

THE SQUAMATA (REPTILIA) OF THE ORANGE FREE STATE,  
SOUTH AFRICA

SR by

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This work, except where otherwise indicated,  
represents my own original work, and has not  
been submitted to any other University for  
degree purposes.

*J. W. P. de Waal.*

#### ABSTRACT

This study deals with the three orders of Squamata (Sauria, Amphisbaenia, Serpentes) of the Orange Free State, South Africa. Following an intensive systematic survey 4 492 specimens have been examined comprising 77 different species and subspecies of which 25% represent new records for the study area. Variation in taxonomically important characters as well as information on colour, size, habitat, breeding, predators and diet are discussed. Certain taxonomic changes have been made. Distribution maps have been compiled on the basis of eighth-degree-units.

Distributional patterns have been analyzed to establish areas of relative homogeneity separated by transitional zones. A causal analysis of the main distribution patterns of the O.F.S. Squamata indicated that rainfall is the major environmental factor influencing distribution. A comparative analysis of the squamate areas has been done with regard to various biogeographic phenomena.

## ACKNOWLEDGEMENTS

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To my parents and parents-in-law a word of thanks for moral and financial support. I am indebted to my wife without whose constant encouragement and inspiration this work could not have been instigated nor completed.

On line 15 from top of page, for "soud" read "sound".

District name omitted in central OFS (Map 1) is Ventersburg.

On line 2 from bottom of page, for "fiber-glass" read "fibre-glass".

On line 6 from top of page, for "mammologist" read "mammalogist".

On last line, "et al," should be "et al.,".

Last paragraph : The specimen of *Psammophis angolensis* under discussion in this paragraph is mentioned and illustrated in the following publication : Noble, E.M. 1966. Occurrence of *Psammophis angolensis* in Ethiopia. *Copeia*, 1966(1) : 125-126

On line 3 from top of page, "sundevalli" should be "sundevallii".

"Note:" - "Thaba Pachao Berg" should be "Thaba Pachoa Berg".

"Breeding:" - Omit sentence and read : "Four gravid females collected in September contained two well-developed eggs while one female collected during the same period contained three eggs."

On line 2 from bottom of page, for "grandient" read "gradient".

Point "6a" - "exluded" should read "excluded".

First line, for "Regne.Amin." read "Règne.Anim."

"Habitat:" - "Dolorite" should be "Dolerite".

"Key to the species:" - "didactyle" should be "didactyl" and "monodactyle" should be "monodactyl".

On line 4 of "Characters:" - "blueish-grey" should be "bluish-grey".

On line 9 of "Note:" - "grandient" should be "gradient".

On line 3 from top of page, "grandient" should be "gradient".

"Material examined from:" - "Bleomfontein" should be "Bloemfontein".

On line 3 of "Breeding:" - "measuriing" should be "measuring".

On line 2 of "Range:" - "Cpae" should be "Cape".

On line 3 of "Note:" - "et al," should be "et al.,".

"*Psammophis longementalis*" - after "p. 736" add ", pl. 27".

On line 2 of "Breeding:" - "unbilical chord" should be "umbilical cord".

On line 2 from bottom of page, "occurence" should be "occurrence".

"*Elapsoidea sundevalli*" should be "*Elapsoidea sundevallii*".

"*Elapsoidea sundevalli*" should be "*Elapsoidea sundevallii*".

On line 11 of "Note:" - "Kockva" should be "Kochva".

On line 14 from top of page, "cross-bans" should be "cross-bands" and "spreaded hood" should read "spread hood". On line 1 of "Diet:" - "as" should be "a".

On line 5 of "Note:" - "et al," should be "et al.,".

On line 2 of "Note:" - "program" should be "programme".

On line 5 of second paragraph, for "taxa" read "taxon".

age

- 30 Last paragraph : The word "contagious" is used in the same sense as used by Hagmeier and Stults (1964, p. 127) and Udvardy (1969, p. 243). If one states that distributional limits are contagiously distributed it means that they are distributed more or less parallel to each other, but not random, regular or clumped.
- 32 On line 9 of second paragraph, "*Elapsoides sundevalli*" should be "*Elapsoides sundevallii*".
- On line 2 from bottom of page, "Hueey" should be "Huheey".
- 35 On line 3 from bottom of page, "*Elapsoides sundevalli*" should be "*Elapsoides sundevallii*".
- 38 On line 6 from top of page, " $IFC + 100L/n$ " should read " $IFC = 100L/n$ ".
- On line 7 from top of page and last line, "occuring" should be "occurring".
- On line 2 from bottom of page, " $CC + 100C/n_1 + n_2 - C$ " should read " $CC = 100C/n_1 + n_2 - C$ ";
- 43 On line 1 of third paragraph, "Schwerdfeger's" should be "Schwerdtfeger's".
- 44 On line 5 of first paragraph, "et al." should be "et al.,".
- On line 6 of first paragraph, "simular" should be "similar".
- On line 3 of "Temperature:", for "poikilothermous" read "poikilothermic".
- On line 4 of "Temperature:" - "temparature" should be "temperature".
- 45 On last line, "Thieneman's" should be "Thienemann's".
- 46 On last line, "mold" should be "mould".
- 47 On line 8 of first paragraph, "occuring" should be "occurring".
- 53 On line 9 from top of page, "managably" should be "manageably".
- 54 On line 4 from top of page, for "become" read "becomes".
- On line 6 of second paragraph, for "emphasize" read "emphasizes".
- 56 Point "11", "managably" should be "manageably".



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I.

INTRODUCTION

After making a routine collection of snakes and lizards in the Orange Free State in 1972 it was apparent that this area had been much neglected in regard to these animals, especially as several common species were found that had not been previously recorded as occurring here. It became obvious that a survey of the Squamata (Sauria; Amphisbaenia; Serpentes) of the Orange Free State was very desirable and would be a contribution to the knowledge of the herpetofauna of southern Africa. The objective of this study is therefore to determine the distribution and status of the Orange Free State Squamata and to give information on colour, size, habitat, breeding, predators and diet. Additionally, variation in taxonomically important characters is discussed, especially as half of all animal synonyms over the whole world owe their origin to underestimation of individual variation (Mayr, 1969). Complete distributional data are necessary for sound taxonomy and sound zoogeography as well as for identifying the ecological factors which produce distribution patterns. Once established, complete distribution data can serve as a basis for future workers to determine if, and to what extent, distributions of species change in time.

The first contribution to our knowledge of Orange Free State Squamata was that of Boettger (1883) who recorded four snake and three lizard species from Smithfield, collected by Conrad Müller. In 1887, Symonds recorded a few snake species from Kroonstad, identified by Günther. In the following years until 1940 some thirteen publications scantily mention Orange Free State forms, the most important being that of Boulenger (1910). From 1941 to the present approximately ten publications have made contributions, mostly mentioning new localities in revisionary work. The most important contributions to the knowledge of Orange Free State Squamata are those of FitzSimons (1943) in "The lizards of South Africa", and FitzSimons (1962) in "Snakes of southern Africa".



## II.

### THE STUDY AREA

Location and boundaries: The Orange Free State, with an area of 129 152 km<sup>2</sup>, lies between 26° 30' and 30° 45' S latitude and 24° 15' and 29° 45' E longitude. Apart from the western border, the study area is delimited by natural boundaries as follows: the Vaal River in the north and north-west, the Caledon River in the east, the Drakensberg mountains in the north-east and the Orange River in the south. The administrative districts of the Orange Free State are indicated in map 1.

Topographic relief: The topographic relief is indicated in map 2. The western parts of the study area are relatively flat in comparison with the mountainous east. The rivers and watersheds are indicated in map 3. The major drainage systems are the Vaal and Orange Rivers, whose confluence lies to the south-west and which subsume all drainages in the Province.

#### Climate:

Temperature: The differentiation of temperature for the warmest and coldest months (maps 4 & 5) was determined from data supplied by van der Wal (1974) for 28 stations inside and just outside the study area. The number of stations is unfortunately inadequate to determine the exact positions of isotherms. However, van der Wal (1974) indicated that an inverse correlation between temperature and topographic relief exists in the study area (the higher the colder) and therefore relief has also been considered in the delimitation of isotherms.

Bailey (1960) developed a factor called effective temperature (ET) to express the biological importance of summer as a faunistic factor. Based on Bailey's (1960) equation Stuckenberg (1969) compiled an ET map of southern Africa and demonstrated a correlation between the distribution of snakes and frogs with ET zones. Using van der Wal's (1974) temperature data and Bailey's equation the ET's for the 28 stations in the study area were determined and isolines drawn (map 6). The positions of Stuckenberg's (1969) ET isolines are also indicated in map 6 as they differ from my own. Stuckenberg (1969) used inter

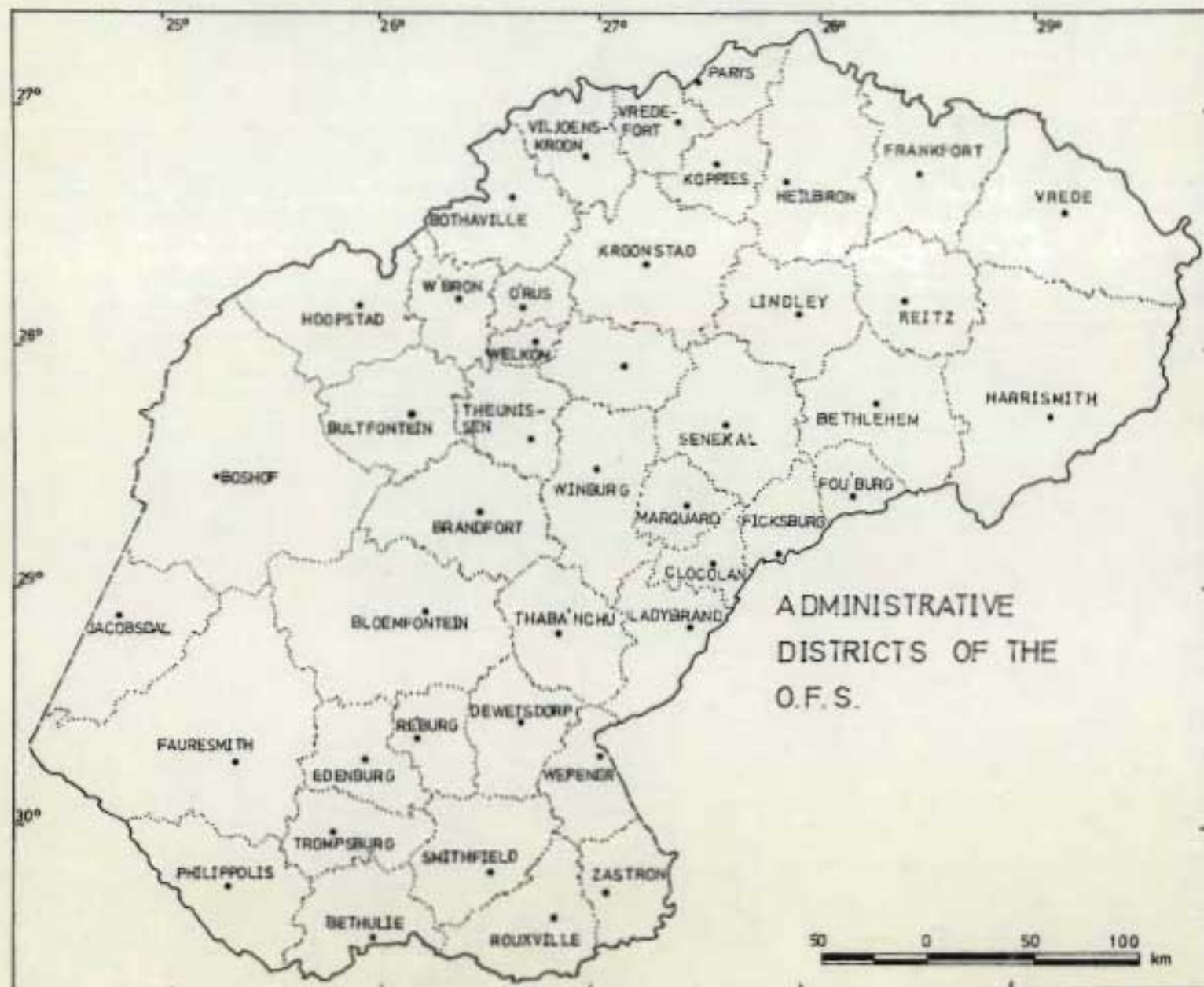
alia the distribution of *Atractaspis bibronii* and *Bufo carens* (Amphibia: Bufonidae) to demonstrate the correlation with ET, both correlating with the 15° ET isoline. New distribution data (this survey) on *A. bibronii* (map 82) and *B. carens* (map 7; Baltespoort; Mara, Parys; Mara, Vredefort; Middenspruit; Palmietfontein) contradict Stuckenberg's findings for at least these two species. However, if their distribution does correlate with ET the position of our own 15° ET isoline (map 6) seems to be preferable. Whatever the case may be, the inadequate number of temperature stations makes it impossible to come to satisfactory conclusions regarding the rôle of effective temperature.

Rainfall: The mean annual rainfall for the study area (map 8) indicates that rainfall differentiates longitudinally and decreases from east to west. Rainfall in the study area increases rapidly during October and reaches a peak during February and March after which it rapidly declines. The mean rainfall for the period October to March is expressed in map 9. Isohyets were based on data from van der Wal (1974). Specific isohyets have been selected for reasons which will become obvious at a later stage. Using five different profiles of the study area van der Wal (1974) indicated that rainfall increases with increasing altitude and that a positive correlation exists between these two variables.

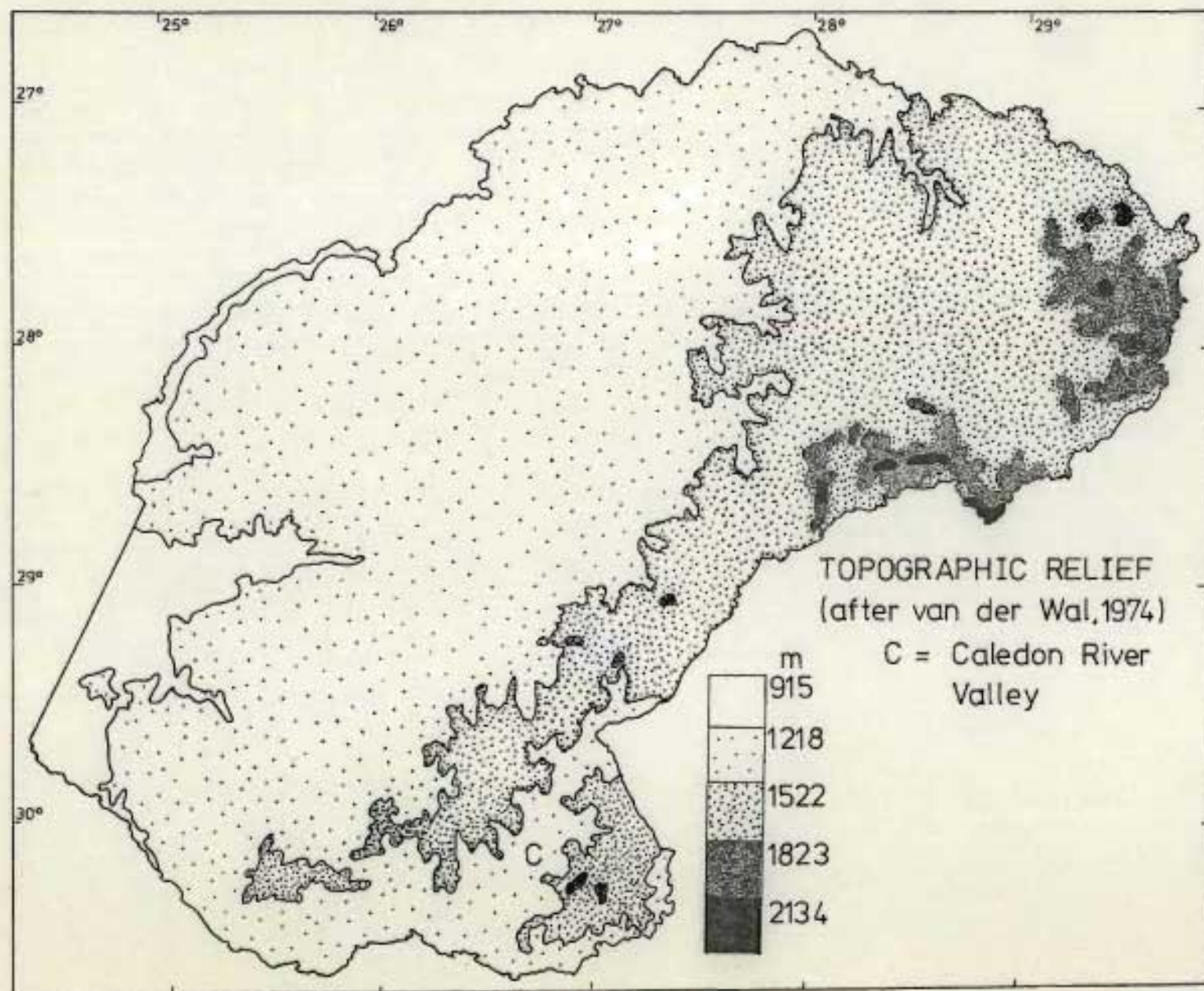
Vegetation: The five vegetation areas as defined by Acocks (1953) for the Orange Free State are indicated in map 10.

Geology: The geological formations of the study area as indicated in map 11 follow those of du Toit (1939).



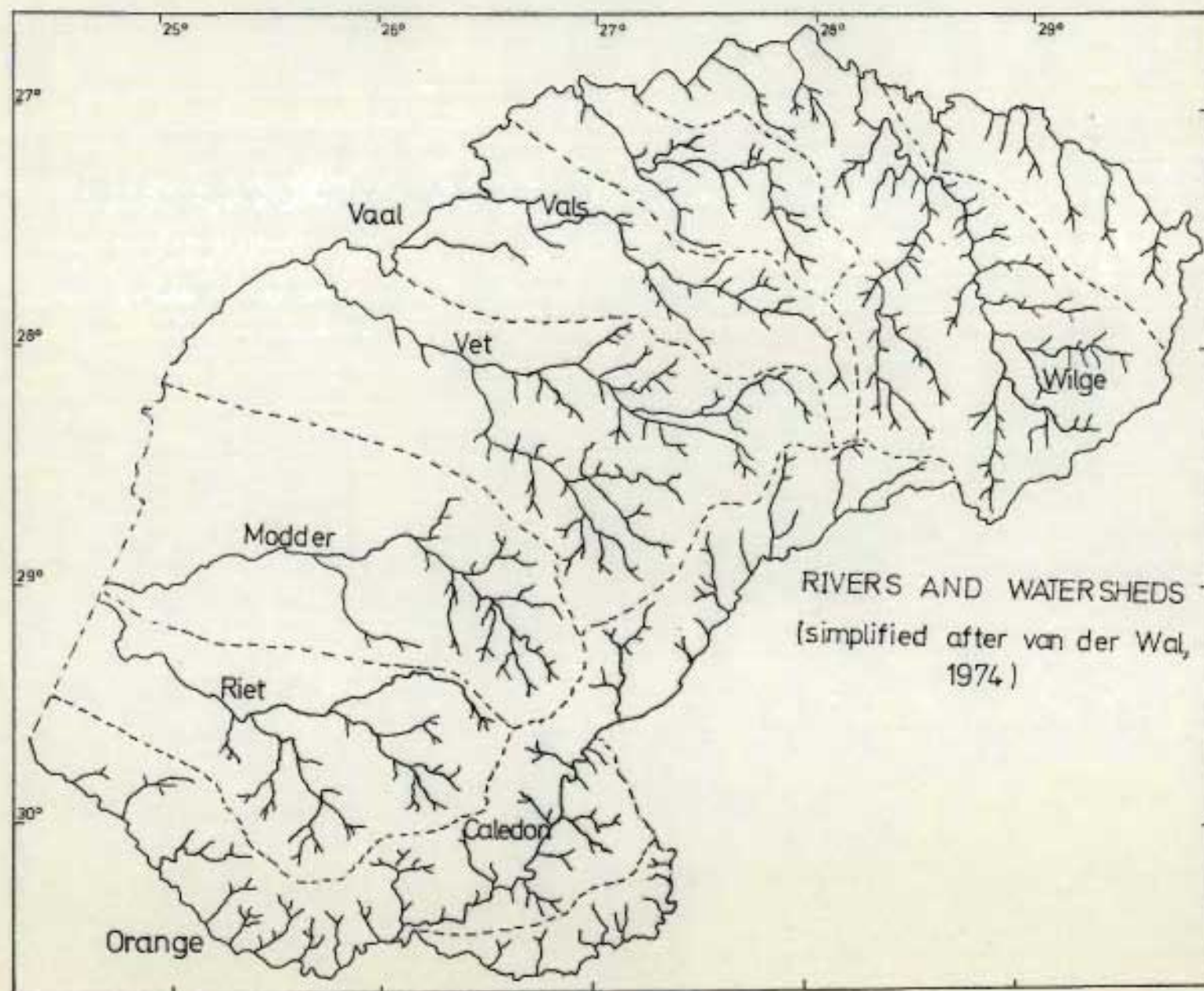


Map 1



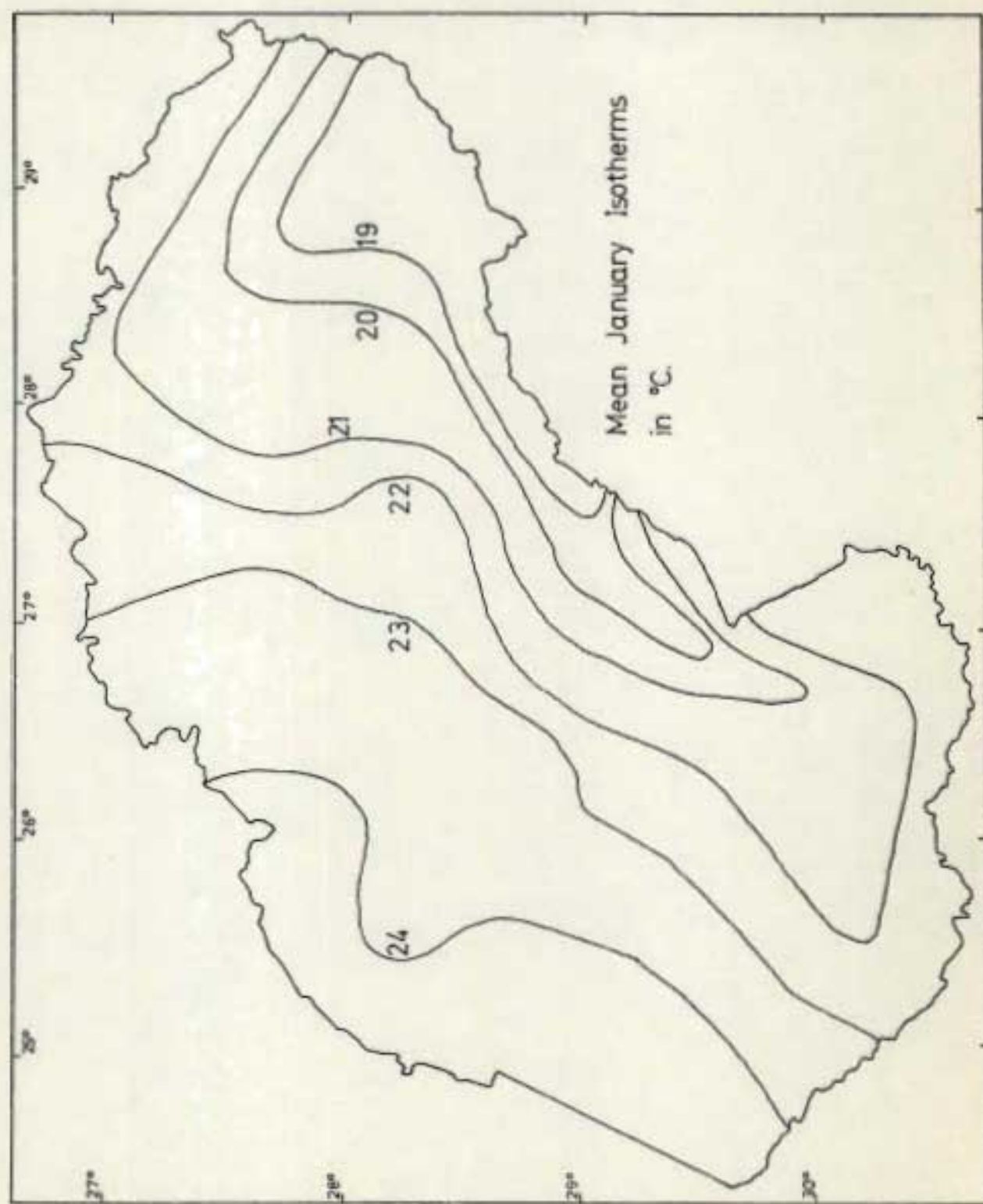
Map 2





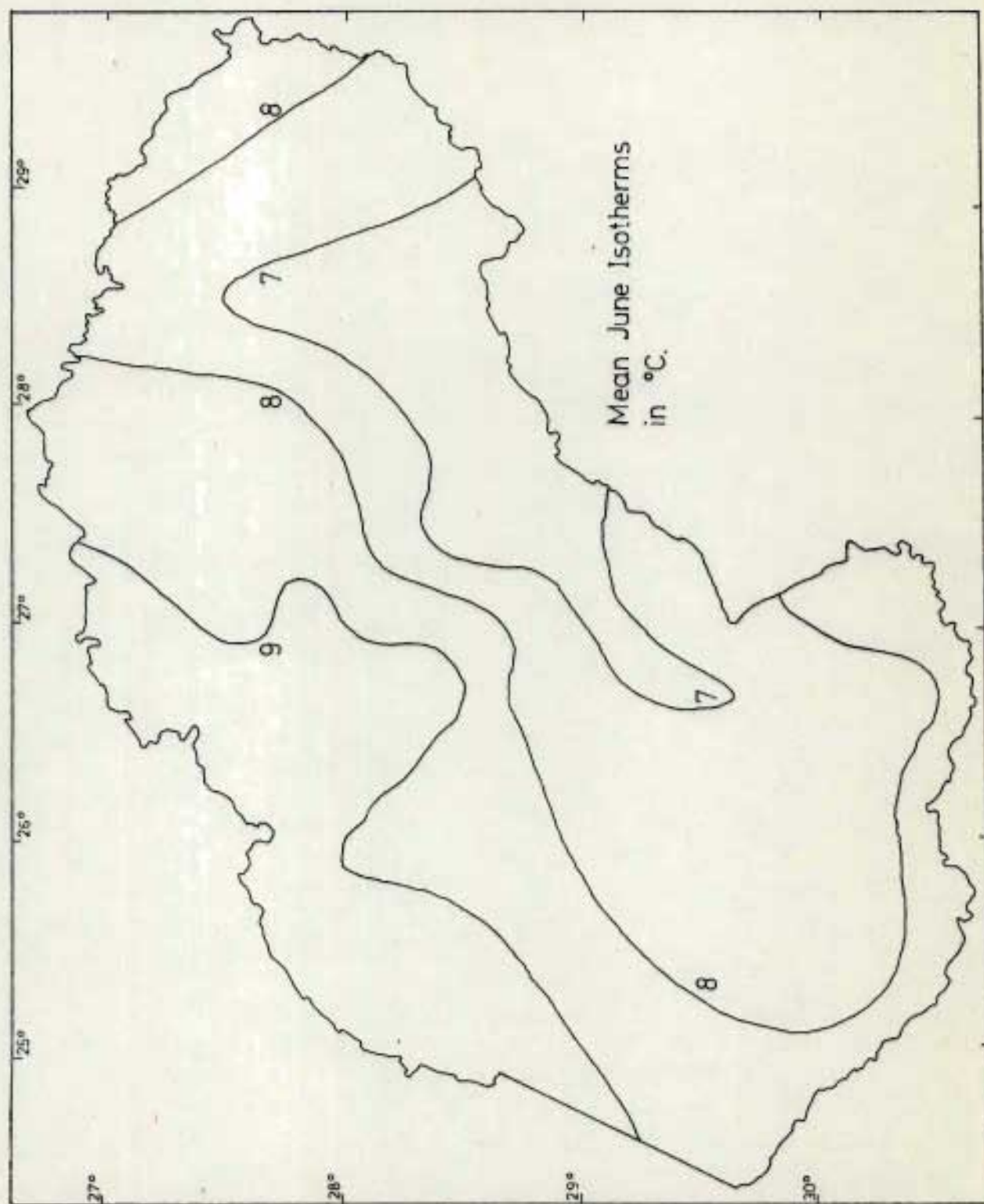
Map 3

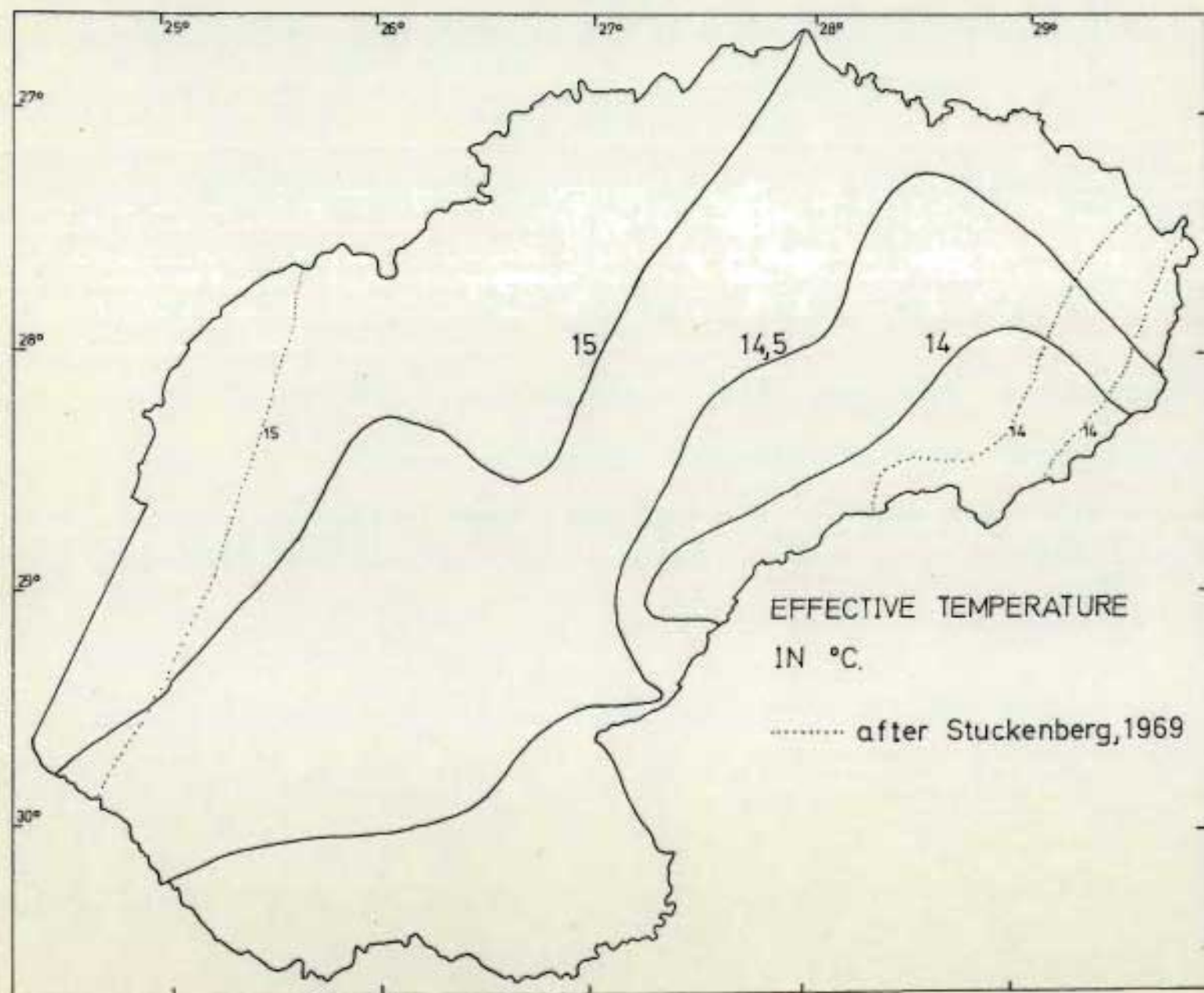
Map 4





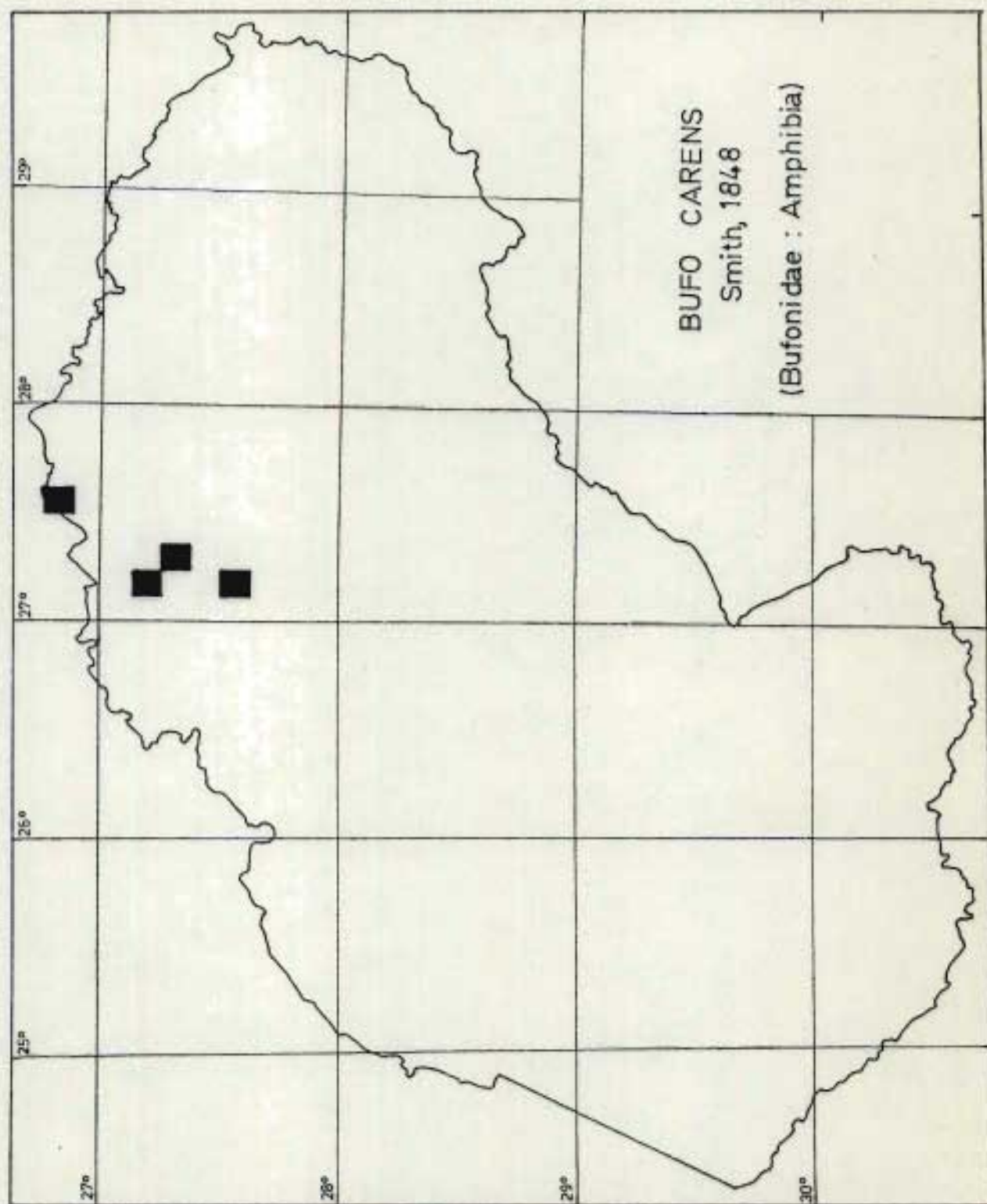
Map 5





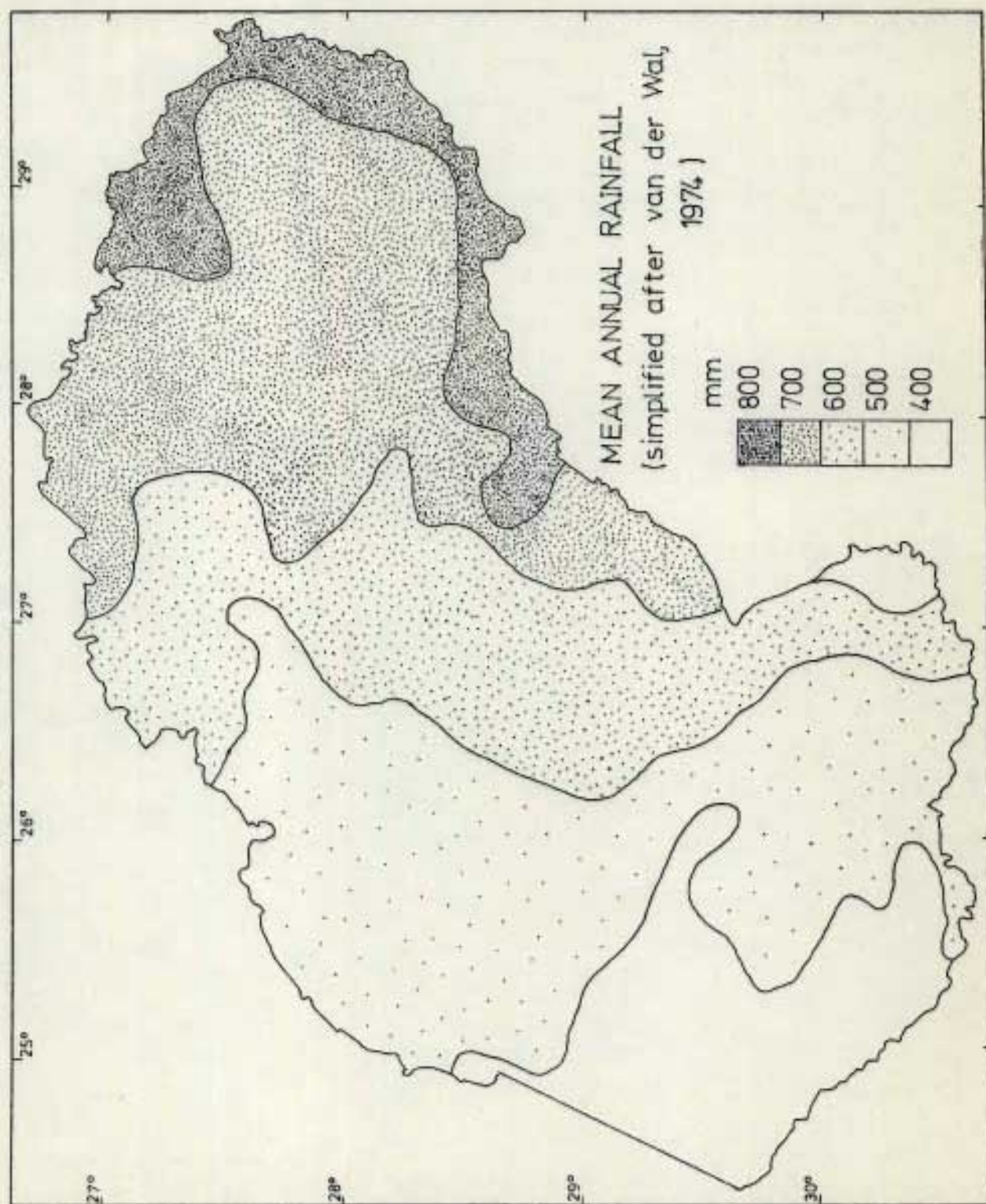
Map 6

Map 7

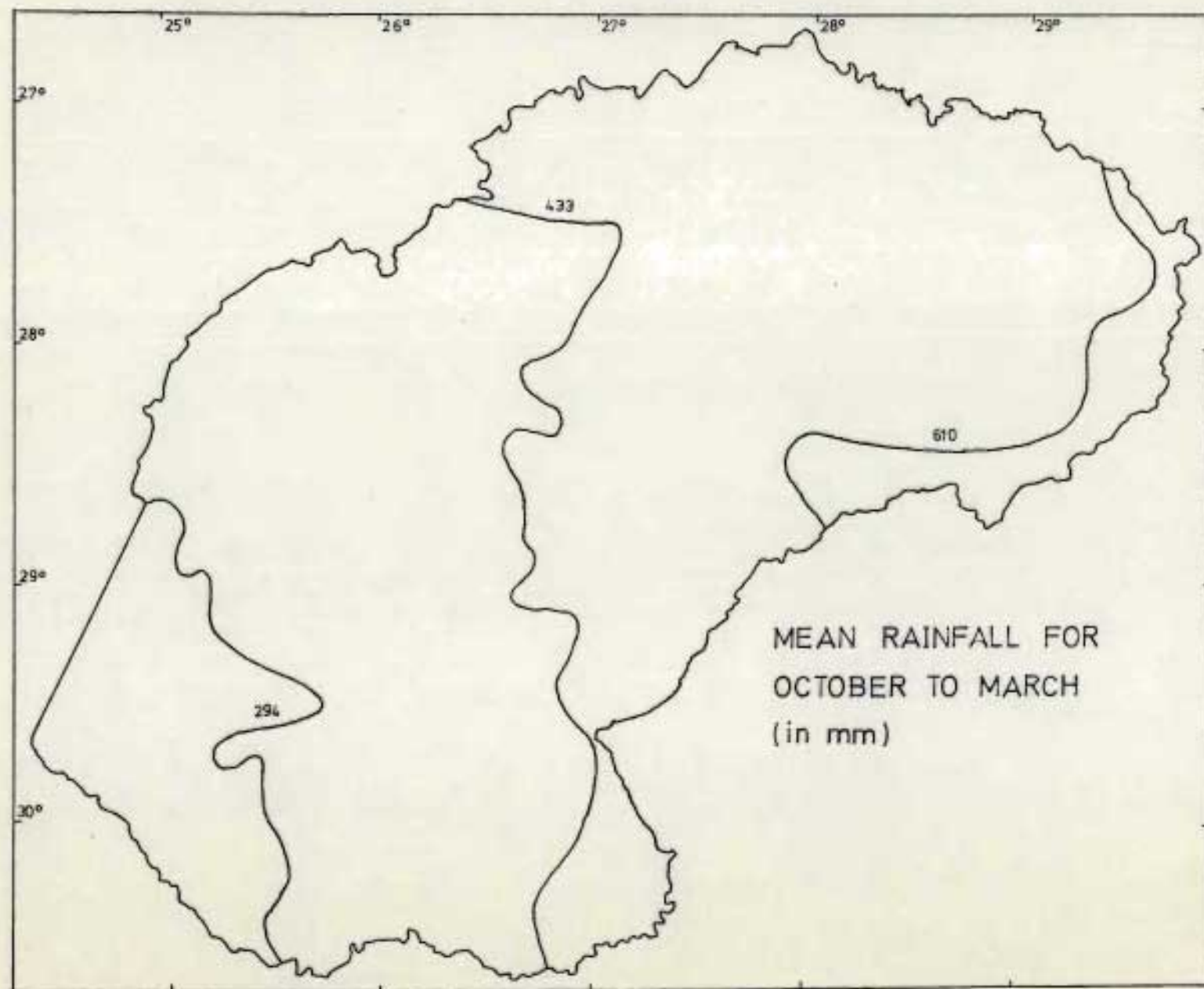




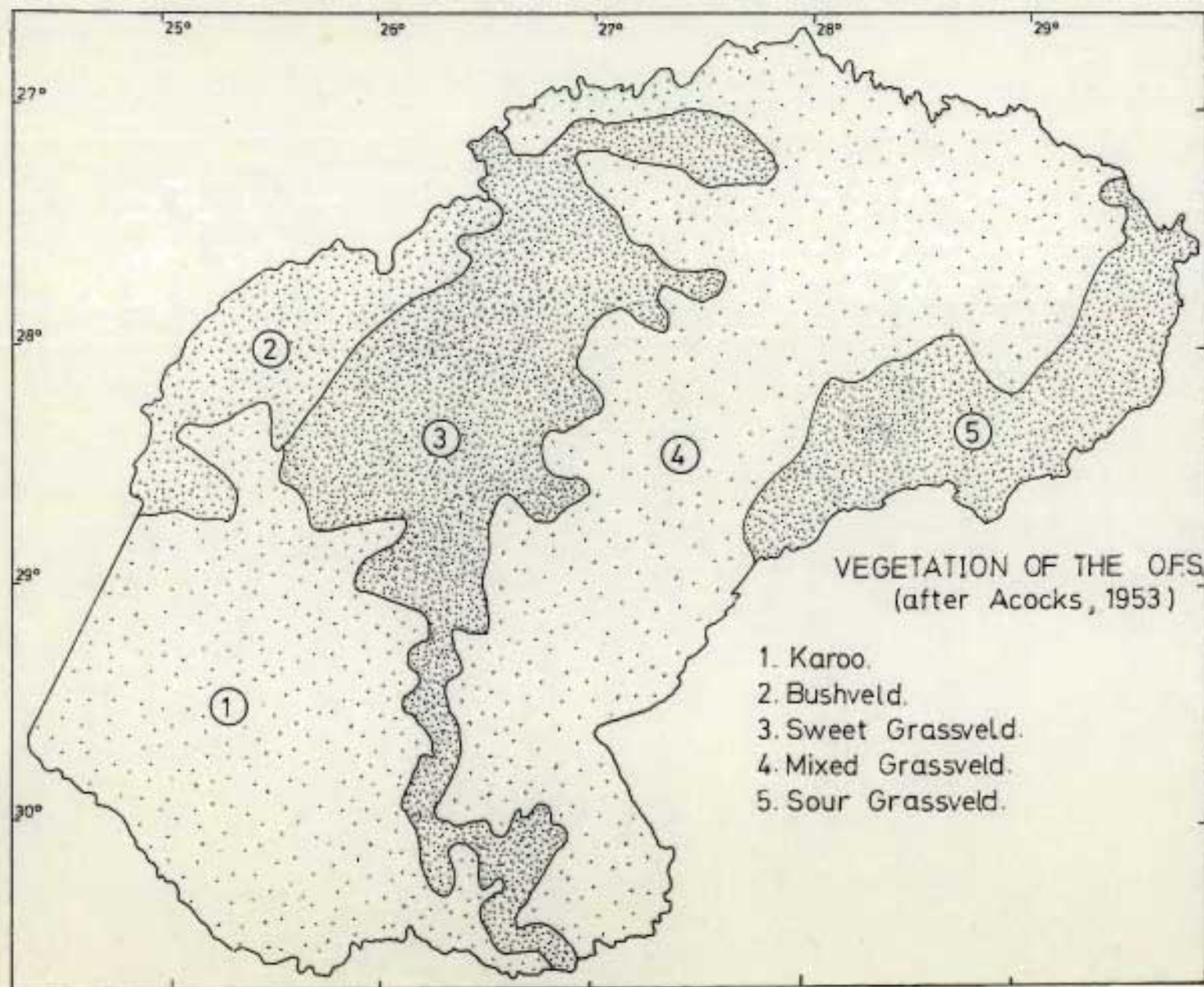
Map 8



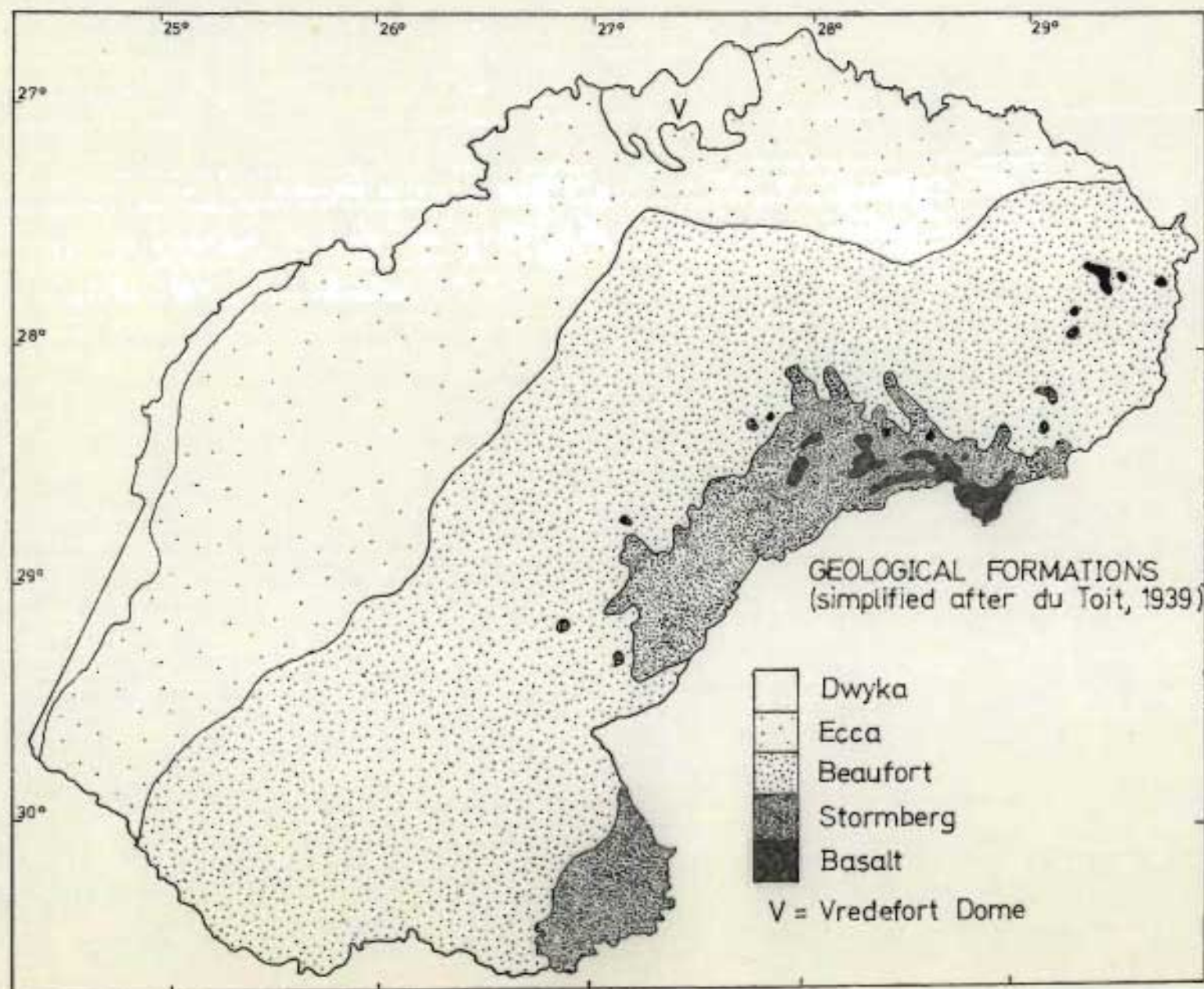




Map 9



Map 10



Map 11



## III.

## MATERIAL AND METHODS

This study is based mainly on material collected in the Orange Free State during the years 1972 to 1974 and housed in the National Museum, Bloemfontein. Collecting was planned with the aid of the index map for the 1/25000 cadastral plan series and the index of Orange Free State farms which gives farm name and number, cadastral plan number and administrative district (compiled by the office of the Surveyor-General, O.F.S., 1970). The above-mentioned map divides each degree-unit<sup>1)</sup> (1 x 1 degree-"square") into 32 smaller units (eighth-degree latitudinally and quarter-degree longitudinally). Collections were made on a farm in each alternating unit, except for a few cases in the north-western Orange Free State where large areas consist of cultivated land without natural habitat. In some cases collections were made also on interjacent units. Material was thus collected from approximately 16 localities within each degree-unit, making this survey probably the most intensive ever made in Africa. In total some 221 localities were visited. Material was collected during all seasons and specimens were obtained from all parts of the study area in both summer and winter. Farms with relatively undisturbed habitats were selected from 1/250 000 topo-cadastral maps (Government Printer, Pretoria). Material was collected from all kinds of habitats in a given locality, by looking for free-running specimens, opening rock-cracks, turning over rocks and digging open old termitaria. At least three (usually four) collectors spent not less than one day at a given locality. In some cases up to six collectors stayed for a week on one locality. All specimens were killed at the museum, except for a few killed during collecting. Lizards were killed with chloroform and snakes with ethyl acetate. Measurements and scale counts were taken from freshly killed specimens as far as possible as this is the easiest way to achieve accurate results. Specimens were fixed in 4% formalin and preserved in 70% ethanol. As formalin changes colour, the latter was noted before

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1. The term "degree-unit" is preferred to "degree-square" as the area formed by two successive degrees of latitude and two (superimposed) successive degrees of longitude is not a square, particularly outside the tropics.

fixation. Relevant information on each specimen was recorded on a printed data card which facilitates extracting results. Many characters like scale counts take considerable time to determine and once recorded on these cards can be of much help to future workers.

Material examined comprises 2701 lizards, 86 amphisbaenids and 1704 snakes, totalling 4491 specimens. Most of these are in the National Museum, Bloemfontein. When material from other institutions was examined, it has been noted in the text. The following abbreviations used in the text denote various institutions:-

AM .....	Albany Museum, Grahamstown.
AMNH .....	American Museum of Natural History, New York.
BMNH .....	British Museum (Natural History), London.
MCZ .....	Museum of Comparative Zoology, Harvard University, Cambridge.
NHMB .....	Naturhistorisches Museum, Basel.
NMP .....	Natal Museum, Pietermaritzburg.
NMB .....	National Museum, Bloemfontein.
SAM .....	South African Museum, Cape Town.
TM .....	Transvaal Museum, Pretoria.
UM .....	Umtali Museum, Umtali.
USNM .....	National Museum of Natural History, Smithsonian Institution, Washington D.C.
ZMB .....	Zoologisches Museum, Humboldt University, Berlin.

English and Afrikaans common names are given when available. These names are mainly based on FitzSimons (1943; 1962) but in a few cases some Afrikaans names known to the author are given. Ranges of species/subspecies are mainly based on FitzSimons (1943; 1962) and Broadley (1966; unpublished Ph.D. thesis).

A detailed description of each form has not been included in the text as this is available in the literature. Observed variation in important taxonomic characters is given, based on material from the study area. The number of specimens examined for each form is indicated, showing the number of specimens on which observed variation is based.



Scales in lizards: Longitudinal scale rows were counted transversely at midbody, a point midway between armpit and groin. In some lizards the dorsal (including lateral) scales are differentiated from the ventral scales. In these instances transverse scale rows were counted longitudinally from back of head to root of tail (dorsally), and from collar or armpit (if collar absent) to groin (ventrally). Subdigital lamellae were counted from base of digit (first junction with an adjacent digit) to tip, except in the Gekkonidae where only the differentiated adhesive lamellae were counted. The terminology and way of expressing caudal scalation in the Gekkonidae is based on Pasteur (1964). If a number of femoral pores is indicated this applies only to the number of scales with femoral pores on one thigh. In some cases the number of differentiated glandular femoral scales is given and again this applies to only one thigh.

Scales in snakes: The number of longitudinal scale rows was counted transversely as follows:-

- (a) Species with regular scalation: three counts were taken  
- at a point one head length posterior to occiput; at midbody, a point midway between snout and vent; at a point one head length anterior to vent (unless otherwise stated).
- (b) Species with irregular scalation: one count midway between snout and vent.

The standard system of counting ventral scales in snakes as proposed by Dowling (1951), was followed. Subcaudal scale counts were taken from the first pair (or if subcaudals entire, from the first one) in contact on the median line, excluding the terminal spine.

Measurements: The largest size of each species/subspecies is indicated by a formula: head and body length + tail = total length. Head and body length was measured from tip of snout to vent. Tail length was measured from vent to tip of tail. An "r" after tail length denotes a regenerated tail. Head length in lizards was measured from tip of snout to posterior border of ear opening. Measurements were taken with a sliding vernier caliper, a 380mm stainless steel rule and a 1500mm fiber-glass measuring tape as appropriate to the size of the animal measured.



Breeding: Gravid females were dissected to determine the number of eggs or embryos. Eggs collected in the veld were hatched in the laboratory to determine the species and sizes of eggs and hatchlings.

Diet: Stomach contents were removed and identified, insects by an entomologist and mammals by a mammologist. Amphibians were identified by the author, based on the taxonomic arrangement of Poynton (1964).

Listing of localities: Localities are listed under two headings:

- (a) "Material examined from" - These localities represent material personally examined, except where otherwise stated. If a locality applies to material held by another institution this is indicated by the abbreviation for the institution's name in brackets. The spelling of farm names follows that of the index of Orange Free State farms compiled by the Surveyor-General (1970). In the case of homonymous names, the administrative district is added, for example: Mara, Vredefort; Mara, Parys. The distribution map number is indicated under this heading. In the case of snakes FitzSimons (1962) recorded many localities based on snake park specimens, and as these snakes are no longer in existence they could not be examined.
- (b) "Literature records" - All localities recorded in the literature are indicated here, even if vague or unacceptable. A given locality is listed only on the first occasion it is mentioned in the literature.

Distribution maps: All acceptable specimen and literature localities were plotted. Literature localities regarded as "probably incorrect" or too vague (Modder River; Vredefort Road) or untraceable (Bethanien) are not indicated on distribution maps. Every acceptable locality, based on material examined, is indicated on the distribution map by a solid rectangle. If no material was examined for a given acceptable literature locality, this locality is indicated on the distribution map by a solid triangle. To indicate the distribution of two forms on the same map solid circles were also employed. Localities were plotted on the quarter-degree grid and locus code method (Davis, 1948; de Meillon et al, 1961), with the exception

that degrees latitude and longitude were further subdivided into eighth-degree-units for greater accuracy of plotting, so that a further value is added to the code, designating either the first, second, third or fourth eighth-degree-unit (see fig. 2, p. 257).). This system gives a better impression of distribution and ecological correlation with distribution can eventually be determined more accurately. The locus codes for localities were converted from cadastral plan numbers supplied by the index of Orange Free State farms as well as from 1/250 000 topo-cadastral maps. The locus code of every locality is given, and the use of this code to plot distribution is explained in the gazetteer.

IV.

SYSTEMATIC ACCOUNT

PREFACE

Taxonomic procedure is based on Mayr (1969). The taxonomic status of each form was determined by evaluation of morphological, ecological and distributional data. Names and authors of families and higher taxa are mainly based on Kuhn (1967). The sequence of taxa follows that of FitzSimons (1943; 1962). In generic or specific citations an "N" sign indicates that the original description has been seen.

Due to the restricted scope of this study the author was reluctant to make taxonomic changes but this was inevitable in the light of evidence presented by the material collected in certain cases. In other cases (*Agama hispida*; *Cordylus vittifer*) where data based on Orange Free State material suggest that subspecific separation is possible no distinction was made as adequate material and complete distributional data from the entire range of the forms concerned are needed for the taxonomic changes implied. However, for the purpose of this study, such forms were treated as infraspecific taxa in view of the situation found in the Orange Free State.

Generic synonymies have been omitted as these are available in the literature (FitzSimons 1943 & 1962; Loveridge, 1957; etc.). Full synonymies of species and subspecies have been attempted but many taxa are in need of revision, which has not here been attempted.

TAXONOMIC CHANGES:

*Pachydactylus capensis oculatus* Hewitt, 1927, is regarded as a valid race, and not a synonym, of *Pachydactylus maculatus*.

*Pachydactylus maculatus albomarginatus* Hewitt, 1932, is regarded as a synonym of *Pachydactylus maculatus oculatus*, and not of the nominate race.



*Cordylus* (*Pseudocordylus*) *melanotus* A. Smith, 1838, is recognized as a good species, and not as a synonym of *Pseudocordylus microlepidotus fasciatus*.

*Cordylus* (*Pseudocordylus*) *subviridis* A. Smith, 1838 is regarded as a race of *Pseudocordylus melanotus*, and not as a separate species.

*Stenostoma conjunctum* Jan, 1861, is tentatively regarded as a synonym of *Leptotyphlops s.scutifrons* (Peters, 1854).

*Leptotyphlops conjunctus incognitus* Broadley & Watson, 1976 is tentatively regarded as a synonym of *Leptotyphlops s.scutifrons* (Peters, 1854).

DOUBTFUL RECORDS

The following species/subspecies have been recorded from the Orange Free State, but are regarded as doubtful, for the reasons given below:

*Tetradactylus seps laevicauda* Hewitt, 1915: Recorded from Smithfield (SAM 11033; FitzSimons, 1943). The specimen has been examined and found to exhibit the characters of the nominate race, which ranges from the south-western Cape Province eastwards along the coastal areas to Cape St. Francis (FitzSimons, 1943). No other material could be obtained and the occurrence of *T. seps* in the Orange Free State could not be confirmed.

*Tetradactylus africanus fitzsimonsi* Hewitt, 1915: Hewitt (1915) recorded a specimen from Kroonstad housed in the Port Elizabeth Museum; this locality, as he remarks, is doubtful. The specimen could not be found in the Port Elizabeth Museum and appears to be lost.

*Chamaesaura aenea* (Fitzinger, 1843): Recorded from Lindley and housed in the Albany Museum (FitzSimons, 1943) where the specimen appears to be lost.

*Rhamphiophis multimaculatus* (A. Smith, 1847): Recorded from Smithfield and housed in the South African Museum (Boulenger, 1910). The specimen appears to be lost and the occurrence of this snake in the Orange Free State could not be confirmed.

*Psammophis sibilans sibilans* (Linnaeus, 1758): Recorded from Kroonstad (Loveridge, 1940). No material has been examined and the occurrence of this snake in the Orange Free State could not be confirmed.

*Psammophis angolensis* (Bocage, 1872): According to Broadley (1974; pers. comm.) there is a specimen from Philippolis in the British Museum (1909.9.3.6). The most southern confirmed record of this species is from the Transvaal Bushveld (FitzSimons, 1962) and as no material has been collected in the study area, the Philippolis record needs confirmation.

*Aspidelaps scutatus* (A. Smith, 1848): Records of this snake from Philippolis (Hewitt, 1912; USNM 63591) and Thaba'Nchu (FitzSimons, 1962; lost in Port Elizabeth Museum) were rejected by Broadley (1968) in his revision of the species. As no additional material could be obtained the above records remain of doubtful authenticity.



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# SYSTEMATIC DISCUSSION

## Order SQUAMATA Oppel, 1811

### Key to the suborders:

- 1a. Body covered with rectangular segments of soft skin which form regular annuli from pectoral region to tip of tail ..... Amphisbaenia, p. 136
- 1b. Body covered with granules or scales which do not form regular annuli from pectoral region to tip of tail ..... 2
- 2a. Limbs usually present, if absent lower eyelid movable ..... Sauria, p. 28
- 2b. Limbs always absent; no movable eyelid ..... Serpentes, p. 139

## Suborder SAURIA MacCartney, 1802

### Key to the families:

- 1a. Dorsal surface of head covered with irregularly arranged, asymmetrical granules or small scales ..... 2
- 1b. Dorsal surface of head covered with large symmetrical and regularly arranged scales ..... 5
- 2a. Tongue deeply forked anteriorly ..... Varanidae, p. 131
- 2b. Tongue not deeply forked anteriorly, feebly nicked at the most ..... 3
- 3a. Tongue long and slender, club-shaped anteriorly ..... Chamaeleonidae, p. 59
- 3b. Tongue short and broad, not club-shaped anteriorly ..... 4
- 4a. Eyes without movable eyelids, incapable of closing ..... Gekkonidae, p. 29
- 4b. Eyes with movable eyelids, capable of closing ... Agamidae, p. 49
- 5a. Tongue distinctly forked anteriorly ..... Lacertidae, p. 114
- 5b. Tongue not forked anteriorly, feebly nicked at the most ..... 6
- 6a. Femoral pores absent; dorsal scales imbricate ... Scincidae, p. 62
- 6b. Femoral pores present; dorsal scales either arranged in transverse series or small and granular ..... Cordylidae, p. 85

Family GEKKONIDAE Cuvier, 1817

Key to the genera:

- 1a. Pupil round ..... *Lygodactylus*, p. 34
- 1b. Pupil vertical ..... 2
- 2a. Digits not dilated, without adhesive lamellae; toes with a lateral fringe of elongate pointed scales ..... *Ptenopus*, p. 29
- 2b. Digits dilated, with adhesive lamellae ..... 3
- 3a. Distal digital expansion with a pair of ventral adhesive plates separated by a longitudinal groove and slightly separated from two smaller proximal pairs ..... *Afroedura*, p. 31
- 3b. Distal digital expansion furnished below by transverse adhesive lamellae ..... *Pachydactylus*, p. 36

Genus *PTENOPUS* Gray, 1865

- \* *Ptenopus* Gray, 1865, Proc.zool.Soc.Lond., p. 640. Type by monotypy:  
*Ptenopus maculatus* Gray, 1865 = *Stenodactylus garrulus* A. Smith, 1849.

*PTENOPUS GARRULUS* (A. Smith, 1849)

*PTENOPUS GARRULUS GARRULUS* (A. Smith, 1849)

- \* *Stenodactylus garrulus* A. Smith, 1849, Ill.Zool.S.Afr., Rept., App. p. 6: "Sandy districts in the interior of Southern Africa".

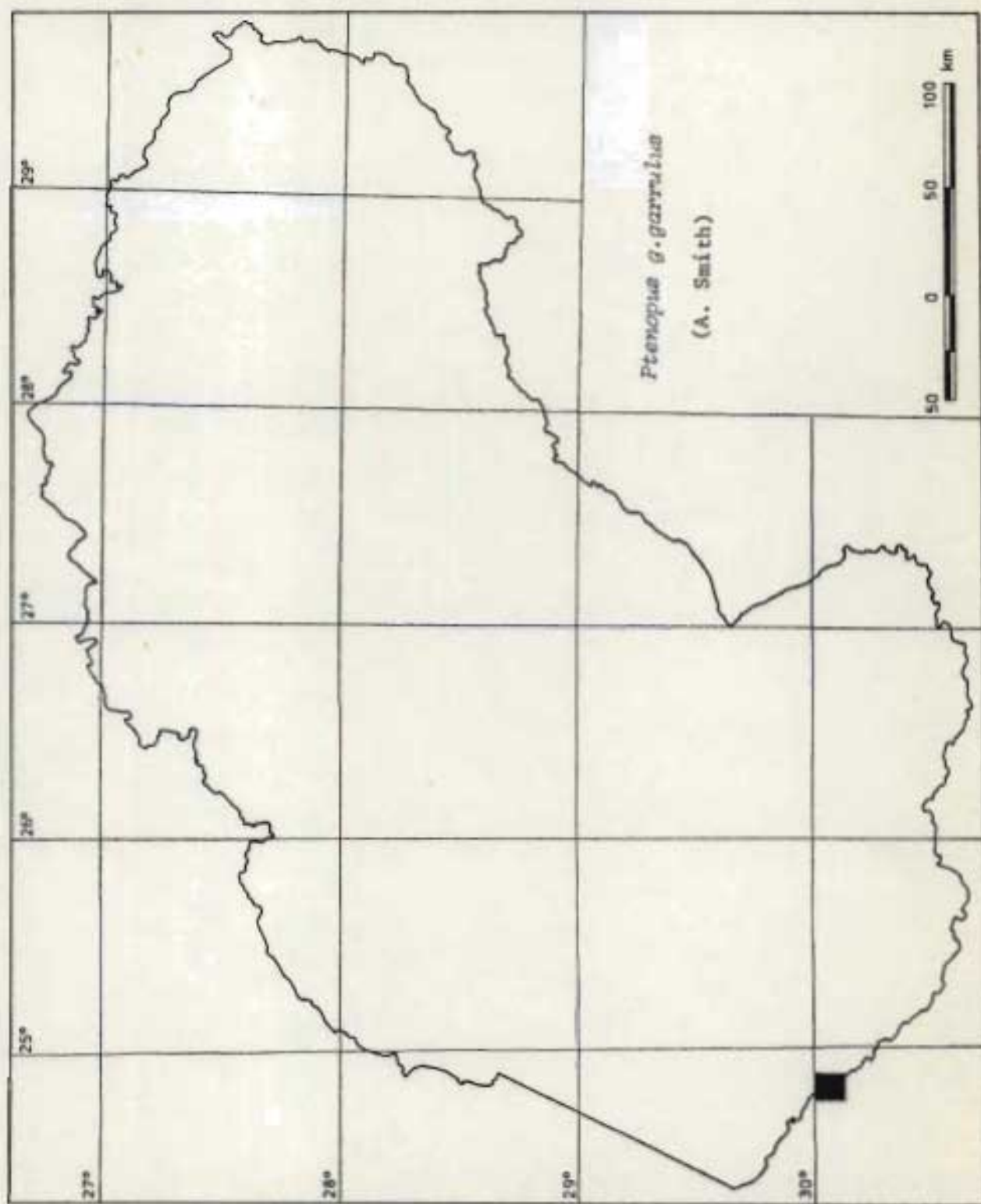
Common name: Whistling Gecko; Klein Grondgeitjie.

