 19, ventrals 179-184, subcaudals 61-65; supralabials 6 (3rd entering orbit); infralabials 8-9.

**Diet:** One male (PEM R8064) had a well-digested ranid in the stomach and mammal hair in the lower gut.

**Notes:** The southern and western races *nigricincta* and *woodi* are unlikely to be conspecific with *N. nigricollis* (Broadley, pers. comm.), which reverts to binomials.

*Naja melanoleuca* Hallowell 1857

**Additional material:** PEM R1151 - Mbala, Northern Province (0831Cd), H. Bredo. An adult male, 1559 (1291+268)mm. Midbody scale rows 19, ventrals 207, subcaudals 64, supralabials 7 (3rd and 4th entering orbit), infralabials 7 (first four in contact with anterior sublinguals). Two distinct dark bands on the neck (on ventral count 13-18 and 24-29), colouration typical for *subfulva*.

**Reproduction:** The testes were flaccid, measuring 48.2x9.6mm.

**Note:** Broadley (1968) found large variation in both colour and ventral counts in the species, and rejected the retention of *subfulva* as a race.

*Dendroaspis polylepis* Günther 1864

**Material examined:** PEM R6188 - Sakeji School, Northwestern Province (1124Ab); PEM R6189 - Sanolumba village, 46km north-east of Sakeji, south-eastern DRC (1124Ba): 1 juvenile male, 936(734+202)mm, and 1 sub-adult female, 1396 (1042+354)mm. Midbody scale rows 21; ventrals 266 in male, 277 in female; subcaudals 129 in male and 125 in female. Both a dull lead-grey colour dorsally with pale grey ventrum.

#### VIPERIDAE: CAUSINAE

*Causus bilineatus* Boulenger 1905

**Material examined:** PEM R6170-71 - Sakeji School, Northwestern Province (1124Ab); PEM R6169 - Sanolumba village, 46km north-east of Sakeji, south-eastern DRC (1124Ba): 2 males, largest (PEM R6169) 354(318+46)mm; 1 adult female, 348(309+39)mm. Midbody scale rows 17 (with one exception of 18 in PEM R6171);

ventrals 136-138 in the males and 138 in the female; subcaudals 25-27 in the males and 26 in the female. Pale dorsolateral lines were distinct in all the specimens with clear dorsal black blotches (37-40 in males and 39 in the female). Ventral scales pale grey colour with black stippled anterior, usually more extensive at midbody.

**Parasites:** Stomach of male (PEM R6169) contained large numbers of nematodes.

**Reproduction:** The female was gravid and contained 8 eggs (5/3), measuring 14x8mm.

*Causus rhombeatus* (Lichtenstein 1823)

**Material examined:** PEM R6199, R6202 - Sakeji School, Northwestern Province (1124Ab); PEM R7127-29, R9535-36 - Musenga town, 12km east of Chingola, Copperbelt Province (1227Db); PEM R6200-01 - Sanolumba village, 46km north-east of Sakeji, south-eastern DRC (1124Ba): 5 males, largest 623(563+60)mm; 4 females, largest 701 (624+77)mm; 2 juveniles. Midbody scale rows 17-19; ventrals 136-145 in the males, 138-139 in the females; subcaudals 25-34 in the males and 26-27 in the female; supralabials 6; infralabials 9 (first 1 in contact with anterior sublinguals). Dorsal colours are pale grey with grey-black markings. Two of the snakes (PEM R7127 and R9535) had a pale grey ventrum, the other 2 had dark central ventra similar to *C. bilineatus*.