Range: Western South West Africa, Botswana, northern Cape Province and northern Transvaal (see Haacke, 1975, fig. 3); south-western Orange Free State.

Characters: Forty-nine specimens examined. Supralabials six to nine, mostly seven or eight; infralabials seven to ten, mostly eight or nine; interorbital scales between supraorbital folds 38 to 48; gulars 70 to 92; 168 to 185 scales around body, counted just anterior to umbilical slit; tail nonverticillate; toes with a lateral fringe of elongate



Map 12



pointed scales; colour above consists of beige, orange-brown and dark-brown marks; ventral surfaces immaculately white except in males which have bright-yellow throats.

Size: Largest male (NMB 4682 - Lemoenboord)  $49 + 28 = 77\text{mm}$ . Largest female (NMB 4656 - Lemoenboord)  $49 + 31 = 80\text{mm}$ .

Habitat: Relative flat sandy areas covered with grass. All specimens collected when the new P.K. le Roux Dam was completed and water flooded the surrounding land (September, 1976).

Material examined from: Lemoenboord (Map 12).

Literature records: None, new record for the Orange Free State.

#### Genus *AFROEDURA* Loveridge, 1944

\* *Afroedura* Loveridge, 1944, Am.Mus.Novit., No. 1254, p. 1, fig. 1.

Type by original designation: *A.bogerti* (= *A.karroica bogerti*)  
Loveridge, 1944.

Key to the species:

- 1a. Rostral borders nostril; 11 to 12 preanal pores in males ...  
..... *A. nivaria*, p. 31
- 1b. Rostral excluded from nostril, six preanal pores in males ...  
..... *A. karroica*, p. 32

#### *AFROEDURA NIVARIA* (Boulenger, 1894)

\* *Oedura nivaria* Boulenger, 1894, Proc.zool.Soc.Lond., p. 608: Summit of Drakensberg Range, Natal.

\* *Oedura amatolica* Hewitt, 1925, Rec. Albany Mus., 3, p. 349, pl. xvi, fig. 3, pl. xvii, fig. 2: Near Hogsback, 6000 feet, Amatola Range, Cape Province.

Common name: Snowy Mountain Gecko.

Range: From the Amatola Mountains of the eastern Cape Province northwards along the Drakensberg Range to western Natal (FitzSimons, 1943; Loveridge, 1947) and the eastern Orange Free State.

Characters: Seventeen specimens examined. Nostril bordered by three nasals, exceptionally four, first supralabial and rostral; anterior



nasals separated by one enlarged granule, sometimes two; supralabials eight to 10; infralabials seven to 10; preanal pores in males 11 or 12 (one specimen with nine pores); original tail verticillate, five to six scale rows per verticil above and four, seldom five, below; subcaudals squarish and juxtaposed; colour above pale grey-brown, with ill-defined irregular, undulating, dark cross-bands on body and tail; an ill-defined dark streak running from loreal region through eye to temporal region; white below.

Size: Largest male (NMB 4533 - Straalfontein)  $58 + 50r = 108\text{mm}$ .

Largest female (NMB 3345 - Sentinel)  $59 + 41r = 100\text{mm}$ .

Habitat: Monticolous, living in narrow crevices from 1829 meters (6000 ft) to 2591 meters (8500 ft). At Sentinel occurs above the snowline.

Breeding: Two eggs are laid between January and March and measure  $13 \times 9,5\text{mm}$ . When laid, the eggs are firmly attached to the rock surface and to each other. After hatching the eggshells are weathered away, except for the part adhering to the rock surface. Other eggs may then be laid by other females on these remains, during the same or the following season and consequently a layer of eggshell remains is formed. Such a layer collected at Perth contained at least 16 layers of eggshell remains.

Diet: The stomach of one gecko contained remains of Coleoptera and Orthoptera.

Material examined from: Monontsa Pass; Perth; Sentinel; Spitzkop; Straalfontein (Map 13).

Literature records: None; new record for the Orange Free State.

Note: The gap in the distribution of this species between western Natal and the eastern Cape Province (FitzSimons, 1943) is now partly bridged by specimens collected at Spitzkop and Straalfontein.

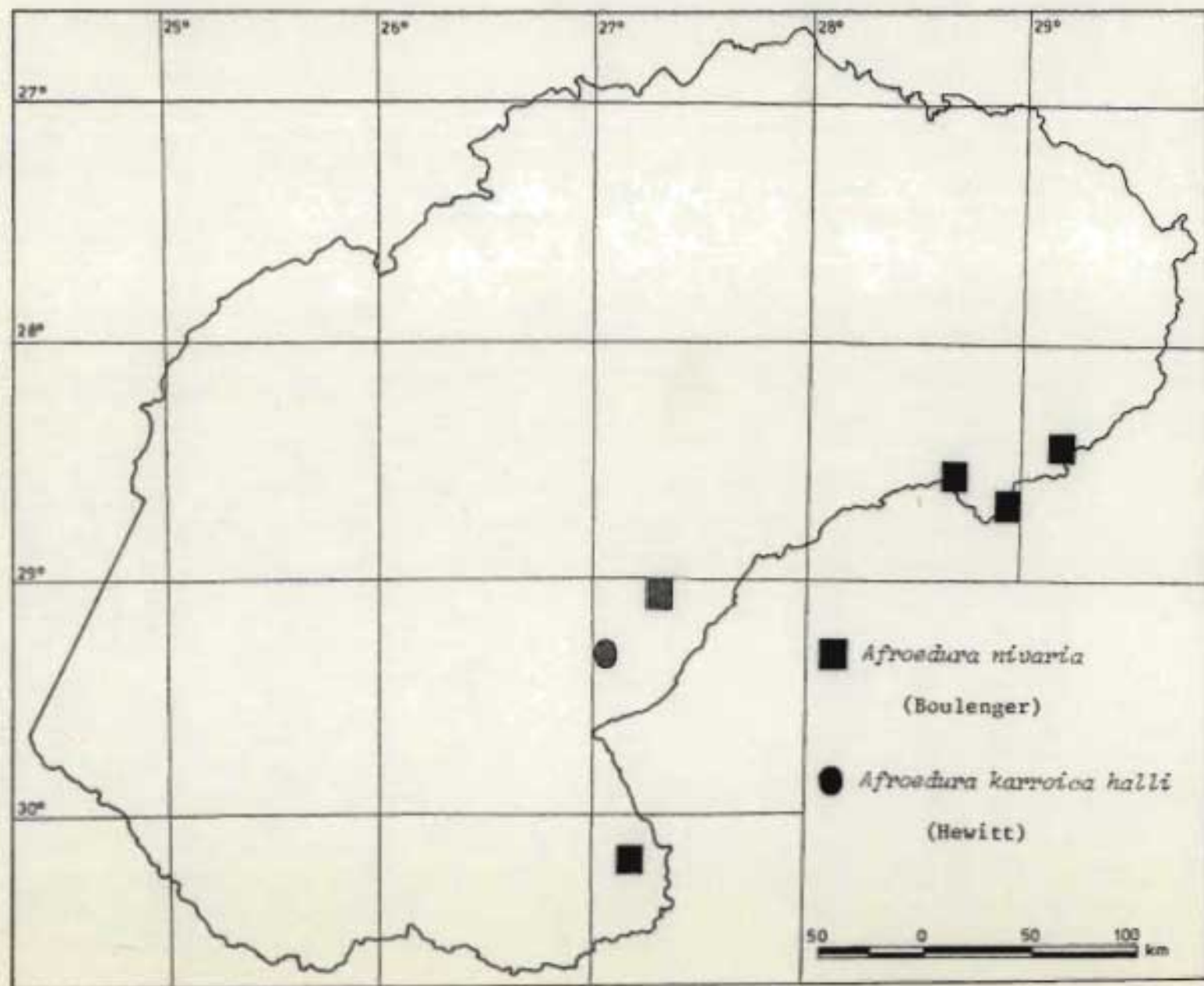
#### *AFROEDURA KARROICA* (Hewitt, 1925)

- \* *Oedura karroica* Hewitt, 1925, Rec.Albany Mus., 3, p. 348, fig. 1:  
Albany District, Cape Province.

#### *AFROEDURA KARROICA HALLI* (Hewitt, 1935)

- \* *Oedura halli* Hewitt, 1935, Rec.Albany Mus., 4, p. 321, pl. xxix, figs. 1-2: Telle Junction, Herschel District, Cape Province, (Holotype: NMP 272).





Map 13

Common name: Hall's Rock Gecko.

Range: Mountains of north-eastern Cape Province, Lesotho and eastern Orange Free State (Loveridge, 1947).

Characters: Five specimens examined (one female from MCZ). Nostril bordered by three nasals, first supralabial narrowly excluded; supranasals separated by one enlarged granule; supralabials 10, exceptionally nine; infralabials eight to nine; preanal pores in males six; original tail verticillate, five dorsal and four ventral scale rows per verticil; colour above pale-grey to beige with several dark, irregular transverse bands; head, limbs and tail with dark mottling; ventral surface white or with faint grey stippling.

Size: Largest male (NMB 1140 - Thaba Pachoa Berg) 61 + 49r = 110mm.

Largest female (NMB 2727 - Thaba Pachoa Berg) 55 + 37r = 92mm.

Habitat: Living on sandstone at 1827 meters (6000 ft) on the summit of Thaba Pachoa Berg.

Breeding: One female collected in November contained two well-developed eggs.

Material examined from: Thaba Pachoa Berg (Map 13).

Literature records: Thaba Pachoa Berg (Loveridge, 1947).

Note: The *Afroedura karrooica halli* population on Thaba Pachao Berg is completely isolated from the main population (eastern Mountains) by surrounding low grassland and therefore can be classified as a geographical relict. Members of this population are geographically isolated but have not diverged morphologically.

Genus *LYGODACTYLUS* Gray, 1864

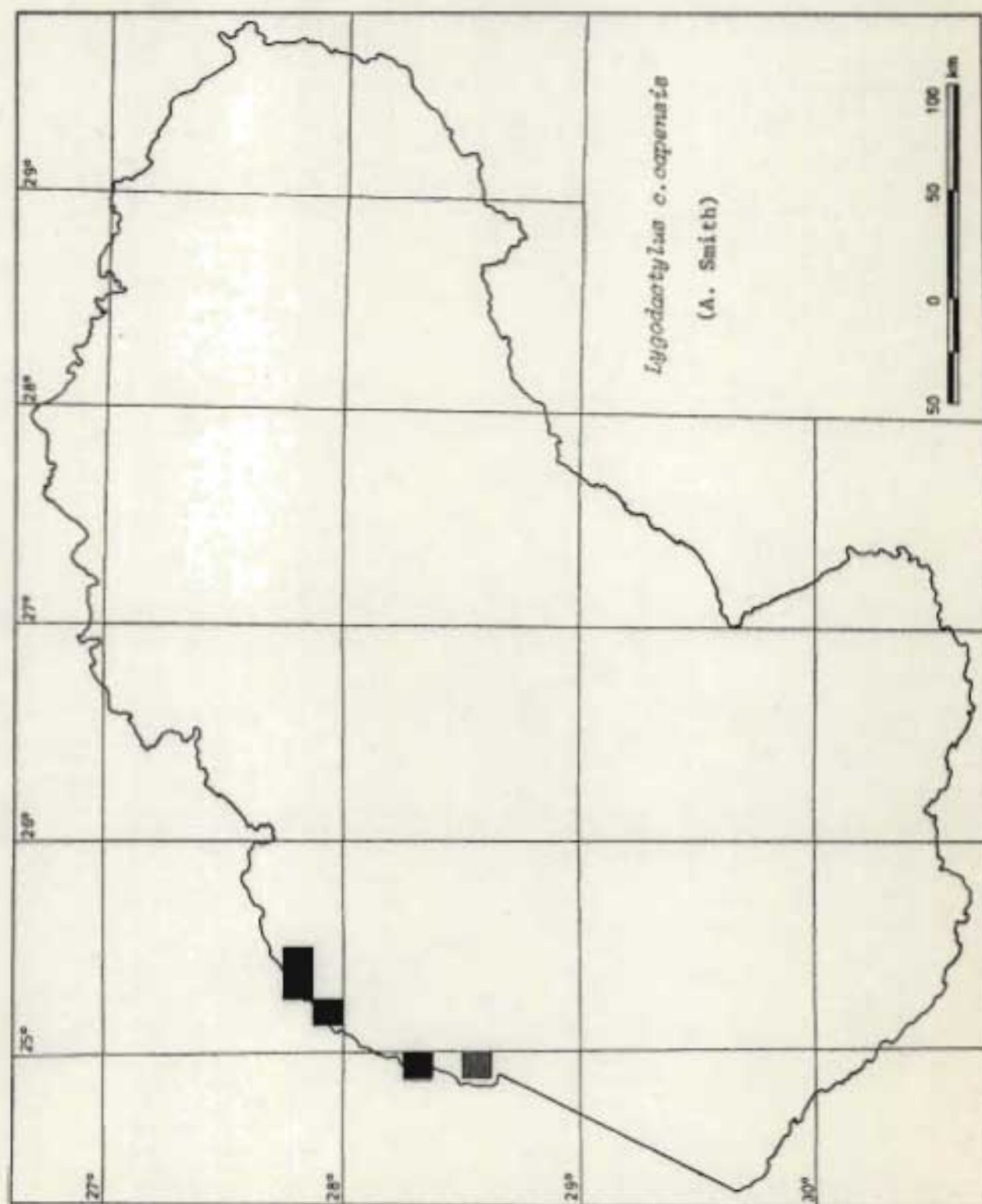
- \* *Lygodactylus* Gray, 1864, Proc.zool.Soc.Lond., p. 59. Type by monotypy:  
*L.strigatus* Gray = *Hemidactylus capensis* A. Smith, 1849.

*LYGODACTYLUS CAPENSIS* (A. Smith, 1849)

*LYGODACTYLUS CAPENSIS CAPENSIS* (A. Smith, 1849)

- \* *Hemidactylus capensis* A. Smith, 1849, Ill.Zool.S.Afr., Rept., pl. 75,  
fig. 3: "Kaffirland and the districts to the north of Cape Colony".  
\* *Lygodactylus strigatus* Gray, 1864, Proc.zool.Soc.Lond., p. 59: "South-eastern Africa".

Map 14





Common name: Common Dwarf Gecko.

Range: Central Kenya, south through Transvaal and Natal to northern Cape Province, west to Zaïre, Angola and Botswana (FitzSimons, 1943; Loveridge, 1947); also north-western Orange Free State.

Characters: Six specimens examined. Nostril bordered by two nasals, first supralabial and frequently rostral also; anterior nasals separated by one granule; mental with deep lateral clefts, postmentals two to three; supralabials seven to nine; infralabials six to seven; preanal pores in males five; original tail with six to seven scale rows per verticil above; according to the terminology of Pasteur (1964) for the scalation of *Lygodactylus*, subcaudals are aperiodic anteriorly, arranged in periods of three posteriorly, each period consisting of a paired, bibordered subcaudal and two single, unbordered subcaudals; colour above grey-brown with a dark streak running from nostril through eye to shoulder and flank, fading out posteriorly; below white with fine stippling on throat.

Size: Largest male (NMB 2079 - Van Aswegenshoek)  $34 + 40 = 74\text{mm}$ .

Largest female (NMB 1678 - Leeuwkuil)  $35 + 37 = 72\text{mm}$ .

Habitat: Acacia trees and rocks.

Material examined from: Leeuwkuil; Moirton; Platberg, Boshof; Van Aswegenshoek; Zoetvlei (Map 14).

Literature records: None, new record for the Orange Free State.

#### Genus *PACHYDACTYLUS* Wiegmann, 1834

*Pachydactylus* Wiegmann, 1834, Herp. Mexicana, p. 19. Type by monotypy:

*P. bergii* = *Platydictylus inognis* Guerin (nec Cuvier), 1829/44 =

*Lacerta geitje* Sparmann, 1778.

#### Key to the species:

- 1a. Dorsum covered with subuniform granules .... *P. mariquensis*, p. 37
- 1b. Dorsum covered with granules intermixed with enlarged  
tubercles ..... 2
- 2a. Transverse adhesive lamellae under fourth toe 10 to 13 .....  
..... *P. bibronii*, p. 46
- 2b. Transverse adhesive lamellae under fourth to five ..... 3

- 3a. Dorsal scales of original tail heterogeneous, consisting of small scales and enlarged tubercles; small, dark spots irregularly arranged on back ..... *P. capensis* p. 43
- 3b. Dorsal scales of original tail without enlarged tubercles; four longitudinal series of large, dark brown, white-edged spots on back ..... *P. maculatus*, p.39

*PACHYDACTYLUS MARIQUENSIS* A. Smith, 1849

*PACHYDACTYLUS MARIQUENSIS MARIQUENSIS* A. Smith, 1849

\* *Pachydactylus mariquensis* A. Smith, 1849, Ill.Zool.S.Afr., Rept., App., p. 3: "Interior of Southern Africa".

Common name: Marico Gecko.

Range: Southern half of Orange Free State, southwards through eastern to southern Cape Province (FitzSimons, 1943).

Characters: Twenty specimens examined. Nostril bordered by three nasals only; anterior nasals in good contact, separated in only one specimen by rostral; supralabials five to eight; infralabials six to eight; three transversely enlarged adhesive lamellae under fourth toe; three to four tubercles on either side at base of tail; tail unsegmented with scales arranged in regular transverse series; colour above pale grey; nape and back with five to seven irregular, dark grey-brown, black-edged, posteriorly directed angular bands, sometimes divided along vertebral line; eight or nine similar bands on tail; dark spot on snout usually fusing with a V-shaped interocular bar pointing anteriorly; loreal region dark; ventral surfaces creamy white.

Size: Largest male (NMB 371 - Krugersdrift Dam)  $52 + 41 = 93\text{mm}$ .

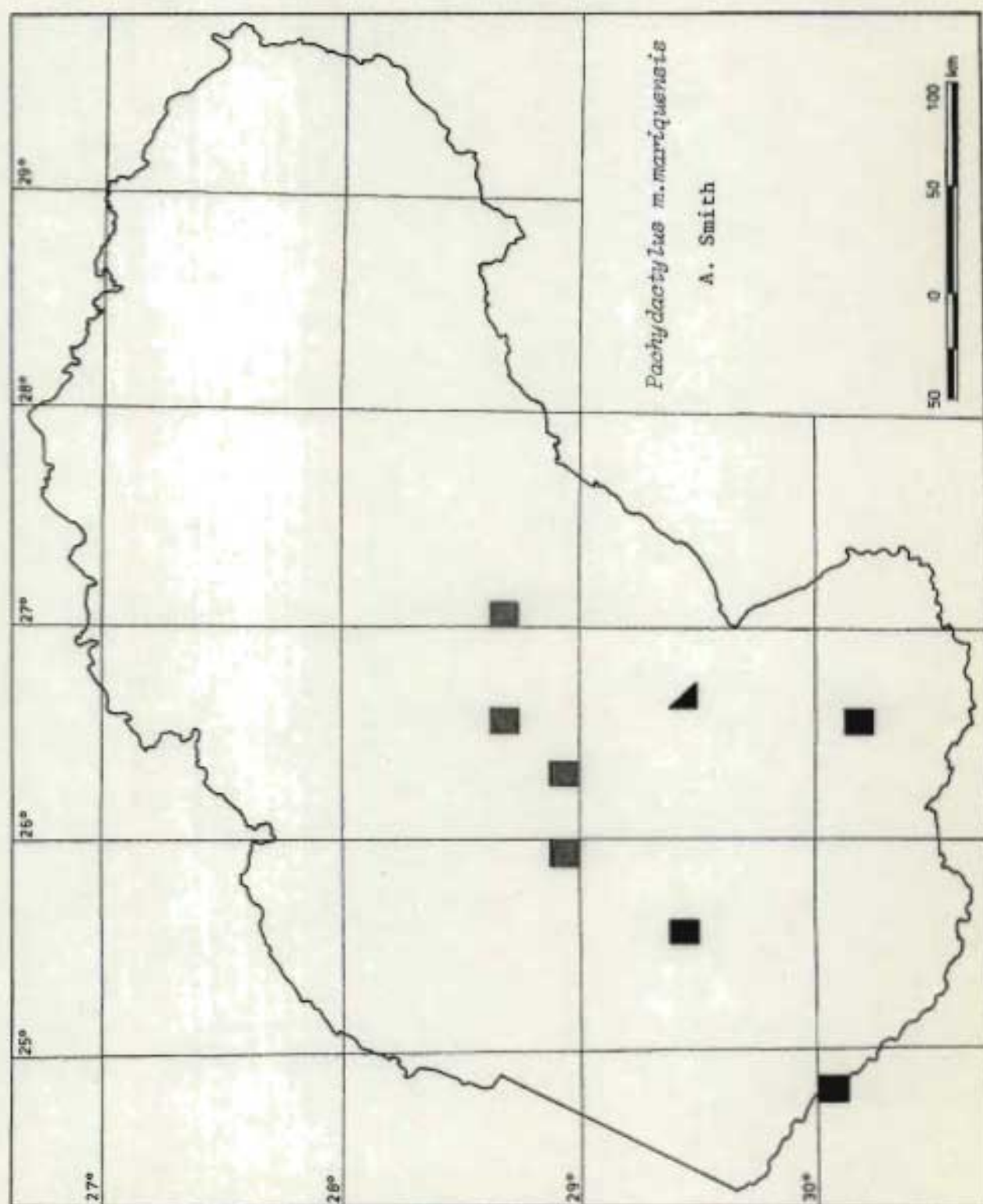
Largest female (NMB 4707 - Lemoenboord)  $57 + 40 = 97\text{mm}$ .

Habitat: Lives in holes in the ground, often in deserted nests of trap-door spiders (Hewitt, 1937). Specimens collected at Krugersdrift Dam had all been drowned in floods during February, 1972. Specimens from Lemoenboord were collected when the first waters of the P.K. le Roux Dam flooded surrounding land.

Breeding: Several gravid females collected in September contained two to three well-developed eggs.



Map 15





Predators: The stomach contents of a *Pseudomophis notostictus* from Leeuwborg revealed one *P. mariquensis mariquensis* and the remains of another was found in the stomach of a *Pseudomophis leightoni trinasalis* from Mimosa.

Material examined from: Glen (USNM); Krugersdrift Dam; Leeuwborg; Lemoenboord; Mimosa; Smithfield (SAM); Sunny Hills (Map 15).

Literature records: Smithfield (Boulenger, 1910); Meadows; Sunny Hills (FitzSimons, 1943).

*PACHYDACTYLUS MACULATUS* Gray, 1845

\* *Pachydactylus maculatus* Gray, 1845, Cat.Liz.Brit.Mus., p. 167: South Africa.

*PACHYDACTYLUS MACULATUS OCULATUS* Hewitt, 1927

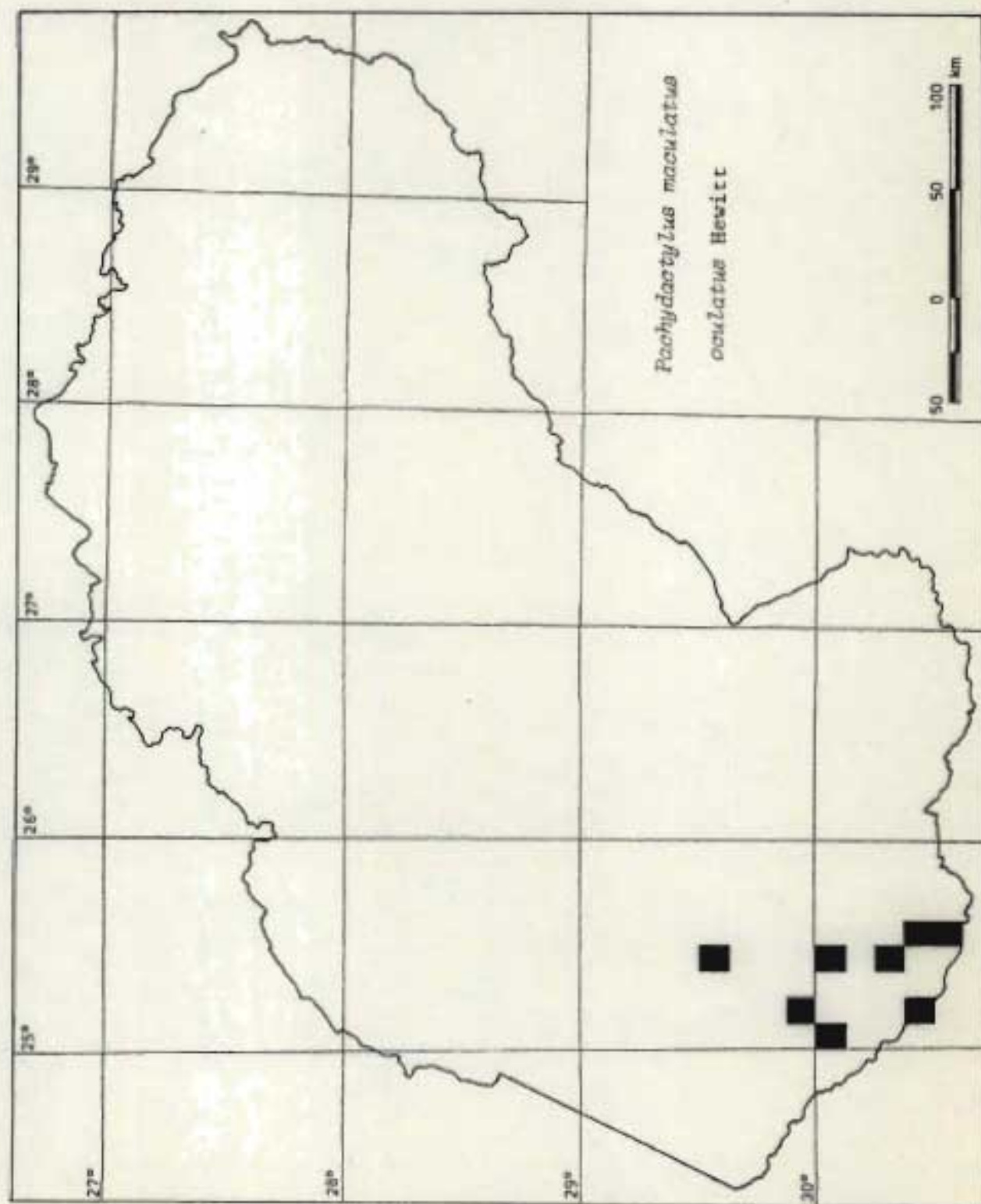
- \* *Pachydactylus capensis oculatus* Hewitt, 1927, Rec.Albany Mus., 3, p. 394, pl. xxiii, fig. 1 (given in plate as *Pachydactylus maculatus oculatus*): Farm Cyrilhurst, six miles from Tarkastad, Cape Province. Type in Albany Museum, Grahamstown, missing.
- \* *Pachydactylus maculatus albomarginatus* Hewitt, 1932, Ann.Natal Mus., 7, p. 121, pl. vi, figs. 6, 7: Norvalspont, Cape Province. Type in Albany Museum, Grahamstown, missing.

Common name: Northern Spotted Gecko.

Range: From Tarkastad district, eastern Cape Province, north-westwards to Colesberg and Norvalspont (FitzSimons, 1943), then further north to south-western Orange Free State, reaching northern limit in Fauresmith district.

Characters: Twenty-two specimens examined. Internasal granules usually two, seldom one, exceptionally three (one specimen); nostril usually pierced in three nasals, sometimes two, with posterodorsal nasal narrowly excluded, exceptionally four nasals present; supralabials eight or nine; five adhesive lamellae under fourth toe; usually three tubercles on base of tail, seldom two or four; original tail flattened and verticillate, five or six scale rows per verticil above and four or five below; 91-110 granules around midbody; colour above pale brown to beige with four longitudinal series of large, rounded, brown to reddish-brown spots over back, these spots distinctly edged with

Map 16





white; broad brown to reddish-brown band on either side of head, arising from nostril and extending through eye to temporal region and converging towards, but not meeting, its fellow on back of head; ventral surfaces white.

Size: Largest male (NMB 4107 - Ospoot)  $42 + 29r = 71\text{mm}$ . Largest female (NMB 2258 - Luiperfontein) head-body length =  $42\text{mm}$ , tail absent.

Habitat: Lives in cracks and under rocks of rocky outcrops in the south-western Orange Free State.

Material examined from: Francis Home; Groenekloof; Klipbankfontein; Luiperfontein; Middelbron; Ospoot; Verwoerd Dam (TM); Visserhoek West (Map 16).

Literature records: None, new record for the Orange Free State.

Note: Hewitt described *P. capensis oculatus* (calling it *P. maculatus oculatus* in his plate) in 1927 and *P. maculatus albomarginatus* in 1932. Both taxa were recognized by FitzSimons (1943). In 1947 Loveridge revised the African Gekkonidae and synonymized *oculatus* and *albomarginatus* with *P. maculatus* Gray, 1845, basing his findings on descriptions only. By synonymizing *oculatus* with *maculatus*, Loveridge indicated that *oculatus* is not conspecific with *P. capensis*, with which I agree.

Orange Free State material of *maculatus* was found to exhibit the white-edged dorsal spots as well as the lower number of internasal granules described for *oculatus* and *albomarginatus* by Hewitt. After comparing eleven specimens of *maculatus* from St Croix Island, Algoa Bay (NMB 2014-2024) with the Orange Free State material it was found that they differ as follows:

St Croix Island material: Dorsum grey with dark grey spots, spots not white-edged; tail cylindrical (regenerated tail also) and poorly verticillate (indistinct to unaided eye); 137 to 152 granules around middle of body; tubercles at base of tail strongly developed; snout obtuse and convex; nostril pierced in one large nasal, exceptionally a feebly enlarged posterodorsal granule present; maximum snout-vent length  $54\text{mm}$ .

Orange Free State material: Dorsum pale brown with red-brown white-edged spots; tail flattened (regenerated tail also) and distinctly verticillate; 94 to 110 granules around middle of body; tubercles



at base of tail poorly developed; snout pointed and flattened; nostril pierced in three or two nasals (with posterodorsal nasal narrowly excluded), exceptionally four nasals present; maximum snout-vent length 42mm.

From the above it is obvious that we have two distinct forms of *P. maculatus* but since Gray (1845) described white-edged dorsal spots also for the type of *P. maculatus* it is doubtful which of the two is the nominate form. The following information was obtained (pers. comm., A.F. Stimson) on the holotype of *Pachydactylus maculatus* Gray, 1845 (BMNH 38.12.6.3.): Dorsum grey with dark grey spots, spots not white margined; tail lost; 130 granules around midbody; tubercles at base of tail strongly developed; snout obtuse and convex; nostril pierced in one large nasal; snout-vent length 43mm. The Orange Free State material therefore does not belong to the nominate race of *P. maculatus* and this name instead applies to material occurring in the coastal areas of the southern Cape Province (see FitzSimons, 1943, p. 81).

The remaining names to consider are *oculatus* and *albomarginatus* but since the types in the Albany Museum appear to be lost, comparisons could not be made. However, from Hewitt's descriptions and plates it seems evident that *oculatus* and *albomarginatus* are the same taxon. This is further supported by two specimens in the Albany Museum (AM 5304) listed as *P. capensis oculatus* from King's Farm, Tarkastad (virtual topotypes), both agreeing with Hewitt's description of *albomarginatus* and also with the Orange Free State material. I therefore regard *albomarginatus* as a synonym of *oculatus* but regard *oculatus* and not *maculatus* as the subspecific name applicable to Orange Free State material. A revision of *P. maculatus* based on adequate material from its entire range may indicate a clinal character gradient and therefore the present separation of *oculatus* from the nominate form must be regarded as tentative.

*PACHYDACTYLUS CAPENSIS* (A. Smith, 1845)

*PACHYDACTYLUS CAPENSIS CAPENSIS* (A. Smith, 1845)

\* *Tarentola capensis* A. Smith, 1845, Ill.Zool.Z.Afr., Rept., pl. 50,  
fig. 2: Interior of South Africa.

\* *Pachydactylus elegans* Gray, 1845, Cat.Liz.Brit.Mus., p. 168:  
South Africa (type lost).

\* *Pachydactylus leopardinus* Sternfeld, 1911, Mitt.zool.Mus.Berl.,  
5, p. 418: Bethanien, Orange Free State.

Common name: Common Cape Gecko; Springgeitjie.

Range: Throughout plateau areas of South Africa (FitzSimons, 1943;  
Loveridge, 1947).

Characters: Three hundred and sixty-nine specimens examined. Nostril bordered by three, sometimes two, nasals; anterior nasals in contact or separated by one granule, seldom two; supralabials six to eight, seldom five or nine; infralabials five to seven, seldom eight or nine; five transversely enlarged adhesive lamellae under fourth toe; two or three poorly developed tubercles on either side of base of tail; original tail verticillate, four (rarely five anteriorly) scale rows per verticil above, with second, third or last row enlarged into rather flattened, feebly keeled tubercles; subcaudals usually in periods of two, one divided, one single or sometimes all divided or all single posteriorly, subcaudals seldom in periods of three or four; colour above pale brown, light grey to grey-brown, spotted and variegated with white and dark brown, sometimes with irregular cross-bands; dark streak from nostril through eye; ventral surfaces white to light grey.

Size: Largest male (NMB 1943 - Klipfontein) 57 + 48r = 105mm.

Largest female (NMB 4033 - Boschkop) 60 + 39r = 99mm.

Habitat: Found in old termitaria or under stones. Collected at 2073 meters (6800 ft) at Monontsa Pass, the highest known locality.

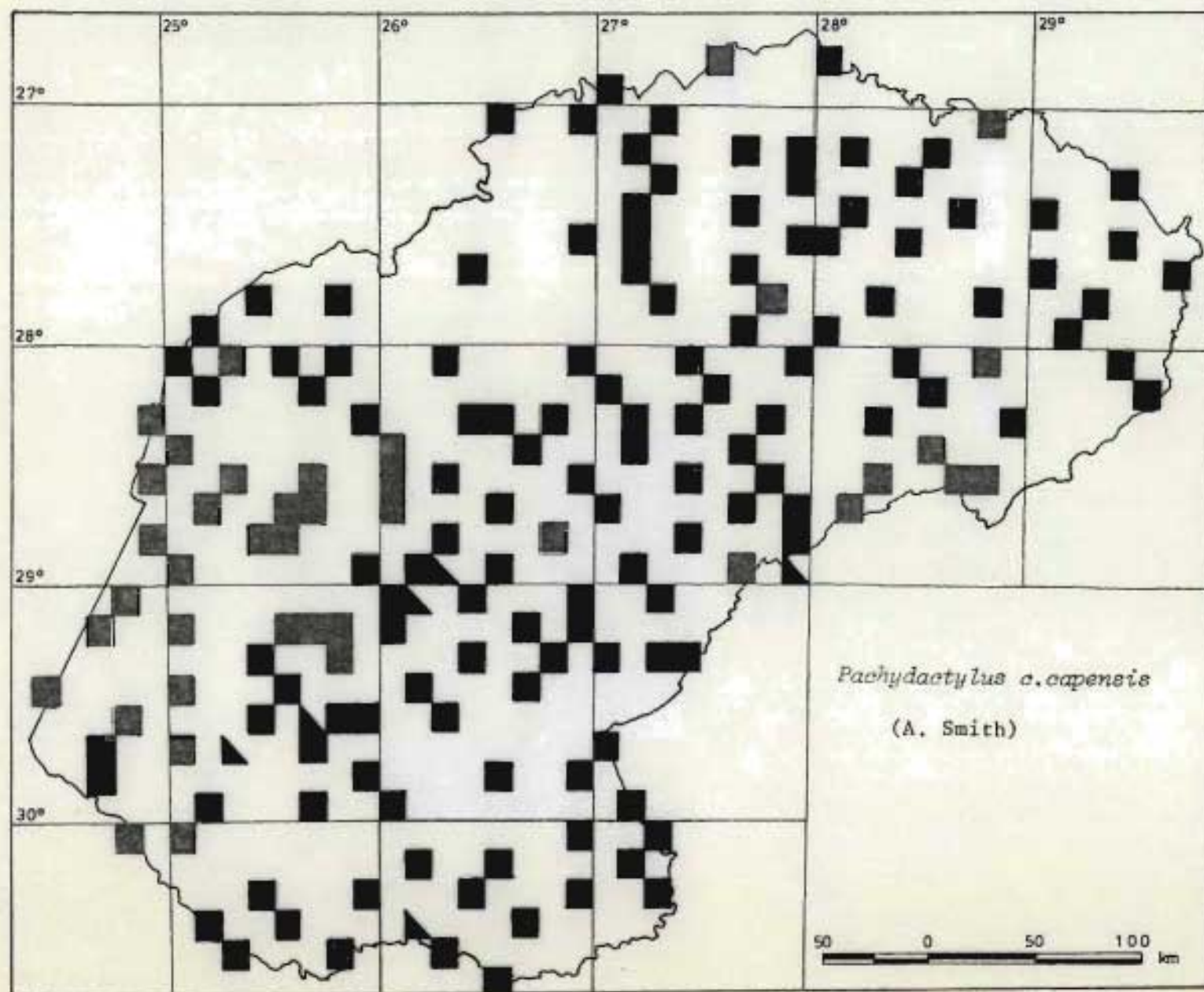
Breeding: Females with two eggs intact have been found from September to November while eggs and juveniles have been collected from November to January. Eggs measuring 10 x 7mm are deposited in old termitaria or under stones.



Predators: Stomach content analysis indicated that this gecko is preyed upon by the following snakes: *Boaedon f. fuliginosus*; *Lycophidion a. capense*; *Crotaphopeltis hotamboeia*; *Pseudophyllax tritaeniatus tritaeniatus*; *Pseudophis notostictus*; *Pseudophis leightoni trinaealis*.

Material examined from: Allanvale; Alpha; Annie's Rust; Atalanta; Babel; Bachelor's Home; Baltespoort; Basberg; Bergkloof; Bergplaats, Bloemfontein; Bergplaats, Dewetsdorp; Berlin; Bethany; Bethel; Beyersfontein; Biddulphsberg; Boesmansberg; Boschkop; Boskop; Brabant; Brakfontein; Brakpan; Bramley's Hoek; Brockenhurst; Caledonspoort; Carlie; Ceylon; Chubani; Cornwall; Damfontein; Dasklip; Deelfontein, Bothaville; De Rust; Die Hoogte; Dipka; Di Poort; Doornlaagte; Elandsfontein; Elim; Erinmore; Exelsior, Edenburg; Falle Grange; Francis Home; Geluk, Boshof; Goedeheop; Goedetrouw; Groenekloof; Grootkloof; Grootkrans; Gruiskop; Gruisrand; Haagen's Stad; Hartebeestfontein, Bloemfontein; Heenenweerskop; Holme's Dale; Honingberg; Hoogveld, Theunissen; Houmoed; Houtkop; Jonkerskraal; Kades; Kafferskop; Kareerand; Karreeboomsvallei; Karreepoort; Kasteelkop; Kleinplaas; Klipbankfontein; Klipdrift; Klipfontein; Klippiespan; Klipplaatdrift, Edenburg; Klipplaatdrift, Winburg; Kopjeskraal; Koppiesdam; Kranskop; Krugersdrift Dam; La Belle France; Lange Hoek; Lang Zeekoegat; Lanquedoc; La Riviera; Leeuwborg; Leeuwfontein, Theunissen; Leeuwkop; Leeuwkuil; Leliehoek; Lemoenboord; Lentelus; Lessingskop; Littlecote; Lorenzo; Loskop; Luiperfontein; Luiperskop; Maanhaar; Machbela; Magdalen; Mandyville; Mara, Parys; Mara, Vredefort; Mecklenburg; Merino, Bethlehem; Merriesfontein; Meyerskraal; Middelbron; Middenspruit; Milambi; Mimosa; Moirton; Monontsa Pass; Mooigelegen; Morgenzon, Ficksburg; Morgenzon, Harrismith; Morgenzon, Senekal; Mount Nelson; Noodhulp; Ongegund; Onze Rust; Ospoot; Paradys; Patrijdsdraai; Petra; Pietersberg; Platberg, Boshof; Poortje, Edenburg; Proces; Quaggasspruit; Ramalitse; Rambouillet; Rietfontein, Rouxville; Riverside; Rohallion; Rondavel; Rorich's Hulp; Rusthof; Schoongezicht; Smithskraal; Spijtfontein; Spitzkop; Stoffelfontein; Straalfontein; Strijdfontein, Heilbron; Strijdfontein, Philippolis; Susannasfontein; Thaba Pachoa Berg; Triangle; Tweefontein; Tygerfontein; Uitkomst; Uitkyk; Vaalkop; Van Aswegens Hoek; Van Der Walt's Rust; Venus; Verdun, Fouriesburg;





Map 17

Vergaderrand; Waterhoek; Welgegund; Weltevrede; Weltevreden, Heilbron; Weltevreden, Smithfield; Wilhelmshohe; Willem Pretorius Game Reserve; Wittekopjes; Wittepoort; Witzieshoek; Wolvekop, Fauresmith; Wolvekop, Kroonstad; Wolvenfontein; Wonderkop; Zandfontein Zoutpan, Jacobsdal; Zuurfontein; Zwartkoppies (Map 17).

Literature records: Modder River (Bocage, 1896); Kroonstad; Smithfield (Boulenger, 1910); Bethanien (farm name?, Sternfeld, 1911); Avalon; Bloemfontein; Deelfontein, Bethulie; Fauresmith; Ficksburg; Glen; Meadows; Verkeerde Vlei (FitzSimons, 1943).

Note: Loveridge (1947) regarded *Pachydactylus mentalis* Hewitt (1926) as a synonym of *capensis*. The cotypes of *mentalis* (AM 5008, two specimens, from Longhope Great Fish River), differ from *capensis* in having enlarged and flattened scales on the snout, between the eyes and also bordering the mental and infralabials, as well as four adhesive lamellae under the fourth toe. It therefore seems that the status of *mentalis* should be reinvestigated. Its inclusion in *capensis* does not at present seem justified.

*PACHYDACTYLUS BIBRONII* (A. Smith, 1845)

\* *Tarentola bibronii* A. Smith, 1845, Ill.Zool.S.Afr., Rept., pl. 50,  
fig. 1: Interior of South Africa.

\* *Homodactylus turneri* Gray, 1864, Proc.zool.Soc.Lond., p. 59, pl. ix,  
fig. 2: South East Africa.

\* *Pachydactylus bibronii* var. *stellatus* Werner, 1910, Denkschr.med.-naturw.  
Ges.Jena, 16, p. 309: Great Namaqualand.

\* *Pachydactylus bibronii pulitzeræ* Schmidt, 1933, Ann.Carneg.Mus., 22,  
p. 6, pl. i: Pico Azevedo, Angola.

Common name: Bibron's Gecko; Blinkogie.

Range: Northern and western Cape Province, western Orange Free State, Transvaal and Zululand, northwards through Botswana (excluding the central Kalahari), Rhodesia, Malawi, Zambia, South West Africa, Angola to Tanzania (FitzSimons, 1943; Loveridge, 1947).

Characters: One hundred specimens examined. Nostril bordered by three nasals, only in one specimen does rostral enter nostril on one side; anterior nasals in contact or separated by one granule, seldom two;



supra- and infralabials nine or ten, seldom eight or 11; 16-20 rows of large, keeled and stellate tubercles across back and flanks; 10 to 13 transversely enlarged adhesive lamellae under fourth toe; original tail verticillate, four to six scale rows per verticil above, one row consisting of large, keeled and stellate tubercles; subcaudals in periods of two, sometimes semidivided anteriorly (not more than three periods), always single posteriorly (one small, one large); colour above pale brown to grey-brown with dark, wavy cross-bands and isolated white tubercles; dark streak running from above third supralabial, through eye to temporal region, and another dark streak from nostril to upper border of eye; lower surfaces white to light grey.

Size: Largest male (NMB 1584 - Kleinplaas) 95 + 96 = 191mm.

Largest female (NMB 3101 - Zoutpan, Fauresmith) 92 + 92 = 184mm.

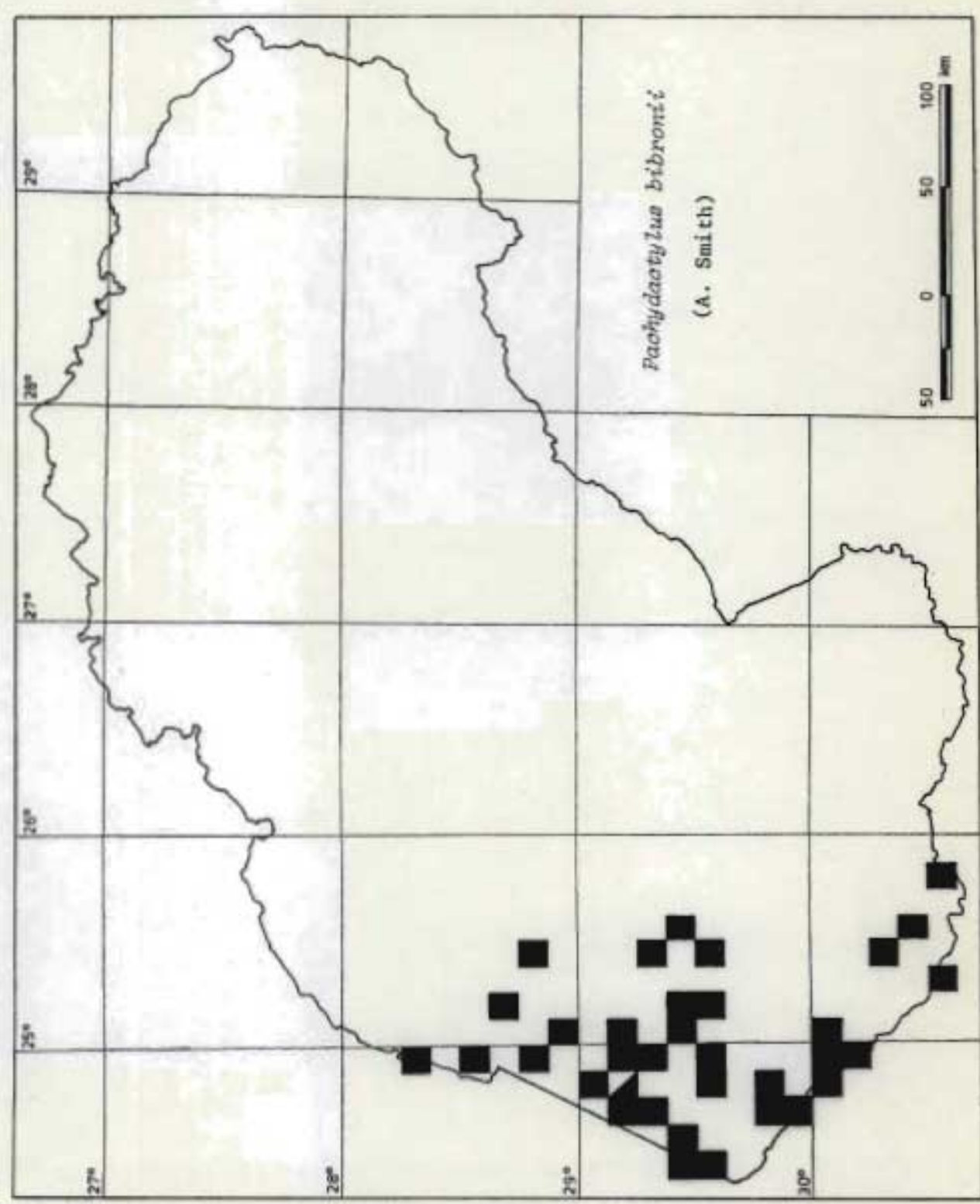
Habitat: Found in rock crevices and sometimes on houses.

Breeding: A gravid female collected in December contained two eggs.

Material examined from: Brakpan; Cornwall; Doornhoek; Dundee; Francis Home; Gruisrand; Heenenweerskop; Heilbron, Philippolis; Honingberg; Joostenberg; Kades; Kalkplaat; Kleinplaas; Klipbankfontein; Klippiespan; Langhoek; Leeuwberg; Leeuwkuil; Lemoenboord; Lentelus; Luiperskop; Middelbron; Ospoor; Oudefontein; Platberg, Boshof; Poortje, Fauresmith; Proces; Rietput; Strijdfontein, Philippolis; Waterhoek; Weltevreden, Jacobsdal; Wintershoek; Wolvekop, Fauresmith; Zoutpan, Fauresmith; Zoutpan, Jacobsdal (Map 18).  
Literature records: Modder River (Bocage, 1896); Doornberg; Rooilaagte (FitzSimons, 1943); the Doornberg locality near Winburg is probably incorrect because *bibronii* inhabits only the western Orange Free State.



Map 18



Family AGAMIDAE Gray, 1827

Genus *AGAMA* Daudin, 1802

\* *Agama* Daudin, 1802, Hist.Nat.Rept., 3, pp. 333 & 356. Type by subsequent designation, fide Loveridge, 1957. *A.colonorum* Daudin, 1830 = *Lacerta agama* Linnaeus, 1758.

Key to the species:

- 1a. No well-defined vertebral crest from nape to base of tail;  
dorsal scaling relatively smooth with few spinose scales ....  
..... *A.atra*, p. 49
- 1b. A well-defined vertebral crest extends from nape to at least  
base of tail; dorsal scaling very rough with many enlarged  
spinose scales ..... 2
- 2a. Ear opening large, diameter more than half cleft of closed eye;  
..... *A.hispida*, p. 52
- 2b. Ear opening very small diameter less than half cleft of closed  
eye; orange blotches on side of neck, in armpit and groin ...  
..... *A.makarikarica*, p. 59

*AGAMA ATRA* Daudin, 1802

- \* *Agama atra* Daudin, 1802, Hist.Nat.Rept., 3, p. 349: South Africa.  
*Agama micropholis* Matschie, 1890, Zool.Jb., Syst., 5, p. 607: Mpome,  
Transvaal.
- \* *Agama micropterolepia* Boulenger, 1896, Ann.Mag.nat.Hist., (6), 17, p.  
22: Rustenburg, Transvaal.
- \* *Agama holubi* Bocage, 1896, Journ.Sci.math.phys.nat., (2), 4, p. 115:  
Modder River, Orange Free State.
- \* *Agama atra* var *rudis* Boulenger & Power, 1921, Trans.R.Soc.S.Afr., 9,  
p. 282: Mossel Bay, Cape Province.

Common name: South African Rock Agama; Bloukoppkoggelmander.

Range: South Africa (not recorded for Kruger National Park, Pienaar, 1966), southern South West Africa and south-eastern corner of Botswana (FitzSimons, 1943).



Characters: Two hundred and thirty-four specimens examined. Midbody scale rows 120 to 150, seldom as low as 109 or as high as 170; supralabials 10 to 15, mostly 13 or 14; preanal pores in males 10 to 16, in a few males up to 33 pores present in a double row; lamellae under fourth toe 16 to 20, seldom 15 or 22; fourth toe longer than third, sometimes equal, seldom shorter; fifth toe longer than first, seldom equal; colour above light to dark grey-brown; males: white vertebral streak running from nape to base of tail; throat, chest and ventral parts of upper arm greenish-blue; sides of body sometimes rust-red; tail often yellow with dark cross-bands; females: much less brightly coloured than males; gravid females with rust-red markings above and on flanks, with yellow background.

Size: Largest male (NMB 1414 - Houmoed)  $110 + 152 = 262\text{mm}$ . Largest female (NMB 3207 - Morgenzon, Senekal)  $98 + 112 = 210\text{mm}$ .

Habitat: Rocky hills, especially where piled rocks provide suitable hiding places. Often found near the faeces of *Procapra capensis*, probably hunting the insects attracted to these faeces.

Breeding: Gravid females with eight to ten well-developed eggs intact were found in January.

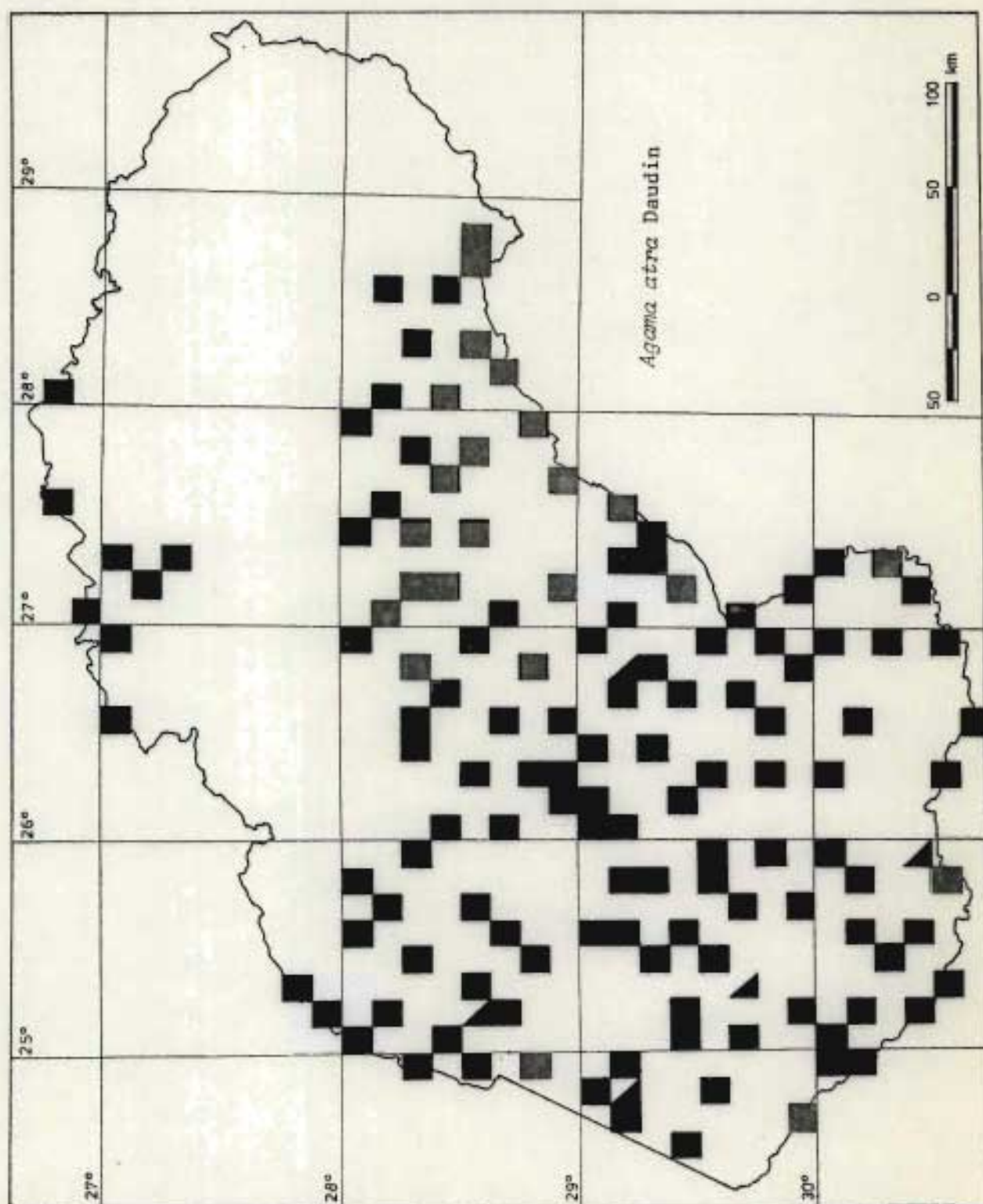
Predators: One specimen was found in the stomach of a *Boaedon f. fuliginosa*.

Diet: Insecta: Coprinae (Coleoptera); Lepidoptera larvae; Hymenoptera; Isoptera (warriors and alates).

Material examined from: Alpha; Annie's Rust; Atalanta; Babel; Baltespoort; Basberg; Bergkloof; Bergplaats, Bloemfontein; Bergplaats, Dewetsdorp; Bethany; Bethel; Beyersfontein; Biddulphsberg; Boesmansberg; Boschkloof; Boskop; Brabant; Brakfontein; Brakpan; Bramley's Hoek; Caledonspoort; Carrie; Ceylon; Chubani; Deelfontein, Bothaville; Die Hoogte; Di Poort; Doornhoek; Doornplaat; Dundee; Francis Home; Geluk, Philippolis; Goedehoop; Groenekloof; Gruiskop; Haagen's Stad; Hartebeestfontein, Boshof; Hebron; Heenenweerskop; Heilbron, Philippolis; Holme's Dale; Honingberg; Hoogevelde, Theunissen; Houmoed; Juist Zoo; Kades; Kalkdam; Kareerand; Karreeboomsvallei; Karreepoort; Kleinplaas; Klipbankfontein; Klipdrift; Klipfontein; Klippiespan; Klipplaatdrift, Edenburg; Klipplaatdrift, Winburg; Koortshoek; Kopjeskraal; Koppiesdam; Kraaifontein; Kranskop; La Belle France; Lang Zeekoegat; Last Poort; Leeuwbeg; Leeufontein, Theunissen; Leeuwkop; Leeuwkuil; Lemoenhoek; Lentelus; Lessingskop;



Map 19



Littlecote; Luiperfontein; Magdalen; Mara, Parys; Mara, Vredefort; Maseru; Merino, Bethlehem; Merriesfontein; Middelbron; Mimosa; Monontsa Pass; Morgenzon, Ficksburg; Morgenzon, Senekal; Morgenzon, Zastron; Mount Nelson; Naval Hill; Noodhulp; Ongegund; Onze Rust; Ospoort; Oudefontein; Palmietfontein; Paradys; Petra; Pietersberg; Platberg, Boshof; Poortje, Edenburg; Poortje, Fauresmith; Proses; Ramalitse; Rietfontein, Rouxville; Riverside; Rohallion; Rondeberg; Roodedraai; Schoongezicht; Smithskraal; Stoffelfontein; Strijdfontein, Philippolis; Susannasfontein; Torbek; Triangle; Tweefontein; Uitkijk; Uitkyk; Vaalkop; Van Aswegens Hoek; Van der Walt's Rust; Veepost; Verdun, Fouriesburg; Verdun, Ladybrand; Welbedacht; Welgegund; Weltevrede; Weltevreden, Jacobsdal; Wilhelmshohe; Willem Pretorius Game Reserve; Winterspoort; Wittekopjes; Witzieshoek; Wolvekop, Fauresmith; Wonderkop; Zomervlakte; Zoutpan, Jacobsdal; Zuurfontein (Map 19).

Literature records: Modder River (Bocage, 1896); Smithfield (Boulenger, 1910); Immigrant (Hewitt & Power, 1913); Bloemfontein; Thaba'Nchu (Boulenger & Power, 1921); Bethulie; Boshof; Fauresmith; Rooilaagte (FitzSimons, 1943).

Note: The disjunctive distribution pattern of *Agama atra* (Map 19) is hard to explain. The northern population coincides with the Vredefort Dome (Map 11) which provides the rocky habitat preferred by *Agama atra*. The absence of this lizard from the north-west can probably be explained by the absence of suitable rocky outcrops but the same argument does not hold for its absence from the mountainous north-east.

#### *AGAMA HISPIDA* (Linnaeus, 1758)

\* *Lacerta hispida* Linnaeus, 1758, Syst.Nat., Ed. 10, 1, p. 205:

"America australe" = Cape of Good Hope, fide FitzSimons, 1943.

\* *Agama aculeata* Merrem, 1820, Tent.Syst.Amph., p. 35: Cape of Good Hope.

\* *Agama armata* Peters, 1854, Mber.dt.Akad.Wiss.Berl., p. 616: Sena, Mozambique.

*Agama infralineata* Peters, 1877, Mber.dt.Akad.Wiss.Berl., p. 613:

Otjimbingue, South West Africa.

\* *Agama brachyura* Boulenger, 1885, Cat.Liz.Brit.Mus., 1, p. 350, pl.

XXVII, fig.1: Cape of Good Hope.



- \* *Agama pulchella* Bocage, 1896, Journ.Sci.math.phys.nat., (2), 4, p. 116: Modder River, Orange Free State.  
\* *Agama distanti* Boulenger, 1902, Ann.Mag.nat.Hist., (7), 9, p. 399: Pretoria, Transvaal.

South-western variety (Kalahari form)

Characters: Twenty specimens examined. Midbody scales 86 to 105; supralabials 10 to 13; infralabials 10 to 14; preanal pores in males 10 to 15, one specimen with 22 pores in a double row: lamellae under third and fourth toes 17 to 19 and 19 to 20 (seldom 17 or 18) respectively; fourth toe longer than third; fifth toe equal to first, seldom longer; tail longer than head and body in both sexes; colour above pale yellowish to dark brown or greyish, sometimes uniform, but more usually with irregular dark brown blotches on either side of back; pale vertebral streak well defined to inconspicuous and interrupted by dark brown; two pale transverse bars on head present or absent; ventral surfaces whitish with grey to blue wavy longitudinal lines on throat, usually extending as a fainter network over chest and belly; dark blue blotch on base of throat in males, or throat entirely suffused with dark blue.  
Size: Largest male (NMB 1166 - Langhoek)  $110 + 121 = 231$ mm. Largest female (NMB 2230 - Heenenweerskop)  $101 + 107 = 208$ mm.

Habitat: Found in the dry, sandy south-western Orange Free State. Often takes refuge under haak-en-steek (*Zizyphus mucronata*).

Material examined from: Bozrah; Gruisrand; Heenenweerskop; Langhoek; Lemoenboord; Lentelus; Luiperskop; Verwoerd Dam (TM); Weltevreden, Jacobsdal; Wolvekop, Fauresmith; Zwartfontein (Map 20).

Literature records: Modder River (Bocage, 1896); Boshof; Jacobsdal; Jagersfontein (FitzSimons, 1943, sub.nom. *A. hispida aculeata*; according to FitzSimons, 1943, these three localities are represented by material in the Kimberley Museum but unfortunately no material could be obtained from this institution for the present study).

Eastern variety:

Characters: Forty-four specimens examined. Midbody scales 84 to 112 (seldom less than 90); supralabials 10 to 14, seldom 9 or 15; infralabials 11 to 15, seldom 10; preanal pores in males 10 to 14, one specimen



with 25 pores in a double row; lamellae under third and fourth toes 12 to 17 and 11 to 15 respectively; fourth toe shorter than third; fifth toe shorter than or equal to first; tail shorter than head and body in females; dorsal ground colour grey, brown or red-brown with interrupted pale vertebral band; males usually uniformly dark dorsolaterally but females with large dark brown spots on either side of vertebral band; head above often with two pale interocular bands; throat and often chest with grey to blue longitudinal lines; bright colours seen during breeding season, especially in males where head scales are greenish-blue and flanks orange; no dark spot at base of throat in either sex.

Size: Largest male (NMB 857 - Slangheuvel)  $90 + 97 = 187\text{mm}$ . Largest female (NMB 856 - Slangheuvel)  $96 + 65 = 161\text{mm}$ .

Habitat: Mainly terrestrial, but sometimes found basking on poles or termitaria.

Breeding: One female collected in February contained 17 well-developed eggs.

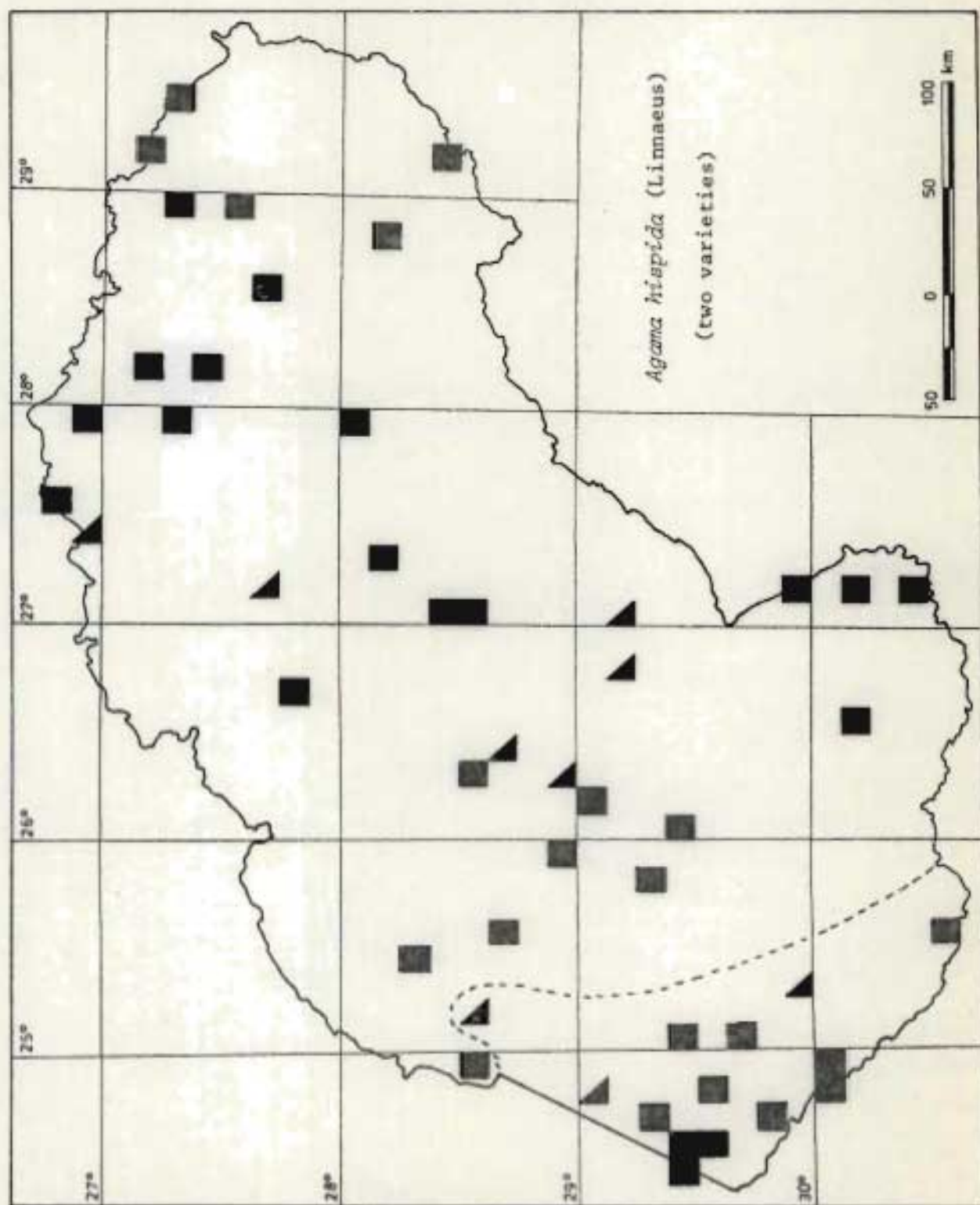
Diet: Remains of ants (*Hodotermes*, *Dorylus*) and beetles (Curculionidae) have been found in the faeces. Stomach contents: Insecta: Hymenoptera and Isoptera (workers and warriors).

Material examined from: Alpha; Bloemfontein; Brandfort (TM); Brandfort 10 miles north-west of (TM); Evenston A; Glenisla; Gruskop; Hartebeestfontein, Boshof; Klipplaat; Krugersdrift Dam; Leeuwkuil; Littlecote; Mierdam; Morgenzon, Zaaron; Odendaalsrus (TM); Rietfontein; Vrede; Rusthof; Slangheuvel; Smithfield (SAM); Spitzkop; Stoffelfontein; Stoltzkop; Sweet Home; Uitzicht; Venus; Weltevreden, Heilbron; Willem Pretorius Game Reserve (TM part); Winburg (TM); Wolvenfontein; Woudzicht; Zoetbron (Map 20).

Literature records: Recorded as *Agama hispida distanti*: Brandfort (Gough, 1909); Kroonstad; Smithfield; Vredefort Road (Boulenger, 1910); Bethanien (Sternfeld, 1911); Bloemfontein; Thaba'Nchu; Tweespruit (Boulenger & Power, 1921); Glen; Odendaalsrus; Parys (FitzSimons, 1943).

Note: A comprehensive study of variation within the species *Agama hispida* was undertaken by Boulenger and Power (1921), who recognized five forms, the nominate race and varieties *armata*, *aculeata*, *distanti* and *brachynota*. They showed that in several cases two or more varieties occur together. FitzSimons (1943) recognized all five forms as subspecies

Map 20





After examining two hundred and ninety-one specimens of *distanti*, *aculeata* and *armata* from east Africa, Broadley (1966) found it impossible to define geographic races for *Agama hispida* and treated it as a monotypic species. The *Agama hispida* complex is obviously in need of a revision throughout its range and although material from the Orange Free State appears to be divisible into geographic races its sub-divisions are for the purpose of this study treated as infrasubspecific varieties. A revision of the *A. hispida* complex might result in the re-instatement of some subspecies, perhaps separating the nominate form (with *brachyura* and *aculeata* as synonyms) from *armata* (with *distanti* as a synonym). If the big Kalahari form is recognized it should probably be called *A. hispida infralineata* Peters, 1877, as *aculeata*, described from the Cape of Good Hope, is apparently a synonymy of typical *A. hispida* (Broadley, 1975, pers.comm.).

*AGAMA MAKARIKARICA* FitzSimons, 1932

- \* *Agama hispida makarikarica* FitzSimons, 1932, Ann. Transv. Mus., 15, p. 36: Makarikari Saltpan, Botswana.

Common name: Makarikari Spiny Agama.

Range: Three isolated populations: north-western Orange Free State; Great Makarikari Saltpan, Botswana; and northern South West Africa (FitzSimons, 1943; Steyn & Steyn, 1970).

Characters: Eleven specimens examined. Midbody scale rows 84 to 103; supralabials 11 to 12, exceptionally 10 or 13; infralabials 11 to 13, exceptionally 10 or 15; preanal pores in males 10 to 12; lamellae under third and fourth toes 13 to 15 and 11 to 13 respectively; third toe much longer than fourth; first toe much longer than fifth; ventrals keeled (Bothaville) or smooth; ground colour above usually light-brown, but sometimes dark-brown; a series of four large dark quadrangular blotches arranged in pairs on either side of back, the same pattern extending over tail; yellowish vertebral line present or absent; head with two dark interocular chevrons pointing posteriorly; bright orange blotches on either side of neck, in armpit and groin; temporal region and posterior parts of upper lips blue in males; lower surfaces whitish, with blackish reticulation on throat and chest.



Size: Largest male (NMB 700 - Moirton)  $63 + 75 = 138\text{mm}$ . Largest female (TM 4337 - Bothaville)  $66 + 70 = 136\text{mm}$ .

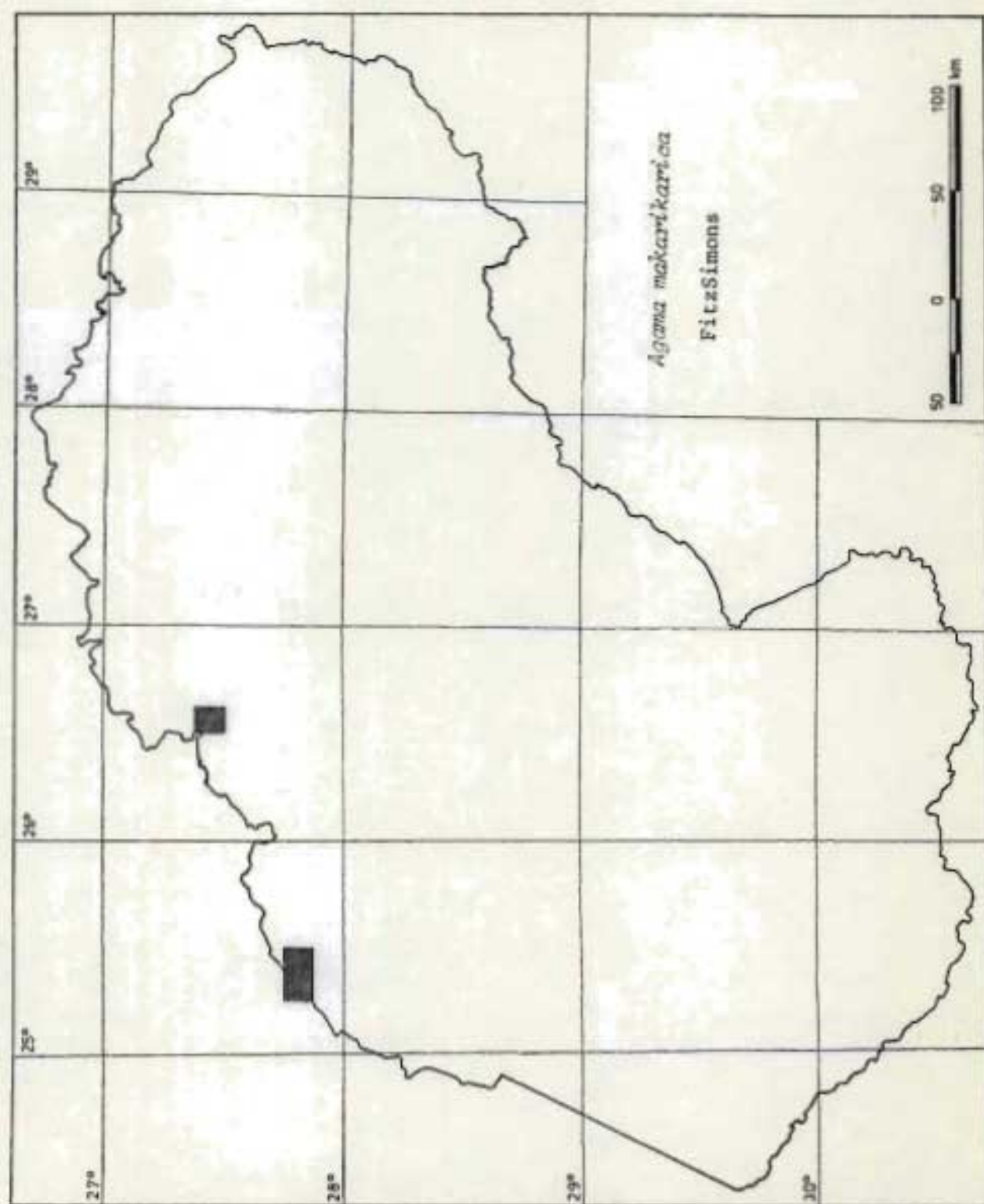
Habitat: Two specimens collected at Moirton and Roodedraai were found amongst loose stones and scattered bushes near the banks of the Vaal River.

Material examined from: Bothaville (TM); Moirton; Roodedraai (Map 21).

Literature records: Bothaville (Steyn & Steyn, 1970).

Note: Nine specimens (TM 4337-4345) of *Agama makarikarica* collected at Bothaville by A. Roberts in 1920 were listed under *Agama hispida brachyura* by FitzSimons (1943).

Map 21



Family CHAMAELEONIDAE Gray, 1827

Genus CHAMAELEO Laurenti, 1768

- \* *Chamaeleo* Laurenti, 1768, Syn.Rept., p. 45. Type by virtual tautonymy (Stejneger, 1936): *C.parisiensis* Laurenti = *Lacerta chamaeleon* Linnaeus, 1758.

CHAMAELEO DILEPIS Leach, 1819

CHAMAELEO DILEPIS DILEPIS Leach, 1819

- \* *Chamaeleo dilepis* Leach, 1819, in Bowdich, Miss.Ashantee, App. p. 493: Gabon.  
*Chamaeleo bilobus* Kuhl, 1820, Beitr. Kennt.Amph., p. 104.  
\* *Chamaeleon planiceps* Merrem, 1820, Tent.Syst.Amph., p. 162: Africa.  
\* *Chamaeleon petereti* Gray, 1865, Proc.zool.Soc.Lond. (1864), p. 470: Mozambique.  
*Chamaeleo capelli* Bocage, 1866, Jorn.Sci.math.phys.nat., 1, p. 59: Benguela, Angola.  
*Chamaeleo* var *quilensis* Bocage, 1866, Jorn.Sci.math.phys.nat., 1, p. 59: Rio Quilo, Angola.  
\* *Chamaeleon parvilobus* Boulenger, 1887, Cat.Liz.Brit.Mus., 3, p. 449, pl. xxxix, fig. 5: West Africa.  
\* *Chamaeleon isabellinus* Günther, 1893, Proc.zool.Soc.Lond., p. 556, pl. xxxiii, fig. 2: Malawi.

Common name: Flap-necked Chameleon; Trapsuutjies; Verkleurmannetjie.

Range: From southern Somalia to Natal, Swaziland, Transvaal, Botswana, and South West Africa, extending north from Angola along the coast through lower Zaïre to Cameroun (FitzSimons, 1943; Broadley, 1966). Also north-western border of Orange Free State.

Characters: Two females examined. No rostral appendage; occipital lobes poorly developed (when compared with material from northern South Africa, i.e. NMB 2311 - Kruger National Park); vertebral and ventral crests present, the latter consisting of white conical tubercles; claws simple; tail shorter than head and body; ventral crest white; pale streak on either side of body; remainder of body subject to colour changes due to environment or temperament.



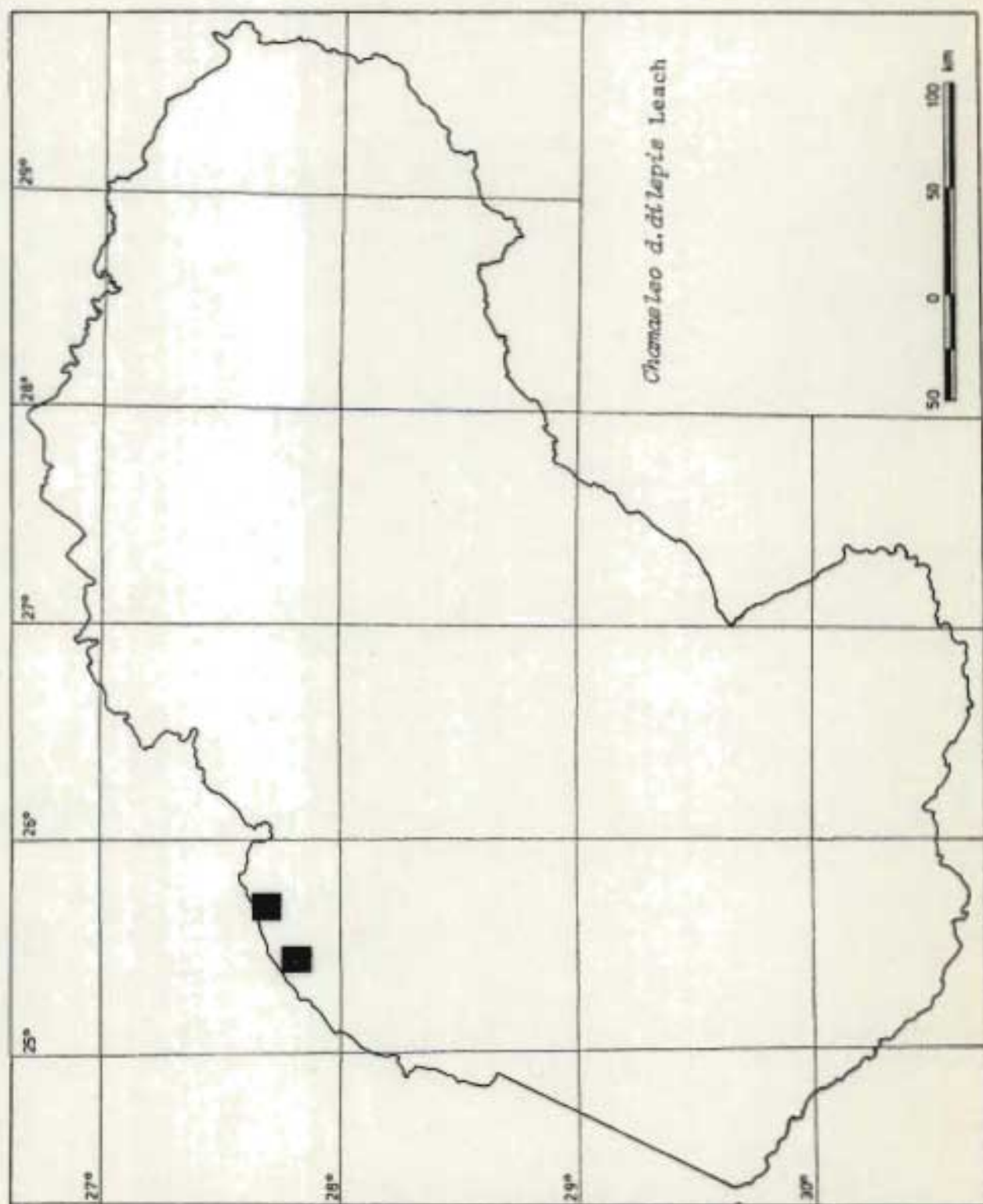
Size: Largest female (NMB 702 - Moirton)  $123 + 100 = 223\text{mm}$ .

Breeding: One female collected during February contained 36 well-developed eggs.

Material examined from: Moirton; Vet River - Bloemhof Dam junction (Map 22).

Literature records: There is a specimen recorded from Smithfield (FitzSimons, 1943) in the South African Museum, but its occurrence in the southern Orange Free State could not be confirmed.

Map 22



Family SCINCIDAE Gray, 1825

Key to the genera:

- 1a. Legs absent ..... *Acontias*, p. 82
- 1b. Legs present ..... 2
- 2a. Eyelids movable ..... *Mabuya*, p. 62
- 2b. Eyelids immovable ..... *Afroablepharus*, p. 80

Genus *MABUYA* Fitzinger, 1826

# *Mabuya* Fitzinger, 1826, Neue Class.Rept., pp. 23, 52. Type by virtual tautonymy: *M.dominicensis* Fitzinger = *Lacertus mabouya* Lacepede, 1788.

Key to the species:

- 1a. Subdigital lamellae and scales on soles of feet smooth .....  
..... *M.homalocephala*, p. 63
- 1b. Subdigital lamellae and scales on soles of feet keeled ..... 2
- 2a. Subocular not narrowed below, similar to supralabials ..... 3
- 2b. Subocular distinctly narrowed below or excluded from lip ..... 4
- 3a. Anterior border of ear opening without lobules; lamellae under  
fourth toe 15 to 20 ..... *M.capeensis*, p. 65
- 3b. Anterior border of ear opening with two to three lobules;  
lamellae under fourth toe 21 to 24 ..... *M.occidentalis*, p. 67
- 4a. Centre of nostril anterior to suture of rostral/first  
supralabial ..... *M.variegata*, p. 72
- 4b. Centre of nostril posterior to or above suture of rostral/first  
supralabial ..... 5
- 5a. A distinct white lateral longitudinal stripe .... *M.varia*, p. 69
- 5b. No white lateral stripe ..... 6
- 6a. Subocular always excluded from lip; males black; females  
olive-brown with six black longitudinal stripes across back  
and flanks ..... *M.sulcata*, p. 75
- 6b. Subocular usually reaches lip, seldom excluded; both sexes  
with a yellow dorsolateral stripe, fading out posteriorly ....  
..... *M.punctatissima*, p. 77



*MABUYA HOMALOCEPHALA* (Wiegmann, 1828)

*Scincus homalocephalus* Wiegmann, 1828, Isis Oken, XXI, p. 374:  
South Africa.

*MABUYA HOMALOCEPHALA SMITHII* (Gray, 1845)

*Euprepis smithii* Gray, 1845, Cat.Liz.Brit.Mus., p. 112: South Africa.

Common name: Smith's Skink.

Range: Eastern Cape Province westwards to Langeberge, Swellendam district (Hewitt, 1937; FitzSimons, 1943); north-eastern and south-eastern Orange Free State.

Characters: Seven specimens examined. Centre of nostril posterior to or above suture of rostral/first supralabial; supranasals in contact or separated; prefrontals separated; supraciliaries four or five; four or five supralabials anterior to subocular; three well-developed lanceolate to obtusely pointed lobules on anterior border of ear opening; midbody scales 32; dorsal scales tricarinate, anterior dorsals poorly keeled; 16 or 19 smooth subdigital lamellae under fourth toe; colour brown above with seven dark longitudinal stripes running over back along margins of scale rows; pale dorsolateral stripe from behind eye to base of tail; dark brown lateral band from nostril through eye to base of tail; below the latter a conspicuous orange-red (white in fixative) lateral stripe from supralabials through ear to groin, dark-edged below; ventral surface white.

Size: Largest male (NMB 808 - Rietfontein, Vrede)  $62 + 36r = 98\text{mm}$ .  
Largest female (NMB 890 - Spitzkop)  $66 + 85 = 151\text{mm}$ .

Habitat: Collected amongst rocks at about 1524 meters (5000 ft).

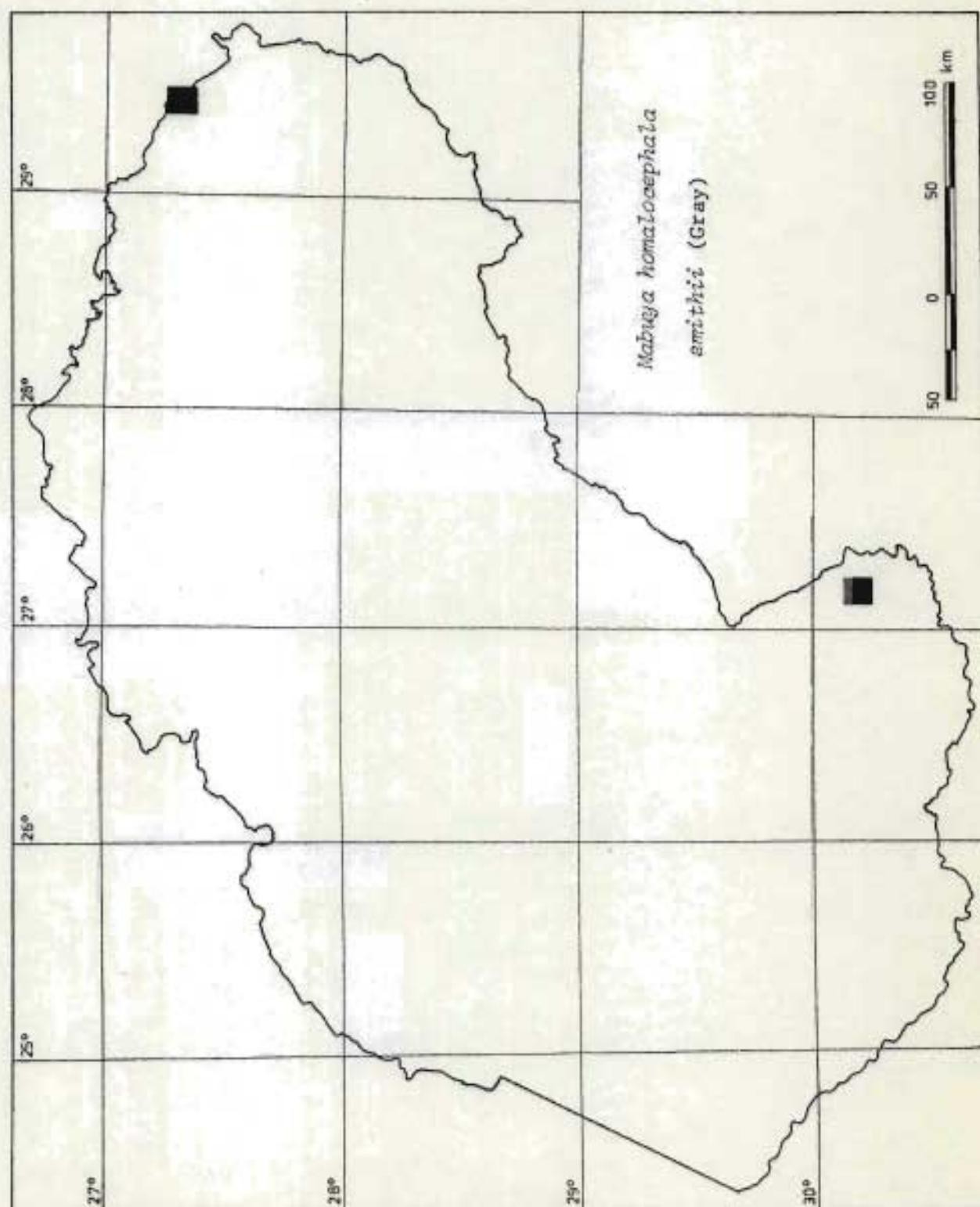
Breeding: At Rietfontein, Vrede, 35 eggs were collected under stones during December. Some of the eggs hatched during the same month, the eggs and the hatchlings measuring  $14 \times 8\text{mm}$  and  $24 + 25 = 49\text{mm}$  respectively. These data contradict FitzSimons (1943) statement that all the species of *Mabuya* in South Africa are "viviparous".

Material examined from: Rietfontein, Vrede; Spitzkop (Map 23).

Literature records: None, new record for the Orange Free State.

Note: Outside the Orange Free State the nearest locality record for this species is Dordrecht, eastern Cape Province (Hewitt, 1937).

Map 23





*MABUYA CAPENSIS* (Gray, 1830)

*Scincus trivittatus* Cuvier, 1829, Regne.Amin.Ed. 2, 2, p. 62:

Cape of Good Hope. Preoccupied by *trivittatus* Hardwicke & Gray, 1827, Zool.Journ., 3, p. 227, an Indian species (fide FitzSimons, 1943).

*Tiliqua capensis* Gray, 1830, in Griffith's Anim.Kingd., ix, Syn., p. 68: Cape of Good Hope.

*Tiliqua ascensionis* Gray, 1838, Ann.Mag.nat.Hist., (1), 2, p. 290.

\* *Euprepes merremi* Dumeril & Bibron, 1839, Erp.Gen., 5, p. 671:

No locality.

Common name: Cape Three-striped Skink; Driestreep-akkedia.

Range: Zambia, Rhodesia, Botswana (Broadley, 1966), South West Africa (Mertens, 1955) and South Africa except for the arid areas of the western Cape Province (FitzSimons, 1943).

Characters: Eighty specimens examined. Centre of nostril always posterior to suture of rostral/first supralabial; supranasals always in contact; prefrontals usually in contact, sometimes separated; supraciliaries mostly five, sometimes four; supralabials four, seldom five, anterior to subocular; 33 to 37, exceptionally 32 or 38 scale rows around middle of body; dorsal scales tricarinate; lamellae under fourth toe 15 to 20; colour above light brown to grey-brown; three pale stripes on back and extending over tail; one dorsolateral stripe on either side and one vertebral stripe (twice as broad as dorsolaterals); a series of dark brown to black transverse bars or spots on back and flanks between pale longitudinal stripes; lower surfaces uniform yellowish-white to grey; in five specimens longitudinal stripes and dark markings are absent, dorsum being uniformly brown to black and lower surfaces dark grey.

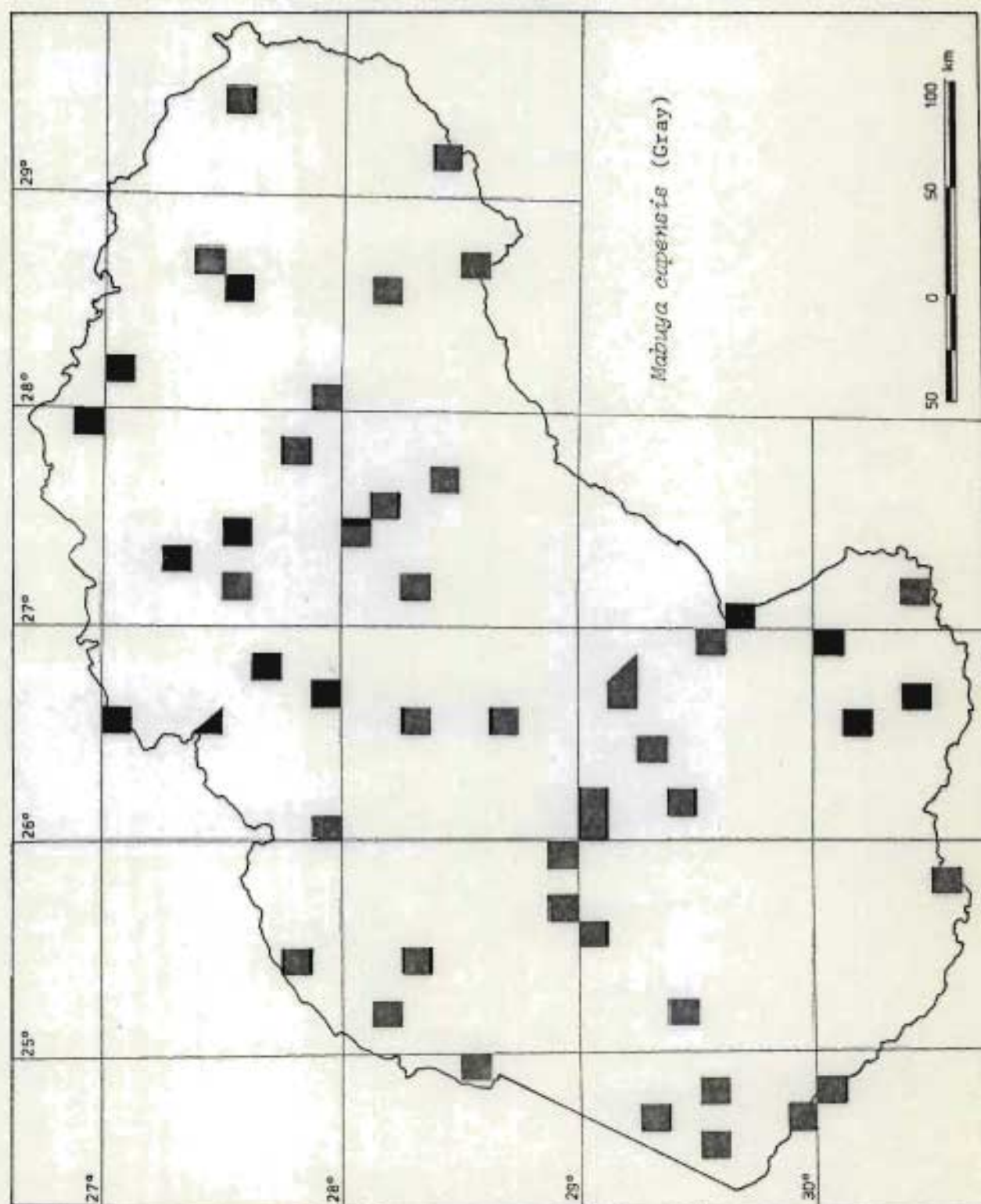
Size: Largest male (NMB 4340 - Welgegund) 108 + 72r = 180mm. Largest female (NMB 900 - Jonkerskraal) 120 + 171 = 291mm.

Habitat: Found in a variety of habitats including rocky areas, amongst open veld vegetation, in holes or old termitaria and around houses.

Breeding: One female collected in February gave birth to eight young, each measuring approximately 60mm in total length. Another female collected in November contained eleven partly developed embryos.



Map 24



Predators: One specimen was found in the stomach of a *Psammophis leightoni trinasalis*.

Diet: The stomach contents of one specimen revealed the tail of another skink.

Material examined from: Babel; Bethel; Bloemfontein; Bozrah; Doornbult; Doornplaat; Dundee; Elandsfontein; Goedeheop; Hartebeestfontein, Boshof; Hoogeveld, Theunissen; Jonkerskraal; Kasteelkop; Kleinplaas; Krugersdrift Dam; Langhoek; Leeuwkuil; Lemoenboord; Louis Rust; Lovedale; Magdalen; Mara, Vredefort; Middenspruit; Mimosa; Moirton; Monontsa Pass; Morgenzon, Zastron; Naval Hill; Onze Rust; Perth; Platrand; Poortje, Fauresmith; Ramalitse; Rambouillet; Richmond West; Rohallion; Slangheuvel; Smithfield (SAM); Triangle; Tygerfontein; Uitkijk; Verdun, Reitz; Vergaderrand; Waterbron; Welgedund; Welkom (TM); Weltevrede; Willem Pretorius Game Reserve (TM); Wolvekop, Fauresmith (Map 24).  
Literature records: Smithfield (Boettger, 1883); Vredefort Road (Boulenger, 1910); Bethanien (Sternfeld, 1911); Bloemfontein; Bothaville; Thaba'Nchu (FitzSimons, 1943).

*MABUYA OCCIDENTALIS* (Peters, 1867)

*Euprepes vittatus* var *australis* Peters, 1862, Mber.dt.Akad.Wiss.Berl., p. 19. Unacceptable on grounds of stability (Mertens, 1955).

*Euprepes occidentalis* Peters, 1867, Mber.dt.Akad.Wiss.Berl., p. 20: Otjimbingue, South West Africa.

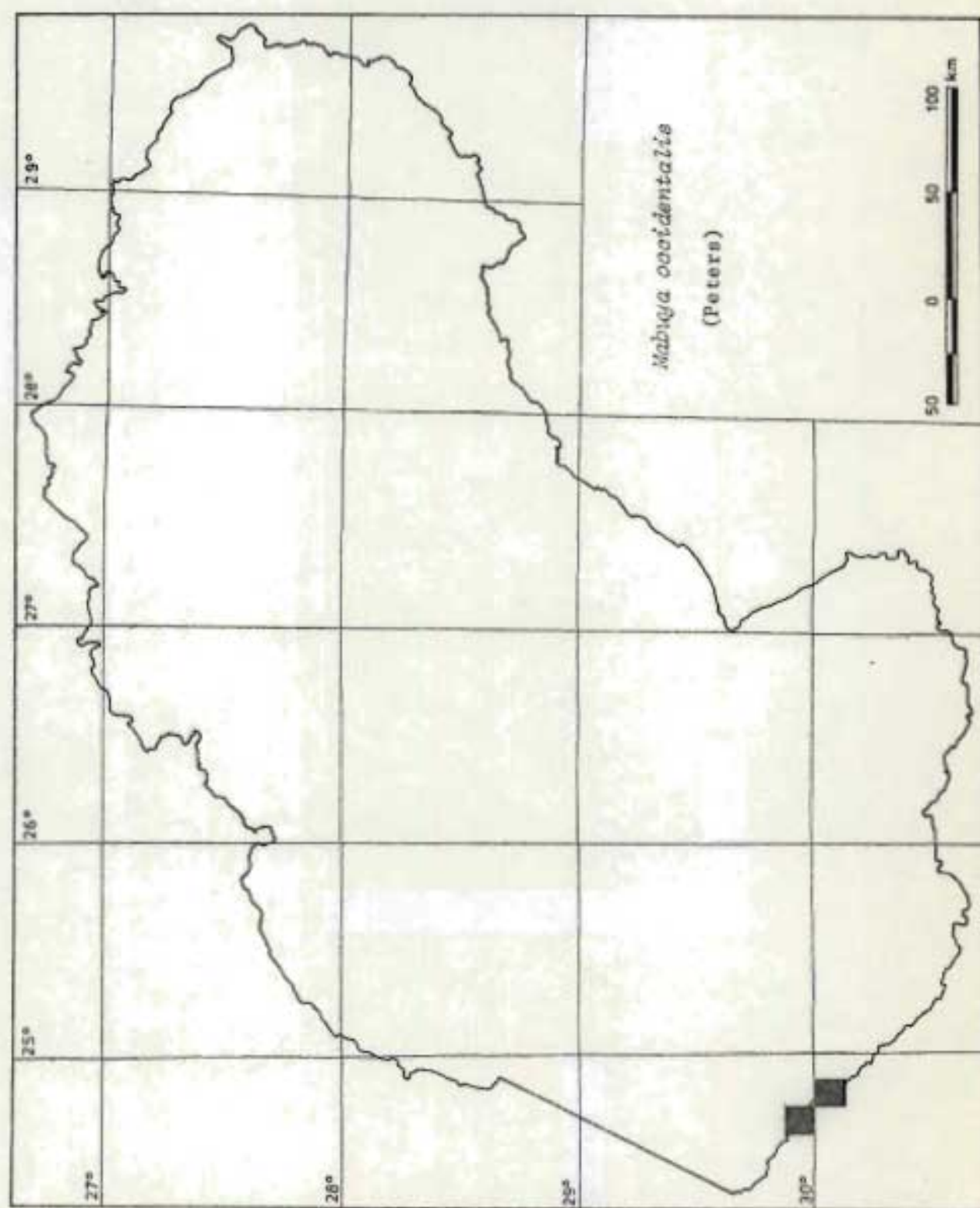
\* *Mabuia calaharica* Werner, 1910, Denkschr.med.-naturw.Ges.Jena, 16, p. 350, pl. viii, Fig. 11: Lehututu-Kang, Kalahari.

Common name: Western Three-striped Skink.

Range: Arid areas of southern Angola, South West Africa and western Cape Province extending into Karoo and south-western corner of Botswana (FitzSimons, 1943); south-western Orange Free State.

Characters: Thirteen specimens examined. Centre of nostril posterior to suture of rostral/first supralabial; supranasals in contact; prefrontals in contact or separated; supraciliaries five; supralabials anterior to subocular four or five; two to three differentiated ear lobules on anterior border of ear opening; midbody scale rows

Map 25





30 to 36; dorsal scales tricarinate; 21 to 24, exceptionally 19 or 20 lamellae under fourth toe; colour above brown to dark brown with three yellowish stripes on back, vertebral stripe broader than dorsolateral stripes; lateral white stripe from supralabials to groin, continuing on anterior third of tail; sutures between labials blackish; ventral surfaces white.

Size: Largest male (NMB 4708 - Lemoenboord)  $90 + 117 = 207\text{mm}$ . Largest female (NMB 4355 - Dundee)  $97 + 97\text{r} = 194\text{mm}$ .

Habitat: Rocky or terrestrial amongst scant vegetation.

Breeding: One female collected in November contained seven undeveloped embryos.

Material examined from: Dundee, Fauresmith; Lemoenboord (Map 25).

Literature records: None, new record for the Orange Free State.

Note: *M. calaharica* Werner has been placed in the synonymy of *M. capensis* (FitzSimons, 1943; Broadley, 1966) but I concur with Sternfeld (1911a, p. 406) and Mertens (1955, p. 79) that it is a synonym of *M. occidentalis*. The specimens here recorded were found sympatrically with *Mabuia capensis*. Although the midbody scale counts of *M. occidentalis* overlap those of *M. capensis*, other characters were typical of *M. occidentalis*.

#### MABUYA VARIA (Peters, 1867)

*Euprepes (Euprepis) varius* Peters, 1867, Mber.dt.Akad.Wiss.Berl., p. 20: Tete, Mozambique.

\* *Euprepes olivieri* var *albopunctatus* Bocage, 1867, Jorn.Sci.math.phys.nat., 1, p. 223: Benguela, Angola.

*Euprepes (Mabuia) laevigatus* Peters, 1869, Mber.dt.Akad.Wiss.Berl., p. 434: Gerlachshoop, north of Middelburg, Transvaal.

\* *Euprepes damaranus* Peters, 1869, Öfvers.K.VetenskAkad.Förh., p. 660: Damaraland, South West Africa.

*Euprepes isselii* Peters, 1871, Mber.dt.Akad.Wiss.Berl., p. 567: Keren, Eritrea = Ethiopia.

\* *Euprepes angolensis* Bocage, 1872, Jorn.Sci.math.phys.nat., 4, p. 78: Bibala, Angola.

*Euprepes hildebrandtii* Peters, 1874, Mber.dt.Akad.Wiss.Berl., p. 372, pl., fig. 4: Barawa = Brava, Somalia (Loveridge, 1957).

\* *Mabuia varia nyikae* Loveridge, 1953, Bull.Mus.comp.Zool.Harv., 110, p. 211: Nyika Plateau above Nchenachena, Malawi.



Common name: Common Variegated Skink.

Range: Sudan and Somalia, southwards through east Africa to south-eastern Cape Province, westwards to South West Africa, Angola and Zaïre (FitzSimons, 1943; Broadley, 1966).

Characters: One hundred and twenty-eight specimens examined. Centre of nostril posterior to suture of rostral/first supralabial, seldom above; supranasals in contact, exceptionally separated; prefrontals separated, exceptionally in contact; supraciliaries usually five, seldom three, four or six; supralabials anterior to subocular four or five, exceptionally six; two or three obtusely pointed lobules on anterior border of ear opening; midbody scales 30 to 36, mostly 32 to 34; dorsal scales tricarinate; lamellae under fourth toe 17 to 23; colour above grey-brown to brown; usually a pale vertebral stripe and a pair of pale dorsolateral stripes, sometimes vertebral stripe and sometimes also dorsolateral stripes absent; white lateral stripe always present from subocular through ear opening to groin; black dorsal blotches present or absent; ventral surfaces white or scales edged with grey.

Size: Largest male (NMB 1696 - Uitkyk)  $50 + 87 = 137\text{mm}$ . Largest female (NMB 3391 - Kasteelkop)  $61 + 77 = 138\text{mm}$ .

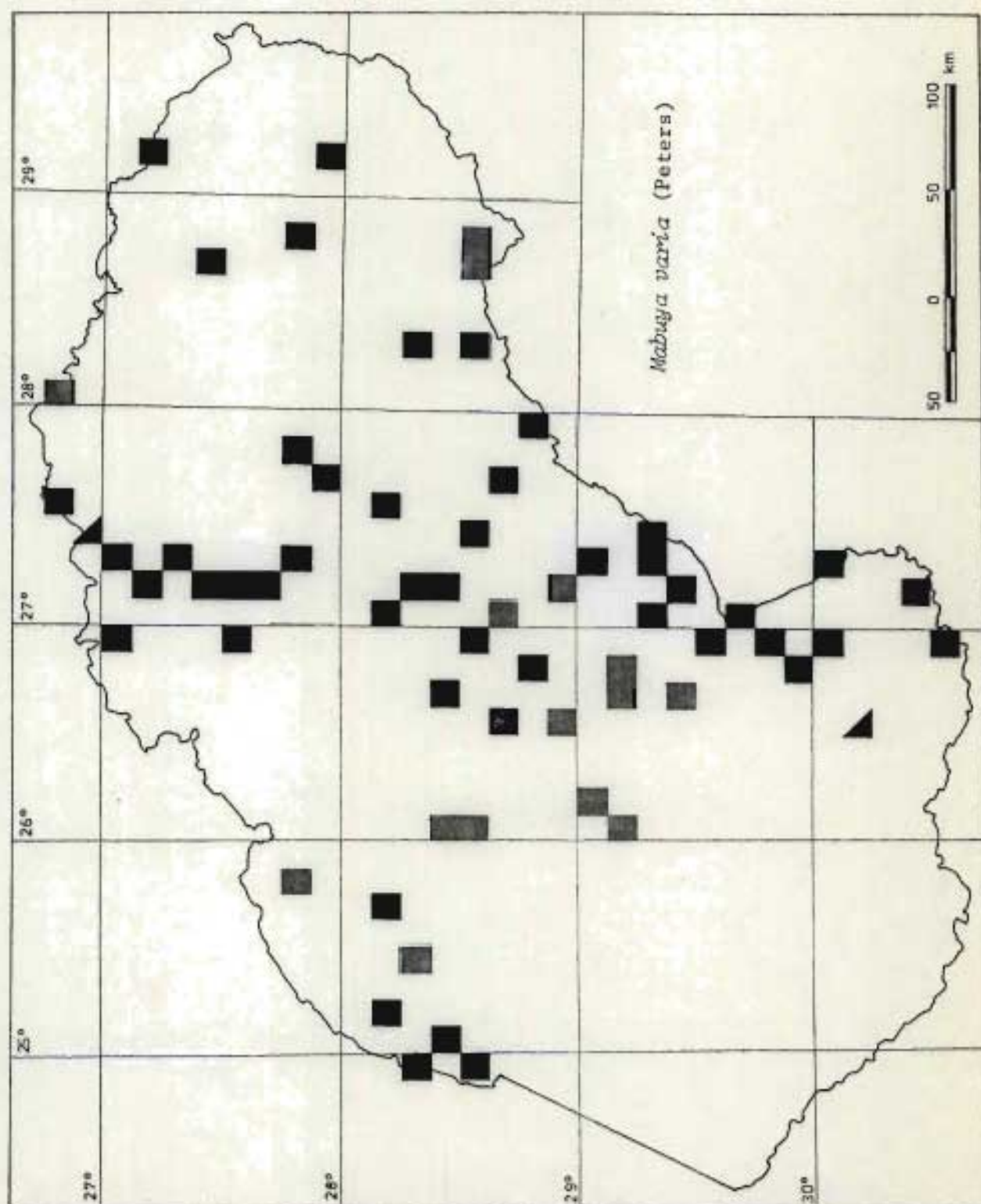
Habitat: Rocky habitat up to 2073 meters (6800 ft).

Breeding: Five to six well-developed embryos were found in females collected in December and January.

Predators: Specimens were found to be eaten by the following snake species: *Lycophidion c. capense*; *Psammophis leightoni trinasalis*; *Psammophis crucifer*.

Material examined from: Annies Rust; Atalanta; Babel; Baltespoort; Basberg; Bergplaats, Bloemfontein; Bergplaats, Dewetsdorp; Bethel; Boskop; Brockenhurst; Ceylon; Di Poort; Geluk, Boshof; Hartebeesfontein, Boshof; Karreeboomsvallei; Karreepoort; Kasteelkop; Klipplaatdrift, Winburg; Kraaifontein; Kranskop; Leeuwkop; Leeuwkuil; Lemoenhoek; Lorenzo; Mara, Parys; Mara, Vredefort; Mecklenburg; Merino, Bethlehem; Meyerskraal; Middenspruit; Mimosa; Monontsa Pass; Morgenzon, Ficksburg; Morgenzon, Harrismith; Morgenzon, Zastron; Mount Nelson; Naval Hill; Ongegund; Onze Rust; Palmietfontein; Paradys; Platberg, Boshof; Ramalitse; Rambouillet; Riverside; Rohallion; Rondavel; Spijtfontein; Straalfontein; Susannasfontein; Thaba'Nchu; Thaba Pachoa Berg; Tweefontein; Uitkijk; Uitkyk;

Map 26





Verdun, Fouriesburg; Welbedacht; Willem Pretorius Game Reserve; Wittekopjes; Wittepoort; Witzieshoek; Wolvekop, Kroonstad; Zoetbron (Map 26).

Literature records: Smithfield (Boulenger, 1910); Parys (FritzSimons, 1943).

*MABUYA VARIEGATA* (Peters, 1869)

Key to the subspecies:

- 1a. Anterior border of ear opening with three pointed lobules; dorsal scales tricarinate ..... *M.v.variegata*, p. 72
- 1b. Anterior border of ear opening with two (or one) pointed lobules; dorsal scales quinquecarinate .... *M.v.punctulata*, p. 73

*MABUYA VARIEGATA VARIEGATA* (Peters, 1869)

\* *Euprepes variegatus* Peters, 1869, Öfvers.K.VetenskAkad.Förh., p. 660: Damaraland, South West Africa.

\* *Mabuya varia* var *longiloba* Methuen & Hewitt, 1914, Ann.Transv.Mus., 4, (3), p. 142: Karasberg, Namaqualand.

Range: West Coast of southern Africa from Cunene River south to Clanwillia area, extending eastwards through Karroo to Kimberley, Zastron district and Albany district (Broadley, 1975); southwestern Orange Free State.

Characters: Ten specimens examined. Centre of nostril anterior to suture of rostral/first supralabial; supranasals in contact; prefrontals separated; supraciliaries four or five, exceptionally six; supralabials anterior to subocular five, exceptionally four; midbody scales 34 (seven specimens), 36 (two specimens) or 32 (one specimen); dorsals tricarinate; lamellae under fourth toe 21 to 22, exceptionally 20; always three lanceolate ear lobes; colour light grey to dark brown above with well-defined dorsolateral pale stripe; black-edged vertebral and pale lateral stripes rather poorly defined; ventral surfaces white or scales grey-edged.

Size: Largest male (NMB 1573 - Klipbankfontein) 47 + 64 = 111mm.

Largest female (NMB 4109 - Ospoort) 53 + 66 = 119mm.

Habitat: Amongst low rocks, usually with their burrows under the rock.

Breeding: One female collected in December contained three partly developed embryos.

Material examined from: Bozrah; Klipbankfontein; Koortshoek; Langhoek; Lismore (TM); Luiperfontein; Middelbron; Ospoor; Strijdfontein, Philippolis (Map 27).

Literature records: Lismore (Broadley, 1975).

*MABUYA VARIEGATA PUNCTULATA* (Bocage, 1872)

\* *Euprepes punctulatus* Bocage, 1872, Journ.Sci.math.phys.nat., Ser. 1, 4, p. 76: Rio Coroca, Angola.

*Mabuia longiloba triebneri* Mertens, 1954, Senckenbergiana 34, (4/6), p. 179, fig. 5: Osona, South West Africa.

Range: Southwestern Angola, South West Africa east of range of *M.v. variegata*, Zambia west of Zambezi, Botswana, northern Cape Province, north-western Rhodesia, Transvaal north of Soutpansberg and Mozambique south of Save River (Broadley, 1975). Southern Orange Free State except south-western part where *M.variegata variegata* occurs.

Characters: Eighteen specimens examined. Centre of nostril anterior to suture of rostral/first supralabial; supranasals in contact; prefrontals separated; supraciliaries usually five, seldom four; supralabials anterior to subocular five, seldom four or six; midbody scales 30 to 34, mostly 32 or 34; dorsal scales quincunciate; lamellae under fourth toe 18 to 21; lanceolate ear lobes two, exceptional one, never three; colour grey-brown above with pale dorsolateral and lateral stripe; paravertebral blackish stripe usually broken; ventral surfaces white.

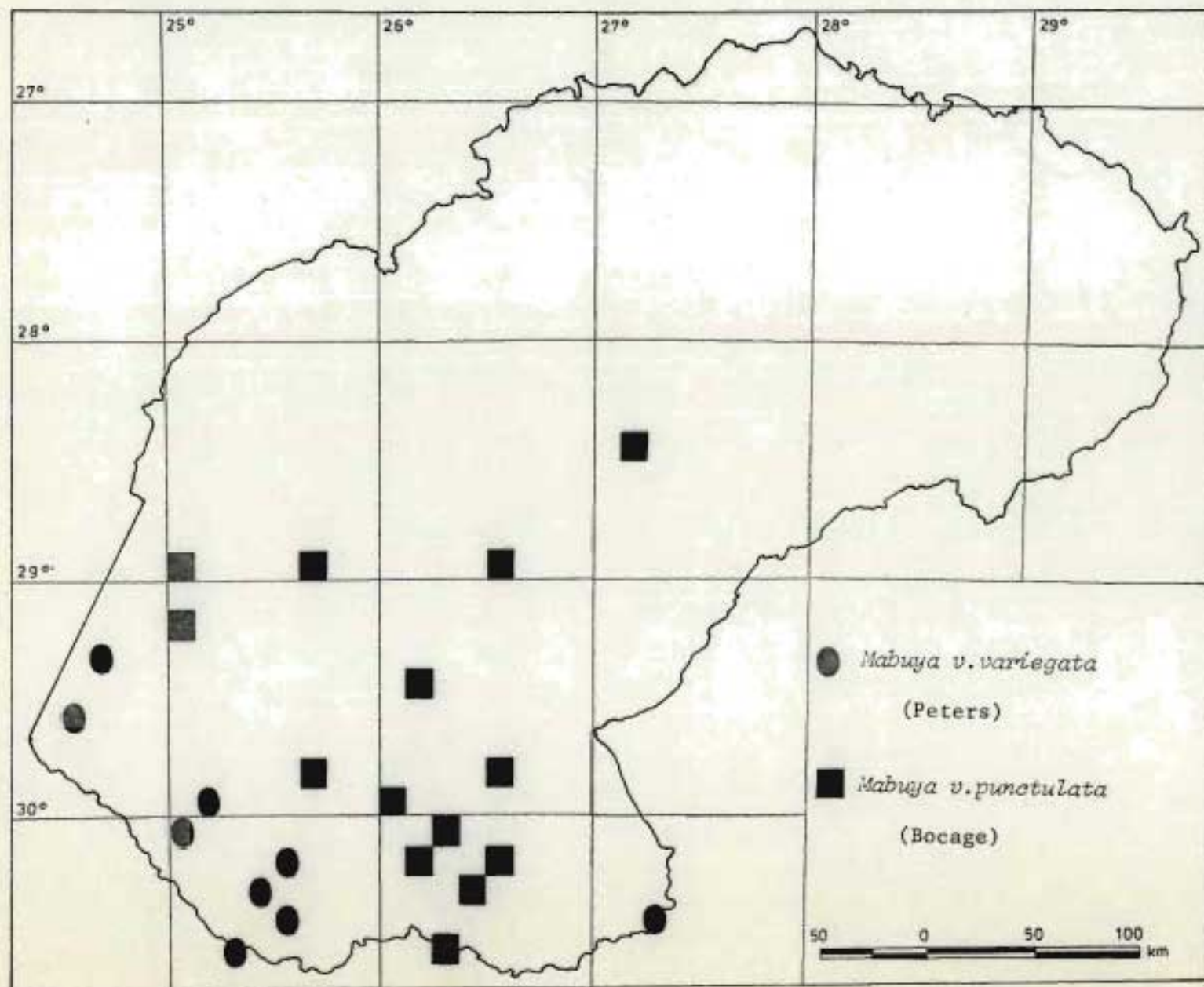
Size: Largest male (NMB 4210 - Weltevreden, Smithfield) 41 + 57 = 98mm. Largest female (NMB 726 - Noodhulp) 44 + 48 = 92mm.

Habitat: Usually found in rocky areas with small associated bushes and vegetation.

Breeding: Two to four young are produced. One female collected in November contained four well-developed embryos.

Material examined from: Alpha; Cornwall; Di Poort; Exelsior, Edenburg; Hebron; Lessingskop; Lovedale; Noodhulp; Rietfontein, Rouxville; Tweefontein; Waterhoek; Weltevrede; Weltevreden, Smithfield; Zandfontein (Map 27).





Map 27



Literature records: None, new record for the Orange Free State.

Note: The possibility exist that *Mabuia variegata punctulata* is not conspecific with the nominate race. Unfortunately material is lacking from the Namib Desert National Park and vicinity to settle this question (Broadley, 1975, pers.comm.).

*MABUYA SULCATA* (Peters, 1867)

*MABUYA SULCATA SULCATA* (Peters, 1867)

*Expreses sulcatus* Peters, 1867, Mber.dt.Akad.Wiss.Berl., p. 20:  
Neu Barmen, Hereroland.

Common name: Koppie Skink.

Range: Southern Angola, southwards through South West Africa, northern half of Cape Province and western Orange Free State (FitzSimons, 1943).

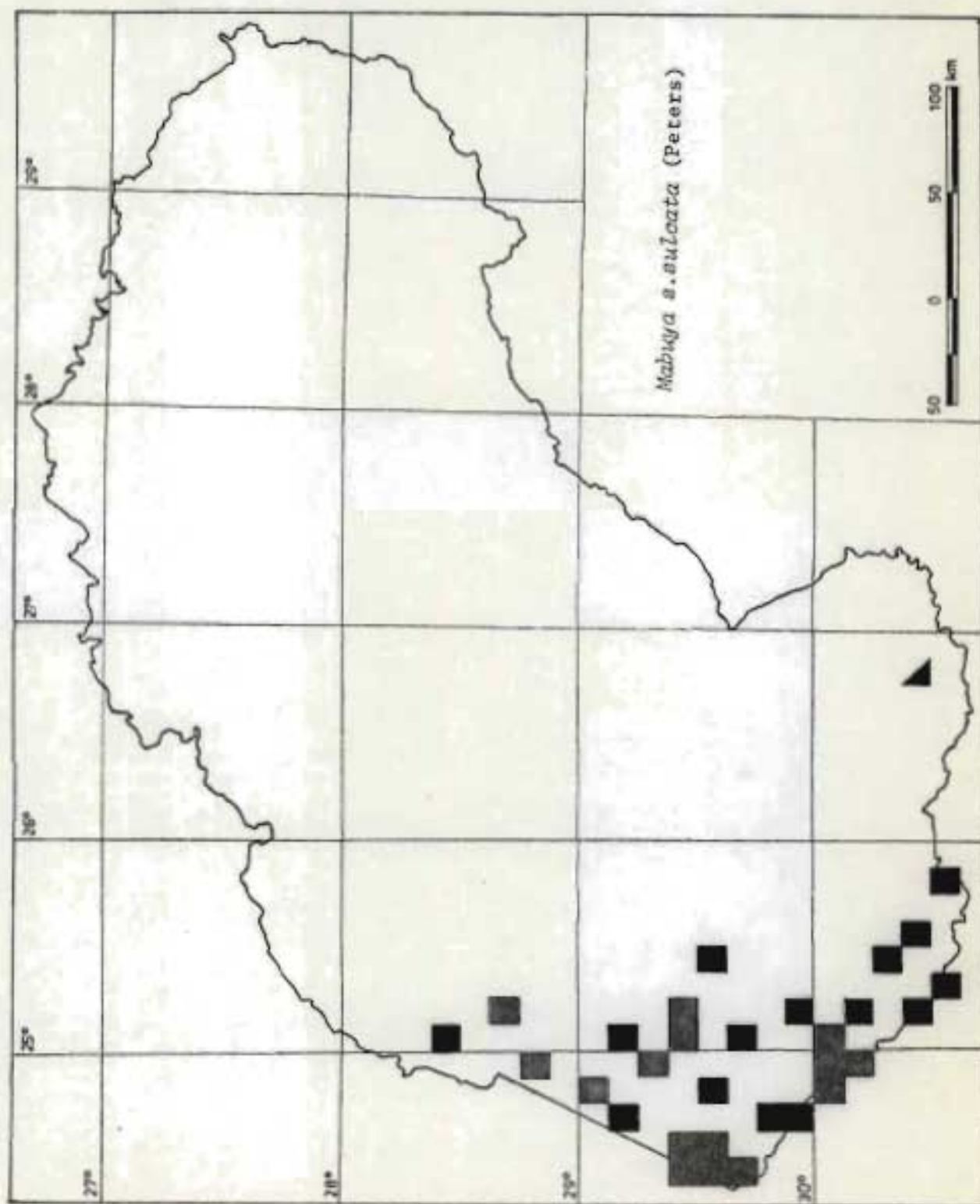
Characters: Ninety-five specimens examined. Centre of nostril posterior to suture of rostral/first supralabial; supranasals always in contact; prefrontals separated, seldom in contact; supraciliaries five, seldom four or six; supralabials usually six (fifth and sixth below subocular) or seven (fifth to seventh or sixth and seventh below subocular), supralabials seldom five (fourth and fifth below subocular) or eight (sixth to eighth below subocular); three or four feebly developed ear lobes on anterior border of ear opening; midbody scales 36 to 40; dorsal scales usually quinquecarinate, sometimes tricarinate; lamellae under fourth toe 21 to 24, exceptionally 20 or 25; adult males black dorsally and ventrally except lower abdomen and cloacal area which is usually dirty white; females and young males olive-brown above with six dark longitudinal stripes across back and flanks; lateral stripes extend from nostril through ear to groin; some females uniformly dark brown above, longitudinal stripes indistinct; ventral surfaces whitish with dark spots on chin and throat.

Size: Largest male (NMB 527 - Middelbron)  $76 + 108 = 184\text{mm}$ . Largest female (NMB 3171 - Brakpan)  $76 + 131 = 207\text{mm}$ .

Habitat: Rocks on the dolomite outcrops of the dry western Orange Free State.

Breeding: Females with partly to well-developed embryos were found from November to February. The embryos, usually five in number, were arranged two in the left and three in the right oviduct.

Map 28





Material examined from: Bozrah; Brakpan; Doornhoek; Dundee; Francis Home; Geluk, Philippolis; Groenekloof; Gruisrand; Heenenweerskop; Heilbron, Philippolis; Kalkplaat; Kleinplaas; Klipbankfontein; Klippiespan; Lemoenboord; Lentelus; Luiperfontein; Luiperskop; Middelbron; Ospoot; Poortje, Fauresmith; Proses; Strijdfontein, Philippolis; Uitkyk; Waterhoek; Weltevreden, Jacobsdal; Wintershoek; Wolvekop, Fauresmith; Zoutpan, Fauresmith; Zoutpan, Jacobsdal (Map 28).

Literature records: Jacobsdal (Hewitt & Power, 1913); Rouxville (= the south-western area of the Rouxville district ?; FitzSimons, 1943).

*MABUYA PUNCTATISSIMA* (A. Smith, 1849)

*MABUYA PUNCTATISSIMA PUNCTATISSIMA* (A. Smith, 1849)

\* *Euprepes punctatissimus* A. Smith, 1849, Ill.Zool.S.Afr., Rept., pl.

31, fig. 1: North-eastern districts of the Cape Province.

\* *Euprepes sunderalli* A. Smith 1849, Ill.Zool.S.Afr., Rept., App. p. 11:

Interior of Southern Africa.

Common name: Common Striped Skink.

Range: Eastern temperate highveld of South Africa to south-eastern Botswana; relict populations exist on eastern highlands of Rhodesia (Broadley, 1966).

Characters: Two hundred and forty-six specimens examined. Centre of nostril usually posterior to suture of rostral/first supralabial, sometimes above; supranasals in contact; prefrontals usually separated, sometimes in contact; supraciliaries five, seldom three, four or six; five supralabials anterior to subocular, seldom six, exceptionally three or four; subocular excluded from lip in 16% of specimens, eight embryos of one female with subocular reaching lip and one with subocular excluded; two to four (usually three) obtusely pointed lobules on anterior border of ear opening, exceptionally absent; midbody scale rows 34 to 40, mostly 36 to 38; dorsal scales tricarinate; lamellae under fourth toe 16 to 21, mostly 18 or 19; colour above dark-brown to blackish; yellow dorsolateral stripe usually fading out posteriorly; scales between dorsolateral stripes each with a pale spot, which may form pale longitudinal lines; ventral surfaces white with dark brown to black blotches on throat and sometimes chest.



Size: Largest male (NMB 3360 - Sentinel)  $79 + 85 = 164\text{mm}$ . Largest female (NMB 860 - Slangheuvel)  $90 + 85\text{r} = 175\text{mm}$ .

Habitat: Found over a wide range of ecological conditions from sandy river banks to rocky habitat up to 2591 meters (8500 ft).

Breeding: Three to ten embryos in different stages of development were found in females collected from October to March.

Predators: Specimens were found in the stomach of the following snakes: *Boaedon f. fuliginosus*; *Psammophis leightoni trinacalis*; *Psammophis crucifer*.

Diet: Insecta: Hymenoptera; Isoptera (workers and warriors):

Material examined from: Allanvale; Alpha; Babel; Bachelors Home;

Basberg; Bergkloof; Berlin; Bethany; Bethel; Bon Haven; Boschkop;

Boskop; Brakfontein; Braunzijkop; Brockenhurst; Caledonspoor;

Carlie; Ceylon; Damfontein; Dasklip; Dealbata; De Rust; Die

Hoogte; Dipka; Di Poort; Doornbult; Doornplaat; Elandsfontein;

Exelsior; Falle Grange; Geluk, Boshof; Goedetrouw; Grootkloof;

Grootkrans; Gruiskop; Haagens Stad; Hartebeestfontein, Boshof;

Hebron; Holmes Dale; Honingberg; Hoogveld, Theunissen; Houtkop;

Juist Zoo; Kades; Kafferskop; Kalkdam; Kareerand; Kasteelkop;

Kleinplaas; Klipfontein; Klipoog; Klipplaat; Klipplaatdrift,

Edenburg; Koortshoek; Kopjeskraal; Kranskop; Lange Hoek; Lang

Zeekoegat; Lanquedoc; La Riviera; Last Poort; Leeuwberg; Leeuwfontein

Theunissen; Lemoenhoek; Lessingskop; Littlecote; Lomagundi;

Lorenzo; Loskop; Louis Rust; Lovedale; Machbela; Magdalen;

Mandyville; Maseru; Mecklenburg; Merriesfontein; Milambi; Moirton;

Monontsa Pass; Mooigelegen; Morgenzon, Ficksburg; Morgenzon, Senekal;

Noodhulp; Oever; Palmietfontein; Petra; Pietersberg; Platrand;

Quaggaspruit; Rambouillet; Rietfontein, Rouxville; Riefontein, Vrede;

Rohallion; Rondeberg; Rusthof; Schoongesicht; Seekoeivleipoort;

Sentinel; Slangheuvel; Smaldeel; Spijtfontein; Spitzkop; Stoffel=

fontein; Strijdfontein, Heilbron; Susannasfontein; Tafelberg;

Tienfontein; Triangle; Tweefontein; Tygerfontein; Uitkomst;

Uitvlugt; Uitzicht; Vaalkop; Verdun, Fouriesburg; Verdun, Reitz;

Verdun, Ladybrand; Vergaderrand; Vet River - Bloemhof Dam junction;

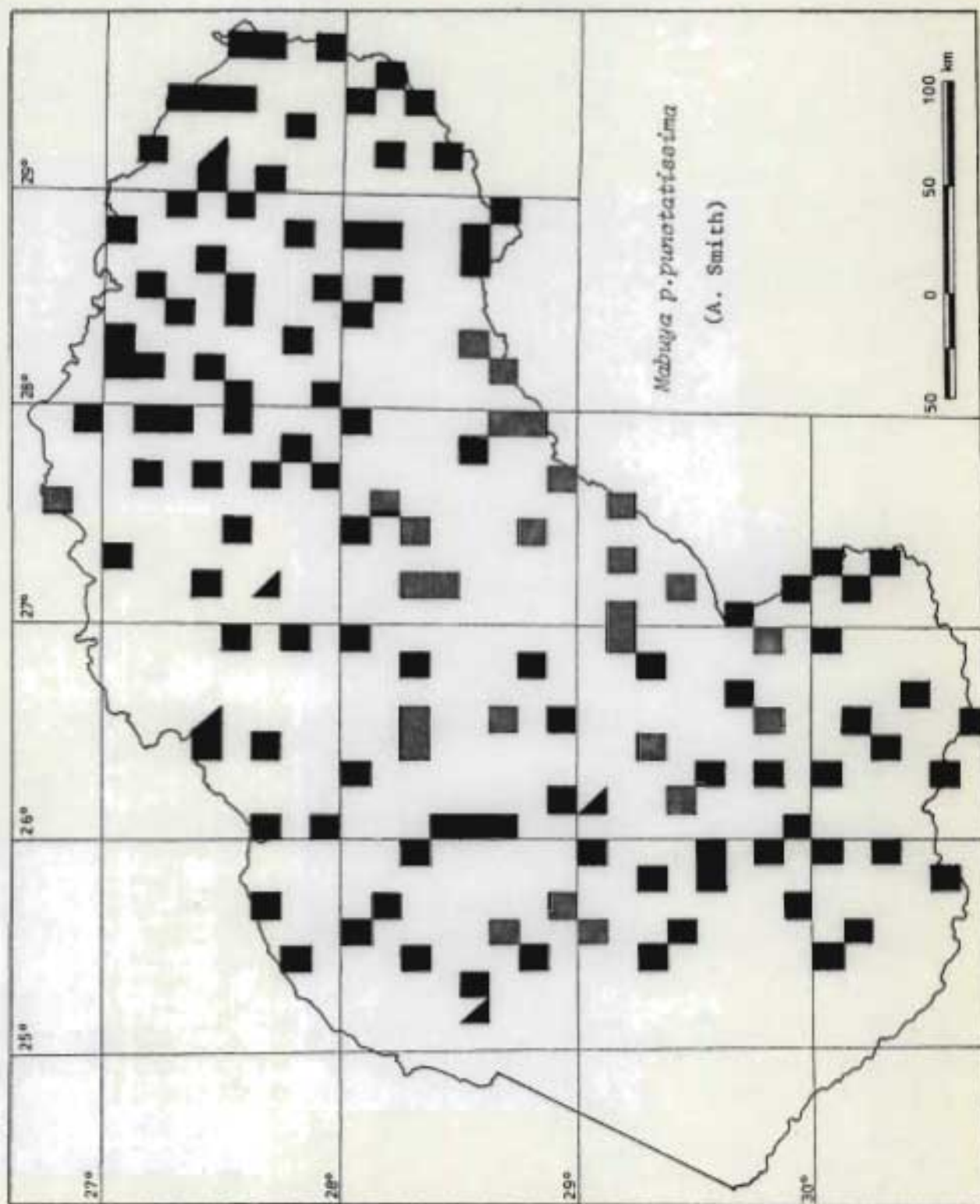
Vissershoek West; Waterfall; Welgegund; Weltevrede; Weltevreden,

Heilbron; Weltevreden, Smithfield; Wilhelmshohe; Willem Pretorius

Game Reserve; Wittekopjes; Witzieshoek; Wolvenfontein; Woudzicht;

Zoetbron; Zwartkoppies (Map 29).

Map 29





Literature records: (Listed as *Mabuia striata*) Immigrant (Hewitt & Power, 1913); Bloemfontein; Boshof; Bothaville; Kroonstad; Smithfield; Vrede (FitzSimons, 1943).

Note: After studying the *Mabuia striata* complex, Broadley (1966) proposed a tentative taxonomic arrangement of the complex, to consist basically of a temperate (*Mabuia punctatissima*) and a tropical species (*Mabuia striata*).

Genus *AFROABLEPHARUS* Greer, 1974

\* *Afroablepharus* Greer, 1974, Aust.J.Zool., Suppl.Ser.No. 31, p. 31.

Type by original designation: *Cryptoblepharus wahlbergii*  
A. Smith, 1849.

*AFROABLEPHARUS WAHLBERGII* (A. Smith, 1849)

\* *Cryptoblepharus wahlbergii* A. Smith, 1849, Ill.Zool.S.Afr., Rept.,  
App. p. 10: "Country to the eastward of Cape Colony".

*Ablepharus carsonii* Boulenger, 1894, Proc.zool.Soc.Lond., p. 735, pl.  
xlix, figs. 4, 4a: Fwambo, Zambia.

*Ablepharus massaicus* Angel, 1924, Bull.Mus.Hist.nat.Paris, 30, p. 52:  
Masai Plains near Nairobi, Kenya.

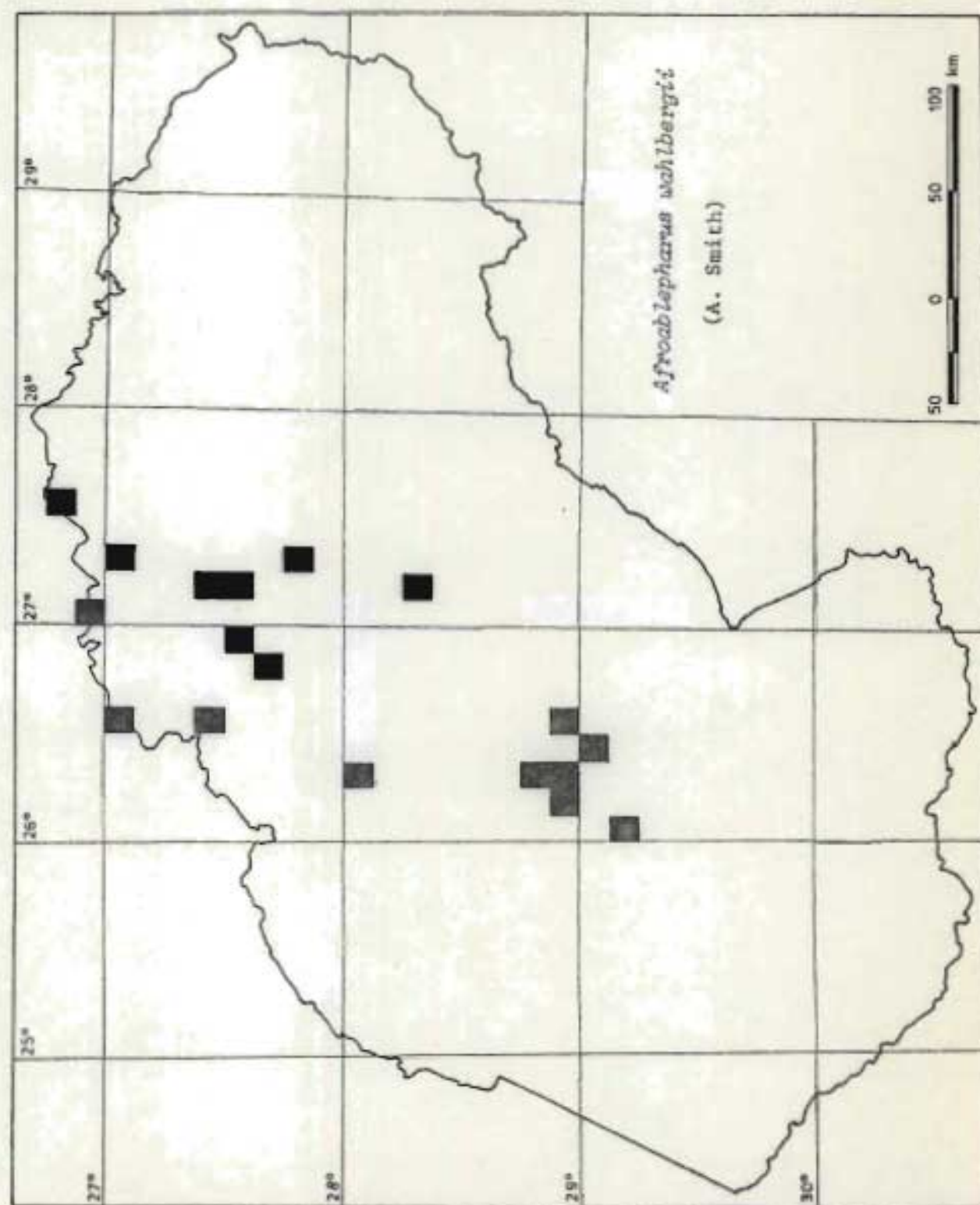
Common name: Wahlberg's Dwarf Skink.

Range: Natal, Zululand, Transvaal and Orange Free State northwards  
to eastern and northern Botswana, northern South West Africa, southern  
Angola, east and central Africa (FitzSimons, 1943; Broadley, 1966).

Characters: Eighty specimens examined. Supranasals present in three  
specimens, fused in two; prefrontals always separated; frontoparietals  
fused; interparietal distinct, fused with frontoparietals in one  
specimen and partially fused in another; supraoculars three;  
supraciliaries four or five, exceptionally six; four supralabials  
anterior to subocular, exceptionally three; midbody scale rows usually  
24, seldom 23, 25 or 26; limbs pentadactyl; lamellae under fourth  
toe 13 to 16, mostly 14 or 15; colour above light grey, brown or  
gold, uniform or with six dark lines; pale dorsolateral stripe present  
or absent; dark brown to blackish lateral band well defined to  
inconspicuous; ventral surfaces white to greyish-blue, except for  
breeding males which are rosy-pink to orange, especially on throat  
and anal region.