**Diet:** A female contained a slightly digested toad (*Bufo* cf. *gutturalis*) in the stomach.

**Reproduction:** A female (PEM R7127) contained 19(9/10) ova (9-11x5-6mm).

## VIPERINAE

*Bitis arietans arietans* (Merrem 1820)

**Material examined:** PEM R6210-13, 6216-19 - Sakeji School, Northwestern Province (1124Ab); PEM R6214 - 64km east of Mansa on Sampfya road, Luapula District (1129Ad); PEM R6215 - Sanolumba village, 46km north-east of Sakeji, south-eastern DRC (1124Ba): 8 males, largest 862(756+106)mm and 2 females, largest 491 (463+26)mm were examined. Ventrals 122-128 in the males and 128-129 in the females; subcaudals 23-28 in males and 13-15 in females. Four specimens had a black and golden yellow dorsal pattern, normally 6 chevrons and 6 blotches with 4 bars on the tail. PEM R7127 was a uniform grey colour with black chevrons; PEM R6214 a very light brown with dark brown chevrons. Two sub-adult snakes (PEM R6210-

11) were light brown with yellow borders on dark brown chevrons whereas the juveniles were all light brown with dark brown chevrons.

**Diet:** Only three guts were completely empty (one other snake was gutted). In three snakes the stomach was empty but the lower gut contained mammal hair. PEM R6219 had a total of 44gm (wet mass) of unidentified mammalian remains in stomach; PEM R6210 contained a small rodent in the gut (weight 4gm, swallowed tail first) and a large lump of mammal hair in the lower gut. Two other snakes had unidentified rodent remains in the stomach.

**Parasites:** Nematodes were collected in the stomach of male PEM R6218.

*Bitis gabonica*

*gabonica* (Duméril & Bibron 1854)

**Material examined:** PEM R6183 - Sakeji School, Northwestern Province (1124Ab); sight record (dry skin) - Lufwanyama farm, 28km east of Chingola, District Chingola, Copperbelt Province. The Sakeji specimen was an adult female, brought in after being killed in a forest fire. It was badly damaged, partly decomposed with posterior part of body missing. The specimen was skinned with midbody scale rows at 41. No ventral or subcaudal counts available because of damage to the body. Adult male measuring 1298(1151+147)mm, ventrals 129, subcaudals 28, midbody scale rows 41, supralabials 12; infralabials 17 (first four in contact with anterior sublinguals).

**Additional material:** PEM R2361 - Mbala, Northern Province (0831Cd).

**Diet:** The Mbala male had mammal hair in the hind gut.

**Notes:** A well-known snake in the Sakeji area. An adult was observed crossing the road on 15 July 1991 on the Hillwood farm near the school. A large adult was observed near the school swimming pool over several months (Brubacker, pers. comm.). As a result of extensive annual bush fires, these snakes are found mainly along the patches of evergreen forests along the streams, but are getting increasingly rare (Heygate, pers. comm.).