Map 30



Size: Largest male (NMB 333 - La Riviera)  $44 + 64 = 108\text{mm}$ .

Largest female (NMB 1424 - Houmoed)  $45 + 63 = 108\text{mm}$ .

Habitat: Most specimens were found in old termitaria but some also under rocks.

Breeding: A female collected in September contained nine eggs in each oviduct. The eggs were in different stages of development.

Predators: This skink is preyed upon by *Lycophidion a. capense* and *Pseudomorphis leightoni trinavalis*.

Diet: Arachnid remains were recovered from the stomach of one skink.

Material examined from: Bergplaats, Bloemfontein; Bothaville; Deelfontein, Bothaville (TM); Di Poort; Glen; Holme's Dale; Houmoed; Klipdrift; La Riviera; Lorenzo; Middenspruit; Richmond West (TM); Spijtfontein; Van der Walt's Rust; Venus; Willem Pretorius Game Reserve; Wittekopjes; Wolvekop, Kroonstad (Map 30).

Literature records: Bothaville (FitzSimons, 1943).

Genus *ACONTIAS* Cuvier, 1817

- \* *Acontias* Cuvier, 1817, Regne Anim., 2, p. 60. Type by monotypy:  
*Anguis melaegris* Linnaeus, 1758.

*ACONTIAS GRACILICAUDA* Essex, 1925

*ACONTIAS GRACILICAUDA GRACILICAUDA* Essex, 1925

- \* *Acontias gracilicauda* Essex, 1925, Rec. Albany Mus., 3, p. 334, figs. D, E & F: Grahamstown.

Common name: Legless Skink; Pootlose Akkedis.

Range: From northern part of eastern Cape Province northwards through Orange Free State highveld to southern Transvaal, then westwards to northern Cape Province (Broadley, 1966).

Characters: Seventy specimens examined. Suboculars three; second supralabial usually entering eye, sometimes narrowly excluded; five supralabials, exceptionally six; supraciliaries four; supraoculars three, exceptionally two or four; midbody scale rows 18, exceptionally 16, 17 or 19; ventrals 151 to 170; subcaudals 30 to 40; colour, olive-green to grey-brown with dorsal scales dark-edged; ventral surfaces dirty yellow or white.



Size: Largest specimen, a male (NMB 3198 - Vet River - Bloemhof Dam junction)  $253 + 42 = 295\text{mm}$ .

Habitat: Fossorial in dank spots under rocks or in old termitaria.

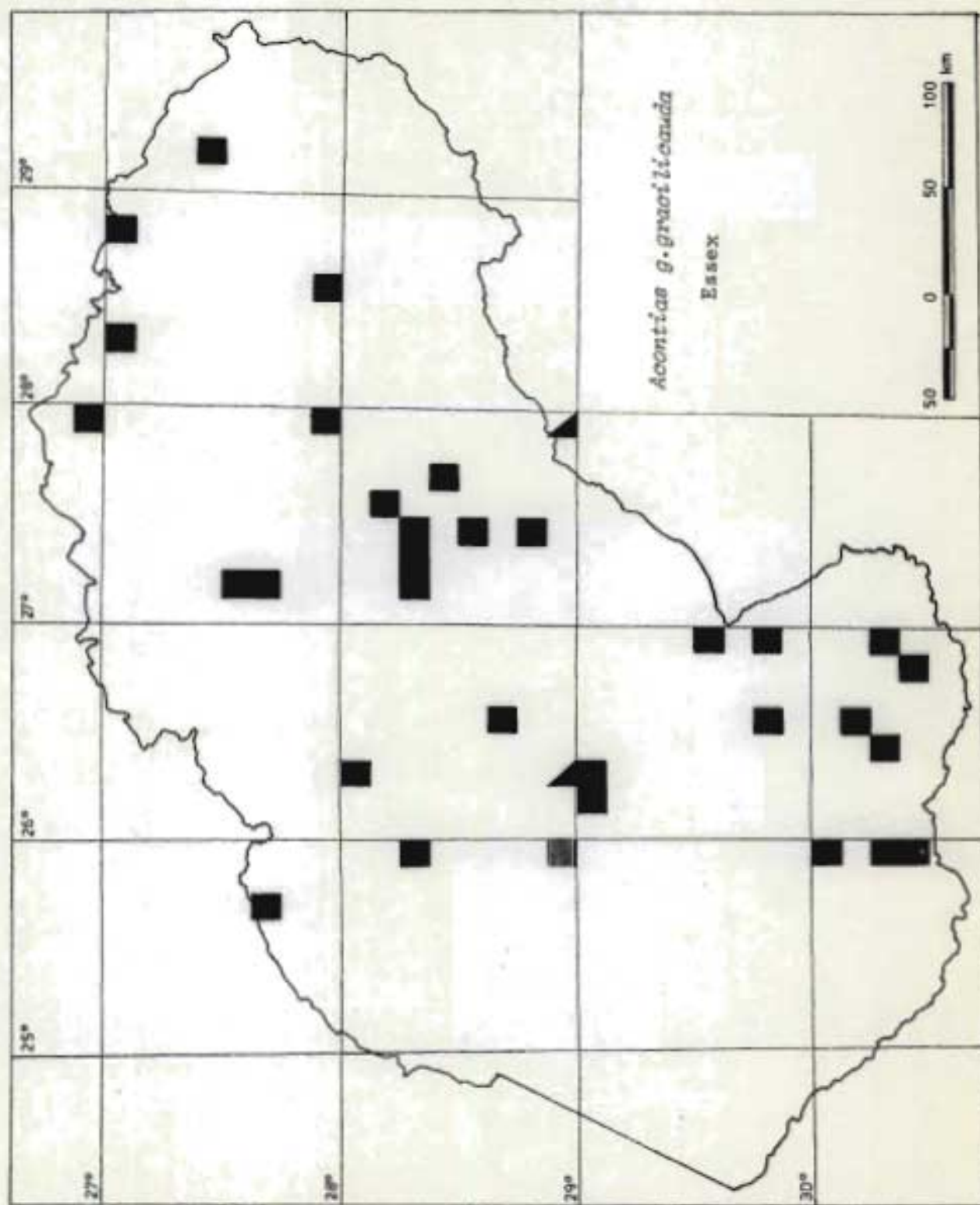
Breeding: Females collected in October and November contained three or four well-developed eggs.

Diet: Insecta: Curculionidae (Coleoptera). Myriapoda: Scutigeridae (Chilopoda).

Material examined from: Alpha; Baunton; Bethel; Bethulie (TM); Bloemfontein; Ceylon; Damfontein; Dealbata; Die Hoogte; Doornberg; Goedehoop; Kalkdam; Klipoog; Kroonstad; Krugersdrift Dam; La Belle France; La Riviera; Leeuwkop; Lessingskop; Lindley (TM); Mandyville; Middenspruit; Milambi; Mimosa; Petra; Rouxville; Slangheuvel; Uitkijk; Vet River - Bloemhof Dam junction; Vrede (TM); Weltevreden, Smithfield; Willem Pretorius Game Reserve (TM part) (Map 31).

Literature records: Smithfield (Boettger, 1883, sub. nom. *A. meleagris*); Bloemfontein; Glen; Kroonstad; Rouxville; Winburg = Doornberg (FitzSimons, 1943, see under *Acontias plumbeus gracilicauda*); Bethulie; Ficksburg; Willem Pretorius Game Reserve (Broadley & Greer, 1969).

Map 31



Family CORDYLIDAE Mertens, 1937

Key to the genera:

- 1a. Parietals two ..... 2
- 1b. Parietals four ..... 3
- 2a. Prefrontals present ..... *Gerrhosaurus*, p. 85
- 2b. Prefrontals absent ..... *Tetradactylus*, p. 88
- 3a. Dorsum covered with small scales and intermixed granules,  
no underlying osteodermal plates ..... *Pseudocordylus*, p. 104
- 3b. Dorsal scales large without intermixed granules, underlain  
with osteodermal plates ..... *Cordylus*, p. 90

Genus *GERRHOSAURUS* Wiegmann, 1828

- \* *Gerrhosaurus* Wiegmann, 1828, Isis Oken, p. 378. Type by monotypy:  
*G. flavigularis* Wiegmann, 1828.

*GERRHOSAURUS FLAVIGULARIS* Wiegmann, 1828

- \* *Gerrhosaurus flavigularis* Wiegmann, 1828, Isis Oken, p. 378: South Africa  
*Gerrhosaurus ocellatus* Cocteau, 1833, Mag.Zool.Guer., cl. iii, pl. iv,  
pl. vi., fig. 1: Cape of Good Hope.
- \* *Pleurotuchus desjardini* A. Smith, 1836, Mag.Zool.Bot., 1, p. 143:  
South-east coast of South Africa.
- \* *Pleurotuchus chrysobronchus* A. Smith, 1836, Mag.Zool.Bot., 1, p. 144:  
Towards the sources of the Cowie River, Grahamstown.
- \* *Gerrhosaurus bibroni* A. Smith, 1844, Ill.Zool.S.Afr., Rept., pl. XXXVII,  
fig. 1, pl. 42, figs. 9-12: Towards the sources of the Caledon  
River, Orange Free State.
- \* *Gerrhosaurus flavigularis* var *quadrilineata* Boettger, 1883, Ber.Tät.  
offenbach.Ver.Naturk., Nos. 22-23, p. 156: Smithfield, Orange  
Free State.
- \* *Gerrhosaurus flavigularis fitzsimonsi* Loveridge, 1942, Bull.Mus.comp.  
Zool.Harv., 89, p. 514: Mount Mbololo, Kenya.



Common name: Yellow-throated Plated Lizard.

Range: Sudan and Ethiopia southwards through Zambia, Rhodesia, Botswana, Transvaal and Orange Free State to south-western Cape Province (Broadley, 1966); an isolated population exists at Gobabis, South West Africa (Mitchell & Steyn, 1965).

Characters: Thirty-three specimens examined. Head length 14-17.4% head and body length; prefrontals separated, in contact in only two specimens; supraciliaries five, seldom four; dorsal scales keeled and striated, in 60 to 64 transverse and 20 to 24 longitudinal rows; ventrals in 35 to 42 transverse and eight longitudinal rows; femoral pores 10 to 12 in males and nine to 12 in females; scales on soles of feet smooth and tubercular; 15 to 18 lamellae under fourth toe; colour above brown with a pair of dark-edged, lemon-yellow dorsolateral stripes from subocular region to anterior part of tail; pair of paravertebral pale lines from occiput to root of tail; supra- and infralabials of adult males red; ventral surfaces white, throat sometimes yellow.

Size: Largest male (NMB 3240 - Boschkloof)  $108 + 164 = 272\text{mm}$ . Largest female (NMB 3015 - Dipka)  $144 + 190 = 334\text{mm}$ .

Habitat: Rocky and grassy hillsides where they have their burrows under rocks.

Breeding: Five to eight eggs measuring  $16 \times 13\text{mm}$  are laid during December and hatch in February. One hatchling measured  $37 + 58 = 95\text{mm}$ .

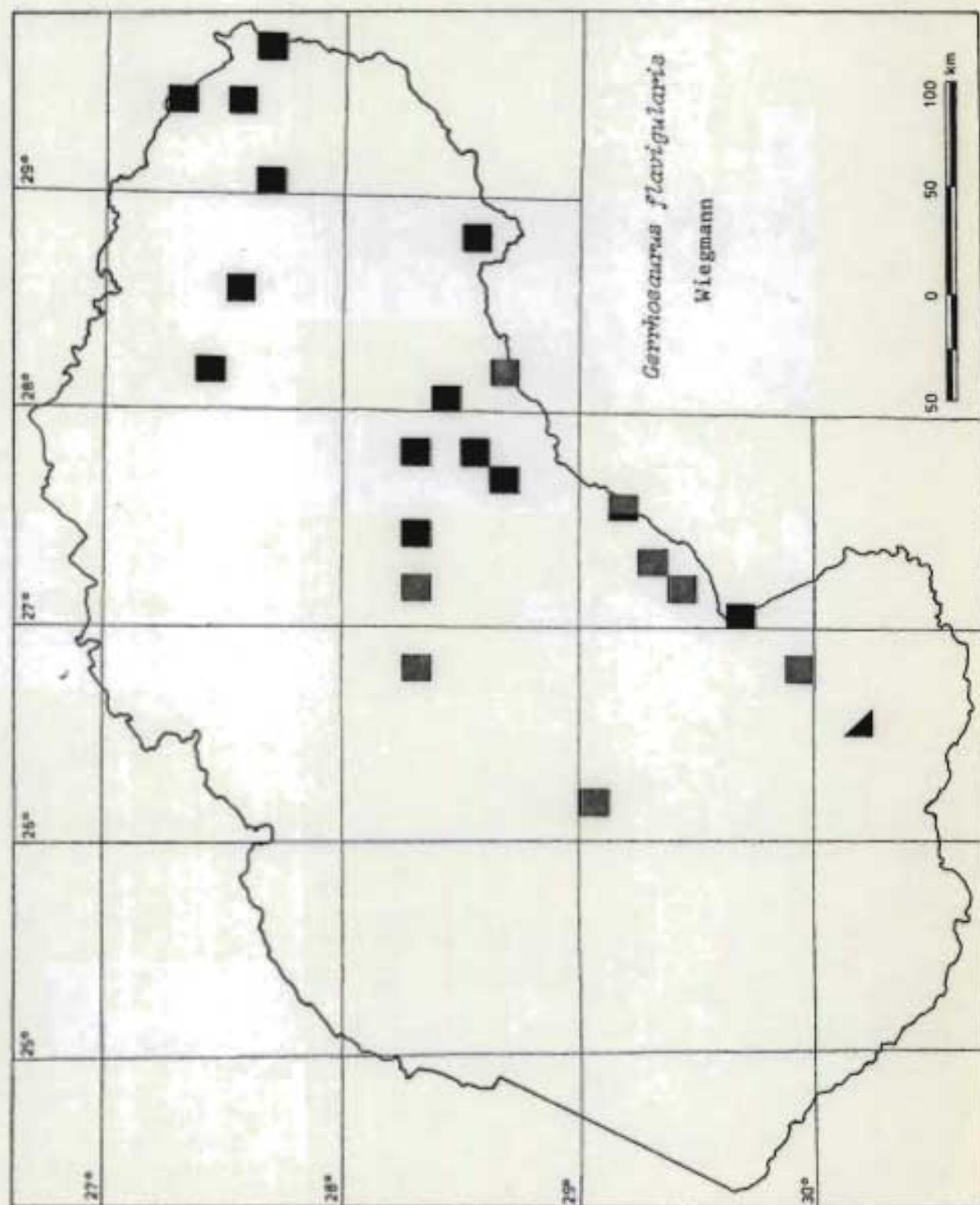
Diet: Insecta: Lagriidae (Coleoptera), Acrididae (Orthoptera);

Blattaria. Arachnida: Aranaeida.

Material examined from: Allanvale; Atalanta; Biddulphsberg; Bloemfontein; Boschkloof; Caledonspoort; Dipka; Leeuwfontein, Theunissen; Lemoenhoek; Morgenzon, Senekal; Petra; Rietfontein, Vrede; Rohallion; Rondeberg; Rusthof; Rydal Mount (NMP); Tygerfontein; Verdun, Reitz; Welbedacht; Willem Pretorius Game Reserve; Wittepoort (Map 32).

Literature records: Smithfield (Boettger, 1883); Bloemfontein; Rydal Mount (FitzSimons, 1943).

Map 32



Genus *TETRADACTYLUS* Merrem, 1820

\* *Tetradactylus* Merrem, 1820, Vers.Syst.Amph., pp. 13, 75. Type by absolute tautonymy: *Chalcides tetradactylus* Daudin, 1802.

Key to the species:

- 1a. Forelimbs didactyle ..... *T.breyeri*, p. 88  
1b. Forelimbs monodactyle ..... *T.afriicanus*, p. 90

*TETRADACTYLUS BREYERI* Roux, 1907

\* *Tetradactylus breyeri* Roux, 1907, Zool.Jb.Syst., 25, p. 430, pl. 14, fig. 6: Transvaal.

*TETRADACTYLUS BREYERI* ssp.

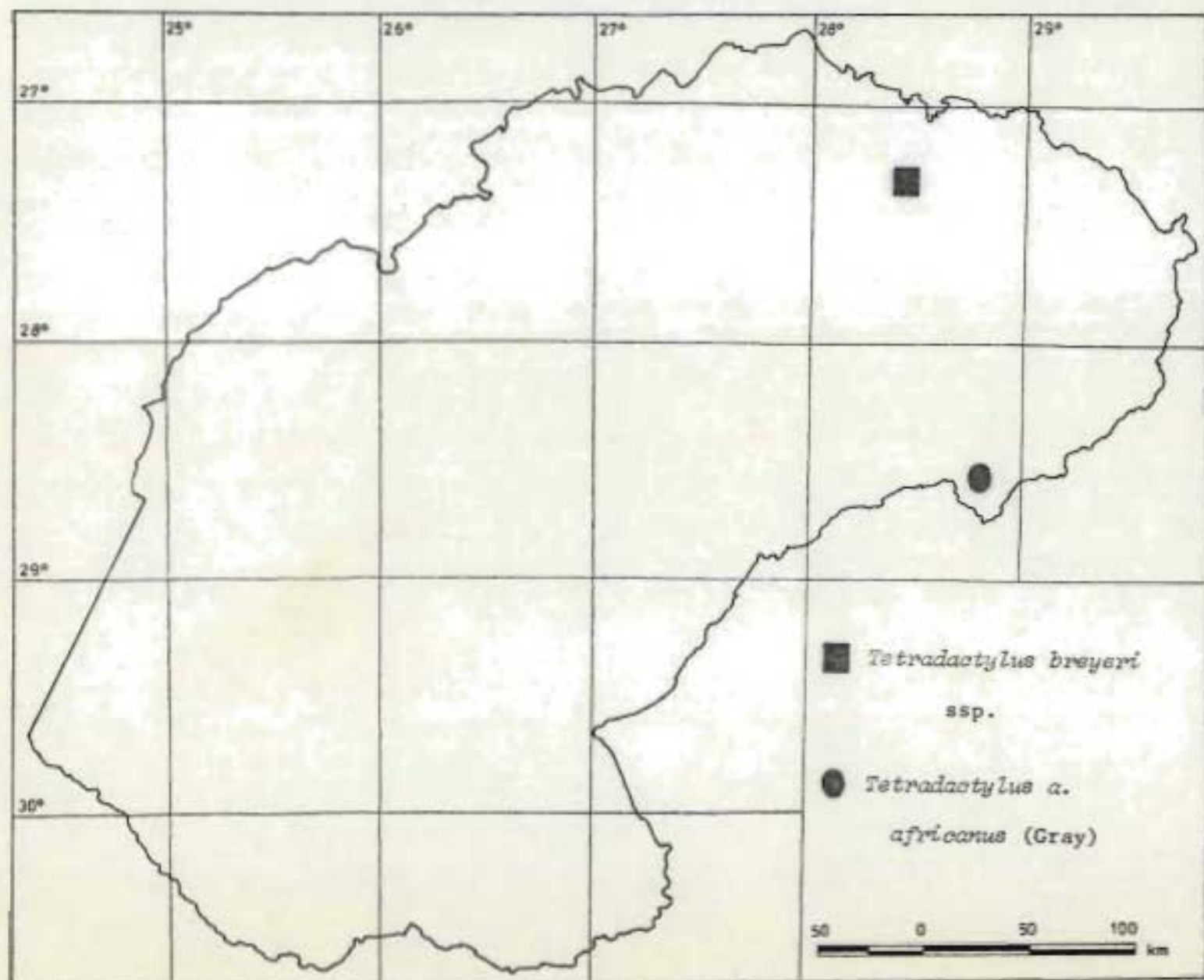
Characters: One specimen examined. Body serpentiform; forelimbs didactyl; hindlimbs monodactyl with three femoral pores on each side; dorsal scales keeled and striated, in 76 transverse and 14 longitudinal rows; ventrals smooth, in 59 transverse and eight longitudinal rows; nostril between two nasals only; upper head shields smooth; three supraciliaries; supraoculars four, only first two in contact with frontal; frontoparietals in contact; parietals longer than broad; two supralabials anterior to subocular; three enlarged preanal scales; colour olive-brown above with dark dorsolateral stripe from side of nape extending posteriorly over tail; dark streak from temporal to side of neck where it narrows to continue along side of body, fading out over anterior part of tail; head with dark spots above; a series of short dark brown vertical stripes on side of neck inferiorly; gular area white; remainder of ventral areas white with grey-edged scales.

Size: (NMB 1073 - Zwartkoppies) 72 + 135 = 207mm.

Habitat: Grassy veld.

Material examined from: Zwartkoppies, Frankfort district (Map 33).  
New record for the Orange Free State.





Map 33

Note: This specimen differs from typical *breyeri* in having three femoral pores on either side instead of two; upper head shields smooth instead of ribbed; first two supraoculars instead of first three in contact with frontal; frontoparietals in contact, not separated by interparietal. *T.breyeri* is known from only three localities in Natal and the vague type locality Transvaal (FitzSimons, 1943). While the Zwartkoppies specimen probably represents an undescribed subspecies a new name is not proposed in the absence of a series of specimens which can serve to define variation in the subspecies, especially as so little is known about variation within the nominate race.

*TETRADACTYLUS AFRICANUS* (Gray, 1838)

*TETRADACTYLUS AFRICANUS AFRICANUS* (Gray, 1838)

*Caita africana* Gray, 1838, Ann.Mag.nat.Hist., 1, p. 389:  
Cape of Good Hope.

Range: Pondoland, northwards to Witziesshoek, Natal and Zululand.  
(FitzSimons, 1943).

Characters: One specimen examined (NMP 86 - Witziesshoek). Limbs monodactyl; three femoral pores on either side; dorsal scales in 71 transverse and 14 longitudinal rows; ventral scales in 52 transverse and six longitudinal rows; nostril between two nasals and first supralabial; supraoculars four; supraciliaries four.

Material examined from: Witziesshoek (Hewitt, 1915; Map 33).

Genus *CORDYLUS* Laurenti, 1768

\* *Cordylus* Laurenti, 1768, Syn.Rept., p. 51. Type by absolute tautonymy: *C.verus* Laurenti = *Lacerta cordylus* Linnaeus, 1758.

Key to the species:

- 1a. Rostral and frontonasal in contact ..... *C.giganteus*, p. 91
- 1b. Rostral and frontonasal separated by nasals ..... 2
- 2a. First transverse row of dorsal scales (postoccipital row) elongate, twice as long as second row ..... *C.vittifer*, p. 99



- 2b. First transverse row of dorsals not twice as long as second row ..... 3
- 3a. Two nasals present comprising a large supranasal and a small inferior nasal in which the nostril is pierced ..... *C. polyzonus*, p. 94
- 3b. A single large nasal present ..... *C. cordylus*, p. 97

*CORDYLUS GIGANTEUS* A. Smith, 1844

- \* *Cordylus giganteus* A. Smith, 1844, Ill.Zool.S.Afr., Rept., pls. XXXV & XXXVI: "Interior districts of Southern Africa on rocky pinnacles of Quathlamba Mountains".
- \* *Zonurus derbionus* Gray, 1845, Cat.Liz.Brit.Mus., pp. 48 & 270: South Africa.

Common name: Giant Girdled Lizard; Ouvoik; Sonkyker; Karkoerhotnot; Skurwejan.

Range: North-eastern half of Orange Free State and adjacent areas of southern Transvaal (Loveridge, 1944). According to Boulenger (1910) also at Colesberg, north-eastern Cape Province but this could not be verified (J. Greig, pers.comm.).

Characters: Ninety-three specimens examined. Nasals separated by rostral; usually four large occipital spines, sometimes five when a small median occipital present; supraciliaries three; supralabials five to seven; infralabials five, seldom four or six; dorsal scales in 21 to 25 transverse and 18 to 23 longitudinal rows; ventral scales in 20 to 25 transverse and 10 to 12 longitudinal rows; males with nine to 13 pores and a patch of differentiated glandular femoral scales; females with 10 to 13 femoral pores; 10 to 12 lamellae under fourth toe; dorsal part of head, body and tail dark brown to blackish; labials, side of neck and body pale yellowish-brown; ventral surfaces dirty white to straw-yellow, often infused with grey.

Size: Largest male (NMB 1059 - Louis Rust) 204 + 172 = 376mm.

Largest female (NMB 1060 - Louis Rust) 205 + 181 = 386mm.

Habitat. Live in self-excavated burrows in flat or sloping grassland. Three species of frogs (*Cacosternum boettgeri*; *Kassina senegalensis*; *K. wealei*) are frequently found with *C. giganteus* in their burrows.



The contents of three burrows were as follows: 1. two adult females, two subadults, two juveniles, one *Kassina senegalensis* and a few *Cacosternum boettgeri*; 2. two adult females, two subadults, two juveniles and 34 *Cacosternum boettgeri*; 3. two adult females and four juveniles. In times of prolonged rains, burrows of ouvolk were found to be flooded with their occupant(s) still alive and well inside. The end of the burrow is usually a little nearer to the ground surface than its deepest (vertical) part and it appears that during flooding air is trapped here, supplying the lizard(s) with oxygen until the water drains away.

Breeding: Females give birth to one or two young per season.

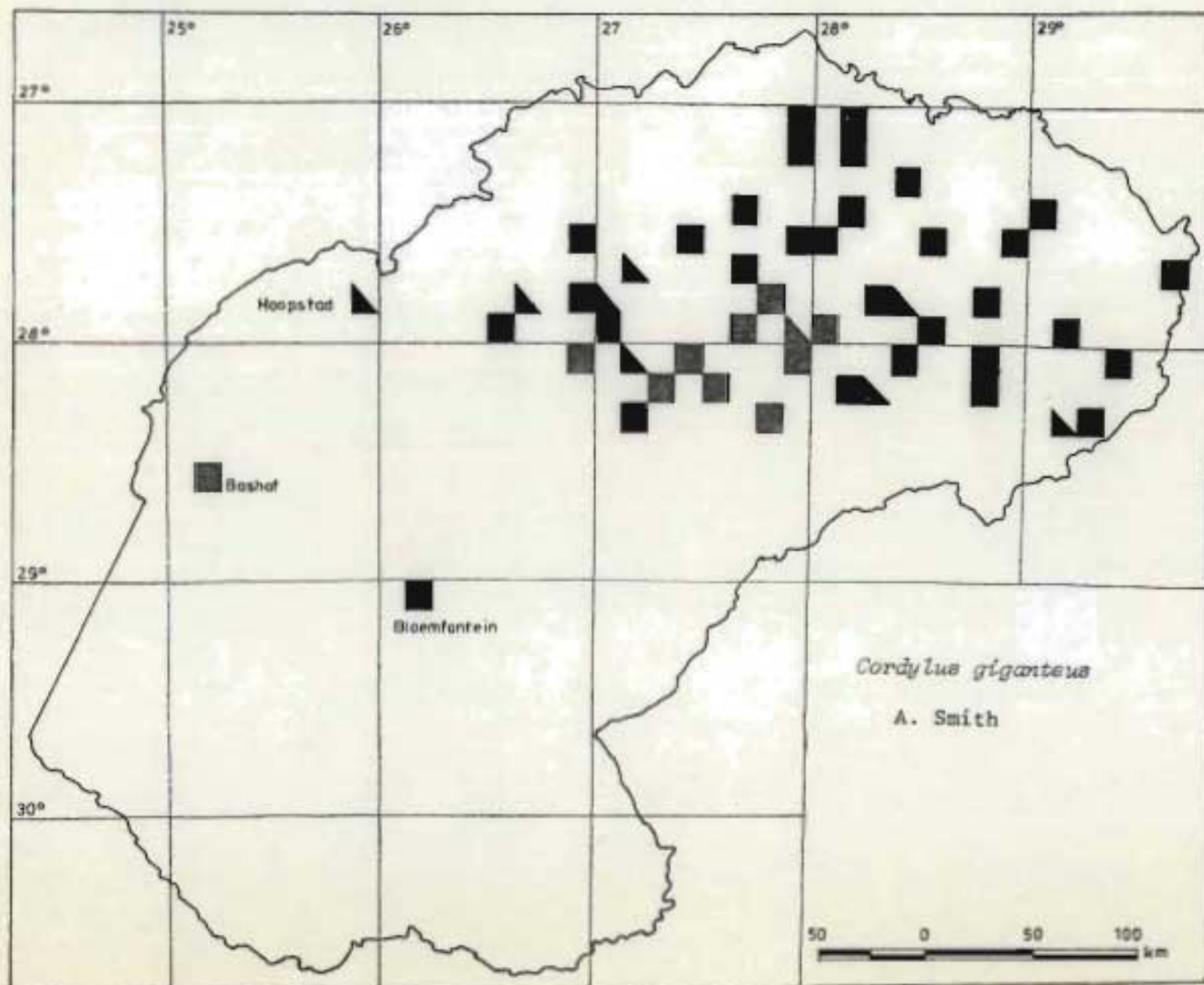
Diet: Insecta: *Ontophagus dives*, *O. lanista*, *O. tarsidorsis*, *Phalops boschas*, *Allogymnopleurus thalassinus*, *Copris muticus* (Scarabaeidae); Curculionidae (Coleoptera); Lepidoptera larvae; Acrididae (Orthoptera). Myriapoda: Juliformia.

Material examined from: Allanvale; Berlin; Bethel; Biddulphsberg; Bloemfontein (TM); Boshof; Braunzijkop; Brockenhurst; Campen; Carlie; Dealbata; Doornland; Elandsfontein; Evenston A; Goedetrouw; Grootkrans; Hoogeveld, Kroonstad; Houtkop; Lange Hoek; Lanquedoc; Loskop; Louis Rust; Lusthof; Mecklenburg; Mooigelegen; Morgenzon, Harrismith; Oorsprong; Quaggaspruit; Rambouillet; Rondebult; Rusthof; Spijtfontein; Stoffelfontein; Strijdfontein, Heilbron; Triangle; Uitzicht; Vaalbank; Verdun, Reitz; Willem Pretorius Game Reserve (TM); Wolvenfontein; Woudzicht; Zwartkoppies (Map 34).

Literature records: Bloemfontein; Kroonstad (Hewitt, 1909); Hoopstad (Boulenger, 1910); Bethlehem (Power, 1930); Boshof; Lindley; Odendaalsrus; Reitz; Rondebult = near Meets Siding (FitzSimons, 1943); Geluk, Kroonstad; Harrismith; Venterburg (Loveridge, 1944).

Note: The type locality as given by A. Smith, i.e. pinnacles of Quathlamb mountains, is unlikely to be correct as this species is not a rock-living form, but lives in grassland in burrows which it digs for itself.

In the distribution map of *Cordylus giganteus* (Map 34) there are three isolated localities, namely Boshof (recorded by FitzSimons, 1943), Bloemfontein (Hewitt, 1909) and Hoopstad (Boulenger, 1910). During the present survey no specimens of *giganteus* could be found at or near these localities. If these localities are regarded as authentic the range of *giganteus* appears to have shrunk eastwards by more than 128 km



Map 34



(Boshof to Welkom). In addition it was found that *giganteus* previously occurred on several farms where they are no longer found. This was established by asking farmers if this well-known species occurred on their farms. In several cases the answer was positive but no specimens could be found, even with the farmer indicating the exact spot where burrows of "ouvolk" used to occur. This species occurs in colonies inhabiting flat or sloping grassland with deep soil for burrowing. This kind of habitat is also ideal for ploughing and gardening. As farming becomes more intensive more and more of the natural habitat of *giganteus* is being converted into lands for cultivation with a consequent decrease in available habitat. In addition *giganteus* has a very good overseas market as pets. These lizards are consequently illegally exported and since *giganteus* occurs in colonies and lives in burrows, it is very easy to locate and excavate an entire colony at a time. Population increase is very slow due to the low number of young produced by each female (a maximum of two per annum). It is therefore evident that this species is endangered and measures should be taken for its conservation.

*CORDYLUS POLYZONUS* A. Smith, 1838

*CORDYLUS POLYZONUS POLYZONUS* A. Smith, 1838

\* *Cordylus polyzonus* A. Smith, 1838, Ann.Mag.nat.Hist., (2), 2, p. 34:  
South Africa.

Common name: Karroo Girdled Lizard; Likkewaanakkedis.

Range: Southern half of Orange Free State westwards through Karroo to western Cape Province and southern South West Africa (FitzSimons, 1943).

Characters: Two hundred and forty specimens examined. Two nasals, supranasals in contact; occipitals four to eight, mostly six; supraciliaries three, exceptionally two; supralabials anterior to subocular four, seldom three or five or subocular exceptionally excluded from lip; dorsal scales in 39 to 45 transverse and 32 to 41 longitudinal rows; ventral scales in 31 to 40 transverse and 20 to 24 longitudinal rows; femoral pores in males 10 to 15; lamellae under fourth toe 13 to 16, mostly 15 to 16; colour above brown, dark brown or blackish,



sides paler; tail brown above and below; short black longitudinal band on side of neck; ventral surfaces pale to reddish, throat sometimes with dark spots.

Size: Largest male (NMB 1552 - Strijdfontein, Philippolis)  $106 + 141 = 247$ mm. Largest female (NMB 502 - Matjesfontein)  $124 + 113r = 237$ mm. One female with original tail (NMB 2488 - Hebron) measures  $111 + 145 = 256$ mm.

Habitat: Rock-living, usually found in rock fissures on low-lying koppies and rocky outcrops.

Breeding: Females with one to three well-developed embryos were collected in January and February.

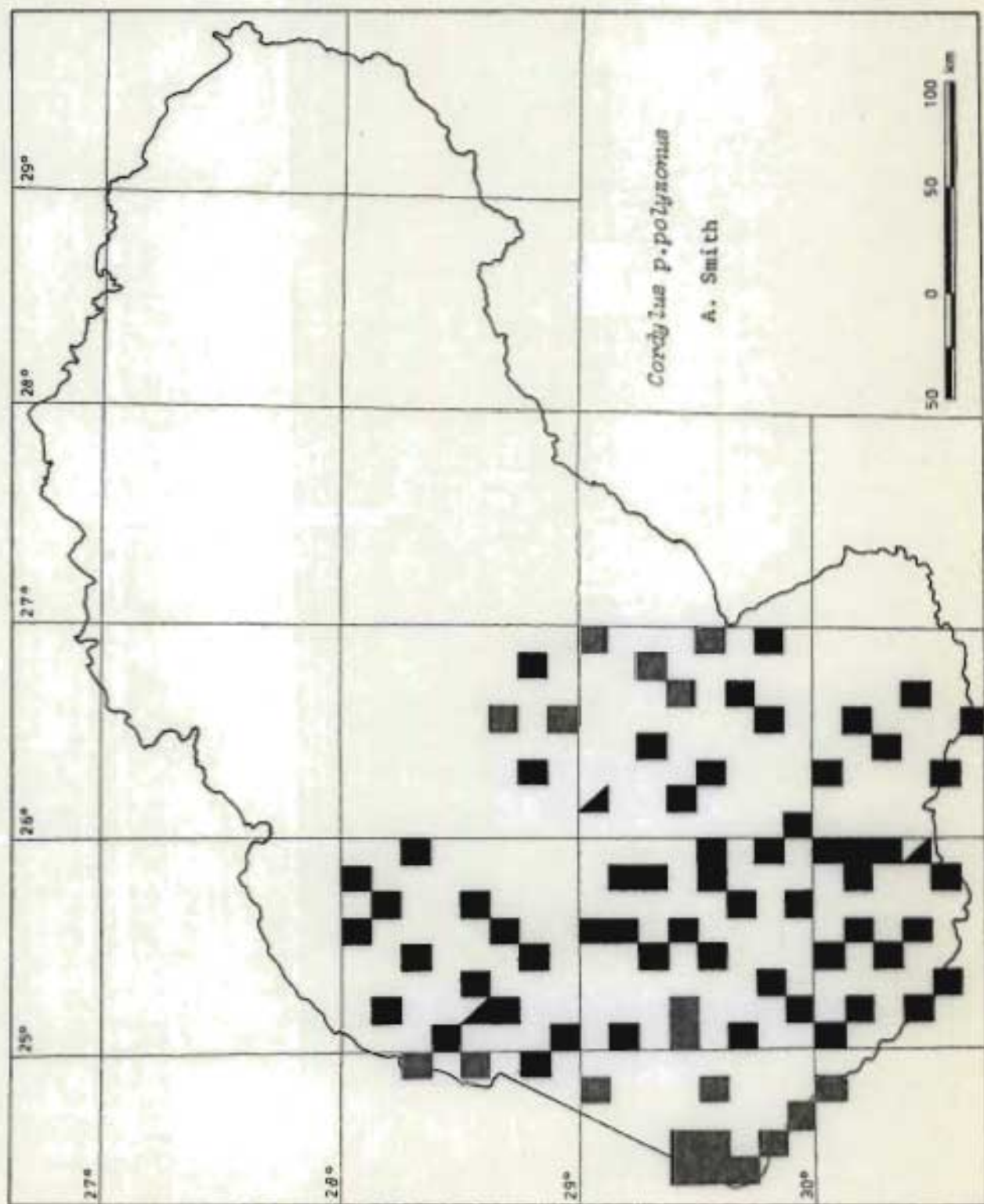
Predators: A juvenile was found in the stomach of a *Pseudomophis notostictus*.

Diet: Insecta: Tenebrionidae, Curculionidae, Scarabaeidae (Coleoptera); Pentatomidae (Hemiptera); Acrididae (Orthoptera); Isoptera - some lizards contained workers and warriors only while others contained warriors and alates only.

Material examined from: Alpha; Bergplaats, Dewetsdorp; Bethany; Beyersfontein; Boskop; Bozrah; Brakfontein; Brakpan; Ceylon; Chubani; Cornwall; Damfontein; Die Hoogte; Di Poort; Doornplaat; Dundee; Exelsior, Edenburg; Francis Home; Geluk, Philippolis; Groenekloof; Gruiskop; Hammanskraal West; Hartebeestfontein, Boshof; Hebron; Heenenweerskop; Honingberg; Houmoed; Joostenberg; Juist Zoo; Kades; Kalkdam; Kalkplaat; Kareerand; Kleinplaas; Klipbankfontein; Klipfontein; Klippiesspan; Klipplaatdrift, Edenburg; Koortshoek; Koppiesdam; Lang Zeekoegat; Leeuwberg; Leeuwkuil; Lemoenboord; Lentelus; Lessingskop; Luiperfontein; Luiperskop; Magdalen; Matjesfontein; Merriesfontein; Middelbron; Mimosa; Noodhulp; Onze Rust; Ospoort; Pietersberg; Platberg, Boshof; Poortje, Edenburg; Poortje, Fauresmith; Proses; Rietfontein, Rouxville; Ruigtepoort; Strijdfontein, Philippolis; Susannasfontein; Tienfontein; Torbek; Uitkijk; Uitkyk; Vaalkop; Vergaderrand; Vissershoeck West; Waterhoek; Weltevrede; Weltevreden, Jacobsdal; Weltevreden, Smithfield; Wilhelmshohe; Winterspoort; Wolvekop, Fauresmith; Wonderkop; Zoutpan, Fauresmith (Map 35).

Literature records: Smithfield (Boulenger, 1910); Bloemfontein; Boshof; Jacobsdal (Power, 1930); Bethulie (FitzSimons, 1943).

Map 35





*CORDYLUS CORDYLUS* (Linnaeus, 1758)

*CORDYLUS CORDYLUS CORDYLUS* (Linnaeus, 1758)

- \* *Lacerta cordylus* Linnaeus, 1758, Syst.Nat., ed. 10, 1, p. 202: Africa.  
\* *Cordylus verus* Laurenti, 1768, Syn.Rept., p. 52: Africa.  
*Cordylus dorsalis* Cuvier, 1829, Regne Anim., ed. 2, 2, p. 33: Africa.  
*Cordylus griseus* Cuvier, 1829, Regne Anim., ed. 2, 2, p. 33: Africa.  
*Zonurus vertebralis* Gray, 1838, Ann.Mag.nat.Hist., 1, p. 388: Cape  
of Good Hope.  
\* *Zonurus cordylus flavus* Rose, 1926, Ann.S.Afr.Mus., 20, p. 492: Robben  
Island, Cape Province.

Common name: Cape Girdled Lizard.

Range: Southern coastal districts from western to eastern Cape Province, northwards to south-eastern Orange Free State (FitzSimons, 1943).

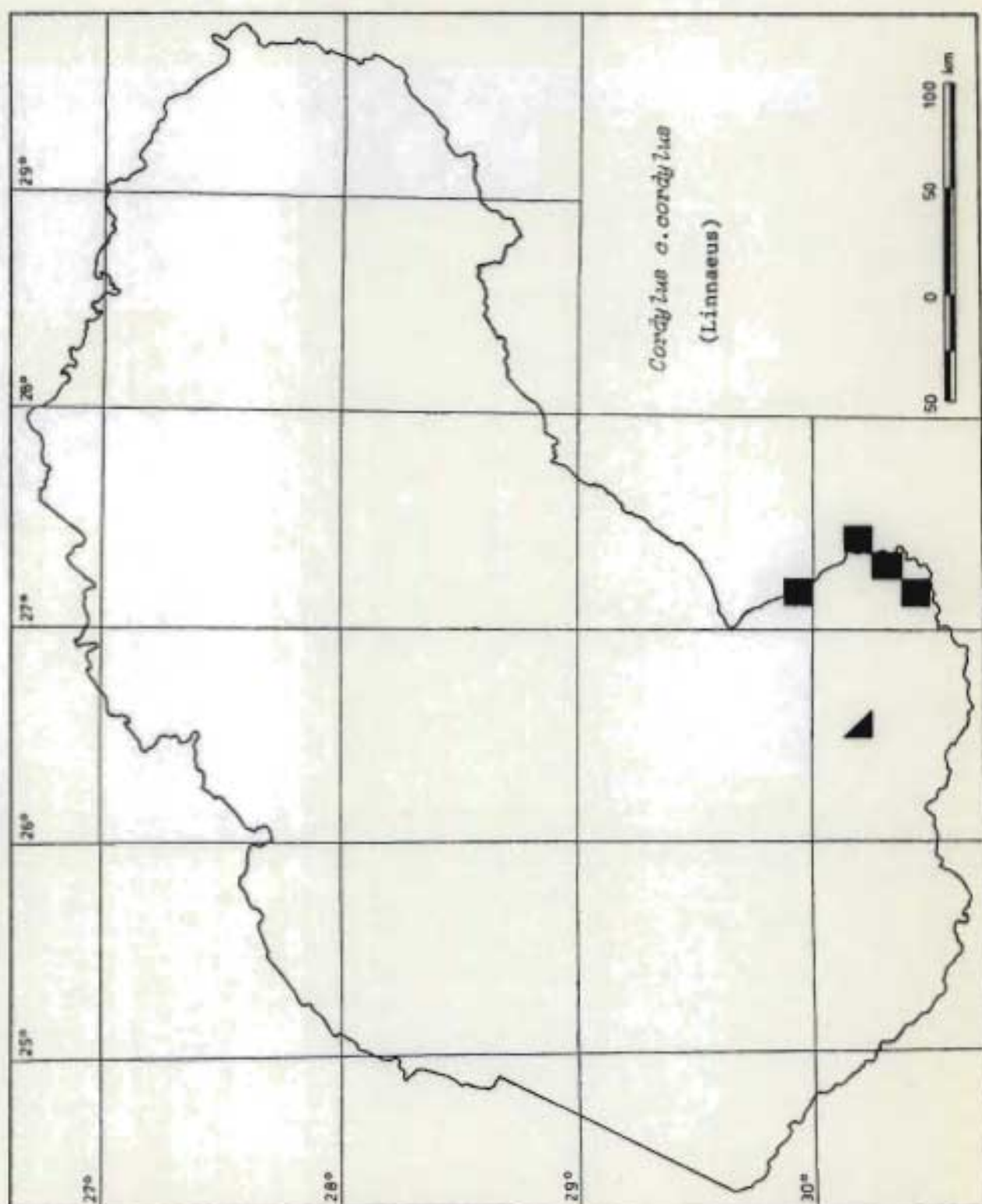
Characters: Twenty-three specimens examined. One nasal on each side, in contact behind rostral; occipitals six to eight; supraciliaries three, exceptionally four; subocular reaching or excluded from lip; supralabials mostly five, sometimes six; infralabials usually five, sometimes six; frontonasal broader than long, usually in contact with loreals, sometimes narrowly separated therefrom; 15 to 18 gular scales between posterior sublabials; paravertebral dorsal scales enlarged; dorsal scales in 26 to 30 transverse and 20 to 22 longitudinal rows; ventral scales in 26 to 29 transverse and 14 longitudinal rows; six or seven femoral pores and three to eight differentiated glandular femoral scales in males; five to seven femoral pores and two to four (exceptionally none) differentiated glandular femoral scales in females; 13 to 15 lamellae under fourth toe; colour above light grey to light brown with scattered dark spots or irregular dark transverse markings; head above usually darker than body; ventral surfaces white.

Size: Largest male (NMB 1241 - Bergkloof)  $72 + 72 = 144$ mm. Largest female (NMB 1282 - Morgenzon, Zastron)  $74 + 85 = 159$ mm.

Habitat: Mountain slopes where they live in cracks and under stones.

Diet: Insecta: Coprinae (Coleoptera: Scarabaeidae).

Map 36





Material examined from: Bergkloof; Littlecote; Maghaleen (TM);  
Morgenzon, Zastron (Map 36).

Literature records: Smithfield (FitzSimons, 1943).

*CORDYLUS VITTIFER* (Reichenow, 1887)

*CORDYLUS VITTIFER VITTIFER* (Reichenow, 1887)

\* *Zonurus vittifer* Reichenow, 1887, Zool.Anz., p. 372: Transvaal  
(Holotype seen, ZMB 10762).

\* *Cordylus tropidogaster* Boulenger, 1910, Ann.S.Afr.Mus., 5, pp. 468 &  
495: Baberton, Transvaal.

Common name: Transvaal Girdled Lizard.

Range: Transvaal, Zululand and Natal (FitzSimons, 1947); also the  
northern and north-eastern Orange Free State.

Variety "A"

Characters: Nineteen specimens examined. One nasal on either side,  
in contact behind rostral; occipitals six, exceptionally five;  
supraciliaries three; supralabials six, seldom seven, exceptionally  
five; infralabials six, exceptionally five; first transverse row of  
dorsal scales elongate, twice as long as second row; frontonasal  
longer than broad, separated from frontal by prefrontals (50% of specimens  
or by one, exceptionally two, small scales; anterior parietals  
separated by interparietal, narrowly in contact in only three specimens;  
18 to 22 gular scales between posterior sublabials; dorsal scales in  
24 or 25 transverse and 22 to 24 longitudinal rows; ventral scales  
in 26 to 30 transverse and 16 to 18 longitudinal rows; five to eight  
femoral pores and 13 to 18 differentiated glandular femoral scales in  
males; undeveloped to seven very poorly developed pores in females,  
differentiated glandular femoral scales absent; 13 or 14 lamellae  
under fourth toe; colour above light yellow-brown to brown; plain  
or with irregularly placed blackish scales or blackish scales arranged  
alongside to form alternating dark transverse bands; no vertebral  
or lateral stripes present; ventral surfaces white.

Size: Largest male (NMB 3772 - Mara, Parys) 87 + 82 = 169mm. Largest  
female (NMB 3412 - Annies Rust) 92 + 85 = 177mm.

Habitat: Rock-living in fissures on rocky flats and hills of the northern Orange Free State.

Diet: Insecta: Tenebrionidae (Coleoptera); Acrididae (Orthoptera).

Material examined from: Annies Rust; Baltespoort; Mara, Parys; Hara, Vredefort; Van der Walt's Rust (Map 37).

Variety "B"

Characters: Thirty-five specimens examined. One nasal on either side, in contact behind rostral; occipitals six; supraciliaries three; supralabials six, seldom five or seven; infralabials six, seldom five; first transverse row of dorsal scales elongate, twice as long as second row; frontonasal usually longer than broad (sometimes rhombic), usually situated between nasals and prefrontals, sometimes in contact with frontal or exceptionally separated therefrom by one small scale; anterior parietals always in broad contact; 17 to 21 gulars between posterior sublabials; dorsal scales in 24 or 25 transverse and 20 to 25 longitudinal rows; ventral scales in 24 to 31 transverse and 14 to 16 longitudinal rows; six to eight femoral pores and 11 to 18 differentiated glandular femoral scales in males; four to seven distinct femoral pores in females, differentiated glandular scales absent; 13 to 15 lamellae under fourth toe; colour above pale brown to beige with scattered, irregular or transversely arranged blackish scales; a distinct whitish, black-edged vertebral stripe from behind occipitals to root of tail or extending over anterior part of tail, vertebral stripe sometimes broken or not well marked; head above dark with pale spots or blotches; ventral surfaces white.

Size: Largest male (NMB 2393 - Klipplaat)  $74 + 94 = 168\text{mm}$ . Largest female (NMB 2922 - Tygerfontein)  $78 + 83 = 161\text{mm}$ .

Breeding: Females with one or two very well-developed embryos were collected in December.

Habitat: Found on sandstone from 1524 to 1829 meters (5000-6000 ft) in the north-eastern Orange Free State.

Material examined from: Berlin; Dipka; Klipplaat; Tygerfontein; Uitvlugt; Woudzicht (Map 37).

Variety "C"

Characters: Eighteen specimens examined. One nasal on either side, in contact behind rostral; occipitals six; supraciliaries three; supralabials six, exceptionally seven; infralabials six, exceptionally five or seven; first transverse row of dorsal scales elongate, twice



as long as second row; frontonasal longer than broad (rhombic in two specimens) usually separated from frontal by prefrontals, exceptionally separated by a small scale, sometimes in contact with frontal (five specimens); anterior parietals always in broad contact; 17 to 22 gular scales between posterior sublabials; dorsal scales in 23 to 27 transverse and 21 to 24 longitudinal rows; six to nine femoral pores and nine to 12, exceptionally 13, differentiated glandular femoral scales in males; five to seven femoral pores and three to seven differentiated glandular femoral scales in females; 12 to 14 lamellae under fourth toe; colour above orange-brown with scattered black scales; a distinct black lateral stripe running from eye to just above hindlimb; ventral surface white.

Size: Largest male (NMB 4591 - Waterfall)  $68 + 78 = 146\text{mm}$ . One male with a regenerated tail measures 71mm from snout to vent. Largest female (NMB 3077 - Waterfall)  $77 + 85 = 162\text{mm}$ .

Habitat: Found in cracks of scattered sandstone rocks on a grassy plateau at 1829 meters (6000 ft).

Breeding: Females collected in July contained one to three well-developed eggs with small or undeveloped embryos.

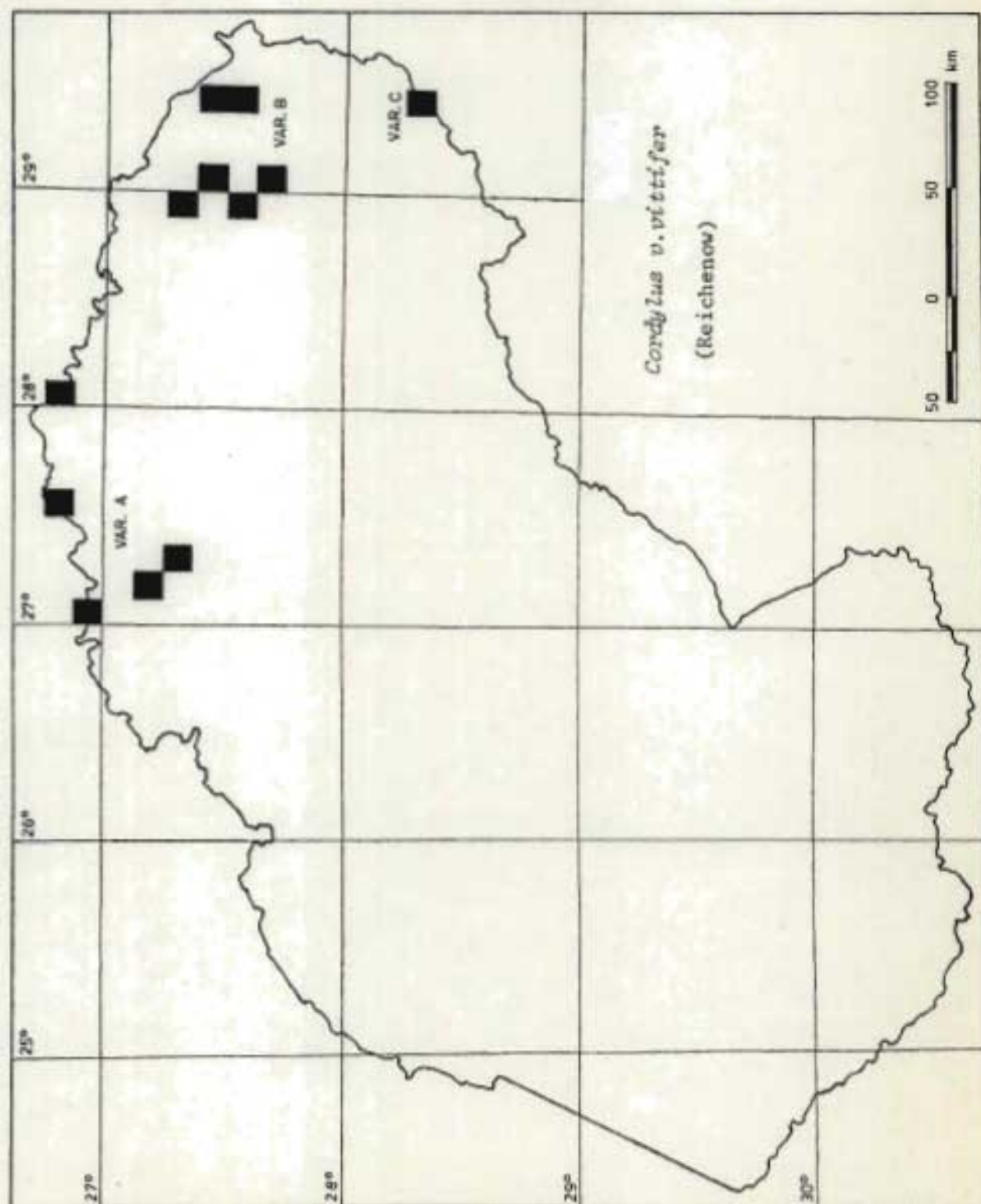
Diet: Insecta: Scarabaeidae, Chrysomelidae (Coleoptera); Pentatomidae (Hemiptera).

Material examined from: Waterfall (Map 37).

Note: The differences between the three allopatric varieties of *C. vittifer* in the Orange Free State can be summarized as follows:

Variety:	"A"	"B"	"C"
pores in females:	undeveloped	4-7	5-7
in males:	5-8	6-8	6-9
glandular femoral scales in females:	none	none	3-7
in males:	13-18	11-18	9-13
anterior parietals:	separated in 80,9%	contact in 100%	contact in 100%
longitudinal ventrals:	16-18	14-16	14
max. head/body length:	92mm	78mm	77mm
stripes:	none	pale vertebral	dark lateral

Map 37





It is evident that in the Orange Free State we have three distinct and easily separable forms. In one hundred and six specimens of *C.vittifer* from the Transvaal, Zululand and Natal no females exhibit the differentiated glandular femoral scales found in females of variety "C" (Harrismith) which therefore seems to be a localized form. However, due to inadequate material from the entire range of *C.vittifer* a decision to separate variety "C" as a subspecies or even allopatric species would at this stage be premature.

In the case of varieties "A" and "B" the position is complicated by the presence of intermediates in Transvaal, Natal and Zululand. The situation can be summarized as follows:

Variety "A" : Twenty-one specimens examined from: Bronkhorstapruut (NMB); Johannesburg; Klerksdorp; Koster; Loskop Dam; Pretoria; Randfontein; Turfloop; Voortrekkerhoogte; Warmbaths; Wierda Park (TM).

Variety "B": Fifty-two specimens examined from: Blyde River Nature Reserve; Cato Ridge; Hartebeestvlakte (163), Pilgrims Rest; Hluhluwe Reserve; Kastrolnek near Wakkerstroom; Magalieskop, 12 miles west of Klaserie; Mullers Pass, Newcastle; Nongoma, Zululand; between Pietermaritzburg and Bulwer; Pretoria (one female, sympatric with the variety "A"); Thabazimbi; Ubombo; Wakkerstroom (TM); Zululand (NMP).

Intermediates: Thirty-three specimens examined from: Carolina; Entabeni; Haenertsburg; Hluti to Goedegun; Letaba; Mankiana; Pigg's Peak; Selati; Schilderskrans; Woodbush (TM).

The differences between these three groups of specimens are as follows:

	"A"	intermediates	"B"
pores in females:	7 poorly developed	none	4-7
anterior parietals:	separated in 76,4%	in contact in 68%	in contact in 77%
longitudinal ventrals:	16-18	14-18	14-16
stripes:	none	pale vertebral, sometimes none	pale vertebral, sometimes none or faint dark lateral

The situation is further complicated by the distribution patterns exhibited by the above groups in Transvaal, Zululand and Natal. Although there is evidence of a basically allopatric distribution there are also some cases of sympatry and due to inadequate material any conclusions at this stage would be premature.

In the three *C.vittifer* varieties as represented by material from the Orange Free State, the most striking morphological differences are seen in the stage of development of pores and the presence or absence of differentiated glandular femoral scales in females. This appears to be important and might function as an isolating mechanism. Although very little is known of the function of femoral pores and differentiated glandular femoral scales it seems that femoral pores have some association with sexual activity for those of male lacertid lizards regress after castration (Bellairs, 1969). FitzSimons (1943) observed heightened secretion during the breeding season. The waxy secretion of femoral pores and differentiated glandular femoral scales usually has a polished appearance, apparently caused by rubbing whilst moving over rocks. This may suggest a possible role in territorial behaviour although it is unknown if these lizards are in fact territorial.

Genus *PSEUDOCORDYLUS* A. Smith, 1838

≠ *Pseudocordylus* A. Smith, 1838, Ann.Mag.nat.Hist., (2), 2, p. 32. Type by subsequent designation by Loveridge (1944): *P.montanus* A. Smith = *Cordylus microlepidotus* Cuvier, 1829. (Proposed as subgenus of *Cordylus* and raised to generic rank by Gray (1845, p. 48).

Key to the species:

- 1a. Frontonasal longer than broad, separated from loreals;  
lateral scales spinose ..... *P.spinosa*, p. 112
- 1b. Frontonasal broader than long, in contact with loreals  
(exceptionally separated); lateral scales not spinose .....  
..... *P.melanotus*, p. 105



*PSEUDOCORDYLUS MELANOTUS* (A. Smith, 1838)

Key to the subspecies:

- 1a. Frontonasal longitudinally divided, very seldom undivided; females without distinct pores, only six to seven shallow femoral pits; males with one to 17 differentiated glandular femoral scales ..... *P. melanotus melanotus*, p. 105
- 1b. Frontonasal always undivided; females with seven to ten well-developed pores; males with 19 to 34 (exceptionally fewer) differentiated glandular femoral scales .....  
..... *P. melanotus subviridis*, p. 109

*PSEUDOCORDYLUS MELANOTUS MELANOTUS* (A. Smith, 1838)

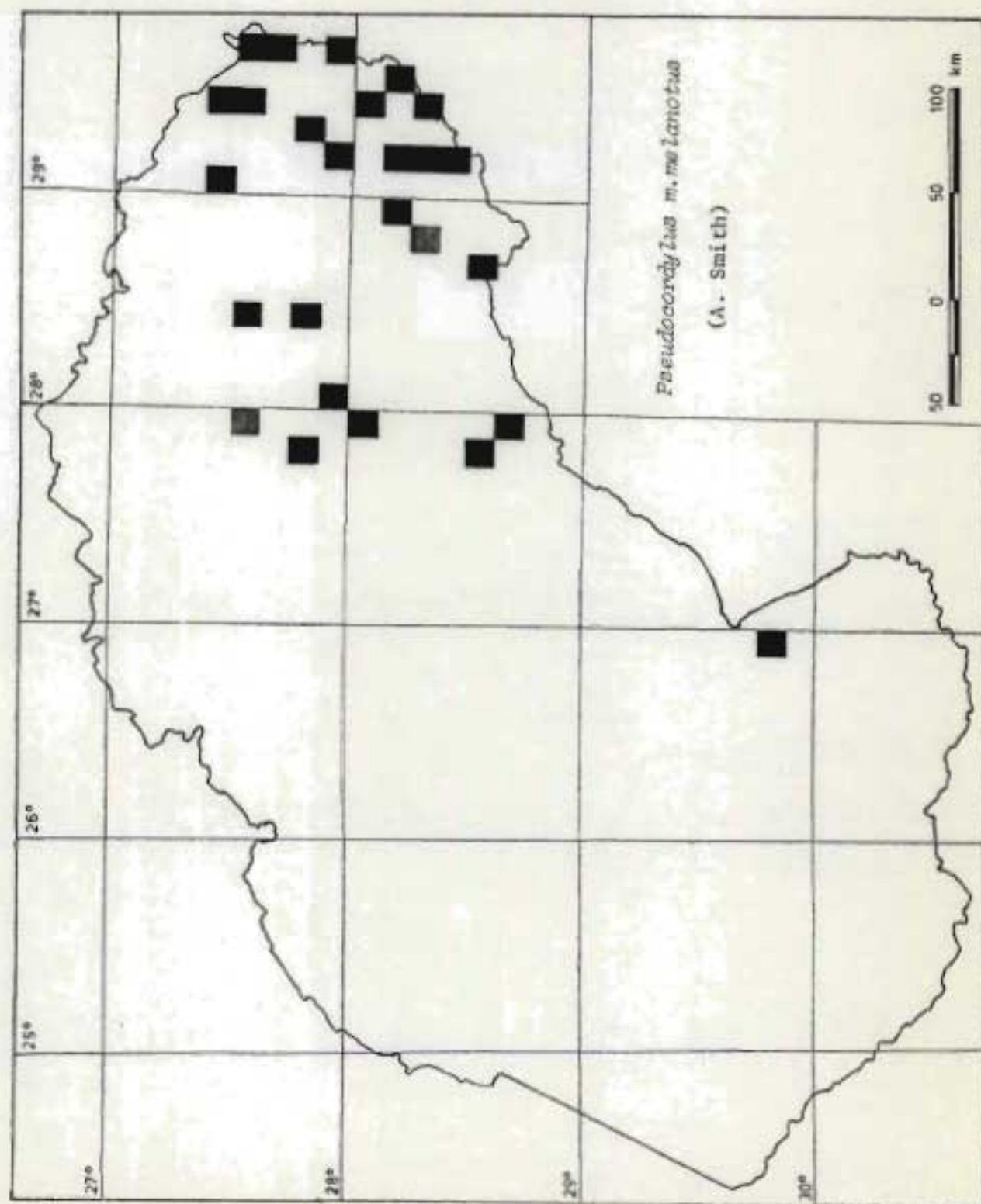
- \* *Cordylus* (*Pseudocordylus*) *melanotus* A. Smith, 1838, Ann. Mag. nat. Hist., (2), 2, p. 32: Type locality subsequently designated as hills between the main branches of the Orange River east of Philippolis, Orange Free State (Smith, 1843), here restricted to the Ficksburg district, eastern Orange Free State.

Common name: Highveld Girdled Lizard.

Range: Eastern Orange Free State (not including *transvaalensis* which ranges from northern Swaziland to Pietersburg district, northern Transvaal) (FitzSimons, 1943).

Characters: One hundred and thirty specimens examined. Nasals usually in contact, separated by the rostral in 12 specimens; frontonasal in contact with loreals, broader than long and usually longitudinally divided in two, occasionally in three when a small posterior scale present, undivided in only seven specimens; occipitals zero to 13; supraciliaries four, exceptionally three or five; temporal scales consist basically of an upper vertically elongate row and smaller lower row, sometimes one or more or all temporal scales vertically elongate in a single row or vertically elongate scales sometimes surrounded by smaller scales; usually four supralabials anterior to subocular (12 specimens have five supralabials on one or both sides, exceptional cases have only three); infralabials six, exceptionally

Map 38





four or seven; 20 to 30 gulars between posterior sublabials; dorsal scales arranged in 58 to 76 transverse and 35 to 48 longitudinal rows; ventral scales arranged in 29 to 38 transverse and 12, exceptionally 14, longitudinal rows; males with six to nine, exceptionally five or ten femoral pores and one to 17 differentiated glandular femoral scales; females without pores, only six to nine shallow femoral pits; lamellae under fourth toe 18 to 20, seldom 21; dorsolateral scales usually much larger than vertical interspaces, although the latter may sometimes be well-developed; colour: adult males usually with broad dark dorsal band and bright orange flanks and side of neck, orange colour extending upwards on sides of body to meet well-defined dark dorsal band dorsolaterally; temporals, supra- and infralabials and some anterior tail whorls reddish; ventral scales pale reddish or white; females usually duller coloured with dark and pale markings on a greyish background and white ventrally; some females have yellowish flanks which may extend to lateral ventral scales and clagcal area; both sexes have one or two irregular black spots on side of neck.

Size: Largest male (NMB 1446 - Langehoek)  $142 + 175 = 317\text{mm}$ , another male (NMB 1479 - Bachelor's Home)  $136 + 201 = 337\text{mm}$ . Largest female (NMB 3079 - Waterfall)  $131 + 170 = 301\text{mm}$ .

Habitat: Rocks and rocky crevices of the hills and mountains of the eastern Orange Free State, up to 2379 meters (7800 ft; Monontsa Pass).

Breeding: Females with one to four well-developed embryos have been collected in December.

Diet: Insecta: *Smaragdesthes africana*, *Copris* sp., *Heteronychus* sp., *Gymnopleurus* sp., *Ontophagus* sp. (Scarabaeidae), Curculionidae (Coleoptera); Neuroptera larvae; Hymenoptera. Arachnida: Araneida.

Material examined from: Allanvale; Bachelor's Home; Berlin; Bon Haven; Ceylon; Elandsfontein; Falle Grange; Grootkloof; Grootkrans; Lange Hoek; Machbela; Monontsa Pass; Mooigelegen; Morgenzon, Harrismith; Morgenzon, Senekal; Oever; Parva Sed Mea; Platberg, Harrismith; Rambouillet; Reitz (UM); Stoffelfontein; Sweetwaters; Tafelberg; Tygerfontein; Uitvlugt; Waterfall (Map 38).

Literature records: Harrismith (FitzSimons, 1943, sub.nom. *P. subviridis subviridis*).

Note: In 1838 Smith described *P. melanotus* and *P. subviridis*, giving somewhat inadequate descriptions and omitting type localities. In 1843 he designated type localities and figured the two forms, treating

them as variants of *P. microlepidotus* Cuvier, 1829. The types of both *melanotus* and *subviridis* are lost (FitzSimons, 1937). FitzSimons (1943) regarded *melanotus* as a synonym of *microlepidotus* but recognized *subviridis*, and described *P. subviridis transvaalensis* as a subspecies. Loveridge (1944), in his revision of the African Cordylidae revived *melanotus* as a race of *microlepidotus* with *subviridis* and *transvaalensis* as synonyms. Broadley (1964), in his review of *Pseudocordylus* in Natal revived *subviridis* as a full species with *transvaalensis* as a race. He also indicated the similarities between *melanotus* and *transvaalensis*, but then restricted the name *melanotus* to the male cotype (as figured by Smith, 1843, pl. 25, fig. A) and made it a junior synonym of *P. microlepidotus fasciatus*, although the latter was not included in his review. Broadley (1964) further regarded the female cotype (as figured by Smith, 1843, pl. 25, fig. B) as a *P. subviridis* because of its elongate temporals. The temporal scale arrangement of both male and female, as figured by Smith (1843) for *melanotus*, can be reproduced in the range of variation of this form in the Orange Free State. Furthermore, both figures show a divided frontonasal, a character not seen in *subviridis*.

From Smith's (1843) figures (plate 25, fig. A & B; plate 30, fig. 3 & 3a) it seems evident that he regarded *melanotus* as a form with a divided frontonasal (a character overlooked by previous workers) and a temporal scale arrangement consisting of an upper vertical elongate row and a smaller lower row (the same temporal scale arrangement as *transvaalensis* FitzSimons, 1943). In the case of *subviridis* the matter is more complicated since plate 26 shows three specimens with a temporal arrangement consisting of a single row of vertical elongate scales while plate 30, figure 4a, which should show the scale arrangement of plate 26, figure A, in fact shows only two median vertical elongate temporal scales surrounded by smaller ones. Since each of the three figures of plate 26 shows only one row of elongate temporals, plate 30, figure 4a, seems to be incorrect, and it can nevertheless be concluded that Smith regarded *subviridis* as a form with an undivided frontonasal and a single row of vertical elongate temporals (plate 26). At this stage there does not seem to be any indication that *melanotus* and/or *subviridis* are conspecific with *microlepidotus*. Therefore, for the purposes of this study *melanotus* is regarded as a full species with *subviridis* as a race thereof, *melanotus* having page priority over *subviridis*.



The type locality of *melanotus* is given as "on the hills between the principal branches of the Orange River, to the eastward of Philippolis". The principal branches of the Orange River are the Vaal River, forming the northern border of the Orange Free State, and the upper Orange River, forming the southern border of the Orange Free State. It seems, therefore, that Smith (1843) meant the type locality to be in the area east of Philippolis, stretching from the Orange River in the south to Vaal River in the north. It therefore seems reasonable to restrict the type locality to the Ficksburg district, eastern Orange Free State, an area visited by Smith in November, 1834 (see map, Kirby, 1940), and also an area where *melanotus* occurs today. The status of *Pseudocordylus subviridis transvaalensis* FitzSimons, 1943 remains doubtful. After examining the holotype and cotypes (TM 1695/7/9, 1700/1, 1954/5) I am convinced that *transvaalensis* is closely related to, if not synonymous with, *melanotus*, except for the undivided frontonasal (divided in one specimen) and the presence of three or four small scales posterior to the interparietal. As in *melanotus*, the females of *transvaalensis* also show only pits and no developed femoral pores.

*PSEUDOCORDYLUS MELANOTUS SUBVIRIDIS* (A. Smith, 1838)

- ≠ *Cordylus* (*Pseudocordylus*) *sub-viridis* A. Smith, 1838, Ann.Mag.nat.Hist., (2), 2, p. 33: Type locality subsequently designated as top of the high mountainous range, which extends behind Kafferland and the country of Natal (Smith, 1843), i.e. Drakensberg Range.

Common name: Drakensberg Girdled Lizard.

Range: Along Drakensberg from Mount-aux-Sources south through Lesotho to Anatola Mountains (Broadley, 1964).

Characters: Thirty specimens examined. Nasals usually in contact, separated by rostral in two specimens; frontonasal in contact with loreals, broader than long and always undivided (separated from loreals in one specimen from Monontsa and separated on one side only in one specimen from Golden Gate (TM)); occipitals seven to ten; supraciliaries four; temporal scales usually consisting of one row of vertically elongate scales, sometimes a second lower small row present; four supralabials anterior to subocular, exceptionally three, five or six; six infralabials; 24 to 32 gulars between posterior sublabials; dorsal scales in 60 to 75 transverse and 29 to 40 longitudinal rows;

ventral scales in 30 to 34 transverse and 12, seldom 14, longitudinal rows; males with seven to 13 femoral pores and 19 to 34 (exceptionally 15) differentiated glandular femoral scales; females with seven to ten well-developed pores; lamellae under fourth toe 20 to 24, exceptionally 19; dorsolateral scales smaller than or equal to vertical interspaces, sometimes larger; colour: adult males with yellow to orange labials and yellow to orange on side of neck and flanks, yellow to orange restricted to sides of body and not extending dorsolaterally as in nominate race; dorsal part of body palish grey-brown with darker and paler markings; no well-defined broad and dark dorsal band as seen in males of nominate race; ventral scales reddish-orange to white; anterior part of thighs and upper arm greenish-yellow; females much duller coloured than males but some show yellow to orange lateroventral scales as well as greenish-yellow thighs and upper arms; both sexes show one or two black patches on side of neck as well as blackish lines formed by black-tipped dorsolateral scales.

Size: Largest male (NMB 4624 - Sentinel)  $108 + 133 = 241\text{mm}$ , another male with incomplete tail (NMB 3523 - Bramley's Hoek) measures  $118\text{mm}$  from snout to vent. Largest female (NMB 4616 - Sentinel)  $95 + 116 = 211\text{mm}$ .

Habitat: Rocks and rocky crevices from 1829 meters (6000 ft; Bramley's Hoek) to 2622 meters (8600 ft; Sentinel).

Breeding: Females with two to four partly developed embryos have been collected in August.

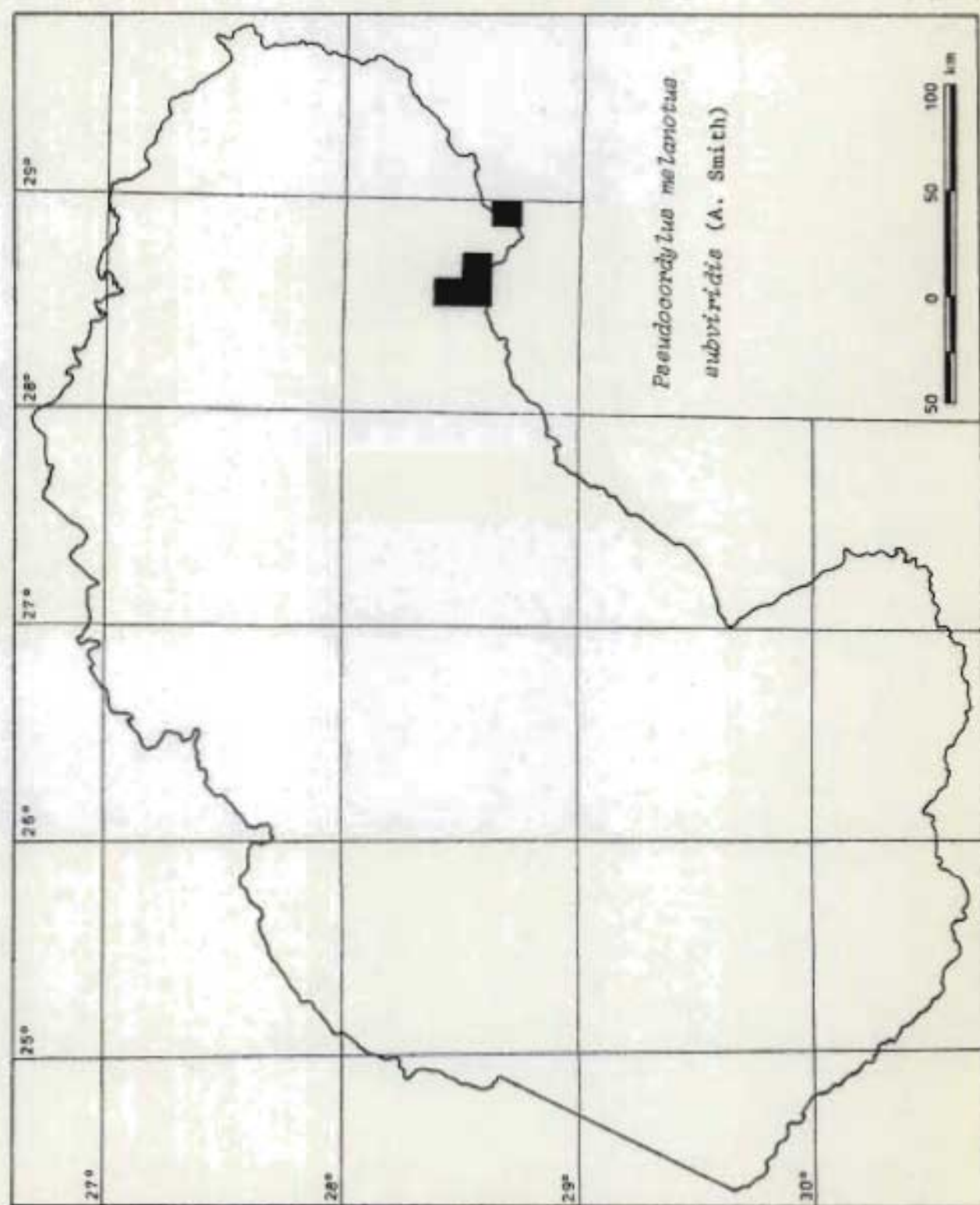
Material examined from: Bramley's Hoek; Golden Gate (TM); Monontsa Pass; Sentinel (Map 39).

Literature records: None, new record for the Orange Free State.

Note: Six specimens from Monontsa Pass (two males and four females) have the frontonasal undivided; males have temporal scales as in *subviridis*; differentiated glandular femoral scales 11-15 as *melanotus*; dorsolateral scales smaller (in one male) or larger (in the other male) than vertical interspaces; females: temporal scales as in *melanotus* or intermediate; seven to nine femoral pores as *subviridis*; dorsolateral scales larger than vertical interspaces. These specimens can therefore be regarded as being intermediate between the two subspecies, so that they appear to meet along a zone of intergradation.



Map 39



*PSEUDOCORDYLUS SPINOSUS* FitzSimons, 1947

\* *Pseudocordylus spinosus* FitzSimons, 1947, Ann.Natal Mus., 11, (1), p. 116, fig. 1, pl. 1. fig. 5, 6: Cathkin Peak area, Drakensberg, Natal.

Range: Lower slopes of Natal Drakensberg from Royal Natal National Park to Giants Castle (Broadley, 1964); also Sentinel, Orange Free State.

Characters: Three specimens (all males) examined. Nasals in contact; frontonasal longer than broad, separated from loreals; occipitals absent; four supraciliaries; temporals a single row of vertical elongate scales; four, exceptionally five supralabials anterior to subocular; infralabials six, exceptionally four or five; 23 gulars between posterior sublabials; dorsal scales in 54 to 58 transverse and 34 to 36 longitudinal rows; lateral scales keeled; ventral scales in 30 to 31 transverse and ten longitudinal rows; three or four femoral pores and 16 to 21 differentiated glandular femoral scales in males, lamellae under fourth toe 16 to 18; colour dark brown to blackish above with yellowish spots forming irregular longitudinal rows; ventral surface white except for grey median gulars and cloacal area; black spot on either side of neck.

Size: Largest male (NMB 3357 - Sentinel) 86 + 102 = 188mm.

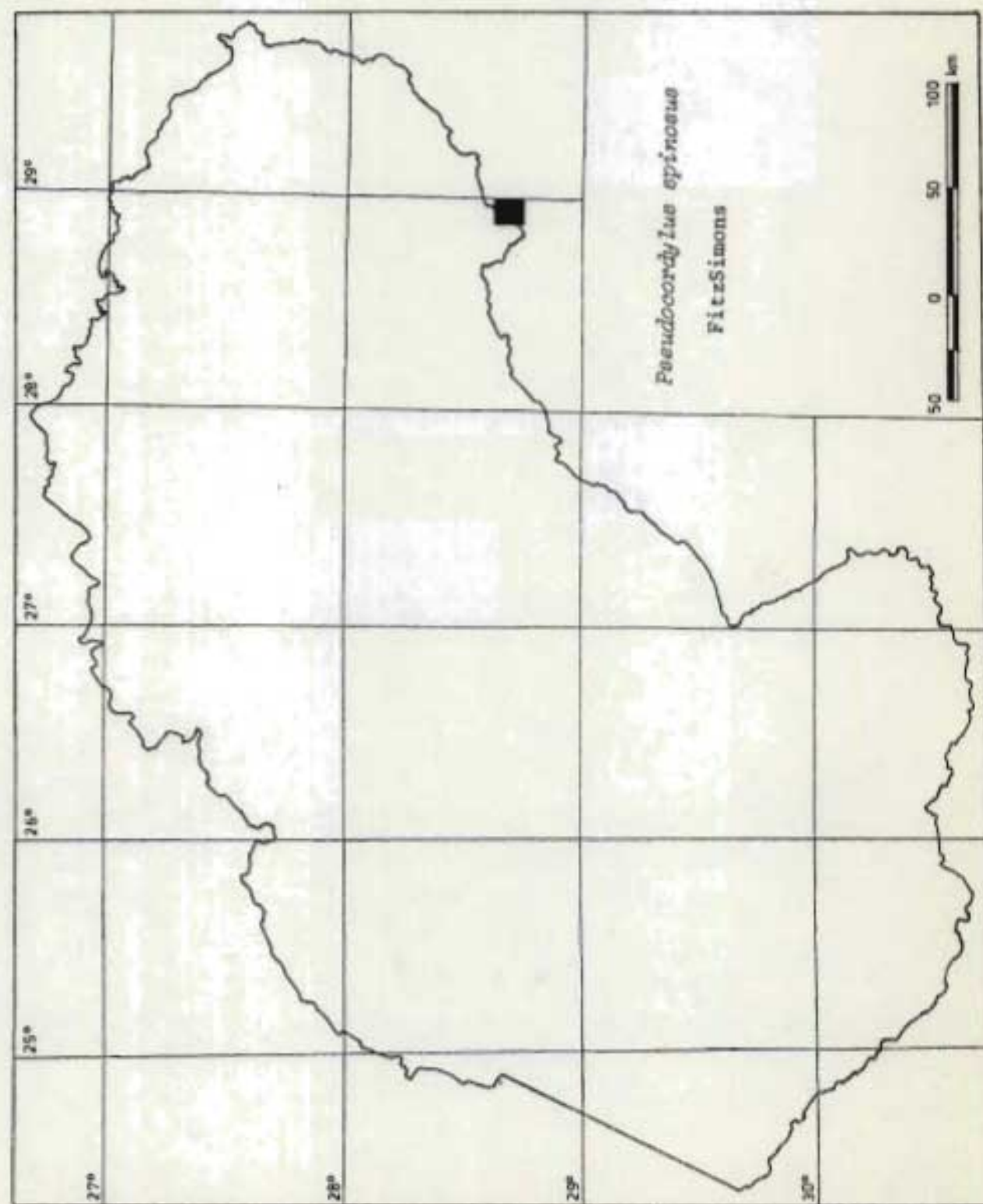
Habitat: Rock-living at 2439 meters (8000 ft).

Material examined from: Sentinel (Map 40).

Literature records: None, new record for the Orange Free State.



Map 40



Family LACERTIDAE Bonaparte, 1831

Key to the genera:

- 1a. Subdigital lamellae smooth ..... *Nucras*, p. 114
- 1b. Subdigital lamellae keeled ..... 2
- 2a. Collar present; subocular bordering lip ..... *Eremias*, p. 121
- 2b. Collar absent; subocular excluded from lip .....  
..... *Iohnotrophia*, p. 128

Genus *NUCRAS* Gray, 1838

*Nucras* Gray, 1838, Ann.Mag.nat.Hist., 1, p. 280. Type by monotypy:

*Lacerta lalandii* Milne-Edwards, 1829.

Key to the species:

- 1a. A series of transversely enlarged plates under forearm;  
**ventral surfaces** unspotted ..... 2
- 1b. No series of transversely enlarged plates under forearm  
(feebly enlarged at most); ventral surfaces usually faintly  
to heavily spotted or if unspotted large black spots at least  
on first and second (lateral) row of ventral scales .....  
..... *N.lalandii*, p. 114
- 2a. Dorsum with longitudinal pale stripes ..... *N.taeniolata*, p. 118
- 2b. Dorsum with series of black-edged pale spots .....  
..... *N.intertexta*, p. 116

*NUCRAS LALANDII* (Milne-Edwards, 1829)

*Lacerta lalandii* Milne-Edwards, 1829, Annls Sci.nat., XVI, pp. 70,  
84, pl. V, fig. 6: Cape of Good Hope.

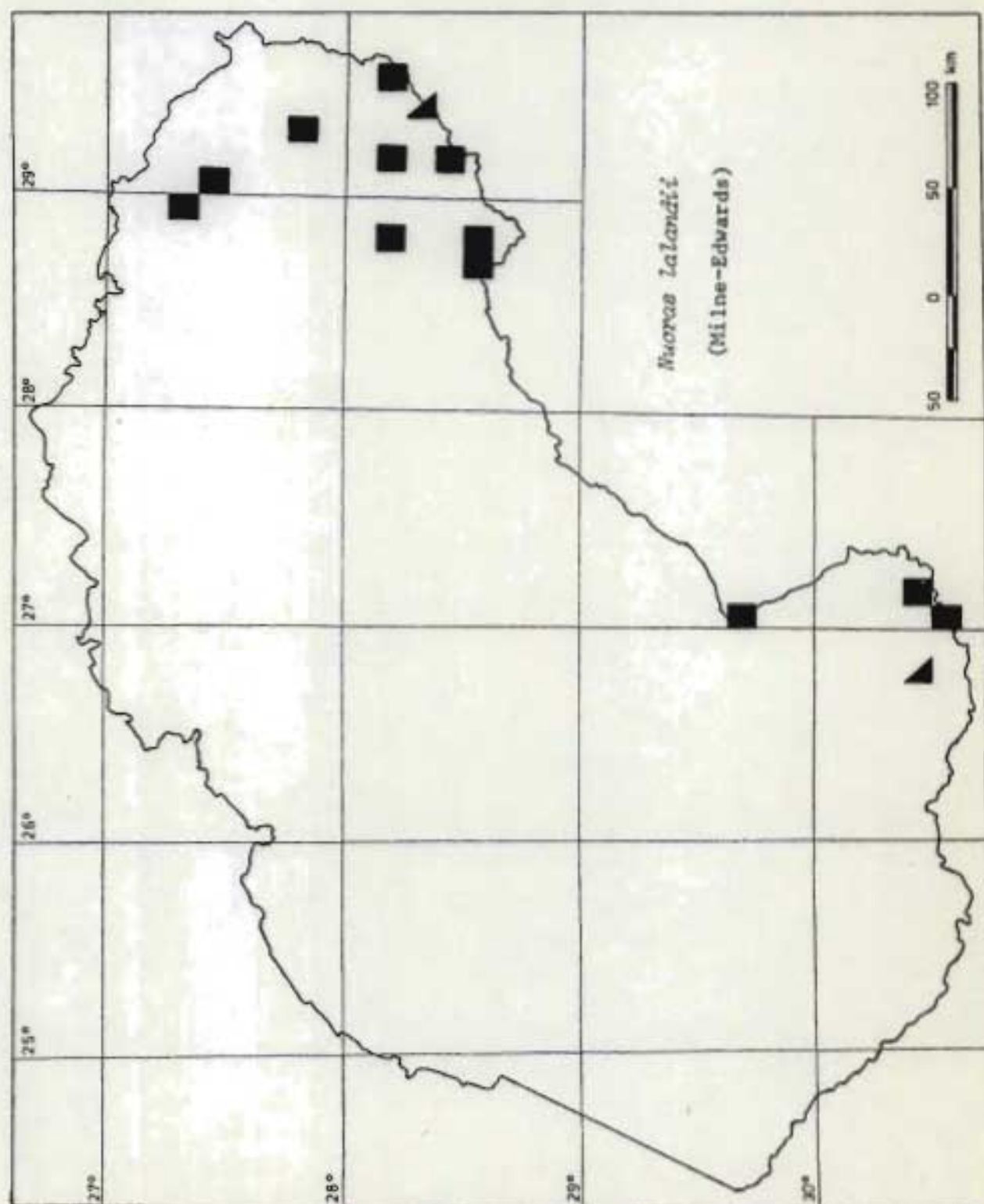
\* *Nucras delalandii* (sic) var *badriagai* Werner, 1898, Jber.Abh.naturw.  
Ver.Magdeb., p. 141: Cape Province.

Common name: Delalande's Spotted Lizard.

Range: Eastern Cape Province through south-eastern and north-eastern  
Orange Free State, Lesotho and Natal to Transvaal (FitzSimons, 1943).



Map 41



Characters: Twenty-two specimens examined. Parietal foramen absent; usually three nasals, seldom two when two postnasals fused; granules between supraciliaries and supraoculars none to three, exceptionally four or five; supraciliaries four to seven, mostly five or six; collar plates seven to 12; longitudinal dorsal scale rows 36 to 47; ventral scales in eight longitudinal and 32 to 39 transverse rows; femoral pores 10 to 15 in both sexes; lamellae under fourth toe 18 to 22; colour: juveniles: pale brown above with eight rows of white black-edged ocellar spots over back; white vertical bars on side of head and neck; ventral surfaces white with black blotches on first two rows of ventrals on both sides; adults: pale to dark brown above with or without retention of white ocelli; black rings usually transversely elongated; ventral surfaces usually with numerous black spots or faintly spotted but sometimes juvenile pattern is retained.

Size: Largest male (NMB 3320 - Monontsa Pass)  $76 + 173 = 249\text{mm}$ .

Largest female (NMB 3057 - Bon Haven)  $107 + 205 = 312\text{mm}$ .

Habitat: Live in burrows under rocks or in the ground in sheltered spots.

Breeding: One female laid nine  $14 \times 9\text{mm}$  eggs in captivity in October. Eight eggs measuring  $16 \times 13\text{mm}$  were collected under a rock at Bon Haven in January. These eggs hatched during February. One hatchling measured  $34 + 54 = 88\text{mm}$ .

Predators: One specimen was found in the stomach of a *Psammophis crucifer*.

Material examined from: Bachelor's Home; Berlin; Bon Haven; Francina; Klipplaat; Machbela; Monontsa Pass; Morgenzon, Zastron; Perth; Rohallion; Tafelberg; Uitzicht; Witzieshoek (NMP) (Map 41).

Literature records: Rouxville; Van Reenen (FitzSimons, 1943).

*NUCRAS INTERTEXTA* (A. Smith, 1838)

\* *Lacerta intertexta* A. Smith, 1838, Ann.Mag.nat.Hist., (2), 2, p. 93:

Country near Latakoo, Cape Province.

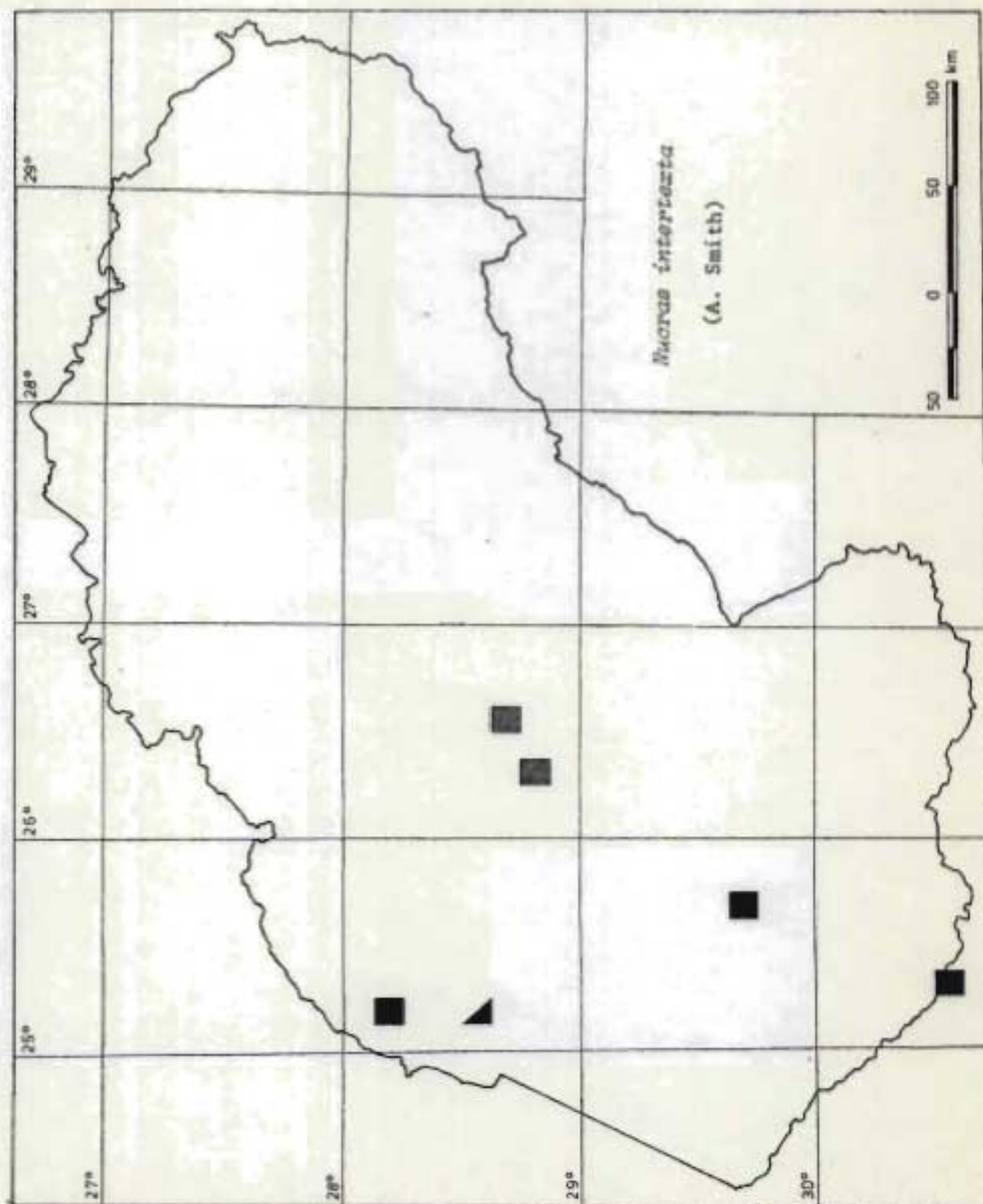
\* *Nucras tessellata* var *ocellata* Boulenger, 1910, Ann.S.Afr.Mus., 5, p.

475: Pietersburg, Transvaal.

Common name: Spotted Sandveld Lizard.



Map 42



Range: Western Orange Free State, north-westwards through northern Cape Province and Botswana to South West Africa, north-eastwards to northern Transvaal, southern Mozambique and south-eastern Rhodesia (Broadley, 1972).

Characters: Six specimens examined. Parietal foramen usually present, absent in one specimen; usually three nasals, two in one specimen where two postnasals are fused; three to six granules between supraciliaries and supraoculars; six supraciliaries; collar plates eight to 11; 38 to 45 longitudinal dorsal scales rows; ventral scales in eight longitudinal and 30 to 37 transverse rows; 12 to 15 femoral pores in both sexes; 21 to 26, mostly 24 lamellae under fourth toe; colour above pale brown with three (juveniles) or two (adults) rows of black-edged white spots; vertebral series of black-edged pale spots distinct to faint; white vertical bars on side of head, neck and on flanks; in adults vertical bars on flanks tend to fuse with lowest row of dorsolateral pale spots; ventral surfaces white.

Size: Largest male (NMB 1562 - Strijdfontein, Philippolis)  $74 + 162 = 236$  mm. Largest female (NMB 1120 - Onze Rust)  $84 + 178 = 262$  mm.

Habitat: The drier sandveld of the western Orange Free State where they have their burrows under bushes of *Zizyphus mucronata* or under stones.

Diet: Insecta: Lagriidae and Scarabaeidae (Coleoptera); Gryllidae (Orthoptera); Lepidoptera larvae. Myriapoda: Scolopendridae (Chilopoda).

Material examined from: Houmoed; Mimosa; Onze Rust; Poortje, Edenburg; Strijdfontein, Philippolis (Map 42).

Literature records: Boshof (Broadley, 1972).

*NUCRAS TAENIOLATA* (A. Smith, 1838)

\* *Lacerta taeniolata* A. Smith, 1838, Ann.Mag.nat.Hist., (2), 2, p. 93: Grahamstown, Cape Province.

*NUCRAS TAENIOLATA ORNATA* (Gray, 1864)

\* *Teira ornata* Gray, 1864, Proc.zool.Soc.Lond., p. 58: Zambezi River. *Eremias holubi* Steindachner, 1882, Sber.Akad.Wiss.Wien, 86, (1), p. 83, pl.: Limpopo River, Transvaal.



- \* *Lacerta tessellata pseudotessellata* Bedriaga, 1886, Abh.senckenb. naturforsch.Ges., 14, p. 377, pl., figs. 8, 21: Tete, Mozambique.
- \* *Lacerta cameranoi* Bedriaga, 1886, Abh.senckenb.naturforsch.Ges., 14, p. 378, pl., figs. 2, 9, 11, 31: Tete, Mozambique.
- \* *Nucras intertexta damarcona* Parker, 1936, Novit.zool., XL, p. 135: Sissekab, Damaraland, South West Africa.

Common name: Ornate Sand Lizard.

Range: Southern Zambia and Malawi south through Transvaal to Natal, westwards through Orange Free State and northern Cape Province to eastern Botswana and northern South West Africa (Broadley, 1972).

Characters: Seventy specimens examined. Parietal foramen present, seldom absent; usually three nasals, or two postnasals exceptionally fused; three to seven granules between supraoculars and supraciliaries; supraciliaries six or seven, seldom five; occipital always present and in contact with interparietal; collar plates five to 13; longitudinal dorsal scale rows 41 to 51, mostly 45 or 46; ventral scales in eight longitudinal, 25 to 33 transverse rows; 10 to 14 femoral pores on either side in both sexes; lamellae under fourth toe 20 to 24; colour above reddish-brown with seven pale longitudinal stripes: vertebral stripe from occipital to base of tail; dorsolateral stripe arising from outer edge of parietal and extending over back and tail; upper lateral stripe, usually broken up in spots, from above ear to base of tail; broader lower lateral stripe from ear to groin; tail reddish-brown; ventral surfaces white.

Size: Largest male (NMB 2807 - Chubani)  $53 + 102 = 155\text{mm}$ . Largest female (NMB 361 - Krugersdrift Dam)  $64 + 104 = 168\text{mm}$ .

Habitat: Rocky flats with some loose rocks or open veld with scant vegetation where they usually have burrows under isolated loose rocks.

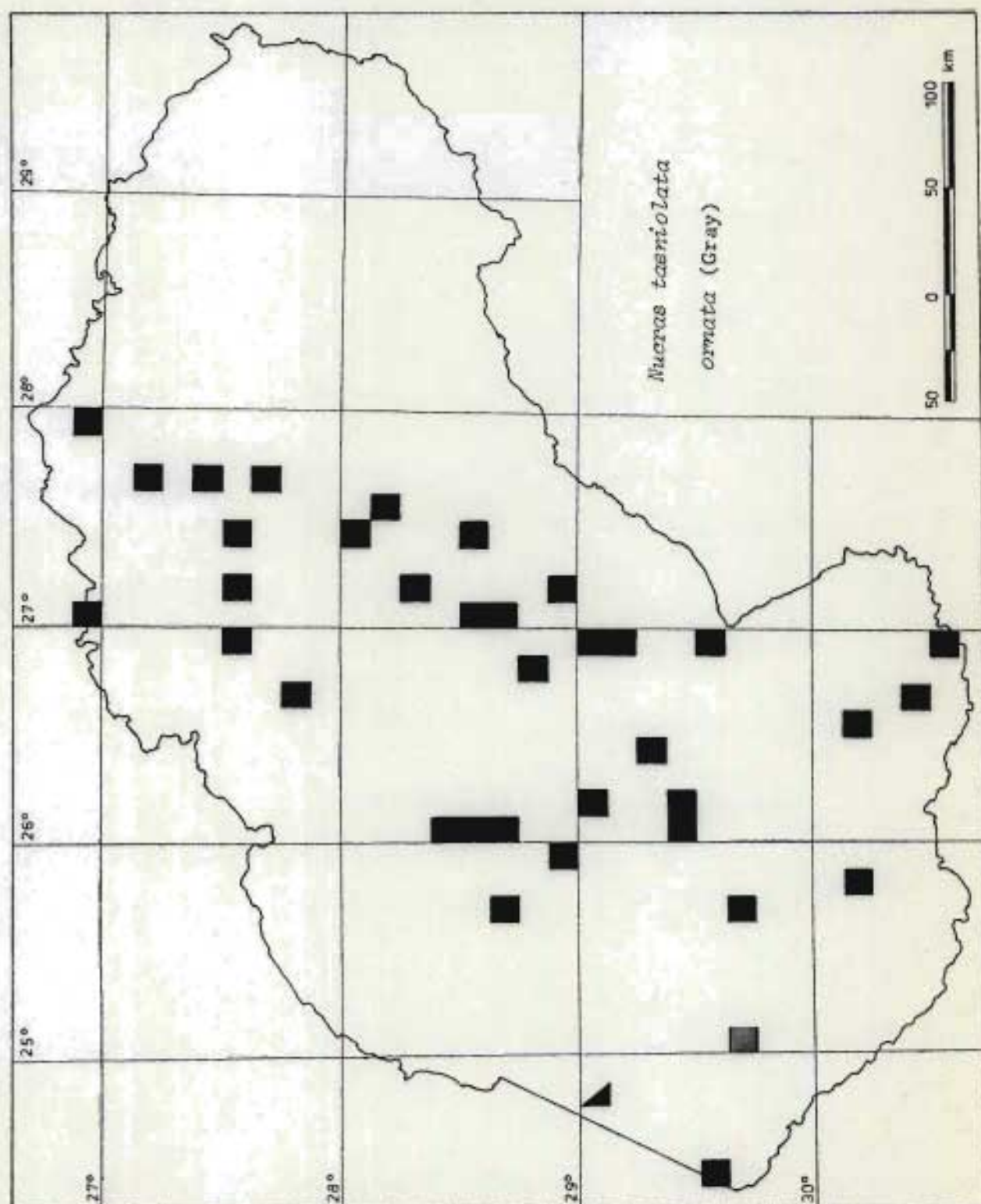
Predators: One specimen was found in the stomach of a *Boaedon f. fuliginosa*.

Breeding: A female collected in October contained five small eggs.

Diet: Insecta: Tenebrionidae, Curculionidae, Chrysomelidae (Coleoptera); Isoptera (workers only).

Material examined from: Basberg; Bethel; Bloemfontein; Chubani; Geluk, Boshof; Haagen's Stad; Heenenweerskop; Houtkop; Kafferskop; Klipplaatdrift, Winburg; Kraaifontein; Krugersdrift Dam; Leeuwkop; Leliehoek; Magdalen; Middenspruit; Mount Nelson; Odendaalsrus (TM); Platrand; Poortje, Edenburg; Quaggaspruit; Slangheuvel; Smithfield (SAM); Spijtfontein; Susannasfontein; Sweet Home; Triangle; Uitkijk;

Map 43





Uitkomst; Van der Walt's Rust; Vergaderrand; Weltevrede; Willem Pretorius Game Reserve (TM); Winburg (TM); Winterspoort; Zoutpan, Fauresmith (Map 43).

Literature records: Smithfield (Boulenger, 1910); Vredefort Road (Boulenger, 1917); Jacobsdal; Odendaalsrus (FitzSimons, 1943); Willem Pretorius Game Reserve; Winburg (Broadley, 1972).

Genus *EREMIAS* Wiegmann, 1834

*Eremias* Wiegmann, 1834, *Herp. Mexicana*, p. 9. Type by subsequent designation by Boulenger (1918): *Lacerta velox* Pallas, 1771.

Key to the species:

- 1a. Narrow tympanic shield on upper anterior border of ear opening ..... *E. namaquensis*, p. 121
- 1b. No tympanic shield ..... 2
- 2a. Lower eyelid with vertically divided transparent disc .....  
..... *E. lineocellata*, p. 123
- 2b. Lower eyelid opaque ..... *E. burchelli*, p. 126

*EREMIAS NAMAQUENSIS* Dumeril & Bibron, 1839

\* *Eremias namaquensis* Dumeril & Bibron, 1839, *Erp. Gen.*, 5, p. 307: Namaqualand.

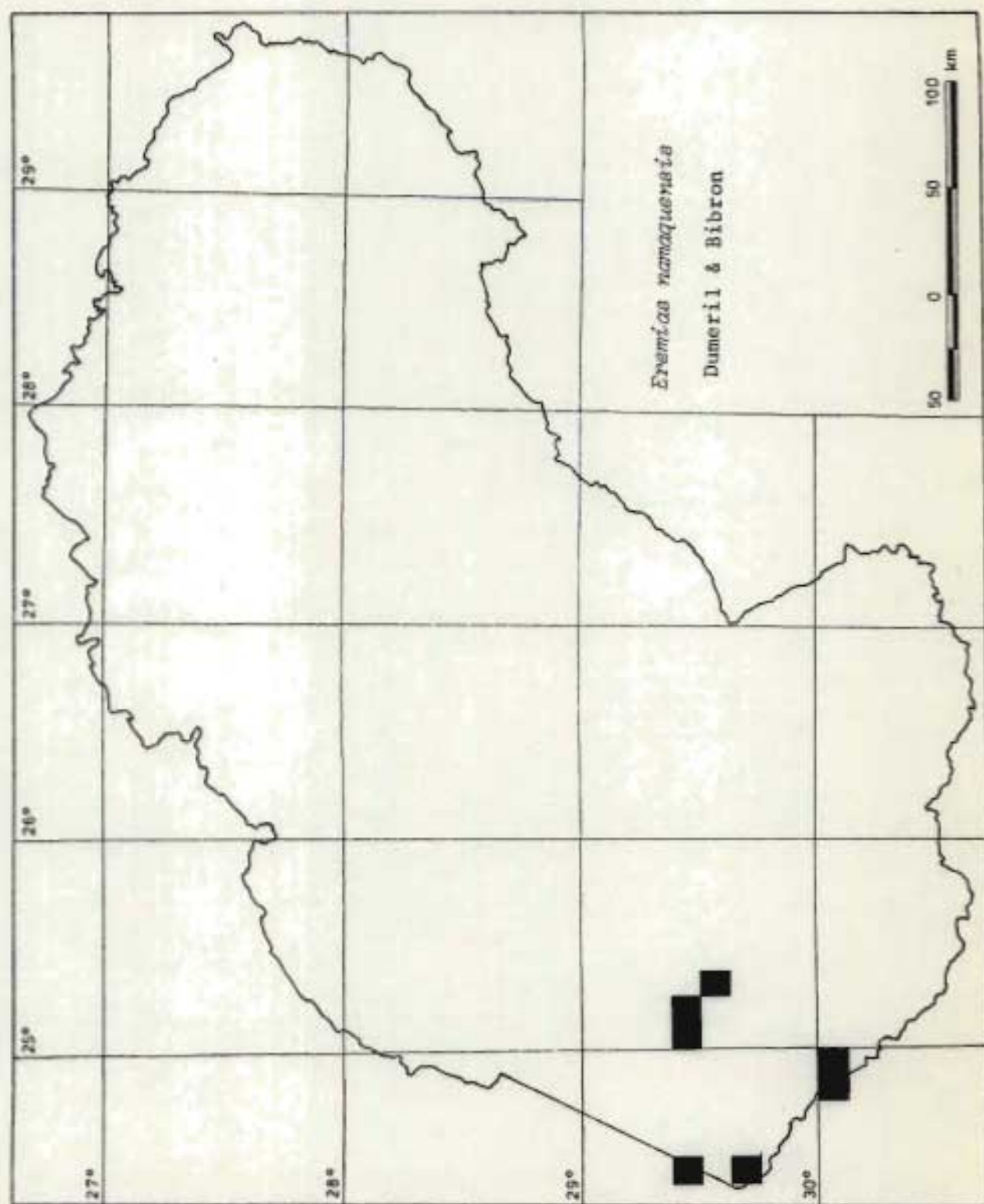
\* *Eremias namaquensis quadrangularis* Hewitt, 1926, *Ann. S. Afr. Mus.*, 20, p. 479: Kalkfontein, South West Africa.

Common name: Namaqua Sand Lizard.

Range: Southern Angola, South West Africa, Botswana, western Orange Free State and northern and eastern Cape Province (FitzSimons, 1943).

Characters: Twenty-five specimens examined. Temporal shield absent; narrow tympanic shield on upper anterior border of ear opening; lower eyelid not transparent; frontonasal longitudinally divided in 32% of specimens; prefrontals separated by one to seven small scales; supraciliaries five to eight; supralabials anterior to subocular four, seldom five; collar plates six to 11; 60 to 72 longitudinal dorsal scale rows; ventral scales in ten or 12 longitudinal and 28

Map 44





to 35 transverse rows; femoral pores 12 to 17 in both sexes; lamellae under fourth toe 25 to 29; colour above pale grey to grey-brown with or without pale vertebral stripe, bifurcate on the neck; pale stripe present or absent on either side of vertebral stripe; dorsolateral pale stripe and lateral pale stripe (ear to groin) usually present; exceptionally all pale stripes absent; hind limbs with white dorsal spots; posterior part of hind limbs orange in breeding males; ventral surfaces white.

Size: Largest male (NMB 783 - Kalkplaat)  $59 + 137 = 196\text{mm}$ . Largest female (NMB 1150 - Lentelus)  $50 + 108 = 158\text{mm}$ .

Habitat: These lacertids are fond of hard ground with scant vegetation where they make their burrows.

Breeding: One female collected in November contained three well-developed eggs.

Diet: Insecta: Dermaptera. Arachnida.

Material examined from: Heilbron, Philippolis; Kalkfontein Dam; Kalkplaat; Lemoenboord; Lentelus; Luiperskop; Poortje, Fauresmith (Map 44).

Literature records: Modder River (Bocage, 1896).

*EREMIAS LINEOCELLATA* Dumeril & Bibron, 1839

*EREMIAS LINEOCELLATA LINEOCELLATA* Dumeril & Bibron, 1839

- \* *Eremias lineo-ocellata* Dumeril & Bibron, 1839, *Erp.Gen.*, 5, p. 314:  
South Africa.
- \* *Eremias pulchella* Gray, 1845, *Cat.Liz.Brit.Mus.*, p. 42: South Africa.
- \* *Eremias annulifera* A. Smith, 1845, *Ill.Zool.S.Afr.*, Rept., pl. XLVII,  
fig. 1, pl. 48. figs. 14, 149: interior of Southern Africa, towards  
the tropic of Capricorn.
- \* *Eremias pulchra* A. Smith, 1845, *Ill.Zool.S.Afr.*, Rept., pl. XLVII, fig.  
2, pl. 48, figs. 12, 12a, 12b: Dry flats in the interior of Southern  
Africa.
- \* *Eremias formosa* A. Smith, 1845, *Ill.Zool.S.Afr.*, Rept., pl. XLVII, fig.  
3, pl. 48. figs. 15, 15a: West coast of Southern Africa in the  
neighbourhood of the Orange River.
- \* *Eremias aspera* Boulenger, 1917, *Ann.S.Afr.Mus.*, 13, p. 217: Mochudi,  
Botswana.

Common name: Ocellated Sand Lizard.

Range: South West Africa southwards to western Cape Province, eastwards across the Karoo to eastern Cape Province, Orange Free State (excluding north-eastern part), Botswana, Transvaal and central Natal (FitzSimons, 1943).

Characters: One hundred and twenty-nine specimens examined. Temporal and tympanic shields absent; lower eyelid with vertically divided transparent disc; prefrontals usually separated by one small scale, in contact in 24% of specimens, exceptionally three small scales separating prefrontals, or frontal and frontonasal in contact; supraciliaries five to eight; supralabials anterior to subocular four or five, exceptionally six; collar plates eight to 15; longitudinal dorsal scale rows 54 to 77; ventral scales in 12 to 14 longitudinal and 28 to 38 transverse rows; femoral pores nine to 17 in both sexes; lamellae under fourth toe 20 to 28; colour above pale brown to orange-brown; dorsolateral pale stripe or spots, black-edged on vertebral side; lateral white stripe or spots from subocular through ear to groin; between dorsolateral and lateral pale stripes a row of three to eight black circles or ocelli with green centres (blue in fixative); ventral part of tail, back of thighs and sides of body and neck sometimes orange; ventral surfaces white.

Size: Largest male (NMB 4804 - Lemoenboord)  $56 + 124 = 180\text{mm}$ .

Largest female (NMB 3151 - Rorich's Hulp)  $63 + 108 = 171\text{mm}$ .

Habitat: Sandy areas or rocky flats with scattered rocks and scant vegetation.

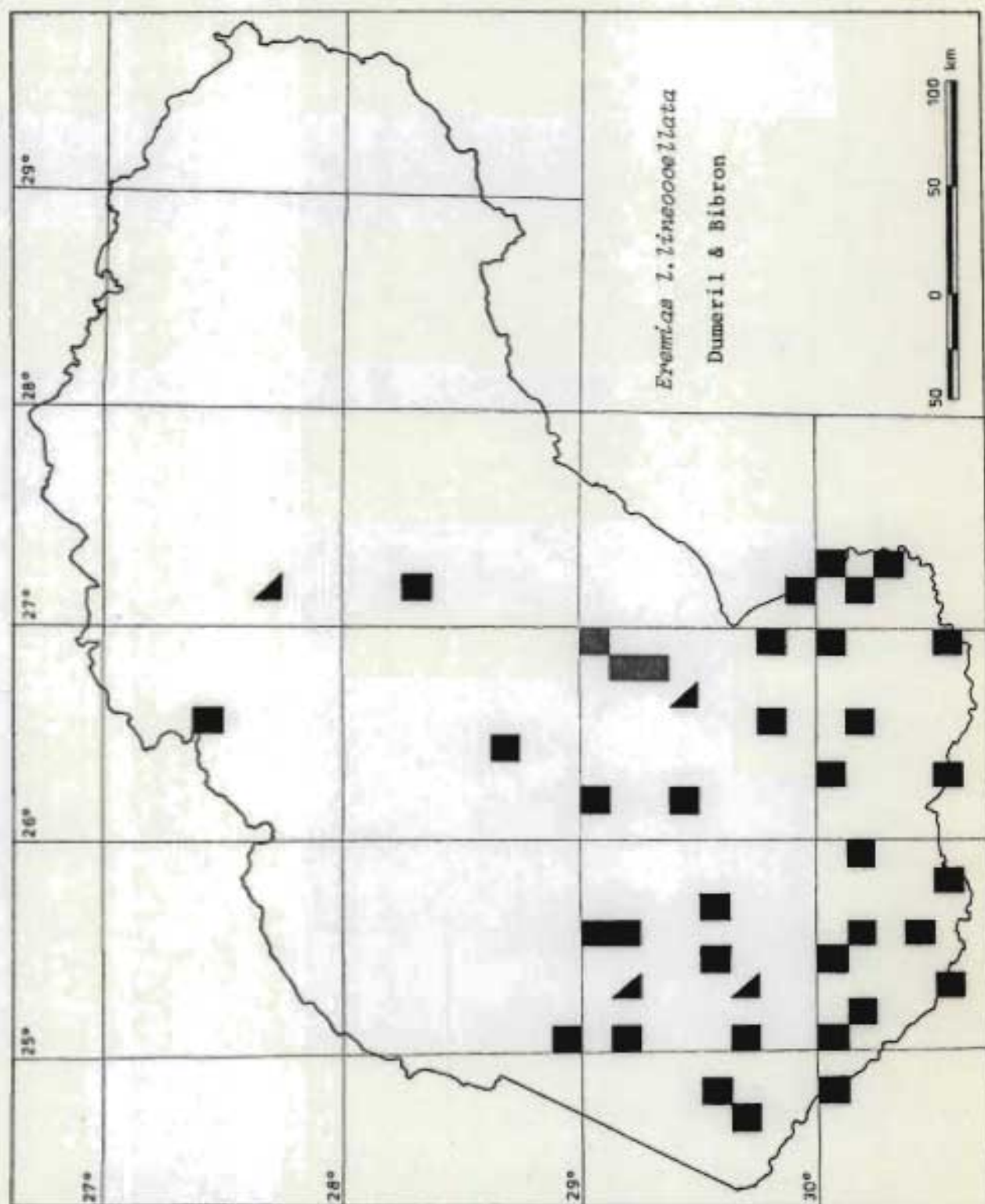
Breeding: Four to eight eggs measuring  $10 \times 6\text{mm}$  are laid in February.

Diet: Insects: Tenebrionidae (Coleoptera); Isoptera (workers and warriors).

Material examined from: Alpha; Avalon; Babel; Bergkloof; Bloemfontein Bothaville (TM); Brandfort (TM); Ceylon; Chubani; Cornwall; Doornplaat; Francis Home; Geluk, Philippolis; Hebron; Heenenweerskop; Kleinplaas; Klipbankfontein; Koortshoek; Koppiesdam; Kraaifontein; Kranskop; Lemoenboord; Lessingskop; Littlecote; Matjesfontein; Middelbron; Rietfontein, Rouxville; Rorich's Hulp; Spitzkop; Strijdfontein, Philippolis; Thaba'Nchu; Tienfontein; Vaalkop; Visser'shoek West; Waterhoek; Weltevrede; Willem Pretorius Game Reserve (TM); Wolvekop, Fauresmith (Map 45).



Map 45



Literature records: Brandfort (Hewitt, 1910); Smithfield (Boulenger, 1910); Emmaus (Hewitt & Power, 1913); Vredefort Road (Boulenger, 1921); Avalon; Bloemfontein; Bothaville; Fauresmith; Kroonstad; Meadows (FitzSimons, 1943).

Note: Boulenger (1921) in his monograph of the Lacertidae regarded *pulchella* as a synonym of *lineocellata*. FitzSimons (1943) revived *pulchella* as a race of *lineocellata* on the following grounds: Dorsal scales over posterior part of back much smaller than scales on tibia, granular, juxtaposed and not or but feebly keeled. These characters are, however, included in the normal range of variation of *lineocellata* in the Orange Free State, hence the two forms cannot be separated geographically in this area.

*EREMIAS BURCHELLI* Dumeril & Bibron, 1839

\* *Eremias burchelli* Dumeril & Bibron, 1839, *Erp.Gen.*, 5, p. 303:  
South Africa.

\* *Eremias burchelli quinquevittata* Hewitt, 1926, *Ann.S.Afr.Mus.*, 20,  
p. 481: Matroosberg, western Cape Province.

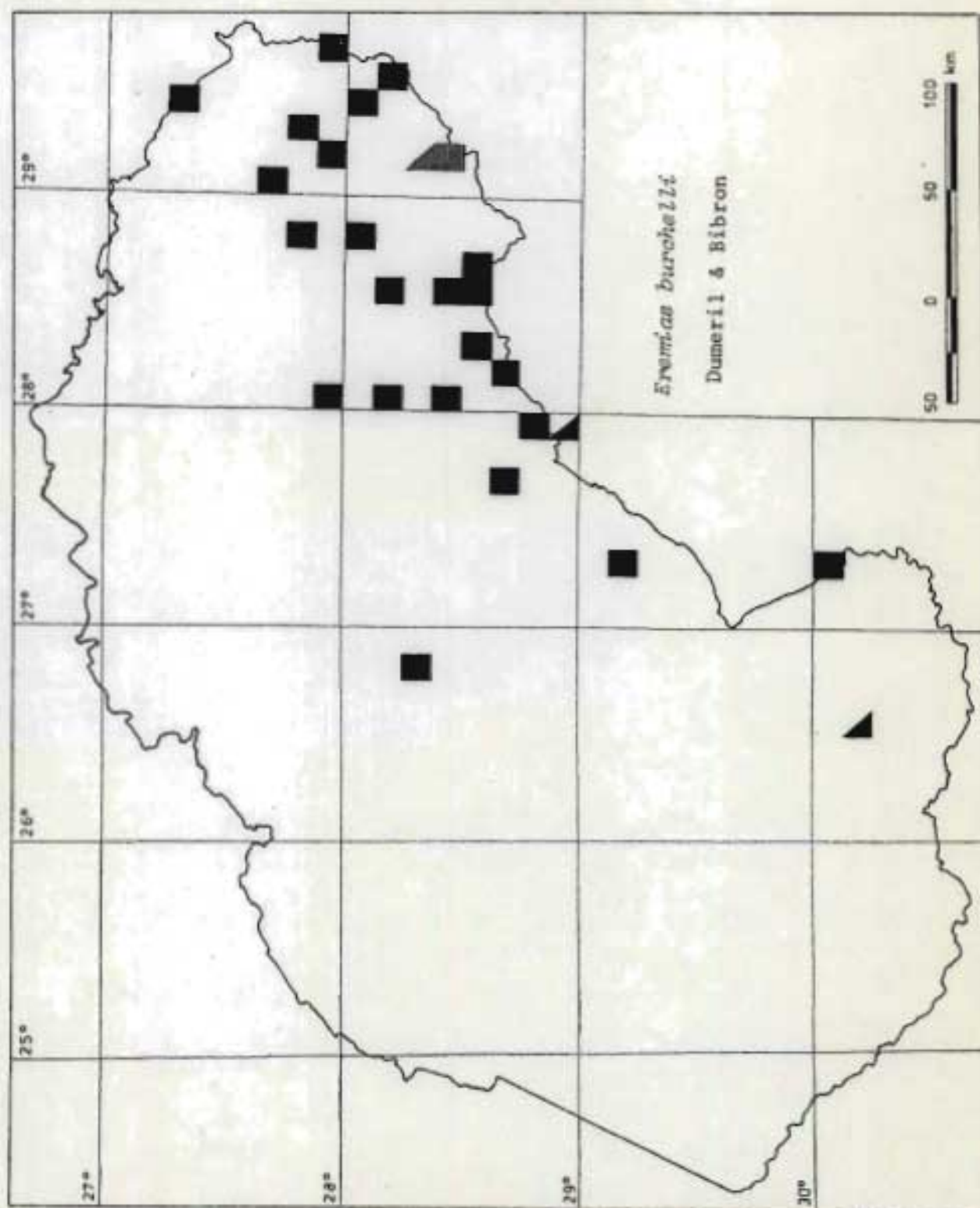
Common name: Burchell's Sand Lizard.

Range: South-western to eastern and north-eastern Cape Province, north- and south-eastern Orange Free State and Lesotho (FitzSimons, 1943).

Characters: One hundred and forty-two specimens examined. Temporal and tympanic shields absent; lower eyelid not transparent; prefrontals seldom separated by one or two small scales; supraciliaries six to 11, mostly seven to nine; supralabials anterior to subocular usually four or five, seldom three, six or seven; collar plates six to 14; longitudinal dorsal scale rows 60 to 80; ventral scales in 14, seldom 16, longitudinal and 29 to 39 transverse rows; femoral pores 10 to 16 in both sexes; lamellae under fourth toe 24 to 32; colour:  
juveniles: black with seven white longitudinal stripes as follows: median stripe usually on neck only but sometimes from base of tail to occipital where it bifurcates over parietals, usually rejoining again with white stripe from posterior border of frontal to rostral; stripe on either side of vertebral stripe running from nasal posteriorly along outer edge of supraoculars and fusing on base of tail; dorsolateral



Map 46



stripe from eye to base of tail; lateral stripe from subocular through ear to groin; limbs with large white dorsal spots; ventral surfaces white except for orange tail; adults: above brown to pale grey with irregular black markings; white stripes on either side of median stripe as well as median stripe itself tend to disappear while dorsolateral and lateral stripes tend to break up into white spots; dorsal white spots on limbs; orange pink on ventral part of tail and sometimes back of thighs; white below.

Size: Largest male (NMB 3311 - Monontsa Pass)  $63 + 119 = 182\text{mm}$ .

Largest female (NMB 1438 - Oever)  $66 + 108 = 174\text{mm}$ .

Habitat: Usually found on mountain slopes and plateaus up to 2378 meters (7800 ft), preferably on rocky flats with scant vegetation and scattered loose rocks.

Breeding: Gravid females with two to six well-developed eggs were collected in December. The eggs, measuring  $15 \times 10\text{mm}$ , are laid in damp places under rocks and hatch in February and March. One hatchling measured  $25 + 41 = 66\text{mm}$ .

Diet: Insecta: *Ontophagus* sp. (Scarabaeidae), Tenebrionidae, Curculionidae (Coleoptera); Lepidoptera larvae.

Material examined from: Bachelor's Home; Bon Haven; Boschkloof; Bramley's Hoek; Caledonspoort; Dipka; Elandsfontein; Groenland; Kranskop; Lange Hoek; Leeuwfontein, Theunissen; Machbela; Mecklenburg; Monontsa Pass; Mooigelegen; Morgenzon, Ficksburg; Morgenzon, Harrismith; Oever; Perth; Rietfontein, Vrede; Verdun, Fouriesburg; Verdun, Ladybrand; Welgegund; Wittepoort; Zomervlakte (Map 46).

Literature records: Modder River (Bocage, 1896; unlikely because this species inhabits the mountainous eastern Orange Free State); Smithfield (Boulenger, 1910); Ficksburg; Harrismith (FitzSimons, 1943).

Genus *ICHNOTROPIS* Peters, 1854

\* *Ichnotropis* Peters, 1854, Mber.dt.Akad.Wiss.Berl., p. 617. Type by subsequent designation (fide Loveridge 1957): *I. macrolapidota* Peters, 1854 = *Algyra capensis* A. Smith, 1838.



*ICHNOTROPIS SQUAMULOSA* Peters, 1854

\* *Ichnotropis squamulosa* Peters, 1854, Mber.dt.Akad.Wiss.Berl., p. 617:  
Tete, Mozambique.

Common name: Rough-scaled Sand Lizard.

Range: Tanzania south to Zululand and west through Malawi, Zambia, Rhodesia, Transvaal, north-western Orange Free State and Botswana to South West Africa and southern Angola (Broadley, 1966).

Characters: Two specimens examined. Frontonasal paired; supraciliaries four; subocular excluded from lip; scales around middle of body 49 to 53; femoral pores 14 to 16; lamellae under fourth toe 19 or 20; colour above blueish-grey with row of dorsolateral white spots and lateral row of white spots from ear to groin; ventral surfaces pale with faint grey markings.

Size: Largest specimen, male (NMB 2073 - Van Aswegenshoek) 67 + 130 = 197mm

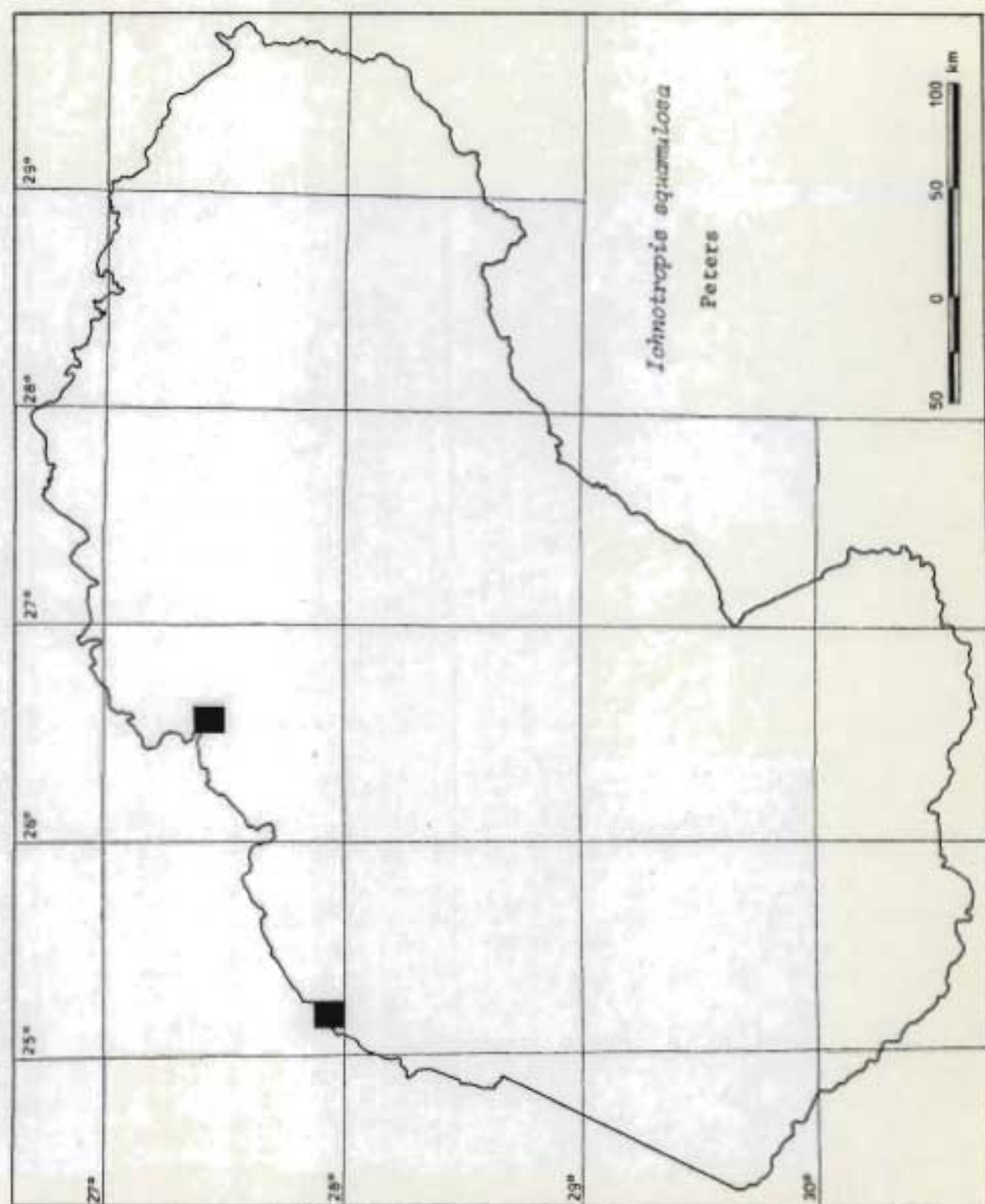
Habitat: A single specimen was collected in sandveld with scattered rocks.

Breeding: Broadley (1966) showed that this species hatches from the egg in November, reaches maturity in approximately nine months and dies after breeding, the species thus surviving in the egg during the months August to October.

Material examined from: Bothaville (TM); Van Aswegenshoek (Map 47).

Literature records: Bothaville (FitzSimons, 1943).

Map 47





Family VARANIDAE Hardwicke & Gray, 1828

Genus VARANUS Merrem, 1820

\* *Varanus* Merrem, 1820, Tent.Syst.Amph., p. 58. Type by subsequent designation (Mertens, 1942): *Lacerta varia* Shaw, 1790.

Key to the species:

- 1a. Nostril oval, slightly nearer eye than end of snout; build slender; semi-aquatic ..... *V.niloticus*, p. 131
- 1b. Nostril an oblique slit, much nearer eye than end of snout; build robust; terrestrial ..... *V.exanthematicus*, p. 133

*VARANUS NILOTICUS* (Linnaeus, 1766)

*VARANUS NILOTICUS NILOTICUS* (Linnaeus, 1766)

*Lacerta nilotica* Linnaeus, 1766, Syst.Nat., ed. 12, 1, p. 369: Egypt.

*Stellio saurus* Laurenti, 1768, Syn.Rept., p. 56: "in Zeylania ad littora maris".

*Lacerta capensis* Sparrmann, 1783, Resa till Goda Hoppsudden, p. 749: Binterbruyntjes Heights, eastern Cape province.

"*L. tupinambis*" Lacepede, 1788, Hist.Nat.Quad.ovip.Serpens, 1, Synopsis Methodica, p. 251, pl. xvii: restricted to Cape of Good Hope, fide, Mertens (1942).

*Tupinambis elegans* Daudin, 1802, Hist.Nat.Rept., 3, p. 36: "Amerique meridionale" (error).

*Tupinambis stellatus* Daudin, 1802, Hist.Nat.Rept., 3, p. 59, pl. xxxi: restricted to Senegal, fide Mertens (1942).

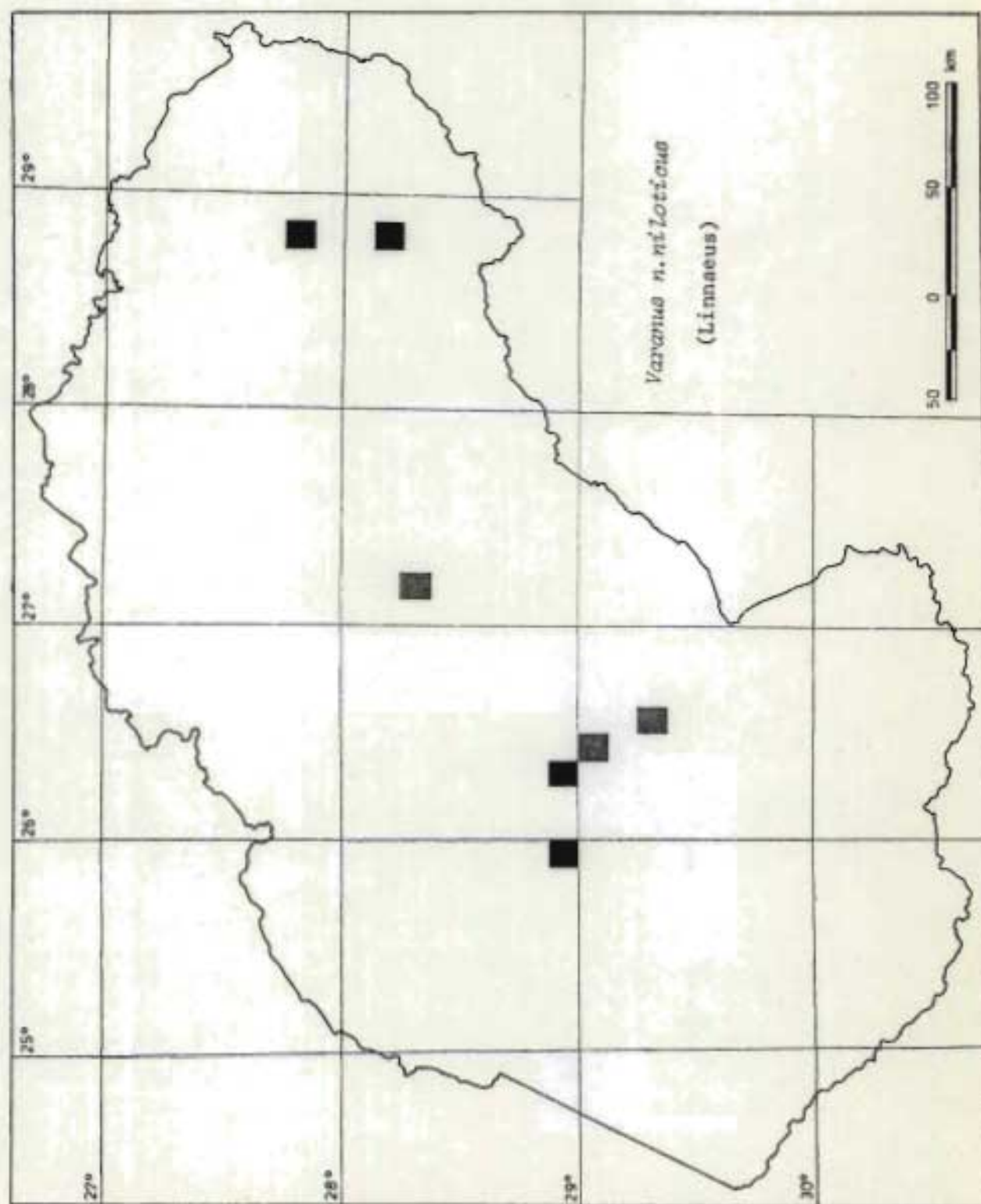
\* *Monitor pulcher* Leach, 1819, in Bowdich, Miss.Ashantee, App., p. 493: Gold Coast.

*Monitor elegans senegalensis* Schlegel, 1844, Abbild.Amph., p. x: Senegal.

Common name: Nile Monitor; Water Leguaan; Waterlikkewan.

Range: All savanna areas of Africa. Absent from arid south-west and also from western rain forest, where replaced by *V.niloticus ornatus*, Daudin, 1803 (Broadley 1966).

Map 48





- Characters: Ten specimens examined. Nostril oval and slightly nearer eye than end of snout; midbody scales 154 to 177; ventral scales from collar to groin 91 to 98; lamellae under fourth toe 22 to 26; colour above greyish-brown to dark brown with yellow spots arranged in six or seven transverse rows on body and 12 to 14 bars on tail; ventral surfaces white with irregular dark crossbands.
- Size: Largest specimen, male (NMB 2913 - Willem Pretorius Game Reserve) 740 + 1140 = 1880mm.
- Habitat: Semi-aquatic in rivers and dams.
- Material examined from: Glen; Krugersdrift Dam; Mazelspoort; Mecklenburg; Middelpunt; Rustfontein Dam; Smitherton; Willem Pretorius Game Reserve (Map 48).
- Literature records: None, new record for the Orange Free State.

*VARANUS EXANTHEMATICUS* (Bosc, 1792)

- Lacerta exanthematica* Bosc, 1792, Act.Soc.Hist.nat.Paris, 1, p. 25: Senegal.
- Varanus ocellatus* von Heyden, 1830, in Rüppell, Atlas Reise Afr. Rept., p. 21, table 6: Kordofan.

*VARANUS EXANTHEMATICUS ALBIGULARIS* (Daudin, 1802)

- \* *Tupinambis albigularis* Daudin, 1802, Hist.Nat.Rept., 3, p. 72, pl. XXXII: Type locality unknown.
- \* *Varanus gillii* A. Smith, 1831, S.Afr.Quart.J., No. 5, p. 16: Mountainous districts of Graaff Reinet and the Orange River.
- Monitor exanthematicus* var *capensis* Schlegel, 1844, Abb.Amph., p. 71, pl. 22, figs. 3, 4: Cape of Good Hope.
- Varanus exanthematicus ionidesi* Laurent, 1964, Breviora, No. 199, p. 2: Kilwa, Tanzania.

Common name: Rock or Tree Leguaan; Berglikkewaan.

Range: Savannas of southern and eastern Africa (Broadley, 1966).

Characters: Seventeen specimens examined. Nuchal scales subequal to or larger than those on dorsum; nostril an oblique slit, much nearer eye than end of snout; midbody scales 138 to 156 (one specimen having 161); ventral scales from collar to groin 88 to 103; lamellae

under fourth toe 16 to 21; colour above blackish or greyish-brown with four to six yellowish to dirty white transverse bands on body and seven to nine on tail; black band from eye to shoulder; ventral surfaces dirty yellowish-white, sometimes with dark lateral and latero-ventral bands.

Size: Largest male (NMB 1731 - Uitkyk)  $606 + 650 = 1256\text{mm}$ . Largest female (NMB 1218 - Koortshoek)  $498 + 562 = 1060\text{mm}$ .