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**APPENDIX 1: GAZATTEER OF LOCALITIES MENTIONED IN THE TEXT**

<b>LOCALITY</b>	<b>PROVINCE</b>	<b>GRID SQUARE</b>	<b>COORDINATES</b>
<b>Zambia</b>			
1. Chansa (Masankwa Flats)	Northern	0830Ca	08°40'S, 30°12'E
2. Chiengi	Northern	0829Ca	08°38'S, 29°11'E
3. Chingola	Copperbelt	1227Bd	12°29'S, 27°47'E
4. Chililabombwe	Copperbelt	1227Bd	12°28'S, 27°51'E
5. Chirundu border post	Southern	1628Cc	16°02'S, 28°50'E
6. Chistenga River	Northwestern	1124Dd	11°45'S, 24°59'E
7. Chombe	Central	1429Db	14°36'S, 29°47'E
8. Dambwa Forest Reserve	Southern	1725Dd	17°46'S, 25°51'E
9. Farm 4304, District Chingola	Copperbelt	1227Db	12°37'S, 27°56'E
10. Gwabi Lodge, Kafue River	Southern	1528Dd	15°57'S, 28°49'E
11. Ikelenge	Northwestern	1124Ab	11°14'S, 24°15'E
12. Isoka	Northern	1032Ba	10°07'S, 32°41'E
13. Kabulonga, Lusaka	Central	1528Ad	15°22'S, 28°23'E
14. Kafulafuta	Copperbelt	1328Bd	13°48'S, 28°46'E
15. Kalala Lodge, Lake Itzhi-Tezhi	Central	1526Cc	15°46'S, 26°00'E
16. Kitwe	Copperbelt	1228Cc	12°52'S, 28°14'E
17. Lake Cheshi	Northern	0829Dd	08°56'S, 29°48'E
18. Lake Mweru	Luapula	0928Bc	09°26'S, 28°34'E
19. Lealui pontoon, Zambezi River	Western	1522Bb	15°12'S, 22°55'E
20. Livingstone	Southern	1725Dd	17°48'S, 25°51'E
21. Livingstone, 27km west	Western	1725Da	17°44'S, 25°36'E
22. Lochinvar National Park	Southern	1527Cd	15°56'S, 27°15'E
23. Luangwe East	Eastern	1332Ad	13°17'S, 32°27'E
24. Luanginga River, Kalabo town	Western	1422Dc	14°59'S, 22°40'E
25. Lufupa Camp, Kafue NP	Northwestern	1426Ca	14°36'S, 26°11'E
26. Lufwanyama Farm	Copperbelt	1227Da	12°37'S, 27°42'E
27. Lusaka	Central	1528Ad	15°10'S, 28°07'E
28. Mambwe	Northern	0931Bb	09°09'S, 31°52'E
29. Mansa, 64km east	Luapula	1129Ad	11°18'S, 29°24'E
30. Mbala	Northern	0831Cd	08°50'S, 31°24'E
31. Mbendele River	Southern	1628Bc	16°20'S, 28°41'E
32. Mongo	Western	1523Ac	15°15'S, 23°08'E
33. Mpika	Eastern	1131Cd	11°50'S, 31°31'E
34. Mpokoroso	Northern	0930Ac	09°22'S, 30°07'E
35. Mumbwa	Central	1527Ab	15°07'S, 27°21'E
36. Mumbwa, 13km west of town	Central	1526Bb	15°07'S, 26°56'E
37. Musenga	Copperbelt	1227Db	12°34'S, 27°53'E
38. Musungwa Lodge, Lake Itzhi-Tezhi	Central	1526Cc	15°46'S, 26°00'E
39. Mweru Wantipa	Northern	0829Db	08°37'S, 29°52'E
40. Mwinilunga	Northwestern	1124Cb	11°44'S, 24°25'E
41. Nchelenge	Luapula	0928Bc	09°25'S, 28°33'E
42. Ndola	Copperbelt	1228Cc	12°56'S, 28°10'E
43. Ngoma Camp, Kafue NP	Central	1525Dd	15°54'S, 25°57'E
44. Nyamkolo	Northern	0831Ca	08°40'S, 31°07'E
45. Sakeyi School	Northwestern	1124Ab	11°14'S, 24°19'E
46. Sampfya	Luapula	1129Bc	11°19'S, 29°31'E
47. Shesheke	Western	1724Cb	17°35'S, 24°25'E
48. Shesheke, 15km northwest	Western	1724Ad	17°26'S, 24°22'E
49. Shimbala	Central	1528Ca	15°41'S, 28°16'E
50. Situnda Pan, Luiwa Plains NP	Western	1422Da	14°40'S, 22°39'E
51. Siyenge pan, Luiwa Plains NP	Western	1422Dd	14°48'S, 22°55'E
52. Zambezi rapids	Northwestern	1124Aa	11°07'S, 24°08'E