Habitat: Terrestrial and arboreal in drier parts of the Orange Free State, especially where rocky outcrops provide hiding places.

Breeding: A 991mm female collected in November contained 31 eggs measuring  $57 \times 34\text{mm}$ , while another 920mm female collected in October contained 13 eggs measuring  $55 \times 30\text{mm}$ .

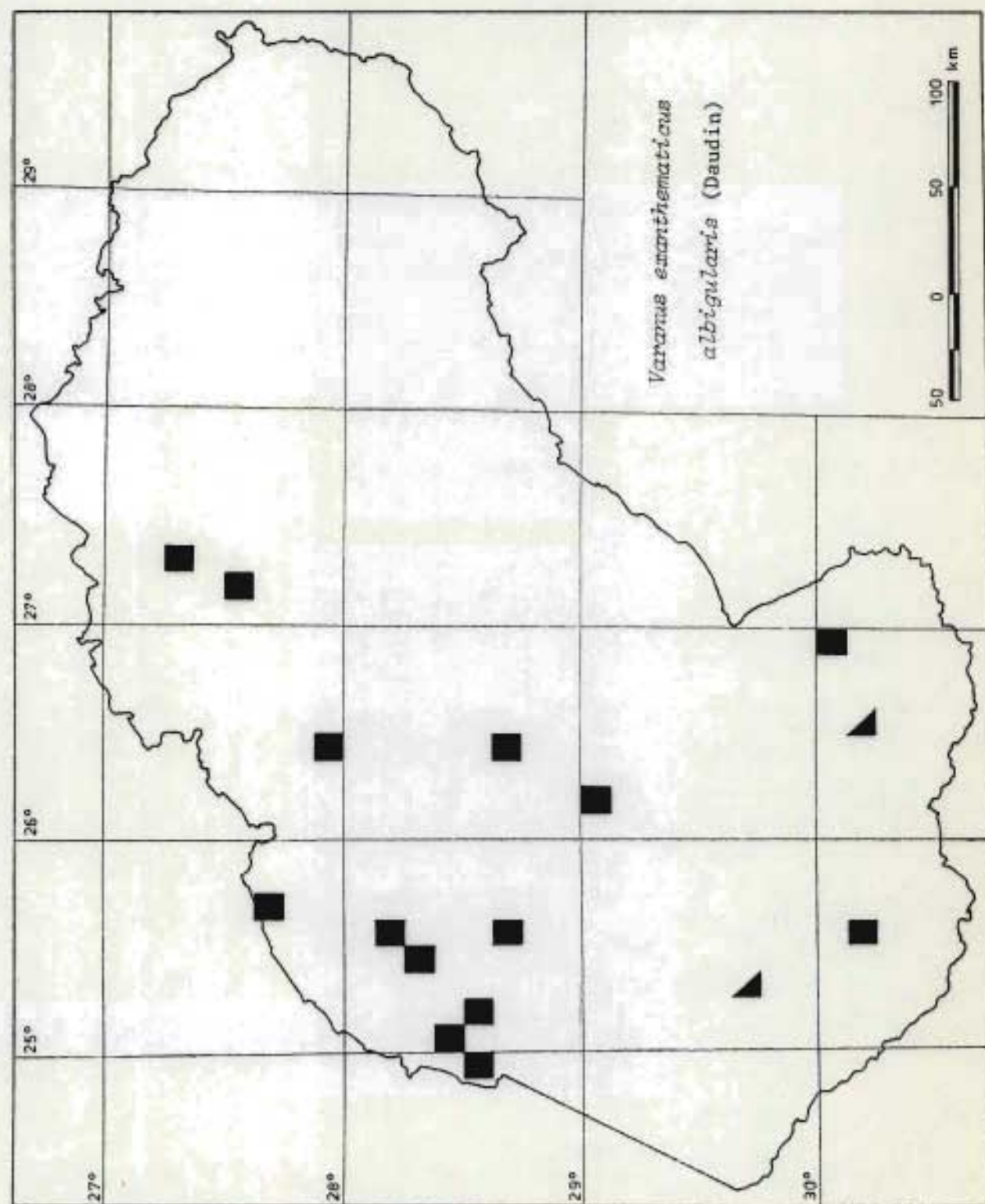
Diet: The stomach contents of one specimen collected at Hertzogville included two young *Testudo pardalis* (mountain tortoise) and one grasshopper.

Material examined from: Babel; Bloemfontein; Brakfontein; Brandfort; Hartebeestfontein, Boshof; Hertzogville; Koortshoek; Leeuwnfontein, Boshof; Leeuwkuil; Mara, Vredefort; Middenspruit; Philadelphia; Uitkyk; Vet River - Bloemhof Dam junction (Map 49).

Literature records: Smithfield (Boulenger, 1910); Fauresmith (FitzSimons, 1943).



Map 49



Suborder AMPHISBAENIA Gray, 1844

Family AMPHISBAENIDAE Gray, 1825

Genus *MONOPELTIS* A. Smith, 1848

\* *Monopeltis* A. Smith, 1848, Ill.Zool.S.Afr., Rept., pl. LXVII. Type by monotypy: *M.capensis* A. Smith, 1848.

*MONOPELTIS CAPENSIS* A. Smith, 1848

*MONOPELTIS CAPENSIS CAPENSIS* A. Smith, 1848

- \* *Monopeltis capensis* A. Smith, 1848, Ill.Zool.S.Afr., Rept., pl. LXVII. Latitude 24 degrees south = junction of Limpopo and Motwan Rivers, western Transvaal (FitzSimons, 1943).  
\* *Monopeltis decosteri* Boulenger, 1910, Ann.S.Afr.Mus., 5, p. 495: Delagoa Bay (= Lourenco Marques), Mozambique.

Common name: Southern Worm-Lizard; Erdslang.

Range: Orange Free State and northern Cape Province north-westwards through South West Africa to southern Angola, north-eastwards through western Transvaal to eastern Botswana, Rhodesia and southern Zambia (FitzSimons, 1943; Broadley, 1966).

Characters: Eighty-six specimens examined. Head covered by single large nasal shield; nasal usually excluded from lip (seldom reaching lip) and not reaching ocular; supralabials two or three; infralabials three, seldom two, exceptionally four; chin shields bordering postmental mostly two, sometimes three or four; annuli on body 198 to 221, annuli on tail 10 to 13; segments in midbody annulus 21 to 28 dorsal + 18 to 28 ventral = 41 to 56; pectoral scales mostly six, sometimes four or five; anal plates four or six; preanal pores one on either side; colour fleshy-pink all over.

Size: Largest specimen (NMB 387 - Krugersdrift Dam) 296 + 15 = 311mm.

Habitat: Fossorial, found in damp soil and sand of river banks. One specimen was found when a colony of *Suricata suricatta* (stokstertmeerkat) was excavated.

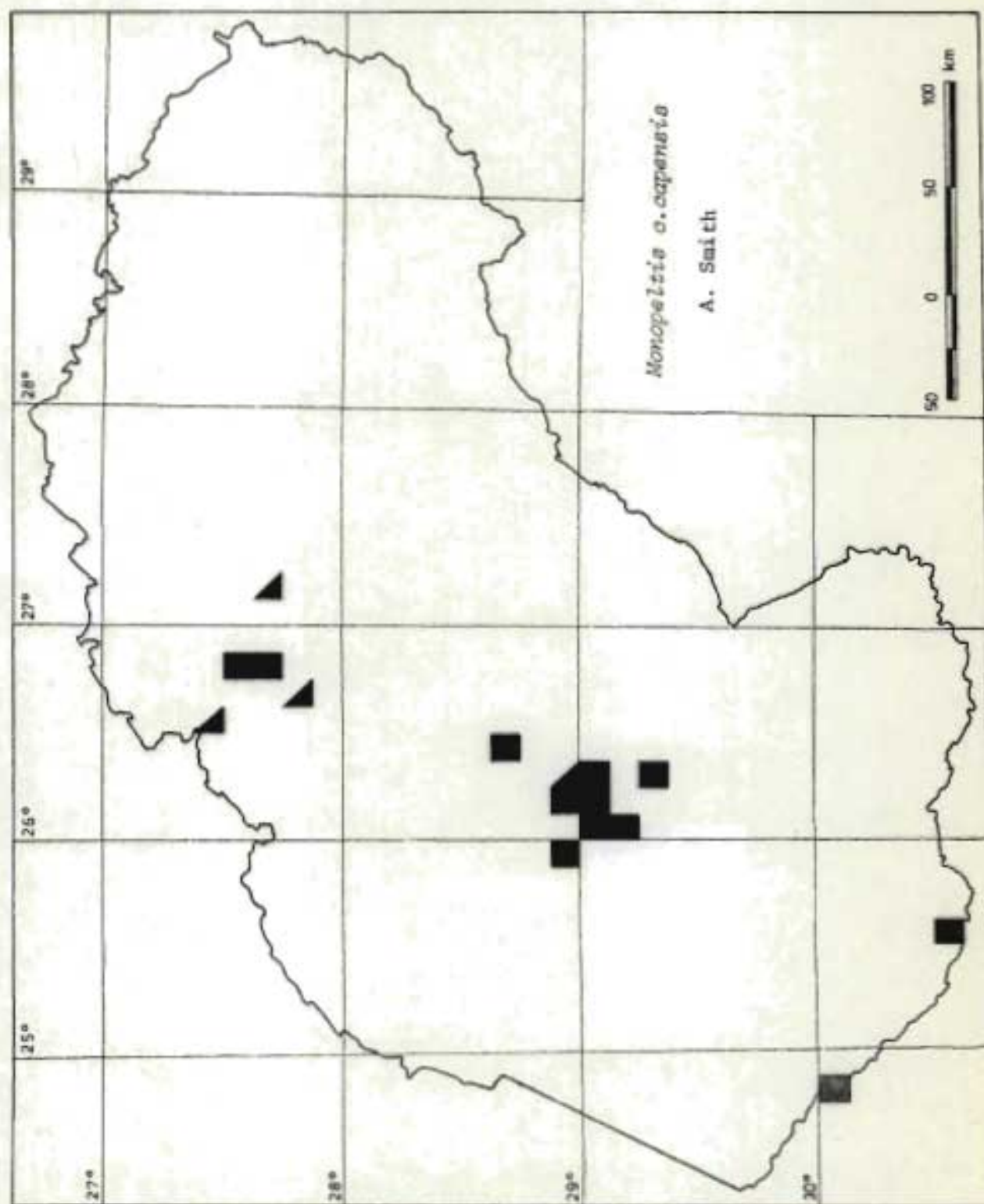


Diet: The stomach contents of one specimen revealed numerous Lammelicorn larvae.

Material examined from: Bainsvlei; Bloemfontein; Brandfort; Holme's Dale; Lemoenboord; Kelly's View; Krugersdrift Dam; Kwaggafontein; Rhenosterspruit; Rietkuil; Rietspruit; Richmond West; Verwoerd Dam (Map 50).

Literature records: Bainsvlei; Bothaville; Glen; Kelly's View; Odendaalsrus (FitzSimons, 1943); Bloemfontein; Brandfort; Kroonstad; Krugersdrift Dam; Rhenosterspruit; Richmond West; Rietspruit (Broadley et al, 1976).

Map 50





Suborder SERPENTES Linnaeus, 1758

Key to the families:

- 1a. Body vermiform, covered by subequal scales; eyes vestigial,  
situated below the head shields ..... 2
- 1b. Body not vermiform, head distinct; a median series of  
transversely enlarged ventral plates present; eyes well-  
developed, situated below a transparent scale ..... 3
- 2a. Midbody scale rows 24 or more ..... Typhlopidae, p. 139
- 2b. Midbody scale rows 14 ..... Leptotyphlopidae, p. 145
- 3a. Enlarged poison fangs present at front of upper jaw ..... 4
- 3b. No enlarged poison fangs at front of upper jaw .....  
..... Colubridae, p. 150
- 4a. Poison fangs immovable, not enclosed in a membranous  
sheath ..... Elapidae, p. 206
- 4b. Poison fangs movable, folded back when not in use and  
covered by a membranous sheath ..... Viperidae, p. 220

Family TYPHLOPIDAE Gray, 1825

Key to the genera:

- 1a. Snout rounded in lateral view; rostral poorly developed  
ventrally, width of head more than twice width of rostral  
at level of nostrils ..... *Typhlops*, p. 140
- 1b. Snout with a sharp-cutting cornified rim in lateral view;  
rostral well-developed ventrally, width of head less than  
twice width of rostral at level of nostrils .....  
..... *Rhinotyphlops*, p. 142

Note: Roux-Esteve (1974) revived the genus *Rhinotyphlops* Fitzinger, 1843, and distinguish it from *Typhlops* as indicated in the above key. Two specimens from the study area (NMB 3213 & 4495) have sharp-cutting cornified rostrals (as in *Rhinotyphlops*) but the width of the head is more than twice (2,3 and 3) the width of the rostral at the level of the nostrils (as in *Typhlops*). When both specimens were sent to

Roux-Esteve for examination and comment, she concluded that they belong to the genus *Rhinotyphlops* (species *R. lalandei*) but that it was difficult to distinguish them as such due to sloughing (Roux-Esteve, 1976; pers.comm.).

Genus *TYPHLOPS* Oppel, 1811

- \* *Typhlops* Oppel, 1811, *Ordn.Fam.Gattung Rept.*, p. 54. Type by subsequent designation, fide Loveridge, 1957: *Anguis lumbricalis* Linnaeus, 1766.

*TYPHLOPS BIBRONII* (A. Smith, 1846)

- \* *Onychocephalus bibronii* A. Smith, 1846, *Ill.Zool.S.Afr.*, Rept., pl. LI, fig. 2: "North of Latakoo" = Kuruman

Common name: Bibron's Blind Snake.

Range: Eastern Cape Province, Natal, Swaziland, Transvaal and northern Cape Province (FitzSimons, 1962); north-eastern Orange Free State.

Characters: Seven specimens examined. Rostral poorly developed ventrally, width of head more than twice width of rostral at level of nostrils; snout rounded; nasal suture arises from first supralabial; prefrontal distinctly elongate transversely; eye distinct (if not sloughing) below ocular/preocular suture; midbody scales 30 to 32; vertebral scales from head to tip of tail 375 to 376 in males, 409 to 442 in females; total length 26 to 41 times diameter of body; colour above olive-greyish to brown; ventral surfaces yellowish to beige.

Size: Largest male (NMB 4300 - Tafelberg)  $296 + 6 = 302\text{mm}$ . Largest female (NMB 4645 - Rusthof)  $389 + 7 = 396\text{mm}$ .

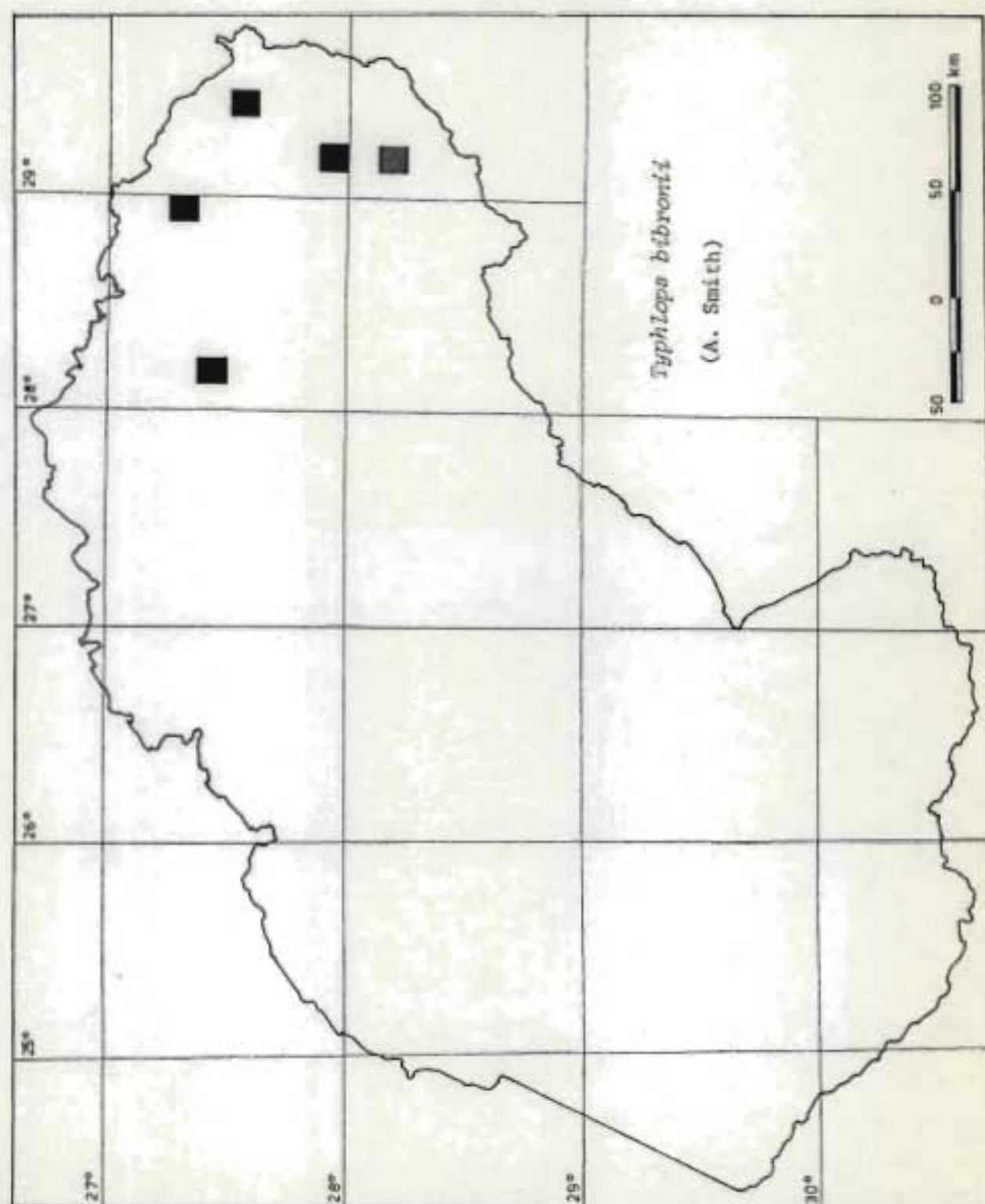
Habitat: Collected in soil under rocks in rocky areas.

Material examined from: Klipplaat; Morgenzon, Harrismith; Rusthof; Tafelberg; Tygerfontein (Map 51).

Literature records: FitzSimons (1962) recorded a specimen from Bloemfontein in the collections of the Transvaal Museum. The only specimen in the Transvaal Museum listed as *Typhlops bibronii* from Bloemfontein (TM 4954) proved on examination to be a *Rhinotyphlops lalandei* and as *Typhlops bibronii* otherwise occurs only in the north-eastern Orange Free State, the Bloemfontein record is regarded as of doubtful authenticity.



Map 51



Genus *RHINOTYPHLOPS* Fitzinger, 1843

\* *Rhinotyphlops* Fitzinger, 1843, Syst.Rept., p. 24. Type by original designation: *Typhlops lalandei* Schlegel, 1844.

*RHINOTYPHLOPS LALANDEI* (Schlegel, 1844)

*Typhlops lalandei* Schlegel, 1839, Abbild.Amph., p. 38, pl. xxxii, figs. 17 to 20: Cape of Good Hope.

Common name: Delalande's Blind Snake.

Range: Southern Cape Province (west of Albany district) to Orange Free State, northern Cape Province, Transvaal and southern Rhodesia (FitzSimons, 1962).

Characters: One hundred and twenty-three specimens examined. Rostral well-developed ventrally, width of head less than twice width of rostral at level of nostrils; snout with a sharp-cutting cornified rim; nasal suture can arise from first supralabial, suture of first and second supralabial or inner edge of second supralabial, exceptionally from edge of preocular (one side in two specimens; both sides in one specimen); prefrontal not distinctly elongate transversely, slightly larger to twice as large as posterior scale; supraocular transverse, its lateral apex wedged between ocular and preocular; eye visible below ocular; midbody scales usually 26 to 28, rarely 24, 30, 31 or 32; 314 to 442 vertebral scales from head to tip of tail; colour above blackish to brown or greyish-brown, paler ventrally.

Size: Largest specimen (NMB 4830 - Lemoenboord)  $339 + 5 = 344$ mm.

Habitat: Usually found in soil under rocks but sometimes also in old termitaria.

Breeding: One female from Willem Pretorius Game Reserve (TM; no date) contained two eggs.

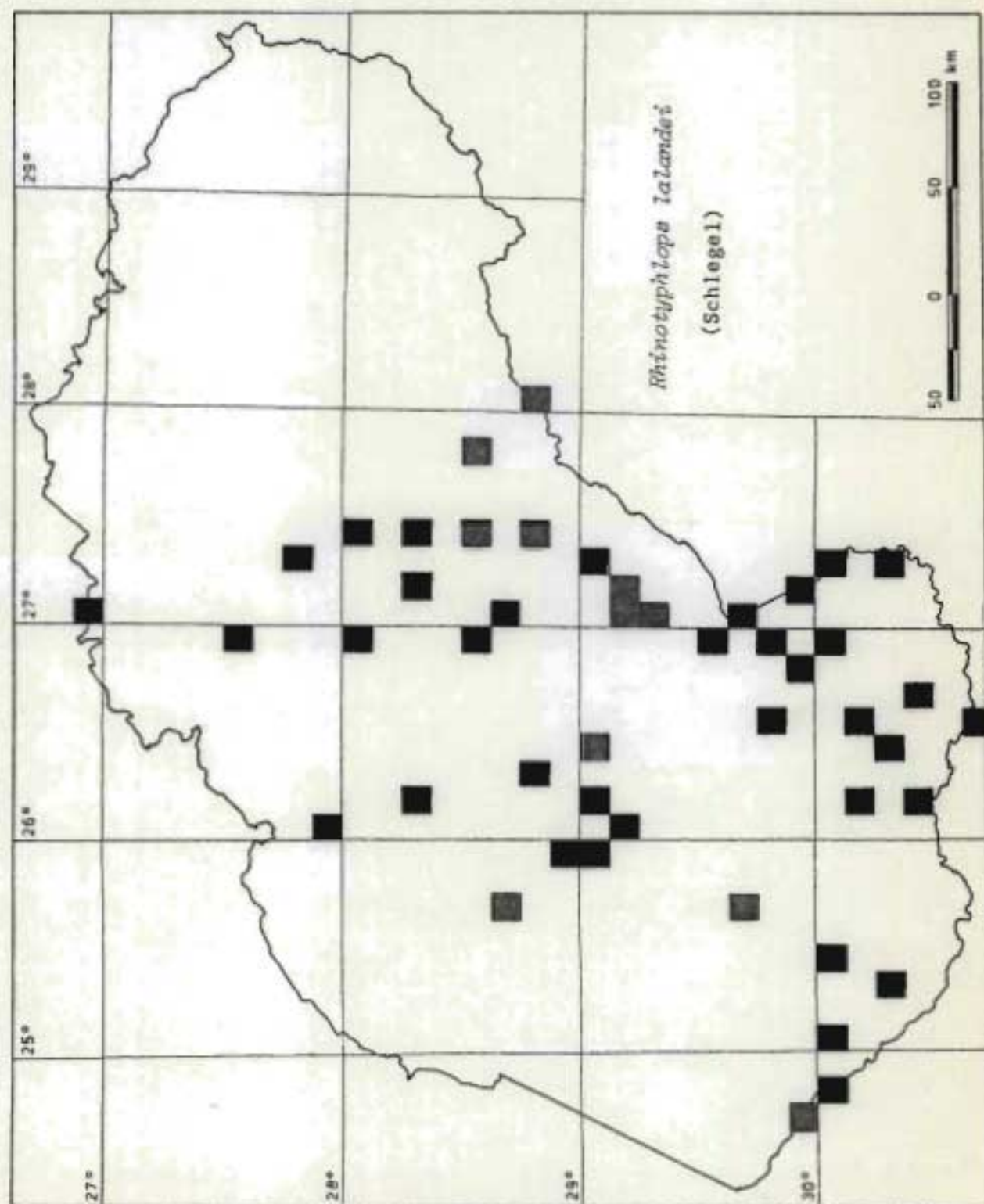
Material examined from: Babel; Bainsvlei; Bergkloof; Bergkraal; Bergplaats, Bloemfontein; Bloemfontein (TM part); Bultfontein; Carlie; Ceylon; De Brug; Doornbult; Dundee; Houmoed; Klipdrift; Klipfontein; Klipplaatdrift, Winburg; Kranskop; Krugersdrift Dam; Leeuwkop; Leliehoek; Lemoenboord; Lessingskop; Littlecote; Middelbron; Milambi; Morgenzon, Senekal; Naval Hill; Newlands A; Ongegund; Op die Rivier (TM); Petra; Philippolis (TM part); Poortje, Edenburg; Rohallion; Smithfield (SAM); Spijtfontein;



Straalfontein; Thaba Pachoa Berg; Triangle; Tussen die Riviere  
Game Farm; Tweespruit (TM); Uitkijk; Van der Walt's Rust;  
Vergaderrand; Vissershoeck West; Welbedacht; Weltevreden,  
Smithfield; Willem Pretorius Game Reserve (TM part); Wolvekop,  
Kroonstad; Zandfontein; Zuurfontein (Map 52).

Literature records: Smithfield (Boettger, 1883); Bloemfontein;  
Philippolis; Tweespruit (FitzSimons, 1962).

Map 52





Family LEPTOTYPHLOPIDAE Stejneger, 1891

Genus LEPTOTYPHLOPS Fitzinger, 1843

- \* *Leptotyphlops* Fitzinger, 1843, Syst.Rept., p. 24. Type by original designation: *Typhlops nigricans* Schlegel, 1839.

LEPTOTYPHLOPS SCUTIFRONS (Peters, 1854)

LEPTOTYPHLOPS SCUTIFRONS SCUTIFRONS (Peters, 1854)

- \* *Stenostoma scutifrons* Peters, 1854, Mber.dt.Akad.Wiss.Berl., p. 621: Sena, Mozambique.
- ? *Stenostoma conjunctum* Jan, 1861, Arch.Zool.Anat.Fisiol., 1, p. 189: Type locality restricted to the eastern Cape Province by Broadley and Watson, 1976.
- Stenostoma groutii* Cope, 1876, J.Acad.nat.Sci.Philad., (2) 8, p. 128: Umvoti Mission, Zululand.
- \* *Glauconia okahandjiana* Ahl, 1924, Arch.Naturgesch., 90 (5), p. 347: Okahandja, South West Africa.
- \* *Leptotyphlops conjunctus incognitus* Broadley & Watson, 1976, Occ. Pap,natn.Mus.Rhod., 5 (8), p. 494: Umtali, Rhodesia.

Common name: Worm snake.

Range: Uganda and Kenyasouth to eastern Cape Province and west through Zambia to Botswana and South West Africa (Broadley, 1966).

Characters: Eighty-seven specimens examined. Supraocular present (exceptionally fused with supranasal) and in contact with rostral; first supralabial present; rostral extending from just behind to well beyond level of posterior borders of eyes and from 16 to 58 percent width of head at this level; rostral width/supranasal width ratio 1,2 to 2,4; vertebral scales between rostral and tip of tail 215 to 270; subcaudals 23 to 28 in males, 20 to 25 in females; 14 scales around midbody and 10 round tail posterior to anal plate (or at middle of tail); total length/tail length ratio 9,3-11,3 (males) and 11,1-15,3 (females); colour brown to dark brown or blackish but grey when sloughing. Sexual dimorphism is illustrated in the following cases:

LOCALITY	SEX	TOTAL LENGTH /TAIL LENGTH	VERTEBRAL SCALES	SUBCAUDALS	ROSTRAL AS % HEAD WIDTH
Vissershoek West	male	10,7	249	26	41
Vissershoek West	female	13,6	259	22	54
Morgenzon, Senekal	male	11,0	236	25	36
Morgenzon, Senekal	female	12,6	250	22	53
Dealbata	male	10,3	234	26	41
Dealbata	female	12,4	252	21	54
Woudzicht	male	9,6	224	26	35
Woudzicht	female	12,9	230	21	40
Maanhaar	male	10,6	227	25	37
Maanhaar	female	11,9	230	21	33
Morgenzon, H'smith	male	10,0	220	26	32
Morgenzon, H'smith	female	11,8	232	23	35
Zoetbron	male	9,7	232	26	34
Zoetbron	female	12,0	237	21	38
Machbela	male	10,9	220	25	27
Machbela	female	11,3	218	24	40
Tafelberg	male	10,1	227	25	36
Tafelberg	female	12,0	226	23	45
Tygerfontein	male	10,1	218	25	32
Tygerfontein	female	13,4	229	22	37

Size: Largest male (NMB 4094 - Vissershoek West)  $145 + 15 = 160\text{mm}$ .

Largest female (NMB 2889 - Waterhoek)  $198 + 15 = 213\text{mm}$ .

Habitat: Found in soil under rocks and sometimes in old termitaria.

Breeding: Gravid females with three to four eggs were collected in November and December. Largest intact eggs measured  $14 \times 3,5\text{mm}$ .

Material examined from: Bergkloof; Berlin; Bloemfontein (TM);

Boschkloof; Bramley's Hoek; Dealbata; Dipka; Faile Grange;

Goedetrouw; Grootkloof; Klipoog; Maanhaar; Machbela; Mecklenburg;

Milambi; Mooigelegen; Morgenzon, Harrismith; Morgenzon, Senekal;

Patys (TM); Rietfontein, Vrede; Rustfontein Dam; Rusthof; Tafelberg;

Tweespruit (TM); Tygerfontein; Van Aswegen's Hoek; Van der Walt's

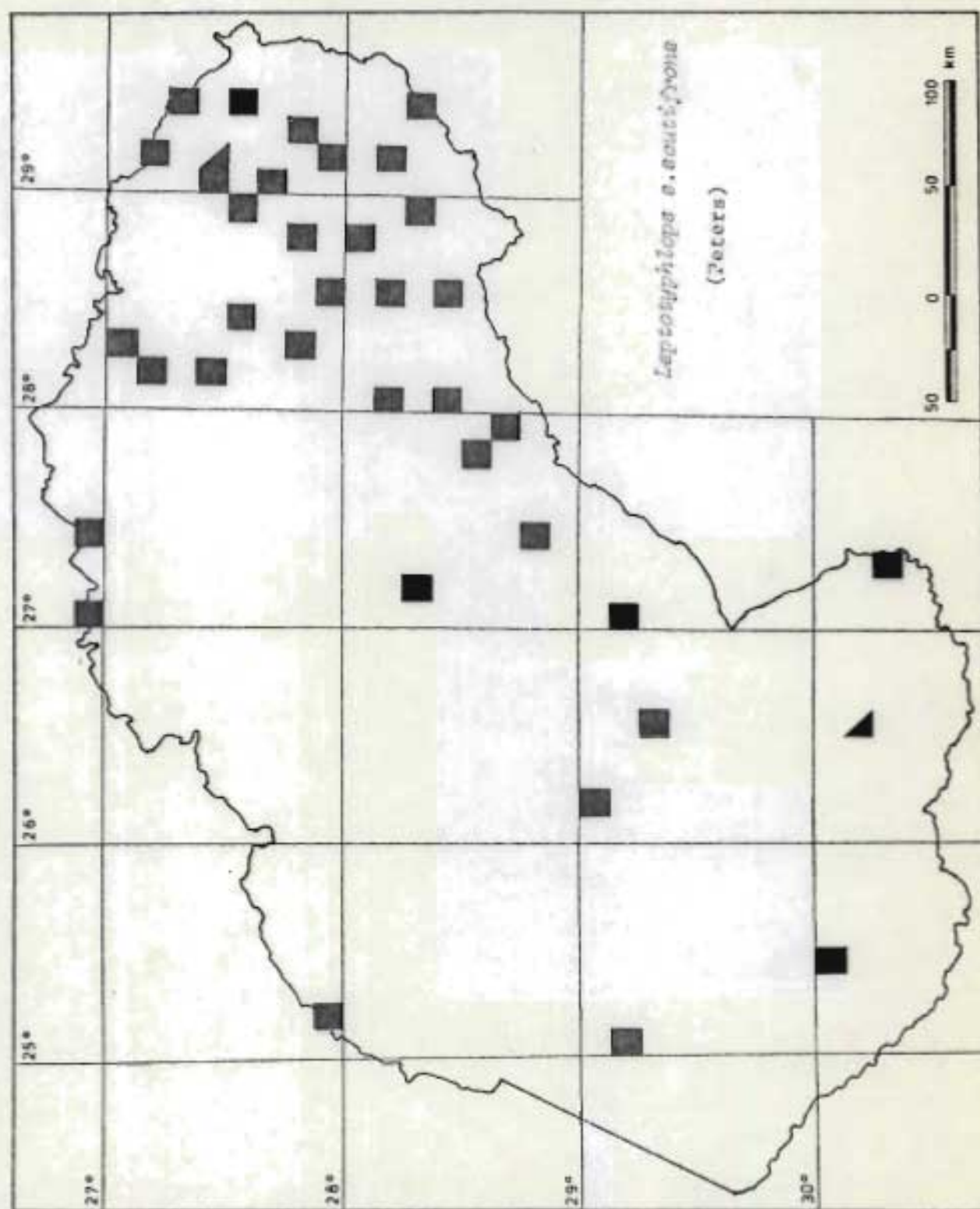
Rust; Vissershoek West; Waterfall; Waterhoek; Welgegund; Willem

Pretorius Game Reserve (TM); Wolvenfontein; Woudzicht; Zoetbron;

Zomervlakte (Map 53).



Map 53



Literature records: Smithfield (Boettger, 1883; sub.nom. *Stenostoma nigricans*); Tweespruit (FitzSimons, 1930); Bloemfontein; Parys; Vrede (FitzSimons, 1962).

Note: FitzSimons (1962) and Broadley (1966) separated *L.scutifrons* from *L.conjunctus* on the width of the rostral in relation to the width of the supranasal (rostral width more than twice or less than twice width of supranasal). The rostral width/supranasal width ratio of Orange Free State specimens forms a gradient from 1,2 to 2,4 and consequently other diagnostic characters were examined. In a study of the American species of *Leptotyphlops* Klauber (1940) provides useful taxonomic characters. These were employed with limited success; owing to a gradient in characters the two forms could not be separated. In a revision of the Leptotyphlopidae of south-eastern Africa, Broadley & Watson (1976) distinguish *L.conjunctus* from *L.s.scutifrons* as follows:

Rostral barely extending beyond the level of the posterior borders of the eyes and less than a third the width of the head at this point; total length/tail ratio usually less than 11,5 .....	<i>L.conjunctus</i>
Rostral extending well beyond the level of the posterior borders of the eyes and more than a third the width of the head at this point; total length/tail ratio usually more than 11,5 .....	<i>L.s.scutifrons</i>

The extent to which the rostral extends beyond the level of the posterior borders of the eyes was found to be of little significance and it was found also that it does not always correlate with rostral width. The total length/tail length ratio merely distinguishes males (less than 11,5) from females (more than 11,5) in the study area, as indicated above. How this same character can be employed to distinguish *L.conjunctus* from *L.s.scutifrons* in south-eastern Africa (Broadley & Watson, 1976) without indicating sexual dimorphism is not clear. However, it is evident that Broadley & Watson (1976) did not consider sexual dimorphism in their study and therefore the matter should be reinvestigated with this in mind.

In order to determine rostral width accurately as percentage of head width at the level of the posterior borders of the eyes, the head



and head shields of each specimen were traced with the aid of a drawing apparatus and dissecting microscope. Measurements were then taken from these drawings and the results indicate a gradient from 16 to 58 percent. No correlation between narrow rostrals and total length/tail length ratios of less than 11,5 or broad rostrals and total length/tail length ratios of more than 11,5 could be found, because of sexual dimorphism. Although this was not always the case females tended to have broader rostrals than males from the same area. However, some correlation existed between rostral width and number of vertebral scales. Specimens with rostral width more than 33% of head width tended to have high scale counts (more than 238, which is the upper limit of *L.c.conjunctus* according to Broadley & Watson, 1976) while specimens with narrow rostrals tended to have low vertebral scale counts. This correlation is, however, not constant and since several specimens intergraded it could not be employed to distinguish successfully between *L.conjunctus* and *L.s.scutifrons* in the Orange Free State.

The reliability of rostral size as a character to distinguish between *L.conjunctus* and *L.scutifrons* is uncertain especially as the gradient in this character indicates great individual variation, apart from being subject to sexual dimorphism to some extent. For these reasons it was found impossible to distinguish between *L.scutifrons* and *L.conjunctus* in the Orange Free State and they are therefore regarded as synonymous. The status of the newly described *L.conjunctus incognitus* Broadley & Watson, 1976, now becomes doubtful as this race occurs sympatrically with *L.s.scutifrons* in south-eastern Africa. The problem of *L.scutifrons* and *L.conjunctus* needs to be further investigated and the present taxonomic arrangement must be regarded as tentative.

Family COLUBRIDAE Gray, 1825

Key to the genera:

- 1a. No enlarged, grooved poison fangs in upper jaw ..... 2
- 1b. Enlarged, grooved poison fangs present in upper jaw, below  
eye ..... 10
- 2a. Scales strongly keeled; three or four lateral scale rows  
reduced and serrated ..... *Dasypeltis*, p. 176
- 2b. Scales smooth; lateral scales not reduced or serrated ..... 3
- 3a. Pupil vertically elliptic ..... 4
- 3b. Pupil round ..... 8
- 4a. Scales not more than 17 rows at midbody ..... 5
- 4b. Scales not less than 19 rows at midbody ..... 6
- 5a. Scales in 17 rows at midbody; nostril pierced in an entire  
nasal ..... *Lycophidion*, p. 164
- 5b. Scales in 15 rows at midbody; nostril pierced in a semidivided  
nasal ..... *Prosymna*, p. 169
- 6a. Ventrals 194 to 232; midbody scale rows 22 to 31 .....  
..... *Boaedon*, p. 159
- 6b. Ventrals 165 to 185; midbody scale rows 19 to 23 ..... 7
- 7a. Frontal barely longer than broad; midbody scale rows 19 to  
23; ventrals 165 to 185; maxillary teeth smallest anteriorly  
..... *Lamprophis*, p. 153
- 7b. Frontal distinctly longer than broad; midbody scale rows 19;  
ventrals 172 to 178; maxillary teeth subequal in size .....  
..... *Lycodonomorphus*, p. 151
- 8a. Anal entire ..... *Duberria*, p. 173
- 8b. Anal divided ..... 9
- 9a. Midbody scale rows 15 ..... *Philothamnus*, p. 167
- 9b. Midbody scale rows 25 to 27 ..... *Pseudaspis*, p. 171
- 10a. Loreal present ..... 11
- 10b. Loreal absent ..... 15
- 11a. Pupil vertically elliptic; anal entire ..... 12
- 11b. Pupil round; anal entire or divided ..... 13
- 12a. Ventrals 190 to 206; dorsum with a median series of large  
black spots ..... *Telescopus*, p. 179
- 12b. Ventrals 146 to 161; dorsum without a median series of black  
spots ..... *Crotaphopeltis*, p. 181



- 13a. Midbody scale rows 19 ..... *Diapholidia*, p. 184  
 13b. Midbody scale rows 15 to 17 ..... 14  
 14a. Maxillary teeth interrupted below anterior border of eye by  
 two enlarged fang-like teeth, separated from true poison  
 fangs by a further series of small teeth below eye .....  
 ..... *Psammophis*, p. 192  
 14b. Maxillary teeth subequal in size and continuing without  
 interruption to the interspace separating them from a posterior  
 pair of grooved poison fangs below posterior border of eye ..  
 ..... *Psammophylax*, p. 186  
 15a. Anal divided; subcaudals paired ..... *Xenocalamus*, p. 200  
 15b. Anal entire; subcaudals single ..... *Aparallactus*, p. 202

Genus *LYCODYNOMORPHUS* Fitzinger, 1843

- \* *Lycodynomorphus* Fitzinger, 1843, Syst.Rept., p. 27. Type by original  
 designation: *Coronella rufula* Schlegel, 1837 = *Coluber rufulus*  
 Lichtenstein, 1823.

*LYCODYNOMORPHUS RUFULUS* (Lichtenstein, 1823)

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

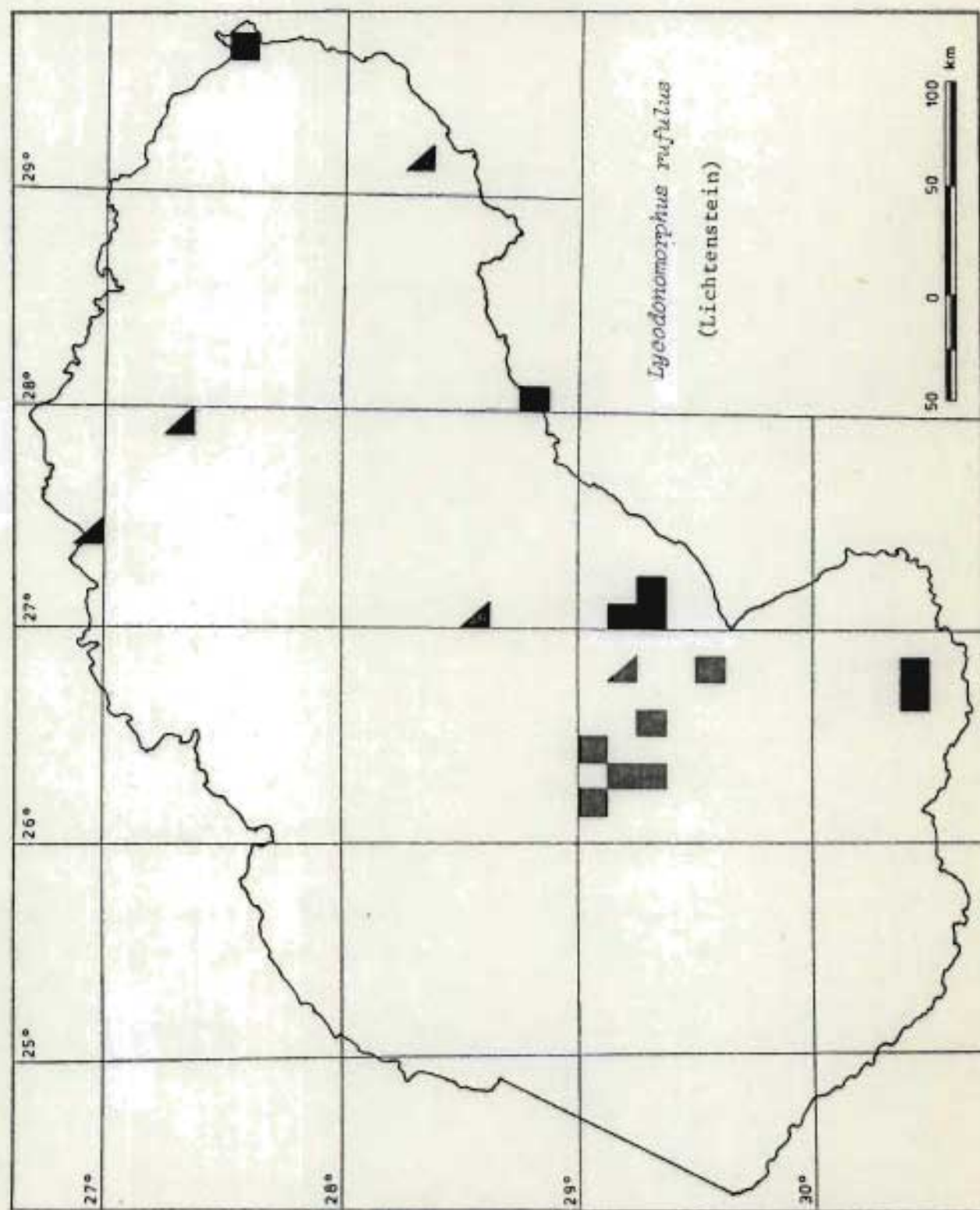
- \* *Coronella leucopilus* A. Smith, 1831, S.Afr.Quart.J.(I), No. 5, p. 17:  
 South Africa.

Common name: Brown Water-Snake; Gewone Waterslang.

Range: The eastern half of South Africa to the south-western Cape  
 Province, excluding the arid western and karroid areas (FitzSimons,  
 1962); also southern Mozambique (Broadley, 1966).

Characters: Sixteen specimens examined. Pupil vertical; one preocular;  
 postoculars two; temporals one + two; supralabials eight, fourth and  
 fifth entering orbit; infralabials eight, first four in contact with  
 anterior sublinguals, exceptionally nine infralabials with first five  
 in contact with anterior sublinguals; dorsal scales in 19 rows on  
 nape and at midbody, 17 anterior to vent; ventrals 172 to 176 in males  
 and 175 to 178 in females; anal plate entire; subcaudals 78 to 83 in  
 males and 61 to 67 in females; colour above olive greenish-brown;

Map 54





supralabials and ventral surfaces white or yellowish; a gravid female collected together with a male showed faint apricot orange ventral scales.

Size: Largest male (NMB 4452 - Rustfontein Dam)  $442 + 150 = 592\text{mm}$ .

Largest female (TM 37998 - Op-die-Rivier)  $608 + 146 = 754\text{mm}$ .

Habitat: Usually found in or near dams and rivers.

Breeding: Two gravid females were collected in October, each containing five eggs.

Diet: An aquatic frog (*Xenopus laevis*) was found in the stomach of one specimen.

Material examined from: Bergkraal; Bleomfontein (TM); Laveno; Manchester; Op-die-Rivier (TM); Rietspruit; Rouxville; Rustfontein Dam; Seekoeivleipoort; Shannon; Thaba Pacho Berg; Tweespruit (TM); Vergaderrand (Map 54).

Literature records: Harrismith; Heilbron Townlands; Parys; Rietspruit; Rouxville; Shannon; Thaba'Nchu; Tweespruit; Winburg (FitzSimons, 1962).

Note: In his review of the genus *Lycodonamorphus*, Broadley (1967) indicated that *L. rufulus mlanjensis* Loveridge (1953) is sympatric with the nominate form in eastern Rhodesia and should be regarded as a race of *L. leleupi* (Laurent, 1950), leaving *L. rufulus* a monotypic species.

#### Genus *LAMPROPHIS* Fitzinger, 1843

\* *Lamprophis* Fitzinger, 1843, Syst.Rept., p. 25. Type by original designation: *Coronella aurora* Schlegel, 1837 = *Coluber aurora* Linnaeus, 1754.

#### Key to the species:

- 1a. Midbody scales in 19 rows ..... *L. fuscus*, p.154
- 1b. Midbody scales in 23, rarely 21 rows ..... 2
- 2a. An orange vertebral stripe present; loreal slightly longer than deep ..... *L. aurora*, p.154
- 2b. No vertebral orange stripe; loreal twice as long as deep ....  
..... *L. inornatus*, p.157

*LAMPROPHIS FUSCUS* Boulenger, 1893

\* *Lamprophis fuscus* Boulenger, 1893, Cat.Snakes Brit.Mus., 1, p. 322, pl. xx, fig. 4: Cape of Good Hope.

Common name: Yellow-bellied House-Snake.

Range: From the Cape Peninsula eastwards to Albany district and then northwards to southern Natal and Orange Free State (FitzSimons, 1962). This very rare snake is now known to occur also in the Transvaal (Haacke, pers.comm.).

Characters: Two specimens examined. Preocular one; postoculars two; temporals one + two; supralabials seven or eight, fourth and fifth entering orbit; infralabials seven or eight, first four in contact with anterior sublinguals; dorsal scales in 19 rows at midbody; ventrals 175 to 176; anal plate entire; subcaudals 66 to 67; colour uniform olive-brown above; first two rows of dorsals on either side, supralabials and ventral surfaces pale-yellowish to yellow posteriorly.

Size: Largest specimen, a female (NMB 3566 - Dealbata) 178 + 47 = 225mm.

Habitat: One specimen was collected in an old termitarium in open grassland.

Material examined from: Dealbata; Smithfield (SAM) (Map 55).

Literature records: FitzSimons (1962) regarded the specimen from Smithfield (SAM) as of doubtful authenticity but in the light of the new data this record should now be accepted.

*LAMPROPHIS AURORA* (Linnaeus, 1754)

*Coluber aurora* Linnaeus, 1754, Mus.Adolph.Frid., p. 25, pl. xix, fig. 1: "Habitat in America"; error, from Africa, fide FitzSimons, 1962.

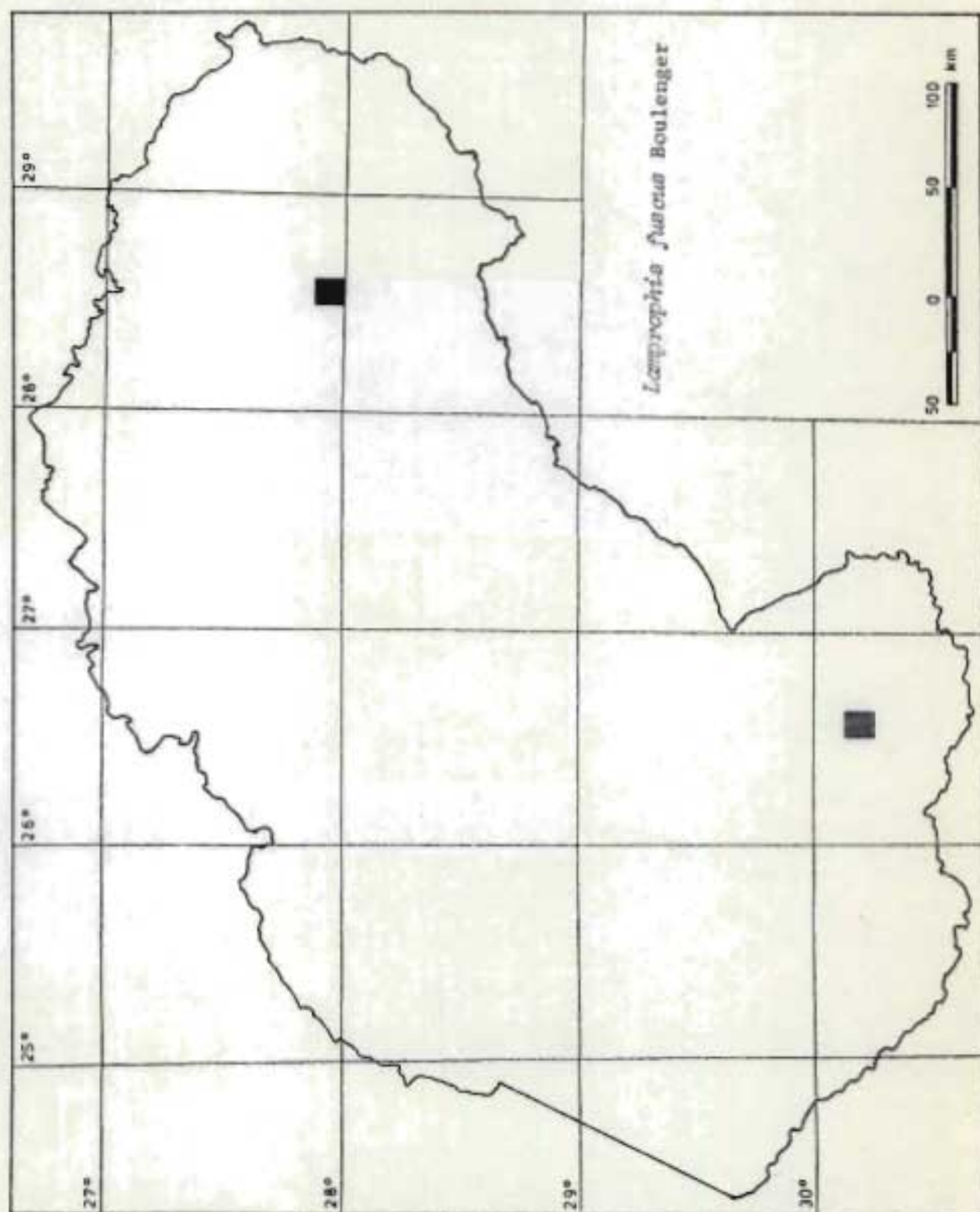
Common name: Aurora- or Night-Snake.

Range: From the Cape Peninsula to eastern Cape Province, Orange Free State, Lesotho, southern Natal and Transvaal (FitzSimons, 1962).

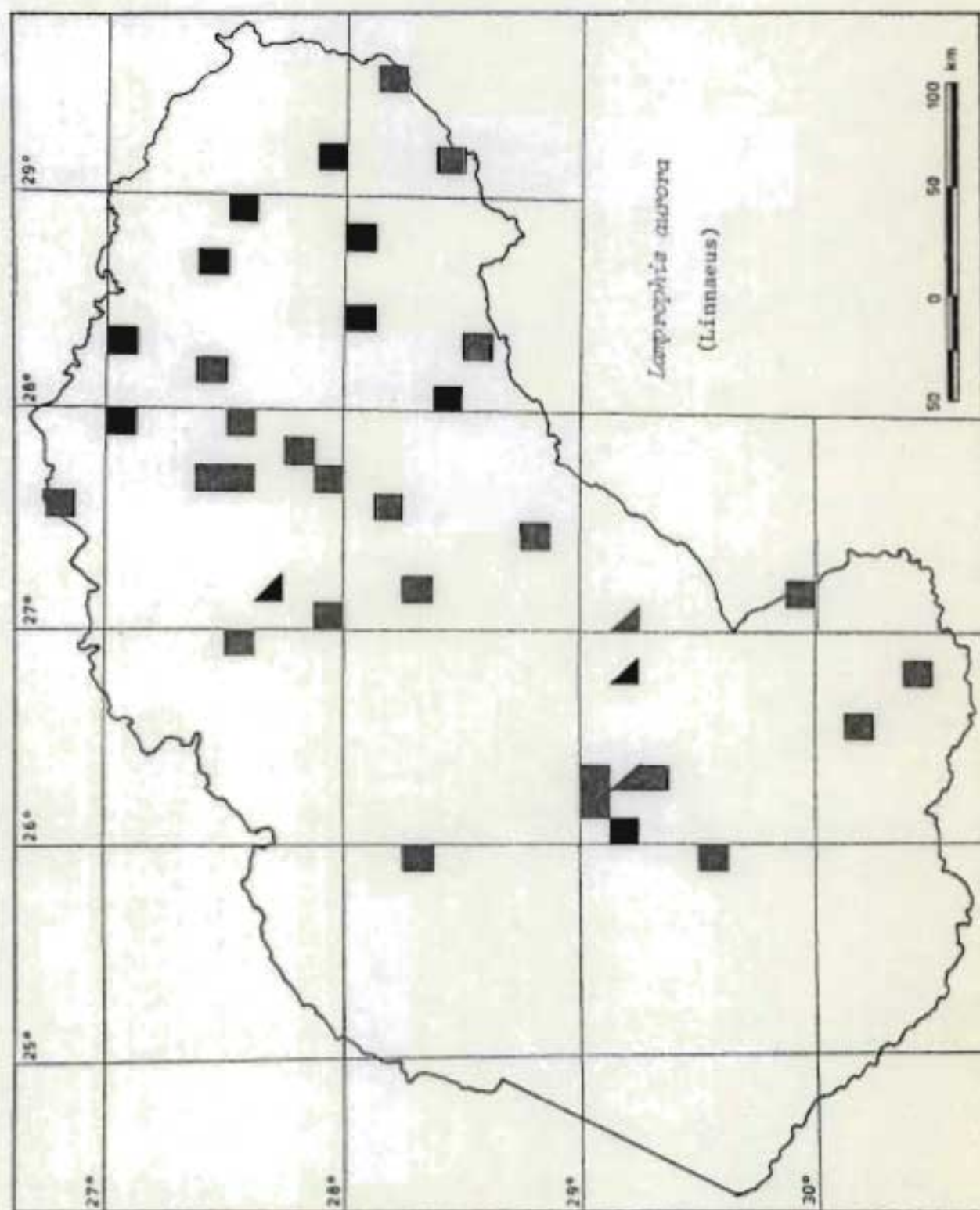
Characters: Fifty-two specimens examined. Preocular one; postoculars two, seldom one; temporals one + two; supralabials eight, fourth and fifth entering orbit; infralabials usually eight (rarely nine), first



Map 55



Map 56





four in contact with anterior sublinguals, seldom seven infralabials with first three in contact with anterior sublinguals; dorsal scales in 21 to 23, exceptionally 19 or 20, rows on nape, 23, exceptionally 21, at midbody and 19, exceptionally 17 or 18, anterior to vent; ventrals 165 to 176 in males and 171 to 185 in females; anal plate entire; subcaudals 51 to 58 in males and 35 to 48 in females; colour olive-green above with vertebral scale row bright orange and dark tipped; first paravertebral scales sometimes also bright orange; head scales sometimes spotted with black; ventral surfaces white.

Size: Largest male (NMB 3140 - Bloemfontein)  $406 + 96 = 502\text{mm}$ .

Largest female (NMB 3333 - Olive Hill)  $643 + 102 = 745\text{mm}$ .

Habitat: Most specimens were found in old termitaria and some under rocks.

Diet: The stomach contents of one specimen revealed Lacertid remains. Several specimens contained remains of small mammals.

Material examined from: Bachelor's Home; Bethany; Bethel; Bloemfontein; Bon Haven; Boschkloof; Brockenhurst; Die Hoogte; Edenville (TM); Grootkrans; Hoogeveld, Kroonstad; Houtkop; Kasteelkop; Klipoog; Littlecote; Loskop; Milambi; Mooigelegen; Morgenzon, Harrismith; Olive Hill; Oorsprong; Rambouillet; Reitspruit; Rouxville; Rusthof; Smithfield (SAM); Spijtfontein; Venus; Verdun, Fouriesburg; Willem Pretorius Game Reserve (TM); Woudzicht; Zandvoort (Map 56).

Literature records: Kroonstad (Symonds, 1887); Smithfield (Boulenger, 1910); Bainsvlei; Bloemfontein; Rietspruit; Rouxville; Shannon; Thaba'Nchu; Tweespruit (FitzSimons, 1962).

#### *LAMPROPHIS INORNATUS* Dumeril & Bibron, 1854

*Lamprophis inornatus* Dumeril & Bibron, 1854, *Erp.Gen.*, 7, p. 464:

Cape of Good Hope.

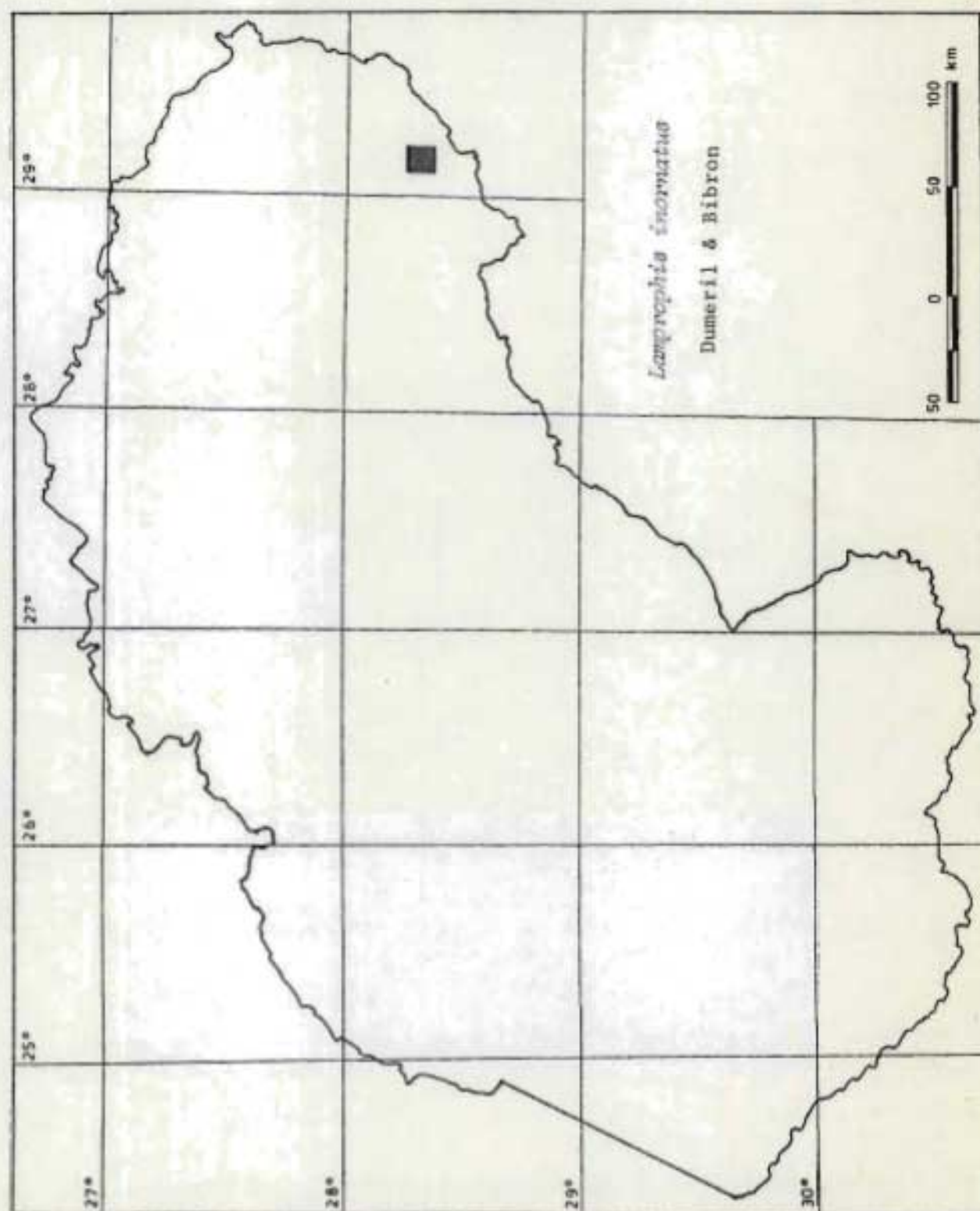
\* *Boodon infernalis* Günther, 1858, *Cat.Colubr.Snakes Brit.Mus.*, p. 199:  
Port Natal.

Common name: Olive-Brown House-Snake.

Range: From the south-western Cape Province eastwards along the coastal areas to Natal and then to Transvaal (FitzSimons, 1962).

Characters: One specimen (female) examined. Internasals much smaller than prefrontals; loreal more than twice as long (horizontally) as

Map 57





deep; preocular one; postoculars two; temporals one + two; supralabials eight, the third, fourth and fifth entering orbit; infralabials eight, first three in contact with anterior sublinguals; dorsals in 21 rows on nape, 23 at midbody and 19 anterior to vent; ventrals 185; anal plate entire; subcaudals 53; colour pale olive-brown above; ventral surfaces dark olive-brown.

Size: A female (SAM 18029 - Harrismith) 662 + 128 = 790mm.

Material examined from: Harrismith (SAM) (Map 57).

Literature records: Harrismith (FitzSimons, 1962).

Genus *BOAEDON* Dumeril & Bibron, 1854

\* *Boaedon* Dumeril & Bibron, 1854, *Exp.Gen.*, 7, p. 357. Type by subsequent designation by Loveridge, 1957: *B. lineatum* Dumeril & Bibron, 1854 = *Lycodon fuliginosus* Boie, 1827.

Key to the species:

- 1a. A double series of dark paravertebral blotches ..... *B. guttatus*, p. 159  
1b. Dorsum plain; head with a pale streak on either side ..... *B. fuliginosus*, p. 161

*BOAEDON GUTTATUS* (A. Smith, 1843)

\* *Lycodon guttatus* A. Smith, 1843, *Ill.Zool.S.Afr.*, Rept., pl. XXIII:  
"beyond Kurrichane", i.e. Rustenburg, Transvaal.

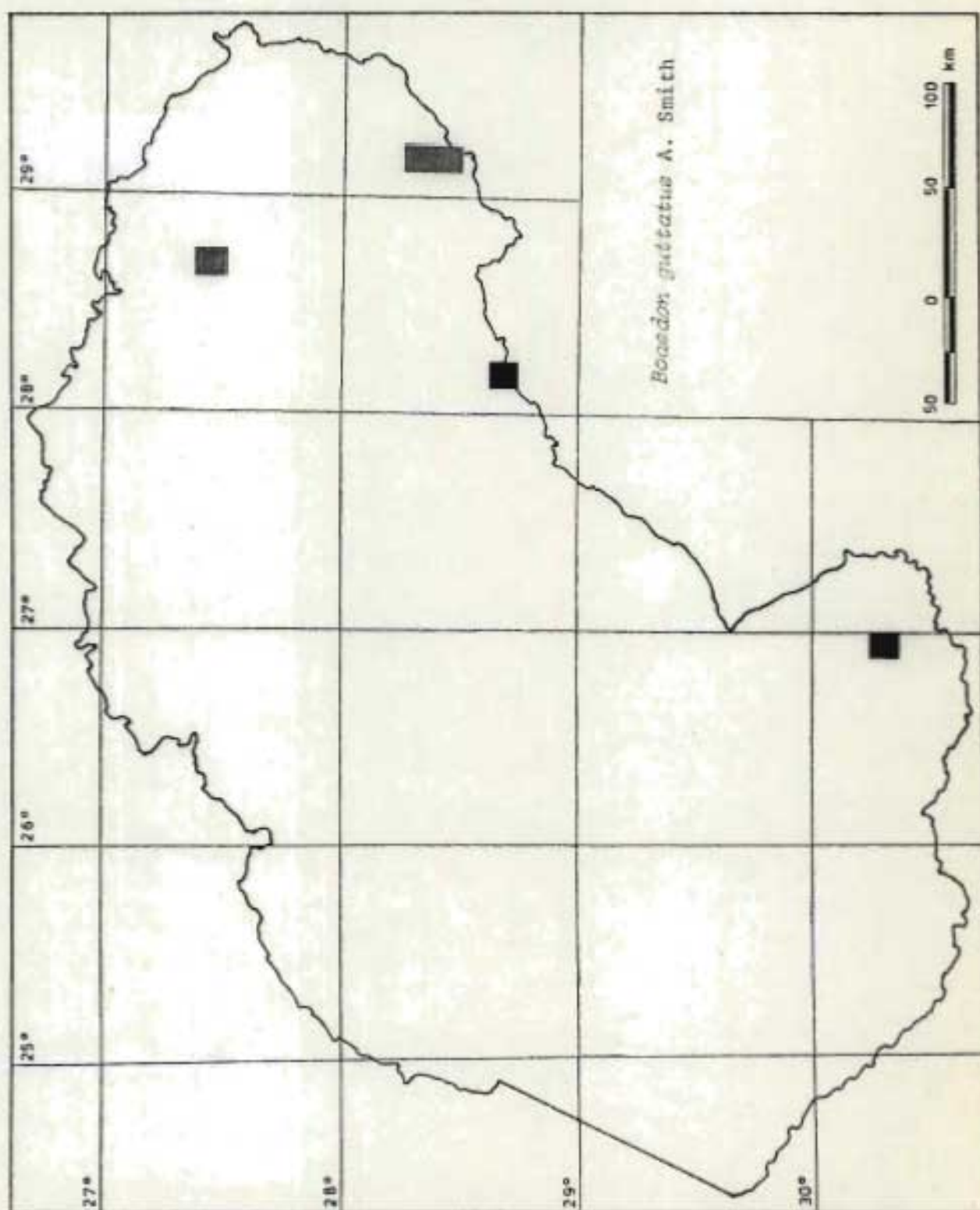
\* *Alopecion annulifer* Dumeril & Bibron, 1854, *Exp.Gen.*, 7, p. 416:  
No locality.

Common name: Spotted House-Snake.

Range: Southern Cape Province, northwards in the west to Great Namaqualand and in the east to Natal and eastern Transvaal (FitzSimons, 1966). Also the eastern parts of the Orange Free State.

Characters: Five specimens examined. Preocular one; postoculars two; temporals one + two, exceptionally one + three; supralabials eight, the third, fourth and fifth entering orbit; infralabials eight, first four in contact with anterior sublinguals; dorsal scales in 21

Map 58





to 23 rows on nape, 23 to 25 at midbody and 19 anterior to vent; ventrals 202 in males, 196 to 202 in females; anal plate entire; subcaudals 64 to 65 in males, 48 to 51 in females; colour pale brown above with dark brown alternating or confluent paravertebral blotches; some specimens have a well-defined dark band from eye to corner of mouth and a dark band from supraocular over parietal to side of head; ventral surfaces white.

Size: Largest male (NMB 3410 - Kasteelkop)  $394 + 90 = 484\text{mm}$ .

Largest female (NMB 987 - Perth)  $581 + 99 = 680\text{mm}$ .

Habitat: Found under rocks in mountainous or hilly areas.

Material examined from: Caledonspoort; Clifford; Kasteelkop; La Belle France; Perth (Map 58).

Literature records: None, new record for the Orange Free State.

*BOAEDON FULIGINOSUS* (Boie, 1827)

*BOAEDON FULIGINOSUS FULIGINOSUS* (Boie, 1827)

*Lycodon fuliginosus* Boie, 1827, Isis Oken, 20, col. 551: "Java"-error for Africa, fide FitzSimons, 1962.

*Lycodon unicolor* Schlegel (not Boie), 1837, Essai Phys.Serp., 1, p. 142; 2, p. 112: Guinea Coast.

\* *Boaedon lineatus* Dumeril & Bibron, 1854, Exp.Gen., 7, p. 363: Gold Coast.

\* *Boaedon quadrivittatus* Hallowell, 1857, Proc.Acad.nat.Sci.Philad., p. 54: Isles de Los, off French Guinea.

\* *Boaedon quadrilineatus* Dumeril, 1859, Archs Mus.natn.Hist.nat., Paris, 10, p. 193, fig. 4: Bissau, Portuguese Guinea.

\* *Alopecion variegatum* Bocage, 1867, Journ.Sci.math.phys.nat., 1, p. 230: Benguela, Angola.

\* *Boodon biprasocularis* Günther, 1888, Ann.Mag.nat.Hist., (6), 1, p. 330, pl. xviii, fig. B: Lake Tanganyika.

\* *Boodon lineatus* var *plutonius* Werner, 1902, Verh.zool.-bot.Ges.Wien, 52, p. 334: Boké, Rio Nunez, French Guinea.

\* *Boaedon maculatus* Parker, 1932, Proc.zool.Soc.Lond., p. 363: Biheh, Somalia.

Common name: Common House-Snake; Bruin-huisslang.

Range: Africa south of the Sahara, excluding the rain forests and replaced in South West Africa by *Boaedon fuliginosus mentalis* (FitzSimons, 1962).

Characters: One hundred and thirty-nine specimens examined. Posterior sublinguals usually in contact, separated by prolongation of anterior sublinguals in only four specimens; preoculars one or two; postoculars two, exceptionally one or three; temporals one + two, seldom one + one, two + two or one + three; supralabials eight, seldom nine, the fourth and fifth usually entering orbit, fifth and sixth or fourth, fifth and sixth or third, fourth and fifth seldom entering orbit; infralabials nine to ten, seldom eight or 11, first three or four in contact with anterior sublinguals; dorsal scales in 23 to 27 rows on nape, 22 to 31 (mostly 27 or 29) at midbody and 16 to 21 (mostly 19) anterior to vent; ventrals 194 to 213 in males and 205 to 232 in females; anal plate entire; subcaudals 54 to 63 in males and 42 to 52 in females; colour above reddish-brown to dark brown; two pale streaks on either side of head, the upper from snout through eye to temporal region and the lower from eye to corner of mouth; ventral surfaces white.

Size: Largest male (NMB 2821 - Rondeberg)  $516 + 101 = 617\text{mm}$ . Largest female (NMB 1199 - Bloemfontein)  $807 + 103 = 910\text{mm}$ .

Habitat: Often found in the vicinity of houses and ruins but most specimens were collected from old termitaria and under rocks.

Breeding: A gravid female collected in September contained nine small eggs while another female collected in December contained six eggs measuring  $43 \times 13\text{mm}$ .

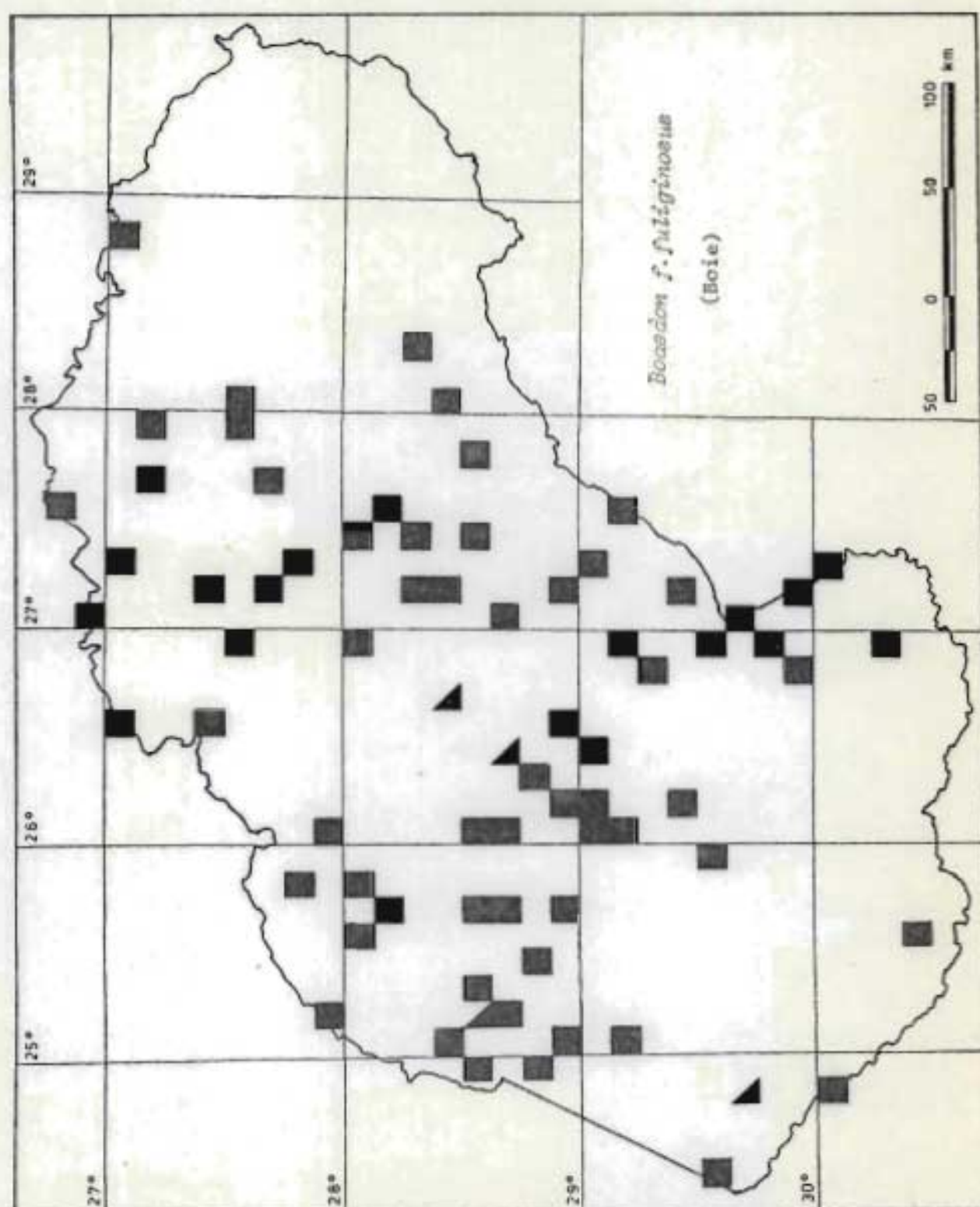
Diet: The stomach contents of various specimens were as follows:

*Pachydactylus a. capensis*; *Mabuya p. punctatissima*; *Agama atra*; *Nucras taniolata ornata*; *Eptesicus capensis* (Chiroptera); *Suncus* sp. (shrew).

Material examined from: Bergplaats, Bloemfontein; Bethany; Bethel; Beyersfontein; Bloemfontein; Boschkloof; Boschrand; Boskop; Brabant; Carlie; Ceylon; Cornwall; Deelfontein, Bothaville; Di Poort; Doornbult; Geluk, Boshof; Grootkrans; Haagen's Stad; Holme's Dale; Houmoed; Kades; Kafferskop; Klipbankfontein; Klipdrift; Klippiesspan; Klipplaatdrift, Winburg; Kranskop; La Belle France; Lanquedoc; Leeuwkop; Leeuwkuil; Leliehoek; Lemoenboord; Lemoenhoek; Littlecote; Lorenzo; Lovedale; Mandyville; Merion, Bethlehem; Merriesfontein; Meyerskraal; Morgenzon, Senekal; Mount Nelson; Naval Hill; Patrijdsdraai; Petra; Proses; Quaggaspruit; Rohallion;



Map 59



Rondavel; Rondeberg; Spijtfontein; Straalfontein; Strijdfontein, Heilbron; Tempe; Triangle; Tweefontein; Uitkijk; Uitkomst; Uitkyk; Vaalkop; Van Aswegen's Hoek; Van Der Walt's Rust; Venus; Waterhoek; Welbedacht; Weltevrede; Wilhelmshohe; Willem Pretorius Game Reserve; Wittekopjes; Wolvekop, Kroonstad; Wonderkop; Zoutpan, Fauresmith (Map 59).

Literature records: Bloemfontein; Boshof; Brandfort; Luckhoff; Theunissen (FitzSimons, 1962).

Note: *Boaedon fuliginosus mentalis* Günther, 1888, is distinguished from the nominate race on the basis of its posterior sublinguals being separated or partly separated, by a prolongation of the anterior sublinguals and of a tendency for the third, fourth and fifth supralabials to enter the orbit (FitzSimons, 1962). Four Orange Free State specimens (Lorenzo; Patrijsdraai; Willem Pretorius Game Reserve; Wonderkop), collected sympatrically with typical *B.f. fuliginosus*, have the posterior sublinguals separated and the fourth and fifth supralabials entering orbit. An investigation based on adequate material may eventually prove *mentalis* to be linked with the nominate race by a character gradient.

#### Genus *LYCOPHIDION* Fitzinger, 1843

≠ *Lycophidion* Fitzinger, 1843, Syst.Rept., p. 27. Type by original designation: *Lycodon horstokii* Schlegel, 1837 = *Lycodon capensis* A. Smith, 1831.

#### *LYCOPHIDION CAPENSE* (A. Smith, 1831)

#### *LYCOPHIDION CAPENSE CAPENSE* (A. Smith, 1831)

≠ *Lycodon capensis* A. Smith, 1831, S.Afr.Quart.Journ., No. V, p. 18: Port Elizabeth, by present restriction (see note).  
*Lycodon horstokii* Schlegel, 1837, Essai Phys.Serp., 2, p. 111, pl. iv, figs. 10 & 11: Cape of Good Hope.

Common name: Cape Wolf-Snake.

Range: Savanna areas of Africa, excluding the western Cape Province (FitzSimons, 1962). Also the Orange Free State, excluding the south-western and north-eastern parts.



Characters: Seventy specimens examined. Postnasal present; dorsal scales with a single apical pit; preocular one; postoculars two; temporals one + two, exceptionally one + three; supralabials eight, the third, fourth and fifth, exceptionally fourth and fifth only, entering orbit, rarely nine supralabials with fourth, fifth and sixth entering orbit; infralabials eight, exceptionally nine, the first four or five in contact with anterior sublinguals (two specimens have first three and fifth in contact with anterior sublinguals, the fourth being excluded); dorsal scales in 17 rows on nape and at midbody, 15 anterior to vent; ventrals 169 to 186 in males and 172 to 192 in females; anal plate entire; subcaudals 32 to 41 in males and 24 to 31 in females; colour above shiny black, dorsal scales sometimes with a small white apical dot; ventral surfaces usually white, sometimes blackish or with dark markings on chin and subcaudals only.

Size: Largest male (NMB 3662 - Patrijdraai)  $328 + 50 = 378\text{mm}$ .

Largest female (NMB 1518 - Pietersberg)  $407 + 44 = 451\text{mm}$ .

Habitat: Most specimens were found in old termitaria and a few under rocks.

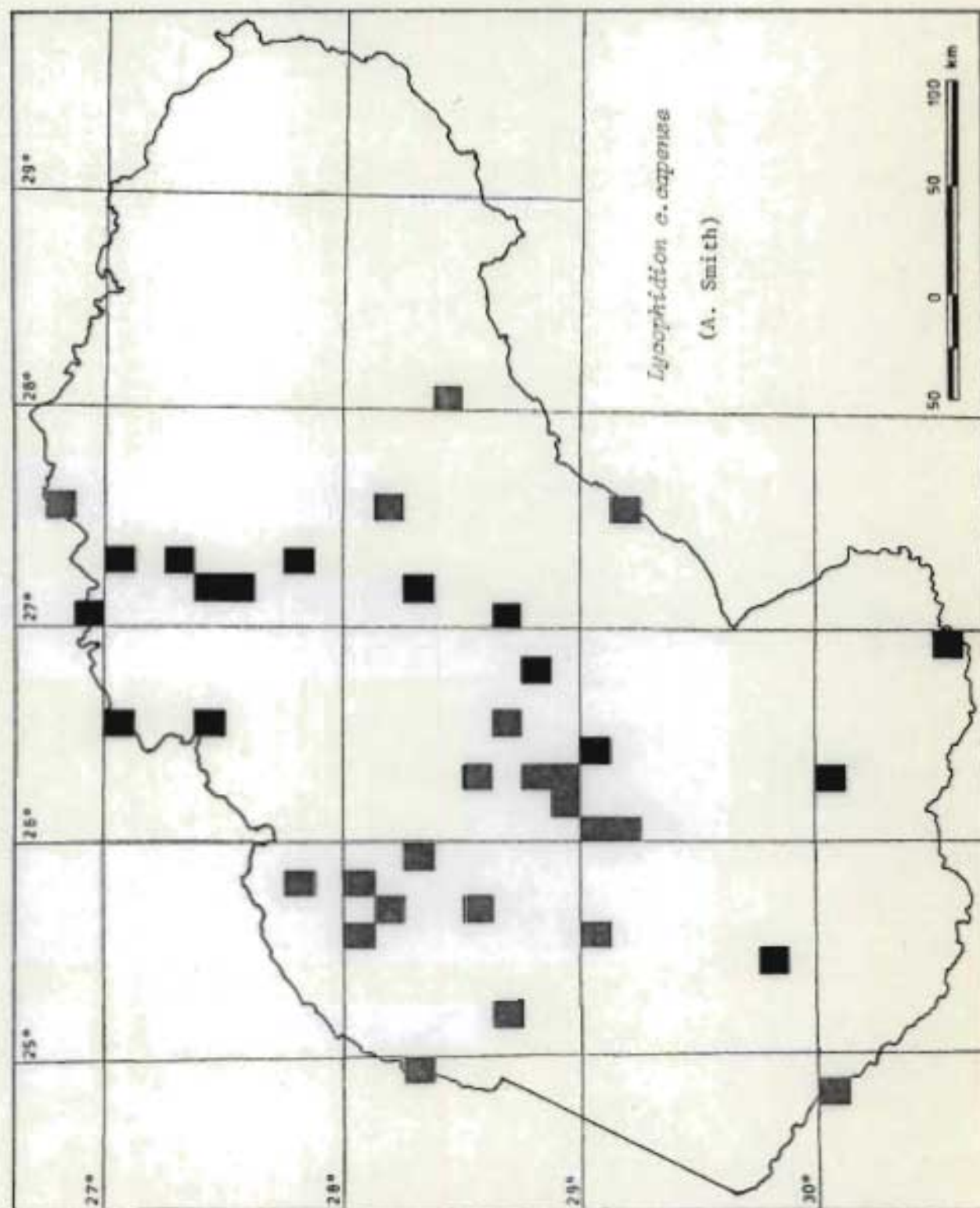
Diet: The following lizards were found to be eaten: *Afroablepharus wahlbergi*; *Pachydaetylus a. capensis*; *Mabuja varia*.

Material examined from: Bergplaats, Bloemfontein; Bethel; Beyersfontein; Boesmansberg; Boschkloof; Boschrand; Boskop; Brabant; Deelfontein, Bothaville; Die Hoogte; Doornplaat; Glen; Hebron; Holme's Dale; Houmoed; Jagersfontein; Klipdrift; Klipplaatdrift, Winburg; Kraaifontein; Lorenzo; Mara, Vredefort; Meyerskraal; Middenspruit; Patrijdraai; Pietersberg; Platberg, Boshof; Proces; Rondeberg; Susannasfontein; Van Der Walt's Rust; Venus; Wilhelmshohe; Willem Pretorius Game Reserve; Wittekopjes; Wonderkop (Map 60).

Literature records: None, new record for the Orange Free State.

Note: The type locality of *Lycophidion capense* (A. Smith, 1831) is cited by Loveridge (1957), FitzSimons (1962), Broadley (1966) and Laurent (1968) as Kurriichane (= Rustenburg district), Transvaal. In his description of this form A. Smith (1831, p. 18) states that he examined two specimens, one from Cape Town and one from Port Elizabeth. *Lycophidion a. capense* seems to be absent from Cape Town (see FitzSimons, 1962) so that the type locality of this form is therefore restricted

Map 60





to Port Elizabeth, the second locality mentioned by Smith. The locality Kurrichane is given only by Smith (1838), and in any case it was well after 1831 that Smith travelled north and visited Kurrichane (Kirby, 1940).

Genus *PHILOTHAMNUS* A. Smith, 1840

- \* *Philothamnus* A. Smith, 1840, Ill.Zool.S.Afr., Rept., footnote to text for pl. LIX. Type by present designation: *Dendrophis (Philothamnus) semivariiegata* A. Smith, 1840.

Note: Loveridge (1957; 1958) states that *Dendrophis (Philothamnus) semivariiegata* A. Smith, 1840, is the type-species of *Philothamnus* by monotypy. This cannot be correct as Smith (1840) described also *natalensis* and *albo-variata* in the same subgenus in the same work (Ill.Zool.S.Afr., Rept., pls. 64 & 65).

*PHILOTHAMNUS NATALENSIS* (A.Smith, 1840)

- \* *Dendrophis (Philothamnus) natalensis* A. Smith, 1840, Ill.Zool.S.Afr., Rept., pl. LXIV, figs. 1-3: Port Natal.

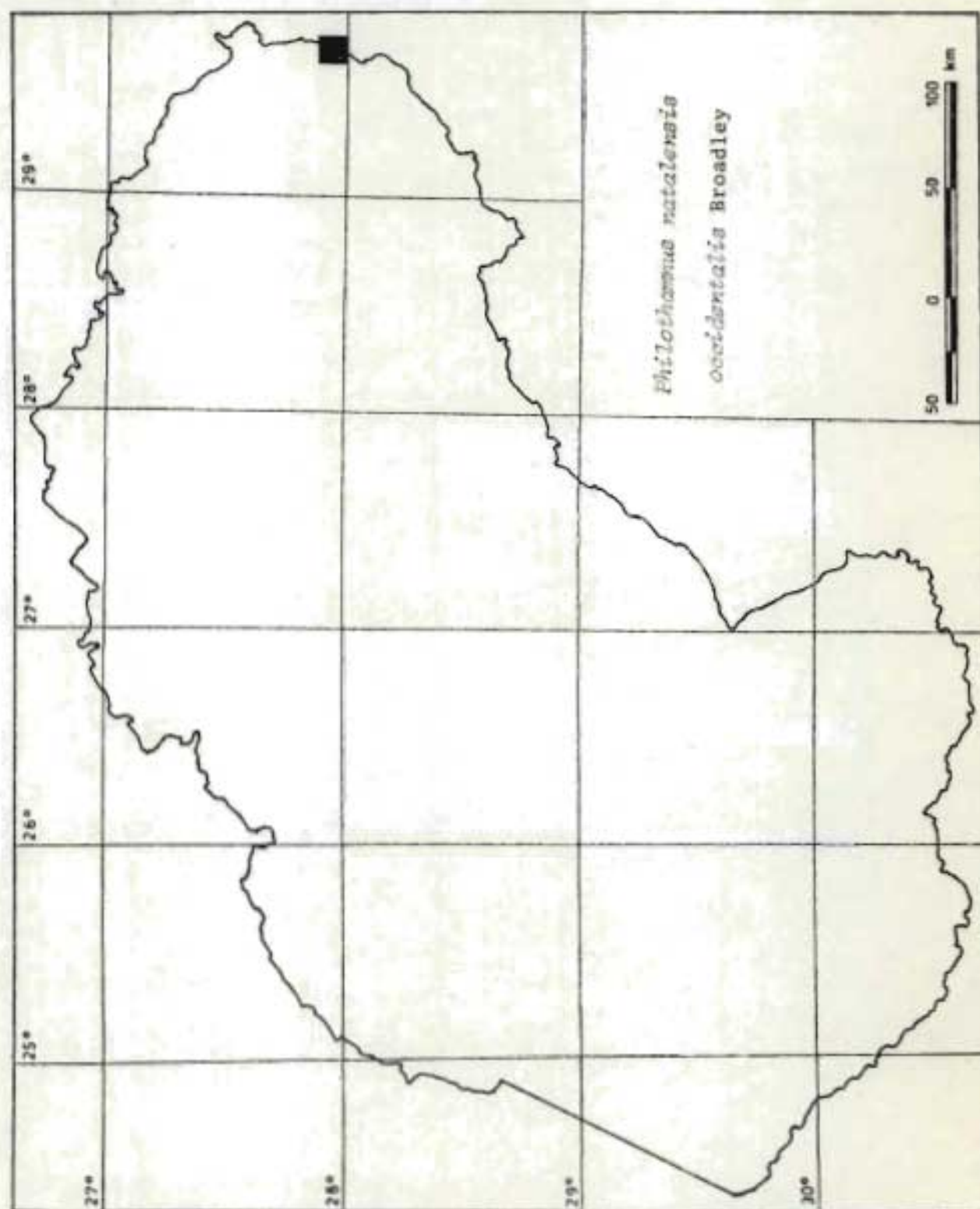
*PHILOTHAMNUS NATALENSIS OCCIDENTALIS* Broadley, 1966

- \* *Philothamnus natalensis occidentalis* Broadley, 1966, Ann.Natal Mus., 18, (2), p. 419: Camperdown, Natal.

Range: Transvaal, south of the Soutpansberg to Natal, eastern and southern Cape Province (Broadley, 1966a). Also the north-eastern Orange Free State.

Characters: One specimen (female) examined. Preocular one; postoculars two; temporals two + two; supralabials nine, the fifth and sixth entering orbit; infralabials ten, the first five in contact with anterior sublinguals; dorsal scales smooth, in 15 rows on nape and at midbody, 11 anterior to vent; ventrals 168, keeled laterally; anal plate divided; subcaudals 119, smooth; colour uniformly dark green above; ventral surfaces white to yellowish-green laterally.

Map 61





Size: Female (NMB 1432 - Oever)  $776 + 330 = 1106\text{mm}$ .

Habitat: Collected on side of pond.

Diet: The stomach contents consisted of a *Rana* sp.

Material examined from: Oever (Map 61).

Literature records: None, new record for the Orange Free State.

Genus *PROSYMNA* Gray, 1849

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

*Calamaria meleagris* Reinhardt, 1843.

*PROSYMNA SUNDEVALLI* (A. Smith, 1849)

*PROSYMNA SUNDEVALLI SUNDEVALLI* (A. Smith, 1849)

\* *Temnorhynchus sundervallii* (sic) A. Smith, 1849, Ill.Zool.S.Afr.,

Rept., App., p. 17: "Kaffirland to the eastward of Cape Colony".

\* *Rhinostoma cupreum* Günther, 1858, Cat.Colubr.Snakes Brit.Mus., p. 9:

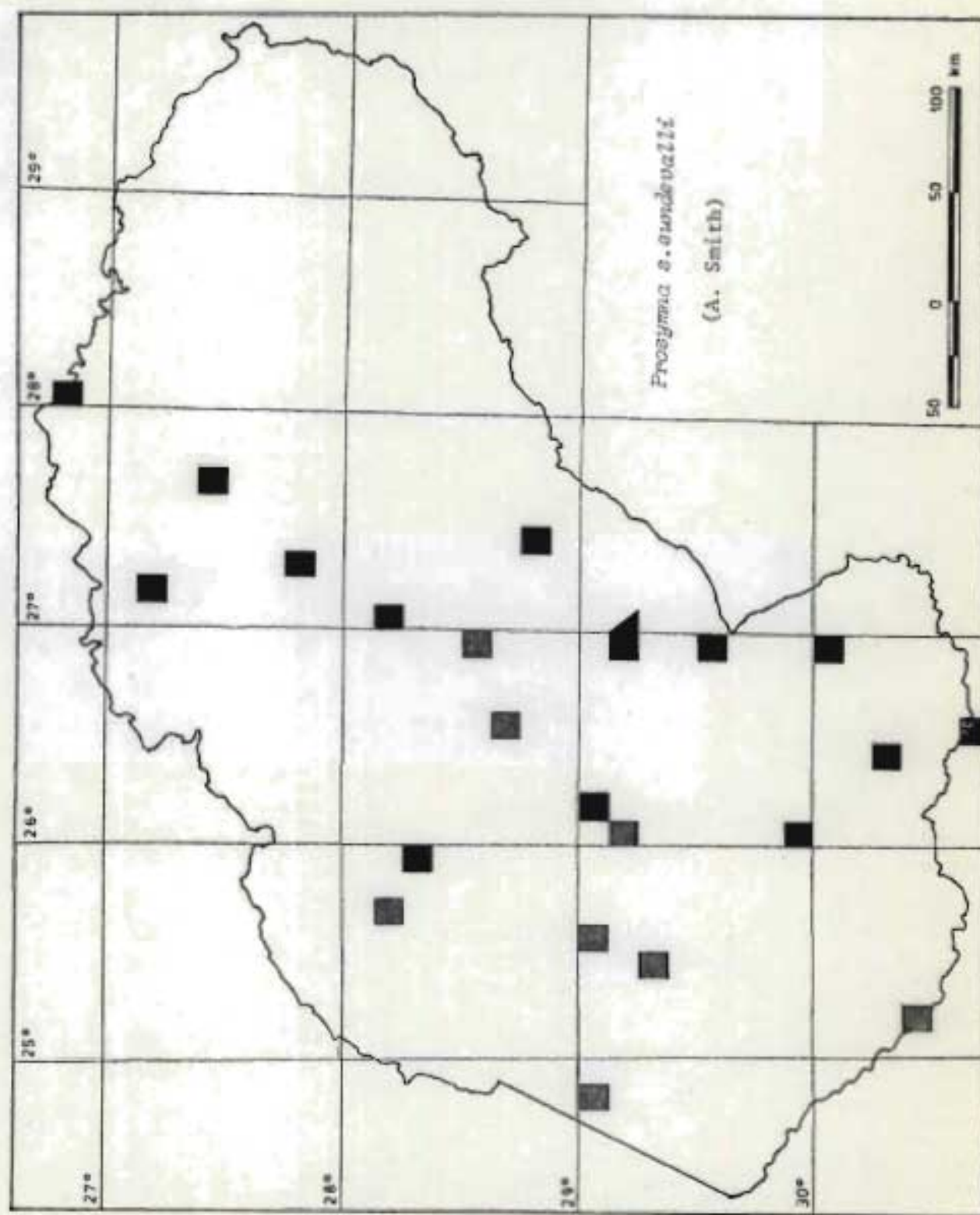
Africa.

Common name: Sundevall's Shovel-snout; Graafneusslang.

Range: Central Transvaal, Orange Free State, Lesotho, Natal and Cape Province (Broadley, 1965).

Characters: Twenty-seven specimens examined. Internasals usually separated, in contact in six specimens; preoculars one, exceptionally two; postoculars two; temporals one + two or two + two, seldom two + three; supralabials six, the third and fourth entering orbit, exceptionally five supralabials with the second and third entering orbit; infralabials eight, seldom seven, the first three, exceptionally first four, in contact with anterior sublinguals; dorsal scales in 19, seldom 21, rows on nape, 15 at midbody and anterior to vent; ventrals 146 to 153 in males, 159 to 177 in females; anal plate entire; subcaudals 27 to 31 in males, 20 to 26 in females; colour brown above; a paired series of dark paravertebral spots, sometimes bordered with white; a faint pale vertebral line sometimes present anteriorly; frontal and parietals each with a large yellow spot; ventral surfaces white; two specimens (Die Hoogte; Boskop) have a broad pale vertebral band with small dark markings and sides uniform brown, paired dorsal spots absent.

Map 62





Size: Largest male (NMB 3661 - Patrijsdraai)  $238 + 34 = 272\text{mm}$ .

Largest female (NMB 1956 - Klipfontein)  $285 + 30 = 315\text{mm}$ .

Habitat: All specimens were collected in old termitaria and under rocks.

Material examined from: Annies Rust; Babel; Bainsvlei; Baltespoort; Bloemendal; Bloemfontein; Boskop; Brakpan; Die Hoogte; Doornplaat; Exelsior, Edenburg; Groenekloof; Honingberg; Houtkop; Karreepoort; Klipfontein; Milambi; Ongegund; Patrijsdraai; Pietersberg;

Rayton; Uitkijk; Uitkomst; Weltevreden, Smithfield; Zandvoort (Map 62).

Literature records: Bloemfontein; Tweespruit (FitzSimons, 1962).

Genus *PSEUDASPIS* Fitzinger, 1843

- \* *Pseudaspis* Fitzinger, 1843, Syst.Rept., p. 25. Type by original designation: *Coluber ocaus* Linnaeus, 1758.

*PSEUDASPIS CANA* (Linnaeus, 1758)

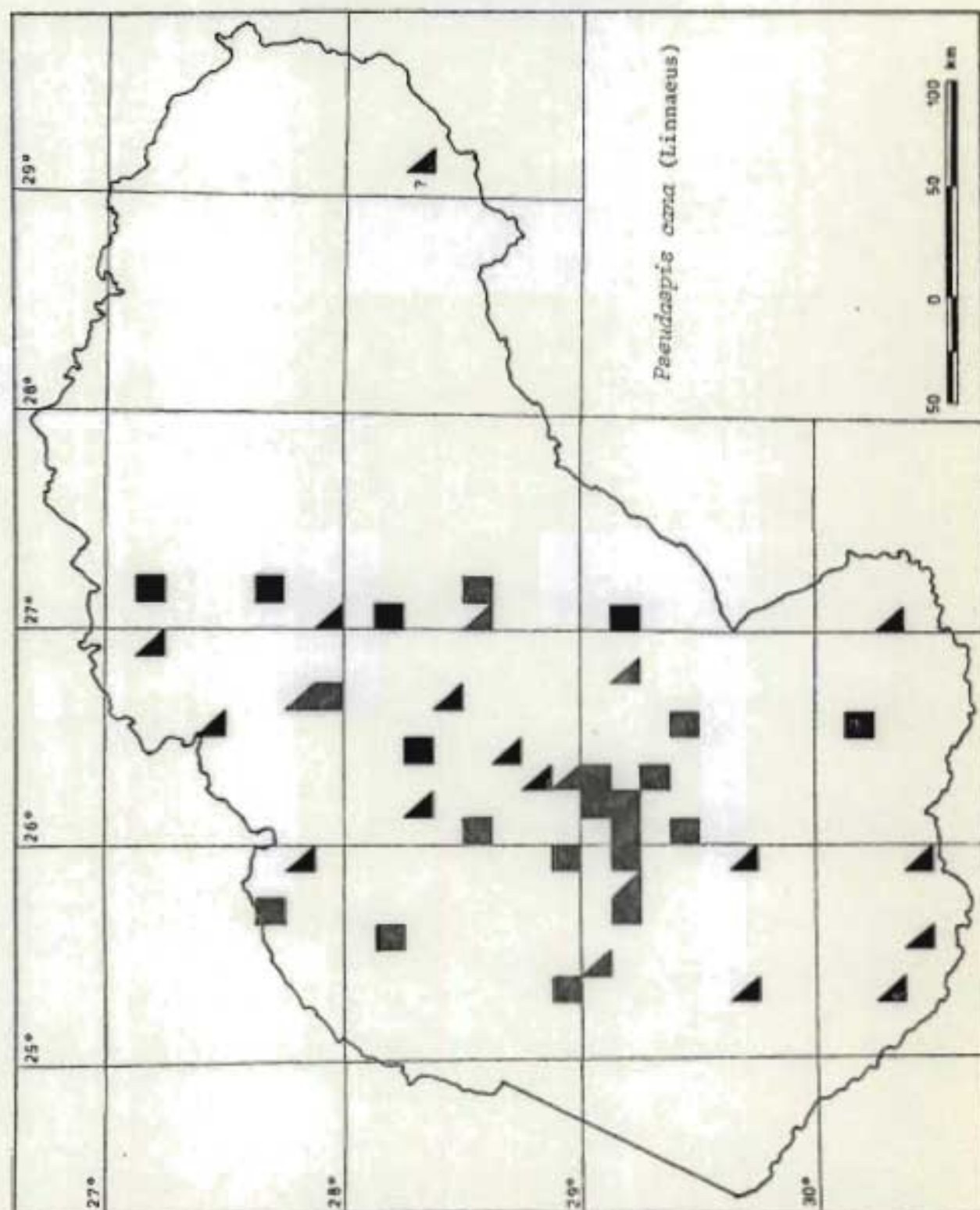
- \* *Coluber ocaus* Linnaeus, 1758, Syst.Nat., ed. 10, 1, p. 221: "in Indiis" = Africa, fide FitzSimons, 1962.
- \* *Coluber elegantissimus* Laurenti, 1768, Syn.Rept., p. 96: No locality.
- Coluber ocellatus* Gmelin, 1789, Syst.Nat., ed. 13, 1, (3), p. 1113: "Zeylon et Sina" (error).
- Cadmus cuneiformis* Theobald, 1868, Cat.Rept.Asian Soc.Mus., p. 58: "Simla, India" (error).
- \* *Coronella phocaena* Günther, 1872, Proc.zool.Soc.Lond., p. 836: Robben Island, Cape Province.
- \* *Ophirrhina anchietae* Bocage, 1882, Journ.Sci.math.phys.nat., 8, p. 300: Caconda, Angola.

Common name: Mole-Snake; Molslang.

Range: Southern Africa, extending to Angola in the west and Kenya in the east (FitzSimons, 1962).

Characters: Thirty-seven specimens examined. Preoculars one, seldom two; postoculars three or four; temporals mostly three + four or two + four, otherwise very variable; supralabials seven, fourth entering orbit; infralabials 10 to 13, first four to six in contact

Map 63





with anterior sublinguals; dorsal scales in 25 to 27 rows on nape, 27, seldom 25, at midbody and 17 to 19, exceptionally 16 or 20, anterior to vent; ventrals 186 to 197 in males and 206 to 218 in females; anal plate divided; subcaudals 57 to 66 in males, 50 to 55 in females; young specimens and subadults pale brown above with a dark brown to blackish, irregular zig-zag vertebral streak and blackish lateral spots, each spot with a white dorsal mark; ventral surfaces uniformly whitish; adults usually pale brown to dark brown above and dirty white below; three specimens pitch black above and below.

Size: Largest male (NMB 2645 - Karreepoort)  $1218 + 253 = 1471\text{mm}$ .

Largest female (NMB 989 - Somerset)  $862 + 135 = 997\text{mm}$ .

Habitat: Found in open grassland, in rodent burrows and under rocks.

Predators: One juvenile was found in the stomach of a *Psammophis leightoni trinasalis* and another specimen held in captivity was taken by a *Naja nivea*.

Diet: Several specimens contained remains of small mammals.

Material examined from: Baltespoort; Bloemfontein; Dealesgift; Hartebeestfontein, Bloemfontein; Hertzogville; Karreepoort; Kolbe; Kroonstad (TM); Krugersdrift Dam; Merino, Bloemfontein; Platkop; Rietfontein, Bultfontein; Rietspruit; Schoongezicht; Smithfield (SAM); Somerset; Sweet Home; Tweespruit (TM); Utopia; Vaalbank Zuid; Vet River - Bloemhof Dam junction; Welgedacht; Welkom; Zandvoort (Map 63).

Literature records: Kroonstad (Symonds, 1887); Smithfield (Boulenger, 1910); Fauresmith (Hewitt & Power, 1913); Bethulie; Bloemfontein; Bothaville; Brandfort; Bultfontein; De Brug; Edenburg; Glen; Harrismith (needs confirmation); Henneman; Hertzogville; Hoopstad; Karee; Odendaalsrus; Petrusburg; Philippolis; Prior; Thaba'Nchu; Theunissen; Tweespruit; Viljoenskroon; Winburg; Zastron (FitzSimons, 1962).

Genus *DUBERRIA* Fitzinger, 1826

- \* *Duberria* Fitzinger, 1826, Neue Class.Rept., pp. 29, 55. Type by absolute tautonymy: *Coluber arctiventris* Daudin, 1803 = *Coluber duberria* Merrem, 1790 = *Coluber lutrix* Linnaeus, 1758.

*DUBERRIA LUTRIX* (Linnaeus, 1758)

*DUBERRIA LUTRIX LUTRIX* (Linnaeus, 1758)

- \* *Coluber lutrix* Linnaeus, 1758, Syst.Nat., ed. 10, 1, p. 216: "In Indiis"  
= Africa, fide FitzSimons, 1962.  
*Coluber duberria* Merrem, 1790, Beytr.Naturg., p. 7, pl. i: No locality.  
*Coluber tetragonus* Latreille, 1802, Hist.Nat.Rept., 4, p. 97: "?France".  
\* *Coluber arotiventris* Daudin, 1803, Hist.Nat.Rept., 7, p. 221: New  
name for *C.duberria* Merrem, 1790.  
\* *Coluber erathon* Hermann, 1804, Observat.Zool., p. 273: "India orientali".  
*Cyclophis catenatus* Theobald, 1868, Cat.Rept.Asian Soc.Mus., p.49:  
"Simla, India".

Common name: Southern Slug-eater; Slakvreter.

Range: The southern and eastern parts of South Africa and southern Mozambique (FitzSimons, 1962).

Characters: Four specimens examined. Loreal usually present, absent in one specimen; preocular one; postoculars two, exceptionally one; temporals one + two; supralabials six, third and fourth entering orbit; infralabials six, first three in contact with anterior sublinguals; dorsal scales in 15 rows on nape, at midbody and anterior to vent; ventrals 119 to 130; anal plate entire; subcaudals 39 to 42 in males, 27 in females; dorsum with a broad beige longitudinal band bisected by a thin dark vertebral line; sides dark brown dorsolaterally to grey ventrolaterally; ventral surfaces white with outer ends of ventrals grey.

Size: Largest male (NMB 283 - Bloemfontein)  $177 + 42 = 219\text{mm}$ .

Largest female (NMB 2646 - Leeuwkop)  $217 + 32 = 249\text{mm}$ .

Habitat: Found under rocks and in old termitaria.

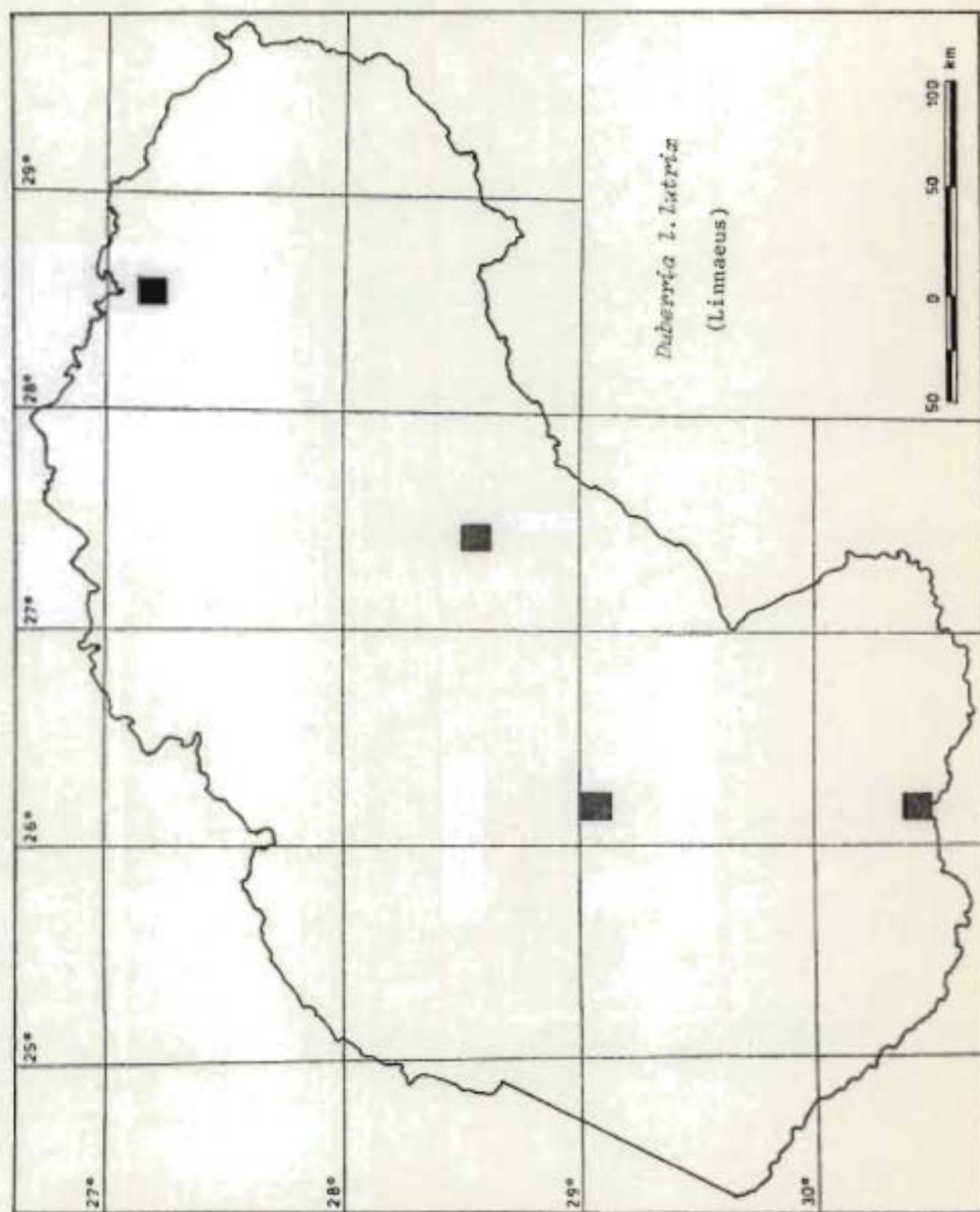
Breeding: Two gravid females were collected, one in March containing eight small eggs and another in October containing 11 well-developed eggs.

Material examined from: Bloemfontein; Dasklip; Deelfontein, Bethulie; Leeuwkop (Map 64).

Literature records: Deelfontein, Bethulie (FitzSimons, 1962).



Map 64



Genus *DASYPELTIS* Wagler, 1830

- \* *Dasypeltis* Wagler, 1830, Nat.Syst.Amph., p. 178. Type by monotypy:  
*Coluber scaber* Linnaeus, 1758.

*DASYPELTIS SCABRA* (Linnaeus, 1758)

- \* *Coluber scaber* Linnaeus, 1758, Syst.Nat., ed. 10, 1, p. 223: "in Indiis"  
= South Africa, fide Flower, 1933.
- \* *Anodon typus* A. Smith, 1829, Zool.Journ., 4, p. 443: Cape Town,  
Cape Province.
- Rachiodon abyssinus* Dumeril & Bibron, 1854, Erpet.Gen., 7, p. 496:  
Ethiopia.
- Dasypeltis scaber* var *capensis* Peters, 1864, Mber.dt.Akad.Wiss.Berl.,  
p. 644, footnote: Cape of Good Hope.
- Dasypeltis scaber* var *mossambicus* Peters, 1864, Mber.dt.Akad.Wiss.Berl.,  
p. 644, footnote: Tete, Mozambique.
- Dasypeltis scaber* var *breviceps* Peters, 1864, Mber.dt.Akad.Wiss.Berl.,  
p. 645, footnote: "Kaffirland".
- Dasypeltis lineolatus* Peters, 1878, Mber.dt.Akad.Wiss.Berl., p. 206:  
Kitui, Ukamba, Kenya.
- \* *Dasypeltis scabra* var *atra* Sternfeld, 1912, Wiss.Ergebn.Deutsch.Zentral-  
Afrika-Exped., 1907-1908, 4, p. 272: Northwest shore of Lake  
Tanganyika, Zaïre.
- Dasypeltis scabra loveridgei* Mertens, 1954, Zool.Anz., 152, p. 213:  
Finkenstein Farm near Windhoek, South West Africa.

Common name: Common Egg-eater; Eiervreter.

Range: Africa, excluding desert, extreme mountain peaks and dense  
lowland rainforest; also southern Arabia (Gans, 1959).

Characters: Three hundred and twenty specimens examined. Preoculars  
usually one, seldom two, exceptionally absent with prefrontal and  
nasal entering orbit; postoculars usually two, seldom one or three;  
temporals usually two + three, otherwise very variable; loreal absent;  
third to fifth or third to sixth row of lateral scales reduced and  
serrated, exceptionally reduced but not serrated in some juveniles;  
supralabials either six, with second and third entering orbit or seven  
with third and fourth entering orbit; infralabials seven to nine



with first three in contact with anterior sublinguals; dorsals in 21 to 28 rows on nape, 21 to 27 at midbody and 17 to 22 anterior to vent; ventrals 175 to 202 in males, 189 to 219 in females; anal entire; subcaudals 44 to 64 in males, 35 to 59 in females; two colour varieties; rhombic phase: light brown or grey above with a vertebral series of dark brown to blackish blotches alternated by a lateral series of dark transverse bars; interspaces between vertebral dark blotches usually distinctly paler than prevailing ground colour; vertebral dark blotches sometimes in contact to form a zig-zag band; a dark V-shaped marking pointing forward on nape, preceded on head by one or two similar but narrower markings; ventral surfaces whitish, uniform or more often dark-spotted or with greyish transverse bands on several or all ventrals, together with dark ventrolateral spots; brown phase: (twenty-nine specimens) uniformly beige-brown above; ventral surfaces whitish to pale beige; sympatric with the common rhombic phase at: Brockenhurst; Goedetrouw; Kafferskop; Klipoog; Lanquedoc; Petra; Platrand; Quaggaspruit; Rambouillet; Rusthof; Stoffelfontein; Stoltzskop; Venus; Willem Pretorius Game Reserve; Wolvekop, Kroonstad.

Size: Largest male (NMB 2075 - Van Aswegenshoek)  $445 + 90 = 535\text{mm}$ .  
Largest female (NMB 2680 - Rohallion)  $609 + 81 = 690\text{mm}$ .

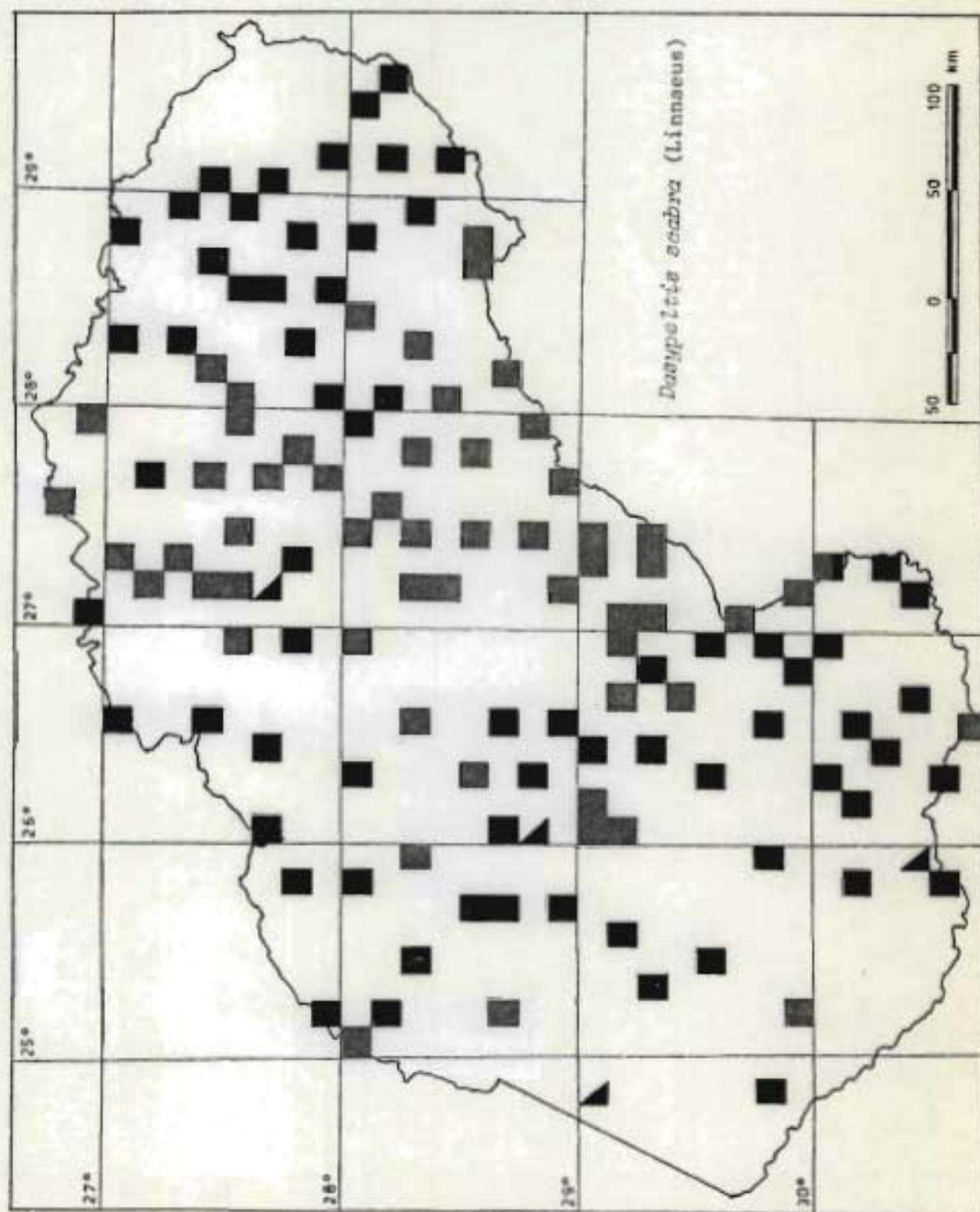
Habitat: Widespread all over the study area. Collected mainly from old termitaria but sometimes found also under rocks.

Breeding: One female collected in November contained three eggs measuring  $41 \times 10\text{mm}$ .

Diet: The stomach contents of several specimens revealed the remains of bird egg-shells; two specimens contained bird embryos, three in one snake and two in another, the embryos measuring approximately  $30\text{mm}$  long. This proves that these snakes will take not only fresh eggs but also highly incubated eggs.

Material examined from: Alpha; Anna's Rust; Annies Rust; Atalanta; Babel; Bachelor's Home; Baltespoort; Bergkloof; Bergplaats, Bloemfontein; Bergplaats, Dewetsdorp; Berlin; Bethel; Beyersfontein; Biddulphsberg; Bloemfontein; Boesmansberg; Bon Haven; Boschkloof; Boschkop; Boschrand; Brabant; Braunzijkop; Brockenhurst; Caledonspoor; Carlie; Ceylon; Dealbata; Deelfontein, Bothaville; De Rust; Die Hoogte; Dipka; Di Poort; Doornland; Elandsfontein; Francis Home; Goedetrouw; Grootkrans; Haagen's Stad; Hartebeestfontein, Boshof; Hebron; Honingberg; Hoogeveld, Theunissen; Houmoed; Houtkop;

Map 65





Joostenberg; Kafferskop; Kasteelkop; Kleinplaas; Klipdrift; Klipfontein; Klipoog; Klipplaat; Kopjeskraal; Koppiesdam; Kranskop; Lange Hoek; Lanquedoc; La Riviera; Leeuwkop; Leliehoek; Lessingskop; Littlecote; Lorenzo; Loskop; Lovedale; Luiperfontein; Maanhaar; Magdalen; Mandyville; Mara, Vredefort; Maseru; Mecklenburg; Merino, Bethlehem; Meyerskraal; Middenspruit; Milambi; Mimosa; Monontsa Pass; Mooigelegen; Morgenzon, Ficksburg; Morgenzon, Harrismith; Morgenzon, Senekal; Morgenzon, Zastron; Mount Nelson; Noodhulp; Onze Rust; Petra; Pietersberg; Platrand; Proces; Quaggaspruit; Ramalitse; Rambouillet; Rietfontein, Rouxville; Riverside; Rohallion; Rusthof; Slangheuvel; Smaldeel; Smithskraal; Spijtfontein; Stoffelfontein; Stoltzskop; Straalfontein; Tafelberg; Thaba Pacho Berg; Triangle; Tweefontein; Twee Zusters; Uitkijk; Uitkomst; Vaalkop; Van Aswegen's Hoek; Van Der Walt's Rust; Venus; Verdun, Reitz; Vergaderrand; Welbedacht; Weltevreden, Smithfield; Willem Pretorius Game Reserve; Winterspoort; Wittekopjes; Witziesshoek; Wolvekop, Kroonstad; Wonderkop; Woudzicht; Zandfontein; Zomervlakte; Zwartkoppies (Map 65).

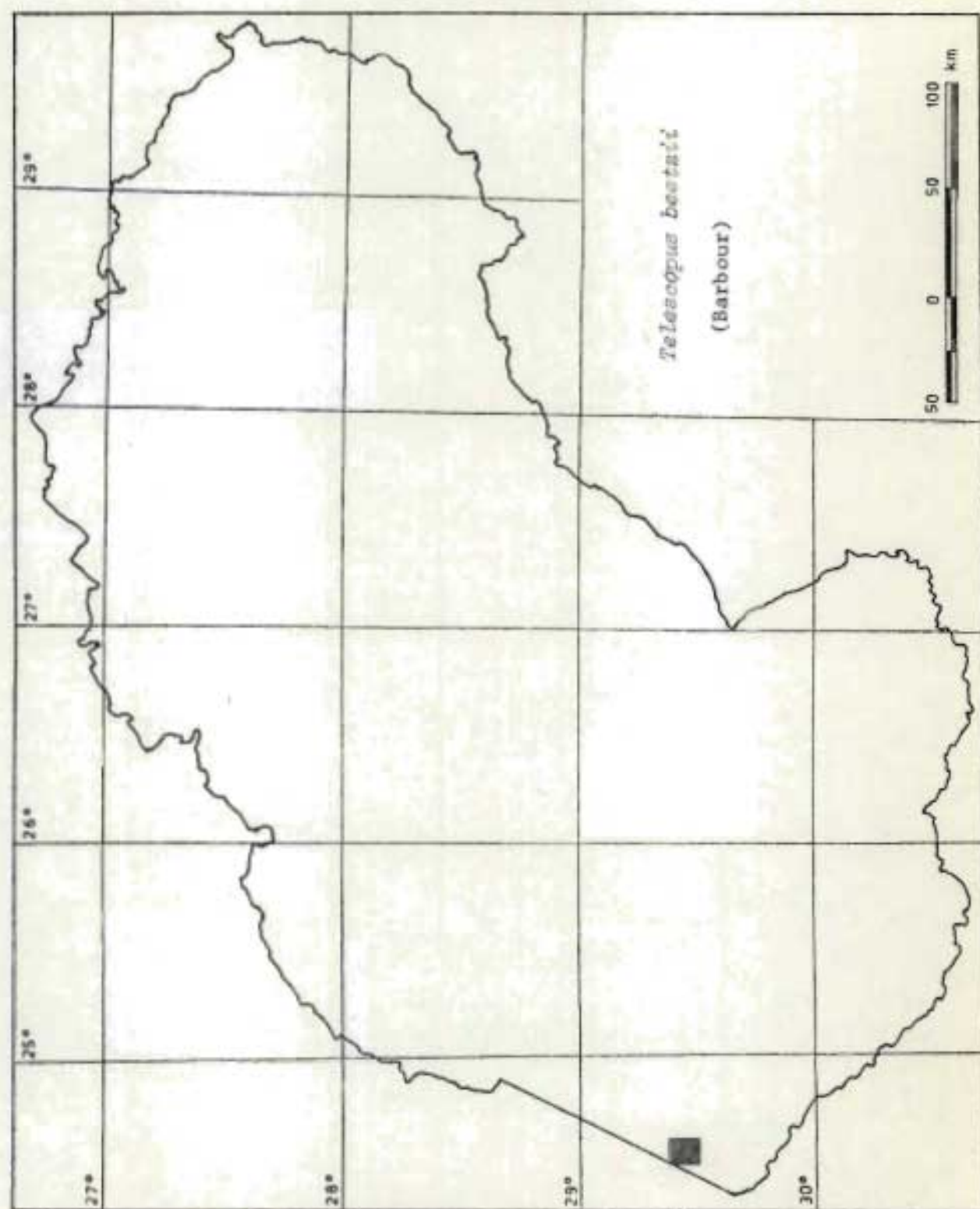
Literature records: Bainsvlei; Bethulie; Bloemfontein; Florisbad; Jacobsdal; Kroonstad; Smithfield (FitzSimons, 1962).

Note: In his revision of the genus *Dasyeltis*, Gans (1959) comments on the problems involved in recognizing the colour variants of *D. scabra* as races, especially as this would amount to nothing more than naming the terminal portions of various clines or extremely localized variant populations. FitzSimons (1962) treated *D. scabra* as a polytypic species without giving substantial reasons for doing so. Therefore, for the purposes of this study *D. scabra* is treated as a monotypic species.

#### Genus *TELESCOPUS* Wagler, 1830

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

Map 66





*TELESCOPUS BEETZII* (Barbour, 1922)

*Tarbophis beetzii* Barbour, 1922, Proc.biol.Soc.Wash., 35, p. 230:

Koimanskop, Great Namaqualand, South West Africa.

Common name: Namib Tiger-Snake.

Range: Apparently a rare snake, known from only seven localities: six in southern South West Africa and one in the northern Cpaie Province at Douglas (Mertens, 1955; FitzSimons, 1962); also the Jacobsdal district, western Orange Free State.

Characters: Two specimens examined. Preocular one; postoculars two, exceptionally three (one side); temporals two + two (two sides), two + (two on one) (one side) or (two on one) + three (one side); supralabials eight, third, fourth and fifth entering orbit; infralabials 11 or 12, first four in contact with anterior sublinguals; dorsal scales in one specimen (female) 19 on nape, 21 at midbody and 15 anterior to vent; dorsal scales in other specimen (male) 19 on nape, 21 at 73rd ventral, 20 at 91st ventral (midbody), 19 at 96th ventral and 14 anterior to vent; ventrals 190 in male and 206 in female; anal entire in both specimens; subcaudals 50 in male and 42 in female; colour brown above with 45 to 50 large, blackish, round, vertebral spots; except for first spot on nape, these are never broader than long as in *Telescopus semiauratus*; vertebral spots 21 on tail + 29 on body (male) and 13 on tail + 32 on body (female); ventral surfaces white.

Size: Male (NMB 3167 - Weltevreden, Jacobsdal) 340 + 61 = 401mm.

Female (NMB 3166 - Weltevreden, Jacobsdal) 580 + 73 = 653mm.

Habitat: Both specimens were found in old termitaria.

Material examined from: Weltevreden, Jacobsdal (Map 66).

Literature records: None, new record for the Orange Free State.

Genus *CROTAPHOPELTIS* Fitzinger, 1843

\* *Crotaphopeltis* Fitzinger, 1843, Syst.Rept., p. 27. Type by original designation: *Coronella rufescens* Schlegel, 1837 = *Coronella hotamboeia* Laurenti, 1768.

*CROTAPHOPELTIS HOTAMBOEIA* (Laurenti, 1768)

- \* *Coronella hotamboeia* Laurenti, 1768, Syn.Rept., p. 85: "India orientali"  
= Africa.
- \* *Coronella virginica* Laurenti, 1768, Syn.Rept., p. 86: No locality.  
*Coluber rufescens* Gmelin, 1789, Syst.Nat., ed. 13, 1, part 3, p. 1094  
(based on Seba, Thesaurus, 1, pl. xxxiii, fig. 6: No locality.
- \* *Coluber bicolor* Leach, 1819, in Bowdich, Miss.Ashantee, p. 493:  
"Fantee" = Fanti, Ashanti, Gold Coast.
- Ophis heterurus* Duvernoy, 1833, Annls Sci.nat., 30, p. 9. pl. i, fig.  
2: No locality.
- Dipsas hippocrepis* Reinhardt, 1843, Dansk Vidensk.Selsk.Skrift, 10,  
p. 251, pl. i., figs. 18-20: Guinea.
- \* *Dipsas inornatus* A. Smith, 1849, Ill.Zool.S.Afr., Rept., App., p. 20:  
"Kaffirland eastward of Cape Colony".
- Oxyropus melanocrotaphos* Cope, 1860, Proc.Acad.nat.Sci.Philad., p. 260:  
No locality.
- \* *Tarbophis barnumbrowni* Bogert, 1940, Bull.Am.Mus.nat.Hist., 77, p. 66,  
fig. 9: Jigjiga, Ethiopia.

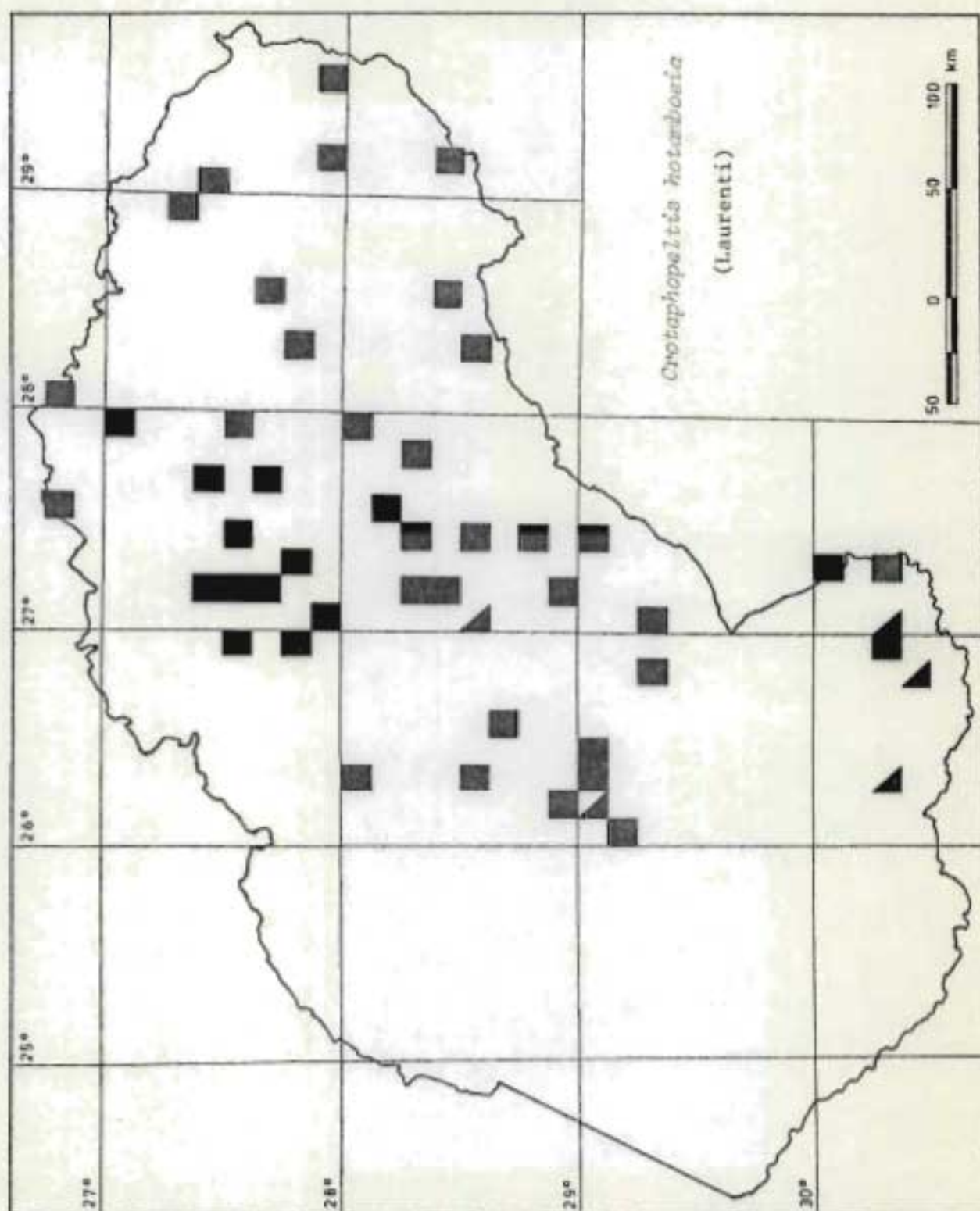
Common name: Red-lipped Snake; Herald Snake.

Range: Tropical Africa south of the Sahara, southwards over eastern Africa to Cape Town; absent from arid western areas (FitzSimons, 1966).

Characters: Ninety specimens examined. Preocular one, seldom two; postoculars two, seldom three, exceptionally one; temporals usually one + two, sometimes one + one or one + one + two, exceptionally one + (two on one); supralabials usually eight, third, fourth and fifth or fourth and fifth entering orbit, supralabials exceptionally six (third entering orbit), seven (third and fourth entering orbit) or nine (third, fourth and fifth entering orbit); infralabials usually nine or 10, seldom eight or 11, the first four, seldom first three or first five, in contact with anterior sublinguals; dorsals in 17 to 19 rows on nape, 19, exceptionally 18 or 21, at midbody and 15, seldom 13 or 14, anterior to vent; ventrals 146 to 160 in males and 146 to 161 in females; anal plate entire; subcaudals 36 to 44 in males and 32 to 41 in females; colour above dark brown to pale brown, uniform or with scattered white specks, especially in young specimens; distinct blackish patch from eye posteriorly to neck; posterior supralabials orange-red; ventral surfaces white.



Map 67



Size: Largest male (NMB 3597 - Olive Hill)  $504 + 70 = 574\text{mm}$ .

Largest female (NMB 1361 - Willem Pretorius Game Reserve)  $508 + 74 = 582\text{mm}$ .

Habitat: Found in old termitaria and under rocks.

Diet: The stomach contents of four snakes revealed remains of *Pachydactylus c. capensis* and *Pyrricephalus delalandei cryptotis*. A small frog, *Cacosternum boettgeri*, was taken in captivity.

Material examined from: Anna's Rust; Annies Rust; Bergkloof; Bergkraal; Berlin; Bethel; Biddulphsberg; Boesmansberg; Bramley's Hoek; Braunzijkop; Driekop; Goedetrouw; Grootkrans; Holme's Dale; Hoogevelde, Kroonstad; Houtkop; Kelly's View; Kleinplaas; Klipplaat; Kranskop; Kromhof; La Belle France; La Riviera; Leeuwkop; Lorenzo; Middenspruit; Milambi; Mimosa; Morgenzon, Harrismith; Mount Nelson; Olive Hill; Oorsprong; Patrijdsdraai; Perth; Petra; Pietersberg; Quaggaspruit; Ribblesdale; Rondavel; Spijtfontein; Stoffelfontein; Stoltzkop; Thaba Paocha Berg; Tweefontein; Twee Zusters; Vaalbank Zuid; Vaalkop; Venus; Verdun, Fouriesburg; Willem Pretorius Game Reserve; Wolvekop, Kroonstad (Map 67).

Literature records: Kroonstad (Symonds, 1887, sub.nom. *Leptodira rufescens*); Bainsvlei; Bloemfontein; Daelfontein, Smithfield; Kelly's View; Rouxville; Winburg; Zastron (FitzSimons, 1962).

Note: Recognition of races of *Crotaphopeltis hotamboeia* seems premature at this stage and should await a review of the species as a whole (Gans et al, 1965).

Genus *DISPHOLIDUS* Duvernoy, 1832

- \* *Dispholidus* Duvernoy, 1832, *Annls Sci.nat.*, 26, p. 150. Type by monotypy: *D. lalandii* Duvernoy = *Bucephalus typus* A. Smith, 1829.