# Democratic Republic of the Congo

53. 32km NE Mufilira  
54. Sanolumba village

Shaba  
Shaba

1228Ba  
1124Ba

12°13'S, 28°42'E  
11°12'S, 24°30'E

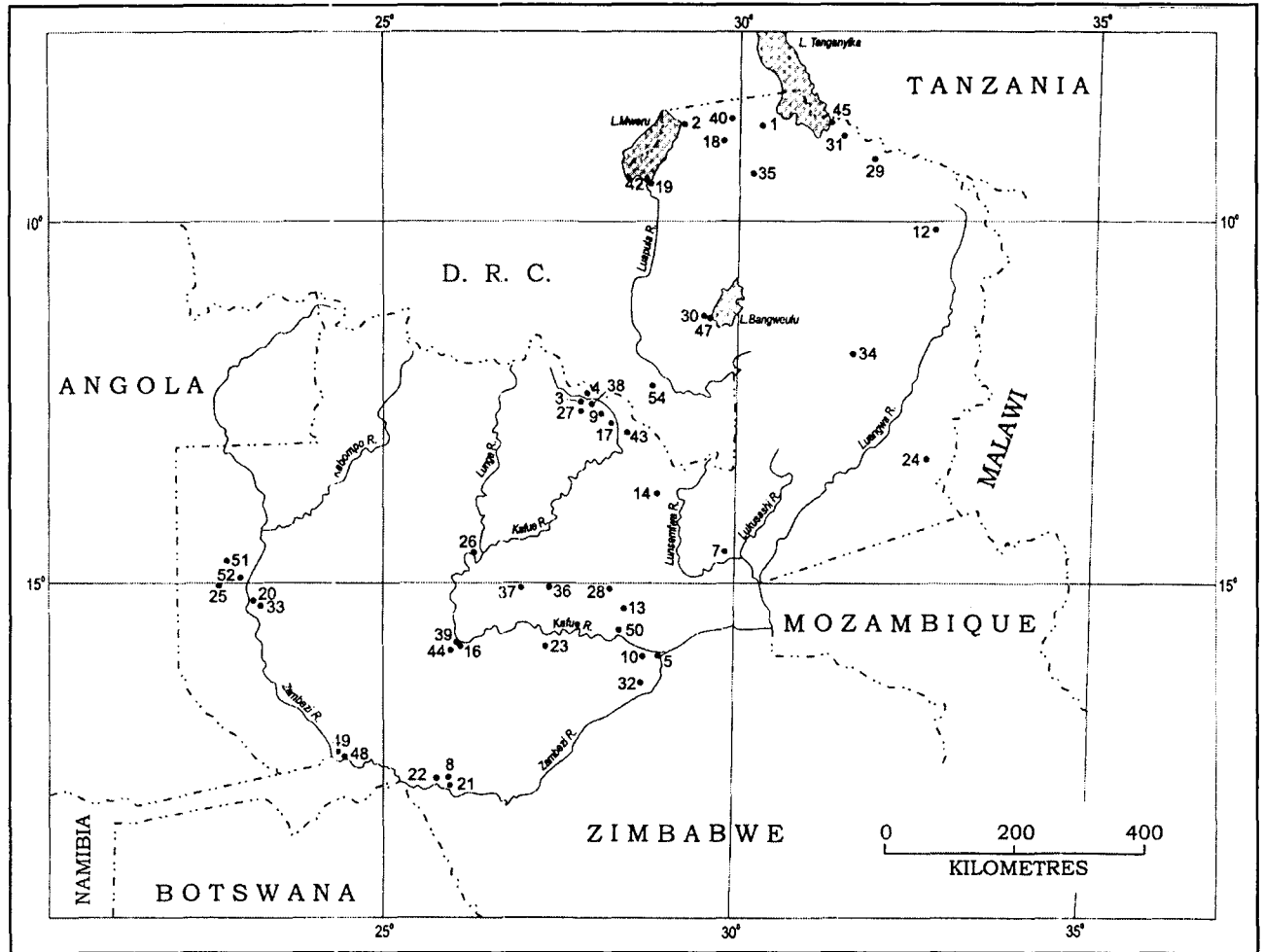


Figure 2. Map of Zambia with localities listed above.