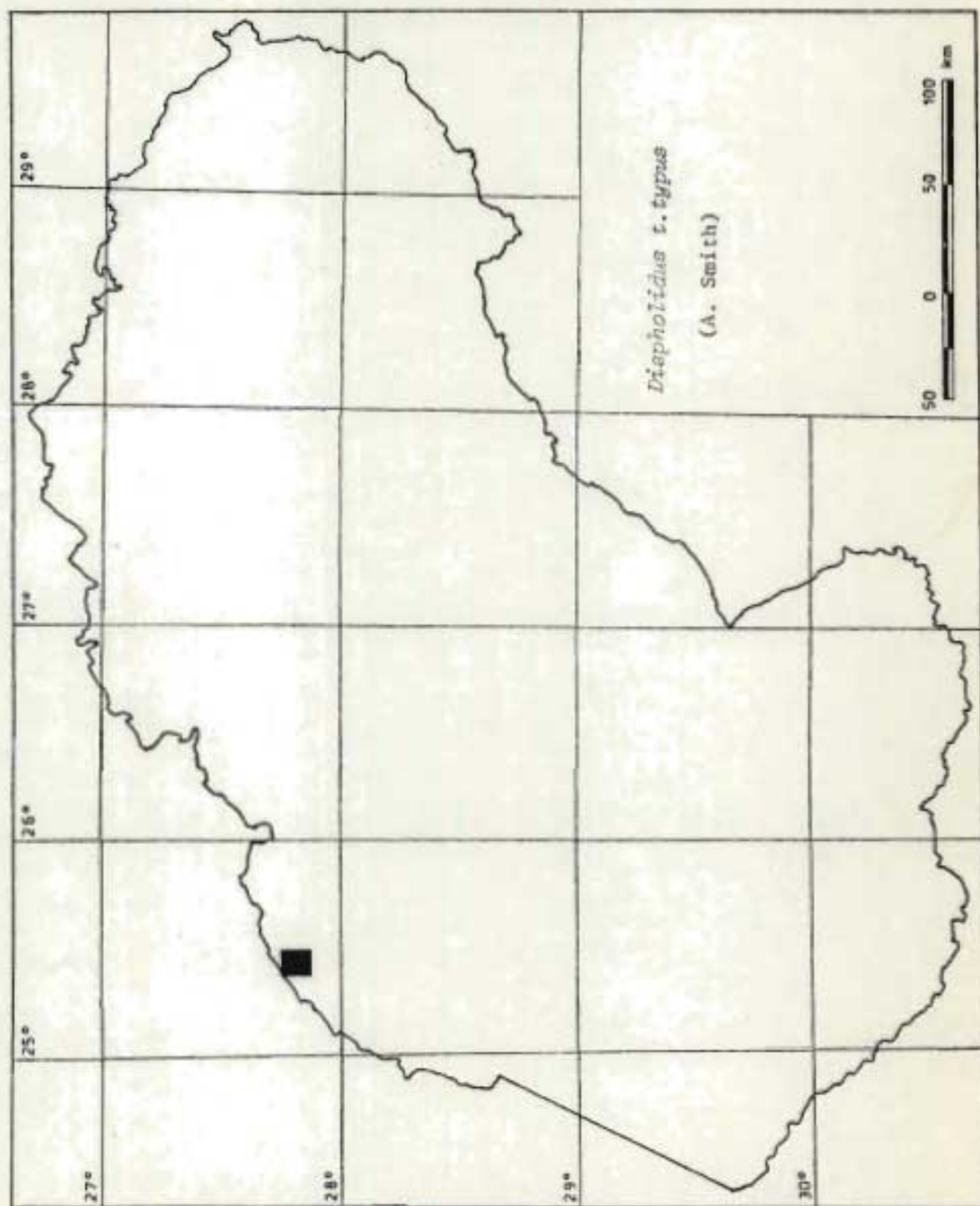
*DISPHOLIDUS TYPUS* (A. Smith, 1829)

*DISPHOLIDUS TYPUS TYPUS* (A. Smith, 1829)

- \* *Bucephalus typus* A. Smith, 1829, *Zool.Journ.*, 4, p. 441: Old Latakoo, northern Cape Province.
- \* *Bucephalus jardini* A. Smith, 1829, *Zool.Journ.*, 4, p. 442: South Africa.
- \* *Bucephalus gutturalis* A. Smith, 1829, *Zool.Journ.*, 4, p. 442: South Africa.



Map 68



- \* *Bucephalus bellii* A. Smith, 1829, Zool. Journ., 4, p. 442: South Africa.  
*Dispholidus lalandii* Duvernoy, 1832, Annls Sci. nat., 26, p. 150:  
Cape of Good Hope.  
*Dendrophis colubrina* Schlegel, 1837, Essai Phys. Serp., 2, p. 238, pl.  
ix, figs. 14-16: Rondebosch, Cape Province.  
\* *Bucephalus viridis* A. Smith, 1841, Ill. Zool. S. Afr., Rept., pl. III:  
Old Latakoo, Northern Cape Province.  
\* *Bucephalus capensis* A. Smith, 1841, Ill. Zool. S. Afr., Rept., pls.  
X-XIII: Cape Province.  
*Dendrophis pseudodipsas* Bianconi, 1848, Nuovi Ann. Sci. Nat., (2), 10,  
p. 108, pl. iv, fig. 2: Mozambique.  
\* *Thrasops jacksonii mossambicus* Mertens, 1937, Abh. senckenb. naturforsch.  
Ges., No 435, p. 13: Cheringoma Farm, Inhamitanga, Mozambique.

Common name: Boomslang.

Range: Savannas of eastern and southern Africa, absent from south-west arid areas (Broadley, 1966).

Characters: Two specimens examined (both males). Proocular one; postoculars three; temporals one + (one on two); supralabials seven, third and fourth entering orbit; infralabials eight to ten, the first three to four in contact with anterior sublinguals; dorsals in 23 rows on nape, 19 at midbody and 13 anterior to vent; ventrals 179; anal plate divided; subcaudals 102 to 104; colour above and below olive-green; dorsal and ventral scales black-edged.

Size: Largest male (NMB 708 - Moirton) 1173 + 370 = 1543mm.

Habitat: Arboreal in *Acacia* sp. and *Zimyphus mucronata*.

Material examined from: Moirton (Map 68).

Literature records: None, new record for the Orange Free State.

#### Genus *PSAMMOPHYLAX* Fitzinger, 1843

- \* *Psammophylax* Fitzinger, 1843, Syst. Rept., p. 26. Type by original designation: *Coluber rhombeatus* Linnaeus, 1754.



Key to the species:

- 1a. Dorsum with rhombic longitudinal pattern anteriorly .....  
..... *P. rhombeatus*, p. 187
- 1b. Dorsum with striped longitudinal pattern .. *P. tritaeniatus*, p. 190

*PSAMMOPHYLAX RHOMBEATUS* (Linnaeus, 1754)

*Coluber rhombeatus* Linnaeus, 1754, Mus.Ad.Frid., p. 27, pl. xxiv,  
fig. 2: "In Indiis", i.e., South Africa, fide FitzSimons (1962).

\* *Coronella tygrina* Laurenti, 1768, Syn.Rept., p. 87 (based on Seba,  
1735): "Amboina".

\* *Psammophylax rhombeatus* var *trilineata* Boettger, 1883, Ber.Tät.offenb.  
Ver.Naturk., p. 156: "Smithfield, Transvaal" = Orange Free State?

\* *Psammophylax rhombeatus* var *biseriata* F. Müller, 1892, Verh.naturf.Ges.  
Basel, 10, p. 202: Transvaal.

\* *Psammophis longementalis* Roux, 1907, Zool.Jb.Syst., 25, p. 736:  
Buffelsrivier, Cape Province.

Common name: Rhombic Skaapstekker.

Range: From Transvaal southwards through the Orange Free State and  
Natal to eastern and south-western Cape Province (FitzSimons, 1962).

Characters: Ninety-seven specimens examined. Internasals usually in  
contact, separated in a few specimens by rostral; preoculars one,  
rarely two; postoculars two, exceptionally three; temporals usually  
two + three, otherwise variable; supralabials eight, rarely nine,  
fourth and fifth, rarely fifth and sixth, entering orbit; infralabials  
11, rarely nine, 10 or 12, first five, rarely first four or six, in  
contact with anterior sublinguals; dorsals in 17, rarely 16, 18 or  
19, rows on nape, 17, rarely 16 at midbody and 13, exceptionally 14,  
anterior to vent; ventrals 157 to 169 in males, 157 to 170 in  
females; anal plate divided, entire in one specimen only; subcaudals  
63 to 82 in males, 56 to 75 in females; brown to dark brown vertebral  
band which may be broken up into rhombic blotches anteriorly; vertebral  
band bordered on each side by a dorsolateral beige to yellowish stripe;  
a brown to dark brown lateral band, usually consisting of rhombic  
blotches, anteriorly; dorsum rarely uniformly greyish-brown when

dark bands absent or inconspicuous; ventral surfaces uniformly white to grey or spotted with black or grey; colour uniformly dark brown above with faint traces of a dorsolateral pale stripe, and ventral surfaces uniformly blackish, in one specimen from Sentinel.

Size: Largest male (NHMB 1940 - Harrismith; examined by Broadley, pers.comm., 1974)  $700 + 225 = 925\text{mm}$ . Largest female (NMB 716 - Uitzicht)  $630 + 198 = 828\text{mm}$ .

Habitat: Found in old termitaria and under rocks up to 2591 meters (8500 ft).

Breeding: Egg clutches and gravid females with well-developed intact eggs were collected in October and November. Clutches varied from eight to 17 eggs as were found under rocks. Eggs measured from  $21 \times 14\text{mm}$  to  $32 \times 15\text{mm}$ . In most cases females were found coiled around the eggs. On the farm Mooigelegen 29 eggs and four females (one still gravid) were found under the same rock. Collected eggs hatched during January and February, a hatchling measuring  $135 + 40 = 175\text{mm}$ .

Predators: One specimen was found in the stomach of a *Hemachatus haemachatus*.

Diet: Several specimens contained rodent remains and one specimen contained four newborn mice.

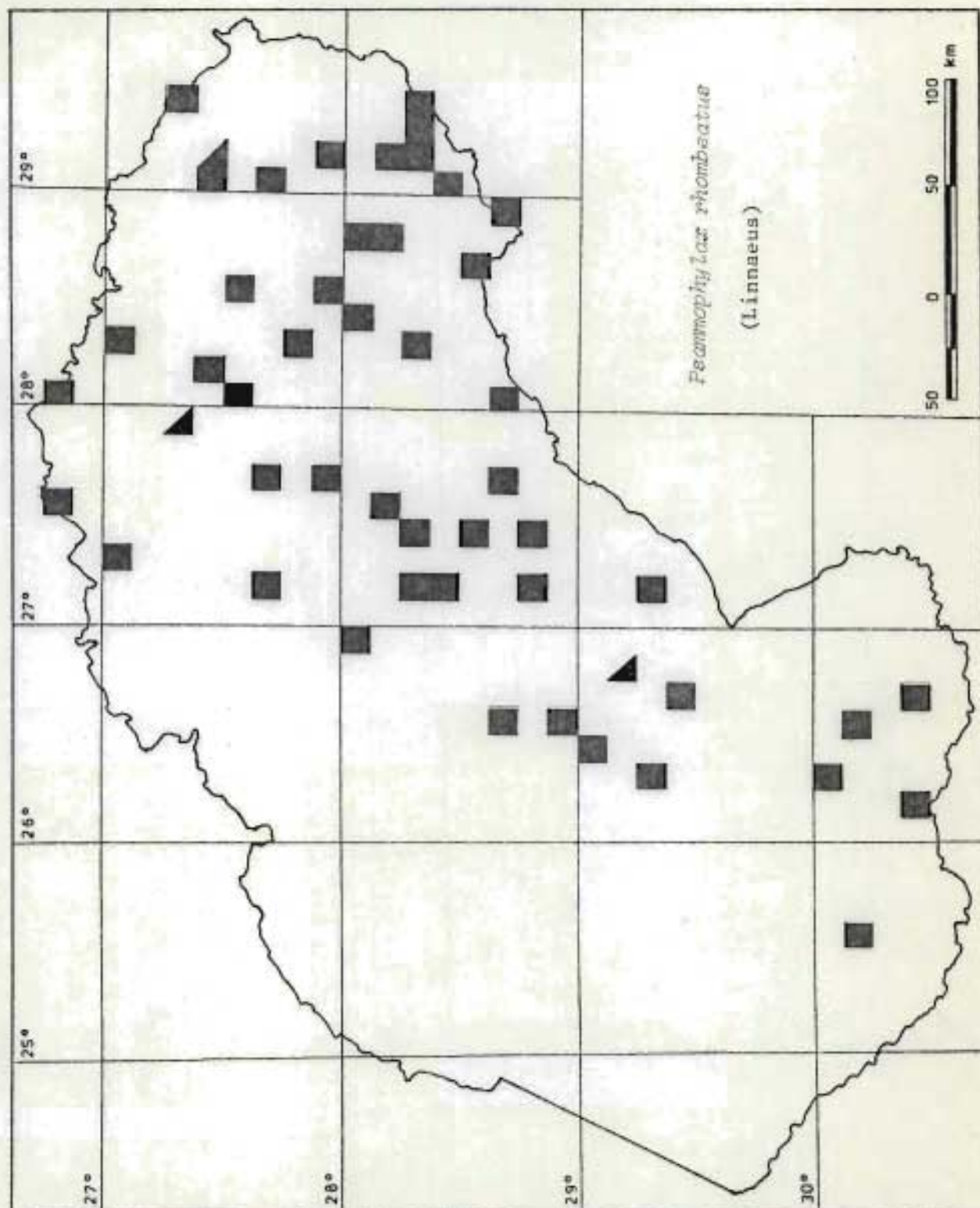
Material examined from: Aberdeen; Annie's Rust; Bergplaats, Dewetsdorp; Berlin; Beth-Aven; Bethel; Brockenhurst; Campen; Carlie; Dealbata; Deelfontein, Bethulie; Dipka; Di Poort; Franshoek; Goedetrouw; Hammanskraal West; Harrismith (NHMB; examined by Broadley, pers.comm., 1974); Hebron; Klipdrift; Klipoog; Koortshoek; Kroonstad (AMNH; examined by Broadley, pers.comm., 1974); Lanquedoc; Leeuwkop; Loskop; Manchester; Mara, Parys; Merino, Bethlehem; Milambi; Monontsa Pass; Mooigelegen; Moreson; Morgenzon, Harrismith; Petra; Pietersberg; Quaggaspruit; Rietfontein, Vrede; Rietspruit; Rusthof; Sentinel; Smithfield (SAM); Tafelberg; Tweefontein; Uitzicht; Venus; Verdun, Reitz; Vergaderrand; Waterfall; Willem Pretorius Game Reserve; Wittekopjes; Wittepoort (Map 69).

Literature records: Smithfield (Boettger, 1883); Bethulie (=Deelfontein); Bloemfontein (=Rietspruit); Harrismith; Heilbron Townlands; Kroonstad; Thaba'Nchu; Vrede (FitzSimons, 1962).

Note: *Psammophylax ocellatus* Bocage, 1873, is excluded from the synonymy here given as it deserves separate taxonomic recognition (Broadley, 1976, pers.comm.).



Map 69



*PSAMMOPHYLAX TRITAENIATUS* (Günther, 1868)

*PSAMMOPHYLAX TRITAENIATUS TRITAENIATUS* (Günther, 1868)

\* *Rhagerria tritaeniatum* Günther, 1868, Ann.Mag.nat.Hist., (4), 1, p. 423, pl. xix, fig. H: "probably from south-eastern Africa".

Common name: Striped Skaapsteker.

Range: Tanzania and southern Zaïre southwards to northern South West Africa in the west and Natal, Orange Free State and northern Cape Province in the east (Broadley, 1966).

Characters: Sixty-six specimens examined. Preoculars one, rarely two; postoculars two; temporals usually two + three, otherwise variable; supralabials eight, rarely nine, fourth and fifth, exceptionally fifth and sixth, entering orbit; exceptionally seven supralabials with third and fourth entering orbit; infralabials nine to 11, exceptionally 12, first four or five in contact with anterior sublinguals; dorsals in 17, rarely 16 to 18, rows on nape, 17, exceptionally 16, at midbody and 13 anterior to vent; ventrals 151 to 160 in males, 153 to 169 in females; anal plate usually divided, entire in two specimens; subcaudals 53 to 68 in males, 54 to 65 in females; dark grey or brown, black-edged, vertebral band from posterior edges of parietals to tip of tail, sometimes divided down middle by a thin yellowish line; beige to yellowish dorsolateral band; dark grey or brown, black-edged lateral band (distinctly broader than dark vertebral band) from nostril through eye to tip of tail; outer one and a half scale rows white with broken orange line running longitudinally through the outer row; ventral surfaces white or sometimes with a greenish tinge; outer edges of ventral plates sometimes with an orange spot with a black dot inside.

Size: Largest male (NMB 3122 - Krugersdrift Dam) 793 + 131 = 924mm.

Largest female (NMB 2320 - Meyerskraal) 518 + 142 = 660mm.

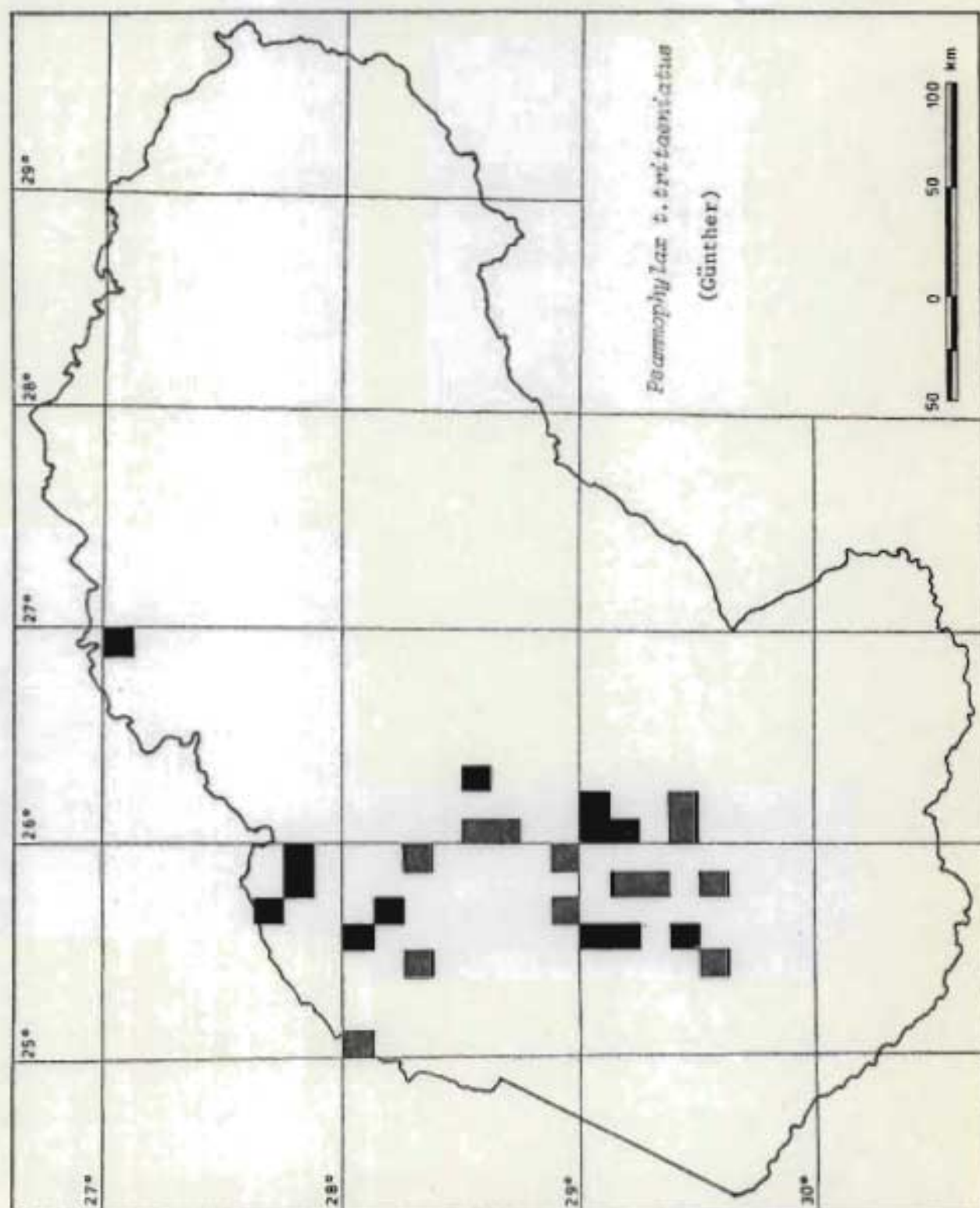
Habitat: Open grassland, in old termitaria and under rocks.

Breeding: A female collected in August contained nine partly-developed eggs and another female collected in September contained 15 well-developed eggs.

Predators: One specimen was found in the stomach of a *Naja nivea*.



Map 70



Diet: The stomach contents of some specimens consisted of frog and rodent remains as well as *Pachydactylus c. capensis*.

Material examined from: Bergplaats, Bloemfontein; Bloemfontein; Boesmansberg; Boskop; Brabant; Die Hoogte; Doornplaat; Francis Home; Geluk, Boshof; Gruiskop; Haagen's Stad; Hartebeestfontein, Boshof; Hoopstad (TM); Kareerand; Klipplaatdrift, Edenburg; Koppiesdam; Krugersdrift Dam; Kwaggafontein; Leeuwberg; Lovedale; Meyerskraal; Paradys; Smithskraal; Sweet Home; Vet River - Bloemhof Dam junction; Weltevrede; Wilhelmshohe, Zandvoort (Map 70).

Literature records: Bloemfontein; Hoopstad (FitzSimons, 1962).

Symonds (1887) recorded a "*Psammophis sibilans*" from Kroonstad.

Based on Symonds's (1887) description FitzSimons (1962) included this record under *Psammophylax t. tritaeniatus*. The true identity of this snake can however not be determined from the vague description and it is therefore not taken into account.

#### Genus *PSAMMOPHIS* Boie, 1826

*Psammophis* Boie, 1826, Isis Oken, 19, col. 982. Type by monotypy:

*Coluber sibilans* Linnaeus, 1758.

#### Key to the species:

- 1a. Scales in 15 rows at midbody ..... *P. crucifer*, p. 197
- 1b. Scales in 17 rows at midbody ..... 2
- 2a. Anal plate entire; preoculars usually two, exceptionally one or three; ventrals 159 to 180; subcaudals 80 to 99 .....  
..... *P. notostictus*, p. 192
- 2b. Anal plate usually divided, exceptionally entire; preoculars usually one, exceptionally two; ventrals 151 to 169; subcaudals 84 to 108 ..... *P. leightoni*, p. 195

#### *PSAMMOPHIS NOTOSTICTUS* Peters, 1867

*Psammophis moniliger* var *notostictus* Peters, 1867, Mber.dt.Akad.Wiss. Berl., p. 237: Otjimbingue, South West Africa.

\* *Psammophis sibilans* var *stenocephalus* Bocage, 1887, Jorn.Sci.math.phys. nat., 11, p. 205: Interior of Mossamedes, Angola.

Common name: Dapple-backed Sand-Snake; Sweep slang.



Range: South-western Angola southwards to the Cape Peninsula, eastwards through the Karoo to the Albany district (Broadley, 1975a).

Characters: Ninety-nine specimens examined. Three nasals; preoculars two, exceptionally one or three, usually in contact with frontal; postoculars two, seldom three; temporals very variable, mostly two + two + three; supralabials eight, fourth and fifth entering orbit, seldom seven supralabials with third and fourth entering orbit; infralabials 10, rarely nine or 11, first four, exceptionally first three or five, in contact with anterior sublinguals; dorsal scales in 17, exceptionally 15 or 16, rows on nape, 17 at midbody and 13 anterior to vent; ventrals 159 to 179 in males, 165 to 180 in females; anal plate entire; subcaudals 80 to 99 in males, 82 to 92 in females; colour above light to dark grey-brown, uniform or vertebral scales pale-tipped and a dorsolateral pale stripe on fourth and fifth dorsal scale rows; parietals usually with a pair of pale spots; V-shaped (apex directed forward) pale marking at back of head usually present; white ventrolateral band on lower half of outer dorsal scale row and ends of ventrals; yellowish-white band on ventrum sometimes dark-edged; throat sometimes spotted with black and orange.

Size: Largest male (NMB 4755 - Lemoenboord) 653 + 245 = 898mm.

Largest female (NMB 4433 - Verwoerd Dam) 628 + 242 = 870mm.

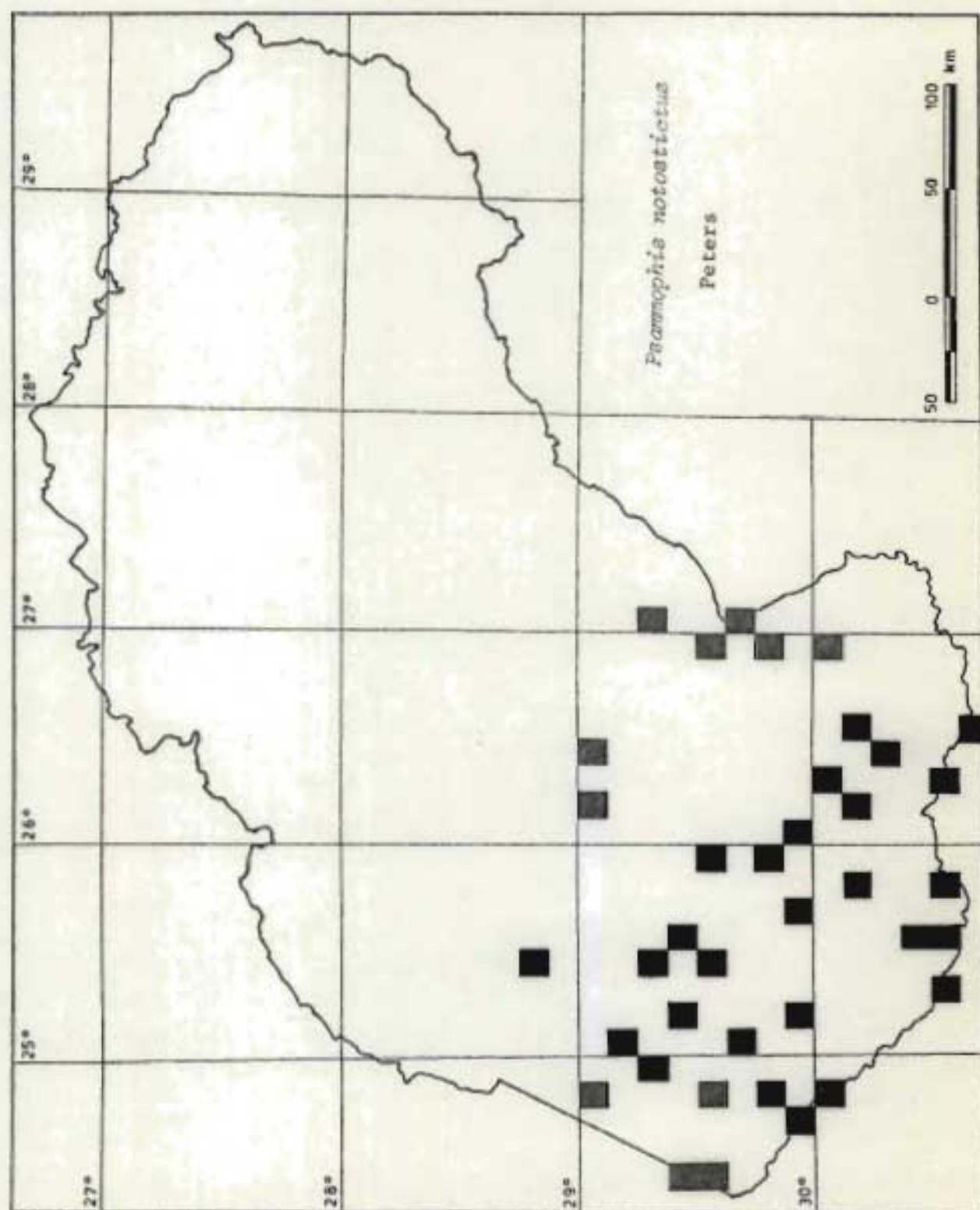
Habitat: Collected mainly from old termitaria but sometimes found also under rocks or in open veld.

Breeding: A gravid female collected at the end of October contained three 28 x 6mm eggs.

Diet: Stomach content analysis revealed the following: *Pachydactylus o. capensis*; *Pachydactylus m. mariquensis*; *Cordylus polyzonus* (juvenile); lacertid remains; grasshopper.

Material examined from: Alpha; Babel; Bethany; Bloemfontein; Brakpan; Dundee; Exelsior, Edenburg; Francis Home; Hebron; Heenenweerskop; Honingberg; Joostenberg; Kades; Kleinplaas; Klipbankfontein; Klipdrift; Klipfontein; Lang Zeekoegat; Leeuwborg; Lemoenboord; Luiperfontein; Luiperskop; Naval Hill; Noodhulp; Poortje, Fauresmith; Rietfontein, Rouxville; Rohallion; Smithfield (SAM); Strijdfontein, Philippolis; Thaba Pachoa Berg; Tienfontein; Uitkijk; Verwoerd Dam; Waterhoek; Weltevreden, Smithfield; Wintershoek; Winterspoort; Wolvekop, Fauresmith; Zandfontein; Zoutpan, Fauresmith (Map 71).

Map 71





Literature records: Smithfield (Boulenger, 1910). The Hoopstad locality (FitzSimons, 1962) was based on a specimen sent to the Durban Snake Park and requires confirmation as *notostictus* appears to be confined to the southern Orange Free State.

*PSAMMOPHIS LEIGHTONI* Boulenger, 1902

- \* *Psammophis leightoni* Boulenger, 1902 (February), Proc.zool.Soc.Lond.,  
1, p. 126. pl. xii: Eerste River Station, Cape Province.

*PSAMMOPHIS LEIGHTONI TRINASALIS* Werner, 1902

*Psammophis moniliger* var *furcatus* Peters, 1867, Mber.dt.Akad.Wiss.  
Berl., p. 236: Otjimbingue, South West Africa. Preoccupied by  
*Dendrophis furcata* Bianconi, 1859 = *Psammophis p.punctulatus*  
Dumeril & Bibron, 1854.

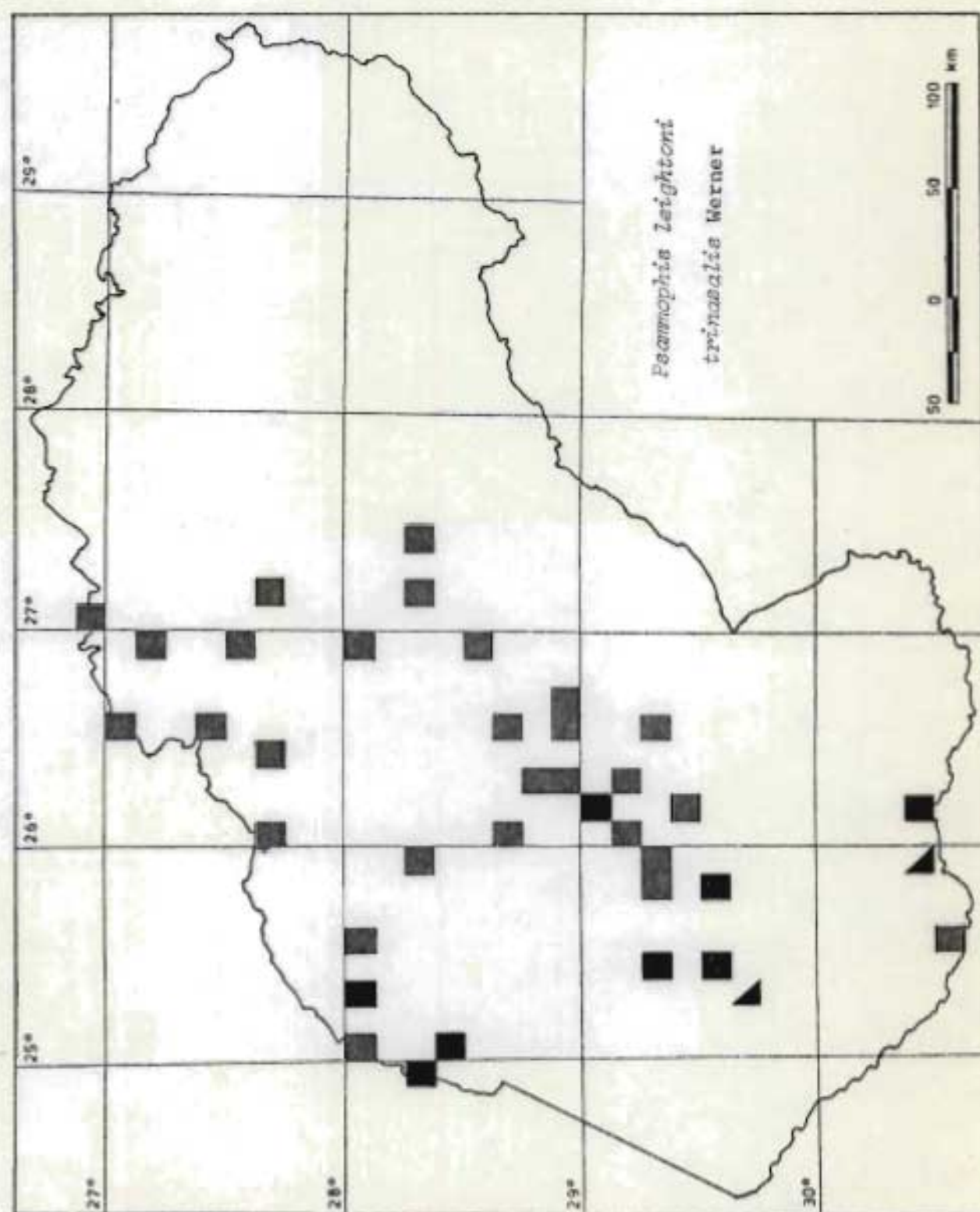
- \* *Psammophis sibilans trinasalis* Werner, 1902 (March), Verh.zool.-bot.  
Ges.Wien, 52, p. 340: Windhoek, South West Africa.

Common name: Fork-marked Grass-Snake.

Range: The South West African plateau, Botswana, northern Cape Province, Orange Free State and Transvaal (Broadley, 1975a).

Characters: Sixty-seven specimens examined. Three nasals; one preocular, exceptionally two, in contact with frontal; postoculars two, rarely one or three; temporals very variable, mostly (one on two) + three; supralabials eight, fourth and fifth entering orbit, rarely seven supralabials with third and fourth entering orbit; infralabials 10, rarely seven, eight, nine or 11, first four, rarely first three or five, in contact with anterior sublinguals; dorsals in 17, exceptionally 16, rows on nape, 17 at midbody and 13, exceptionally 11 or 12, anterior to vent; ventrals 151 to 165 in males, 154 to 169 in females; anal plate divided, exceptionally entire; subcaudals 86 to 108 in males, 84 to 100 in females; colour above dark brown to grey-brown; yellowish vertebral line bifurcates behind parietals into a pair of parallel yellow streaks which extend forward over parietals and supraoculars; yellowish black-edged stripe on fourth and fifth scale rows; flanks paler brown than dorsum; ventral surfaces white with a yellowish or faint grey longitudinal band.

Map 72





Size: Largest male (NMB 1613 - Bergplaats, Bloemfontein)  $626 + 288 = 914\text{mm}$

Largest female (NMB 2637 - Petra)  $571 + 229 = 800\text{mm}$ .

Habitat: Found in open grassveld in old termitaria and under rocks in the western half of the Orange Free State.

Breeding: A gravid female collected in October contained eight well-developed eggs, measuring  $25 \times 9\text{mm}$ . A hatchling (unbilical chord still attached) measuring  $243\text{mm}$  was collected in January.

Diet: The following stomach contents were found: *Mabuya capensis*; *Mabuya varia*; *Mabuya p.punctatissima*; *Pachydactylus o.capensis*; *Pachydactylus m.mariquensis*; *Afroablepharus wahlbergi*; lacertid remains; *Pseudaspis oona* (juvenile); hairy spider; rodent remains.

Material examined from: Angra Pequena (TM); Bergplaats, Bloemfontein; Beyersfontein; Bloemendal; Bloemfontein; Boschkop; Carlie; Deelfontein, Bethulie; Deelfontein, Bothaville; Die Hoogte; Di Poort; Erinmore; Francis Home; Gruiskop; Haagen's Stad; Honingberg; Houmoed; Kelly's View; Klipplaatdrift, Edenburg; Mimosa; Mooivlei; Ongegund; Petra; Pietersberg; Platberg, Boshof; Rietfontein, Brandfort; Rondavel; Rustfontein Dam; Smaldeel; Smithskraal; Spijtfontein; Uitkyk; Usherwood; Van der Walt's Rust; Veepost; Verwoerd Dam (TM); Viljoenskroon (UM); Weltevrede; Wilhelmshohe; Willem Pretorius Game Reserve (TM) (Map 72).

Literature records: Fauresmith (Hewitt & Power, 1913, sub.nom. *P.furcatus*); Bethulie (=Deelfontein); Bloemfontein; Bothaville (=Angra Pequena); Kroonstad (FitzSimons, 1962); Verwoerd Dam; Viljoenskroon; Willem Pretorius Game Reserve (Broadley, 1975a).

#### *PSAMMOPHIS CRUCIFER* (DAUDIN, 1803)

\* *Coluber crucifer* Daudin, 1803, Hist.Nat.Rept., 7, p. 189: "Indes orientales" = South Africa.

Common name: Cross-marked Grass-Snake; Kruisslang.

Range: Coastal and adjoining areas from Little Namaqualand to Natal; inland to Lesotho, eastern Orange Free State and southern and eastern Transvaal; eastern highlands of Rhodesia (FitzSimons, 1962).

Characters: Seventy-four specimens examined. Two nasals; one preocular, not in contact with frontal; postoculars two, exceptionally one; temporals variable, mostly (one on two) + three; supralabials eight,

fourth and fifth entering orbit, rarely seven supralabials with third and fourth entering orbit; infralabials usually nine, rarely eight or 10, first four in contact with anterior sublinguals; dorsal scales in 15 rows on nape and at midbody, 13, rarely 11, anterior to vent; ventrals 142 to 153 in males, 146 to 163 in females; anal plate divided; subcaudals 57 to 75 in males, 61 to 82 in females; brown, black-edged vertebral band; beige dorsolateral band; grey-brown lateral band; white ventrolateral band; broad yellowish or yellow-orange ventral band, black and reddish-edged; distinct transverse white bar anterior and posterior to eye; yellowish black-edged streak from rostral to frontal and another pale streak on either side along suture between frontal and supraocular; throat usually with orange-red, black-edged spots; some specimens unstriped, dorsum plain olive-brown.

Size: Largest male (NMB 3237 - Boschkloof)  $409 + 137 = 546\text{mm}$ .

Largest female (NMB 4312 - Mooigelegen)  $561 + 148 = 709\text{mm}$ .

Habitat: Collected from old termitaria and under rocks in the eastern parts of the study area.

Breeding: Gravid females with three to 13 eggs were collected from September to November. The largest intact eggs measured  $31 \times 9\text{mm}$ .

Diet: The following stomach contents were found: *Mabuja p. pinotatissima*; *Mabuja varia*; *Bufo lalandi*; lacertid remains; *Cacosternum boettgeri* (Amphibia).

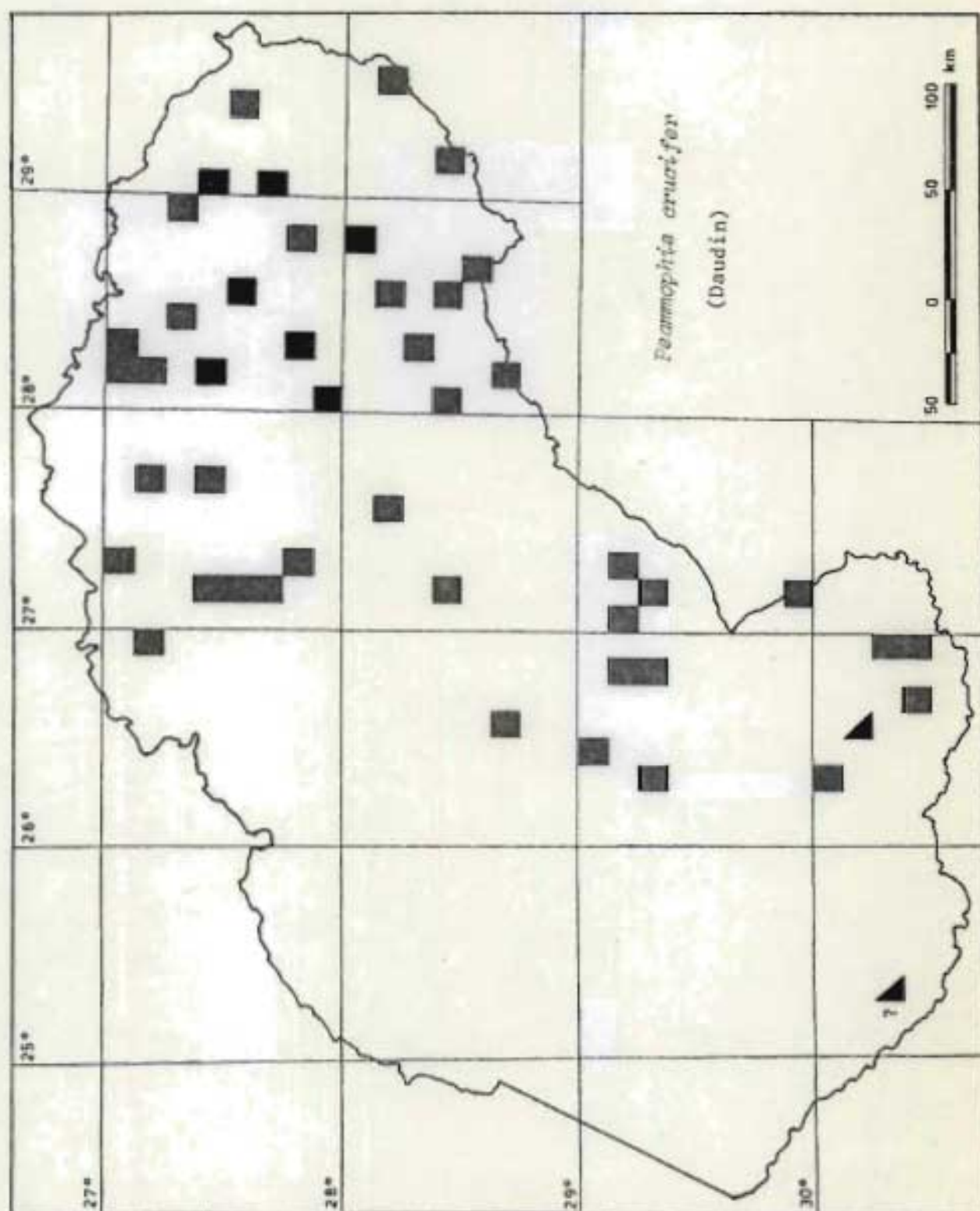
Material examined from: Albion; Bachelor's Home; Berlin; Beth-Aven; Bethel; Boschkloof; Bramley's Hoek; Caledonspoort; Dipka; Elandsfontein; Goedetrouw; Hebron; Houtkop; Kafferskop; Klipdrift; Klipoog; Klipplaat; La Belle France; Littlecote; Lorenzo; Louis Rust; Maseru; Mecklenburg; Merino, Bethlehem; Middenspruit; Mimosa; Monontsa Pass; Mooigelegen; Patrijsdraai; Perth; Rietspruit; Rondavel; Rusthof; Thaba'Nchu; Tweefontein; Tygerfontein; Vaalkop; Verdun, Reitz; Verdun, Ladybrand; Vergaderrand; Viljoenskroon (UM); Welgegund; Wittekopjes; Wolvenfontein; Zwartkoppies (Map 73).

Literature records: Smithfield (Boettger, 1883); Kroonstad (Symonds, 1887); Bloemfontein (=Rietspruit); Philippolis (FitzSimons, 1962).

Note: The Philippolis locality (FitzSimons, 1962) is questionable (Map 73) as the occurrence of *Psammophis crucifer* could not be confirmed in this drier part of the study area.



Map 73



Genus *XENOCALAMUS* Günther, 1868

- \* *Xenocalamus* Günther, 1868, Ann.Mag.nat.Hist., (4), 1, p. 414. Type by monotypy: *X.bicolor* Günther, 1868.

*XENOCALAMUS BICOLOR* Günther, 1868

*XENOCALAMUS BICOLOR BICOLOR* Günther, 1868

- \* *Xenocalamus bicolor* Günther, 1868, Ann.Mag.nat.Hist., (4) 1, p. 415, pl. xix, fig. A: Damaraland, fide Broadley, 1971.  
\* *Micaëla pernasuta* Werner, 1915, Rept.u.Amph., In W.Michaelsen, Land- und Süßwasserfauna Deutsch S.W. Arikas, 3, p. 359, pl. vii, fig. 2: Farm Otjituezu, near Neudamm, Windhoek, South West Africa.  
\* *Xenocalamus bicolor maculatus* FitzSimons, 1932, Ann.Transv.Mus., 15, p. 39: Kuke Pan, Botswana.  
\* *Xenocalamus bicolor concavo-rostralis* Hoffman, 1940, Soöl.Navors.nas. Mus.Bloemfontein, 1, p. 111, fig. 1 & 2: Kelly's View, Bloemfontein.

Common name: Quill-snouted Snake.

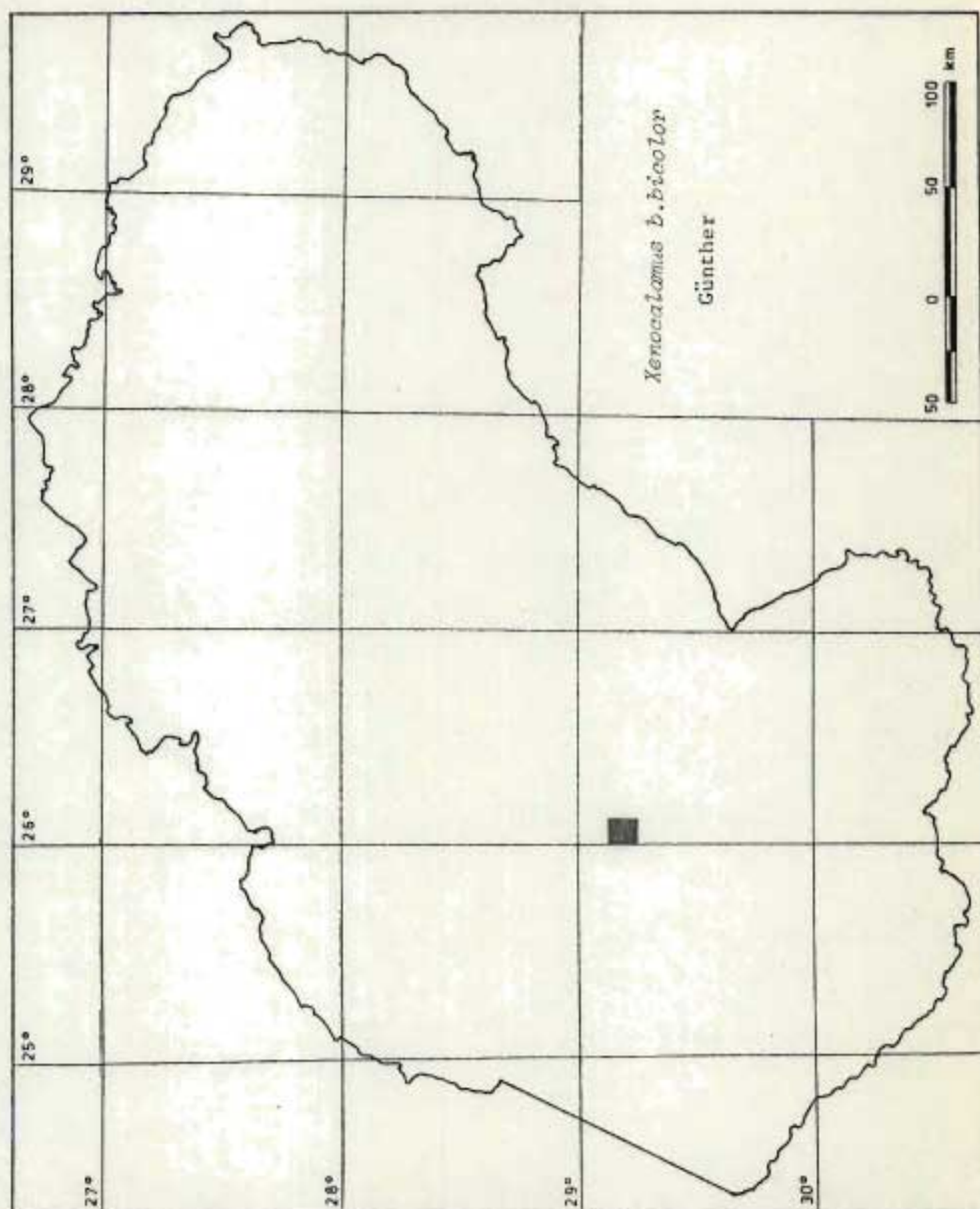
Range: South West Africa, western and central Botswana, northern Cape Province, central Orange Free State, northern Rhodesia and Cheringoma Plateau in Mozambique (Broadley, 1971).

Characters: One specimen examined, holotype of *X.bicolor concavorostralis*, NMB 2077, male from Kelly's View, Bloemfontein (Map 74). Postocular one; supralabials six, third and fourth entering orbit; infralabials five, first three in contact with anterior sublinguals; dorsals in 17 rows on nape, at midbody and anterior to vent; ventrals 196, anal plate divided; subcaudals 29; dorsum bluish-grey, scales pale-edged; outer three scale rows and ventrum white.

Note: *Xenocalamus bicolor concavorostralis* was synonymized by Broadley (1971) on the grounds of representing a stage in clinal variation.



Map 74



Genus *APARALLACTUS* A. Smith, 1849

\* *Aparallactus* A. Smith, 1849, Ill.Zool.S.Afr., Rept., App., p. 15.

Type by monotypy: *A. capensis* A. Smith, 1849.

*APARALLACTUS CAPENSIS* A. Smith, 1849

\* *Aparallactus capensis* A. Smith, 1849, Ill.Zool.S.Afr., Rept., App.,

p. 16: "Kaffirland to the eastward of Cape Colony" = Natal,  
fide FitzSimons, 1962.

\* *Cercocalanus collaris* Günther, 1863, Ann.Mag.nat.Hist., (3), 11, p. 21,  
pl. iii, fig. A: "Central America", in error, fide Loveridge, 1944a.

\* *Aparallactus punctatolineatus* Boulenger, 1895, Ann.Mag.nat.Hist., (6),  
16, p. 173: Angola.

\* *Aparallactus bocagii* Boulenger, 1895, Ann.Mag.nat.Hist., (6), 16, p.  
173: Angola.

*Aparallactus lubberti* Sternfeld, 1910, Mitt.zool.Mus.Berl., 5, p. 57:  
Between Omaruru and Okanjanda, South West Africa, fide Loveridge  
(1944a).

Common name: Centipede-eater.

Range: Tanzania south through Malawi and Rhodesia to Transvaal,  
Orange Free State, Natal and eastern Cape Province; west through  
Zambia and Katanga to Angola and northern South West Africa (Broadley,  
1966).

Characters: One hundred and eighty-seven specimens examined. Loreal  
absent; nasal entire; one preocular, exceptionally two or fused with  
supraocular; one postocular, exceptionally two or fused with a  
supralabial; temporals usually zero + one + one, sometimes zero + zero  
+ one, one + one or zero + one + two, exceptionally zero + zero + two;  
supralabials usually six, third and fourth entering orbit, supralabials  
rarely five (second and third entering orbit) or seven (fourth and  
fifth entering orbit); infralabials five, rarely six or four, first  
three, rarely first four, in contact with anterior sublinguals;  
mental in contact with sublinguals; dorsal scales in 15 rows on nape,  
at midbody and anterior to vent; ventrals 141 to 157 in males, 159 to  
173 in females; anal plate entire; subcaudals (single) 37 to 48 in  
males, 29 to 46 in females; black collar on nape extending over head;



dorsum dark brown, red-brown or beige with blackish vertebral line, blackish dorsolateral line (on fifth scale row) and blackish lateral line (on third scale row); all blackish lines sometimes absent or only lateral and dorsolateral lines absent; ventral surfaces white.

Size: Largest male (NMB 2825 - Mount Nelson)  $259 + 57 = 316\text{mm}$ .

Largest female (NMB 3699 - Rondavel)  $282 + 60 = 342\text{mm}$ .

Habitat: Collected from old termitaria and sometimes under rocks.

Breeding: Gravid females containing three to five eggs were collected in October and November. The largest intact eggs measured  $18 \times 6\text{mm}$ .

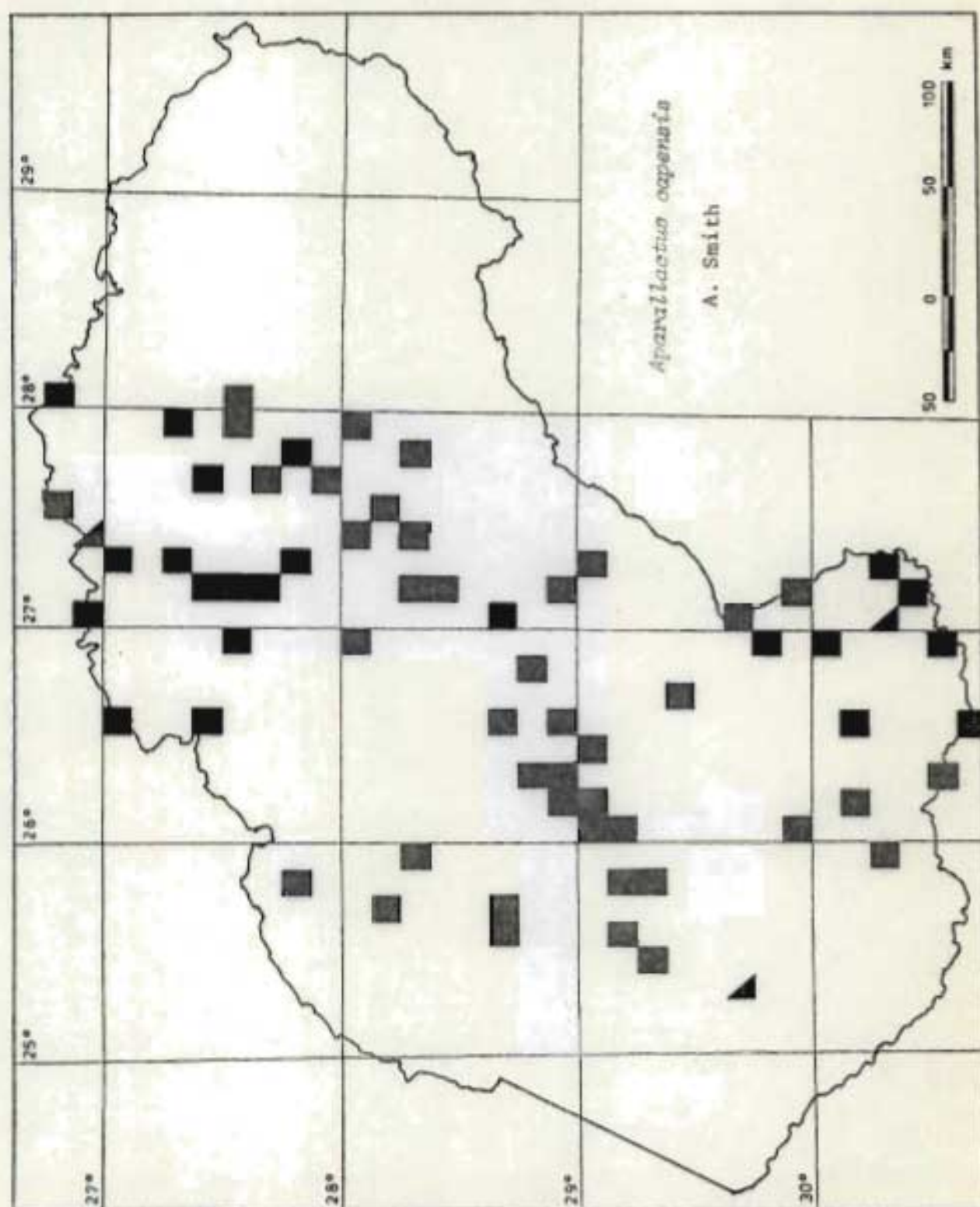
Diet: Several specimens contained remains of centipedes. A  $177\text{mm}$  specimen contained a  $71\text{mm}$  centipede.

Material examined from: Annie's Rust; Babel; Bergkloof; Bergplaats, Bloemfontein; Bergplaats, Dewetsdorp; Bethel; Biddulphsberg; Bloemfontein; Boschrand; Boskop; Brabant; Brakfontein; Brockenhurst; Carlie; Ceylon; Damfontein; Deelfontein, Bothaville; Die Hoogte; Di Poort; Exelsior, Edenburg; Glen; Grootkrans; Gruiskop; Holme's Dale; Honingberg; Houmoed; Houtkop; Kareerand; Klipdrift; Klipfontein; Klipplaatdrift, Winburg; Koppiesdam; Kraaifontein; Lanquedoc; Leliehoek; Littlecote; Lorenzo; Mara, Vredefort; Meyerskraal; Middenspruit; Mimosa; Morgenzon, Zastron; Mount Nelson; Patrijdsdraai; Petra; Pietersberg; Quaggaspruit; Rambouillet; Rietfontein, Rouxville; Rohallion; Rondavel; Smithfield (SAM); Spijtfontein; Stoffelfontein; Straalfontein; Susannasfontein; Triangle; Tweefontein; Van Der Walt's Rust; Venus; Weltevreden, Heilbron; Willem Pretorius Game Reserve; Wittekopjes; Zandfontein (Map 75).

Literature records: Fauresmith (Hewitt & Power, 1913); Kroonstad; Parys; Smithfield; Zastron (FitzSimons, 1962).

Note: Although no Orange Free State specimens have the high ventral count described for *A. bocagii*, Broadley (1966) indicated a clinal increase in ventrals from east (Mozambique) to west (Angola) and concluded that *A. bocagii* is inseparable from *A. capensis*. De Witte & Laurent (1947) distinguished *punctatolineatus* as a race of *A. capensis* on its supralabial formula (five supralabials, the second and third entering orbit). As this supralabial formula is included in the variation of Orange Free State material, I concur with Broadley (1966)

Map 75





that the recognition of *punctatolineatus* would be premature until additional material is available, and therefore treat *Aparallactus capensis* as a monotypic species.

Family ELAPIDAE Boie, 1827

Key to the genera:

- 1a. Scales not more than 15 rows at midbody ..... 2
- 1b. Scales not less than 17 rows at midbody ..... 3
- 2a. Anal plate entire; scales in 13 rows at midbody .....  
..... *Elapsoidea*, p. 208
- 2b. Anal plate divided; scales in 15 rows at midbody ... *Elaps*, p. 210
- 3a. Rostral large and shield-like, projecting laterally .....  
..... *Aspidelaps*, p. 206
- 3b. Rostral moderate, not projecting laterally ..... 4
- 4a. Ventrals 133 to 150; subcaudals 39 to 47 ..... *Hemachatus*, p. 214
- 4b. Ventrals 190 to 220; subcaudals 54 to 63 ..... *Naja*, p. 217

Genus *ASPIDELAPS* A. Smith, 1849

\* *Aspidelaps* A. Smith, 1849, Ill. Zool. S. Afr., Rept., App., p. 21.

Type by monotypy: *Natrix lubrica* Laurenti, 1768.

*ASPIDELAPS LUBRICUS* (Laurenti, 1768)

*ASPIDELAPS LUBRICUS LUBRICUS* (Laurenti, 1768)

\* *Natrix lubrica* Laurenti, 1768, Syn. Rept., p. 80: Cape of Good Hope.

\* *Coluber latonia* Daudin, 1803, Hist. Nat. Rept., p. 156: No locality.

\* *Naja somersetta* A. Smith, 1826, New Phil. J., 1, p. 253: No locality.

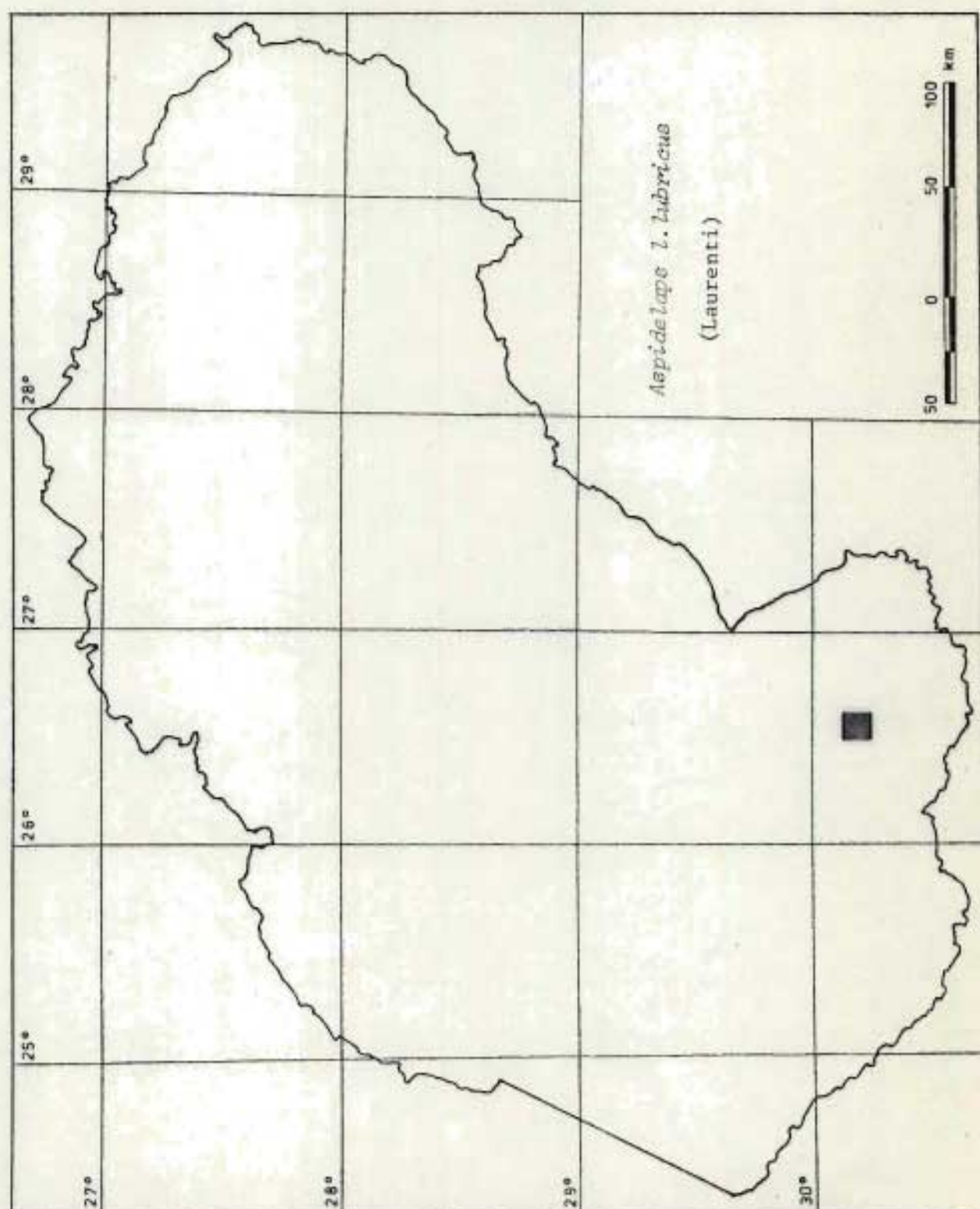
Common name: Coral Snake.

Range: Cape Province south of the Orange River and west of the Great Fish River, also the southern Orange Free State (FitzSimons, 1962).

Characters: One specimen examined from Smithfield (SAM 16642; Map 76). One preocular; postoculars three; temporals two + three; supralabials seven, third and fourth entering orbit; infralabials eight, first four in contact with anterior sublinguals; dorsals in 19 rows on nape and at midbody, 14 anterior to vent; ventrals 153; anal plate entire; subcaudals 23.



Map 76



Note: Although FitzSimons (1962) records this locality with doubt and the occurrence of this snake in the Orange Free State could not be confirmed, a specimen was found on the south bank of the Orange River at Aliwal North (Cape Province), so that it is possible that this snake occurs in the southern Orange Free State.

Genus *ELAPSOIDEA* Bocage, 1866

*Elapsoidea* Bocage, 1866, *Jorn.Sci.math.phys.nat.*, (1), 1, pp. 50 & 70. Type by monotypy: *E.guantheri* Bocage, 1866.

*ELAPSOIDEA SUNDEVALLI* (A. Smith, 1848)

\* *Elaps sundewalli* (sic) A. Smith, 1848, *Ill.Zool.S.Afr.*, Rept., pl. LXVI: "Southern Africa to the eastwards of Cape Colony" = Natal, fide Broadley, 1971a.

*ELAPSOIDEA SUNDEVALLI MEDIA* Broadley, 1971

\* *Elapsoidea sundevalli media* Broadley, 1971a, *Occ.Pap.natn.Mus.Rhod.*, 4, (32), p. 615: Farm Galulis, Edenvale, near Johannesburg, Transvaal.

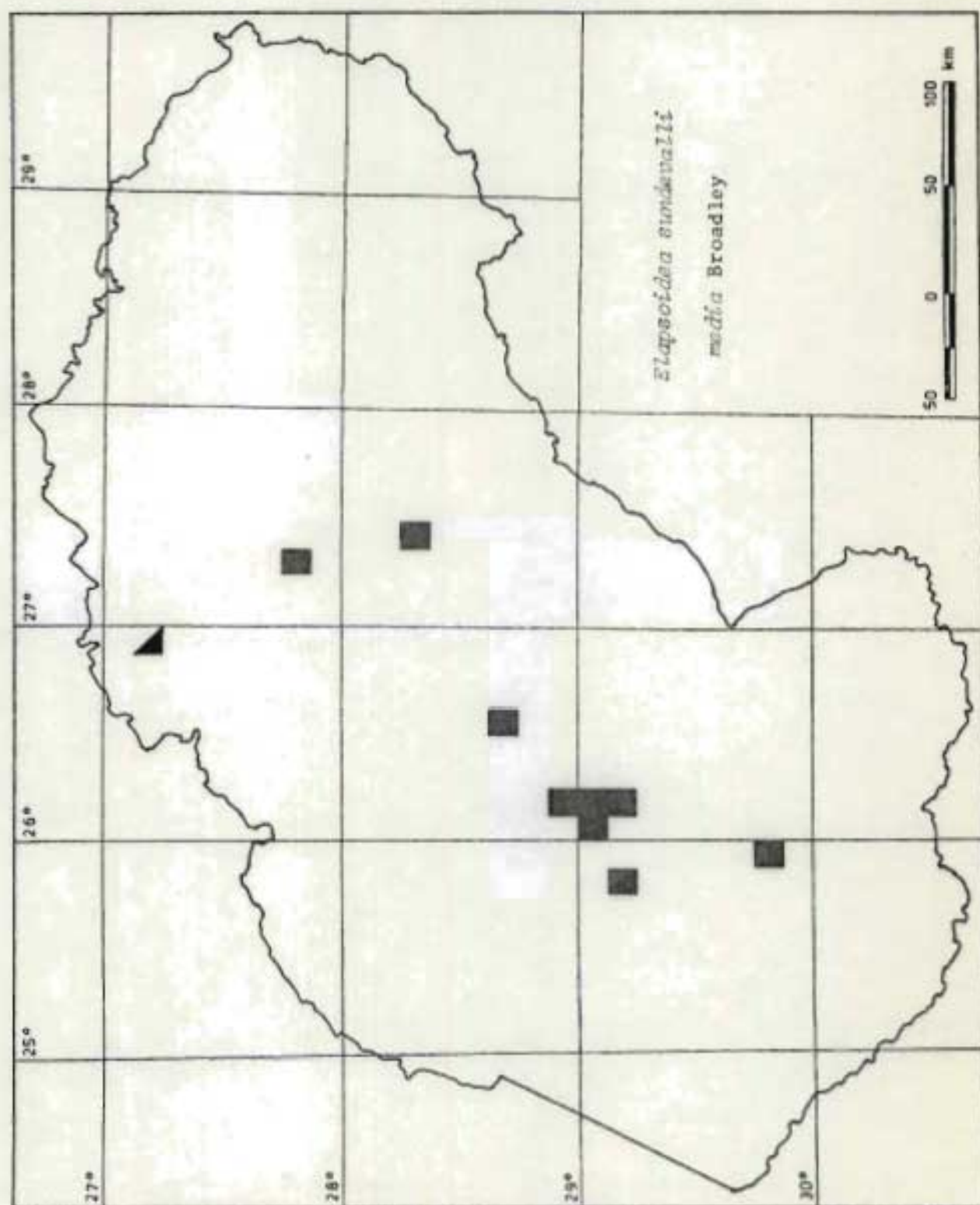
Common name: Garter Snake; Kousbandslang.

Range: Highveld regions of the Transvaal and Orange Free State, extending into the northern Cape Province at Kimberley (Broadley, 1971a).

Characters: Eleven specimens examined. Preocular one; postoculars two, exceptionally one; temporals one + two, exceptionally one + one + two; supralabials seven, third and fourth entering orbit; infralabials seven, first three or four in contact with anterior sublinguals; dorsals in 15 rows on nape, 13 at midbody and anterior to vent; ventrals 161 to 164 in males, 143 to 152 in females; anal plate entire; subcaudals 21 to 22 in males, 14 to 17 in females; juvenile and subadult colour: dorsum with alternating black and white cross-bands; white cross-bands 17 to 23 on body, two to three on tail; black cross-bands twice as broad as white cross-bands; ventral surfaces white to faint grey; adult colour: cross-bands absent, dorsum uniformly steel-grey; ventrum white to faint grey.



Map 77



Size: Largest male (NMB 3660 - Patrijsdraai)  $200 + 15 = 215\text{mm}$ .

Largest female (NMB 1397 - Holme's Dale)  $372 + 25 = 397\text{mm}$ .

Habitat: Collected from old termitaria and under rocks in central areas of study area.

Material examined from: Bloemfontein (TM); Holme's Dale; Kwaggafontein; Mimosa; Noodhulp; Northfield; Orange Free State (no locality); Patrijsdraai; Petra; Rodenbeck (Map 77).

Literature records: Orange Free State (no locality, Gough, 1908); Bloemfontein (FitzSimons, 1962, sub.nom. *descostei*); Viljoenskroon (Broadley, 1971a).

Genus *ELAPS* Schneider, 1801

*Elaps* (part) Schneider, 1801, Hist. Amph., 2, p. 289. Type species:  
*Coluber lacteus* Linnaeus, 1754, fide FitzSimons, 1962.

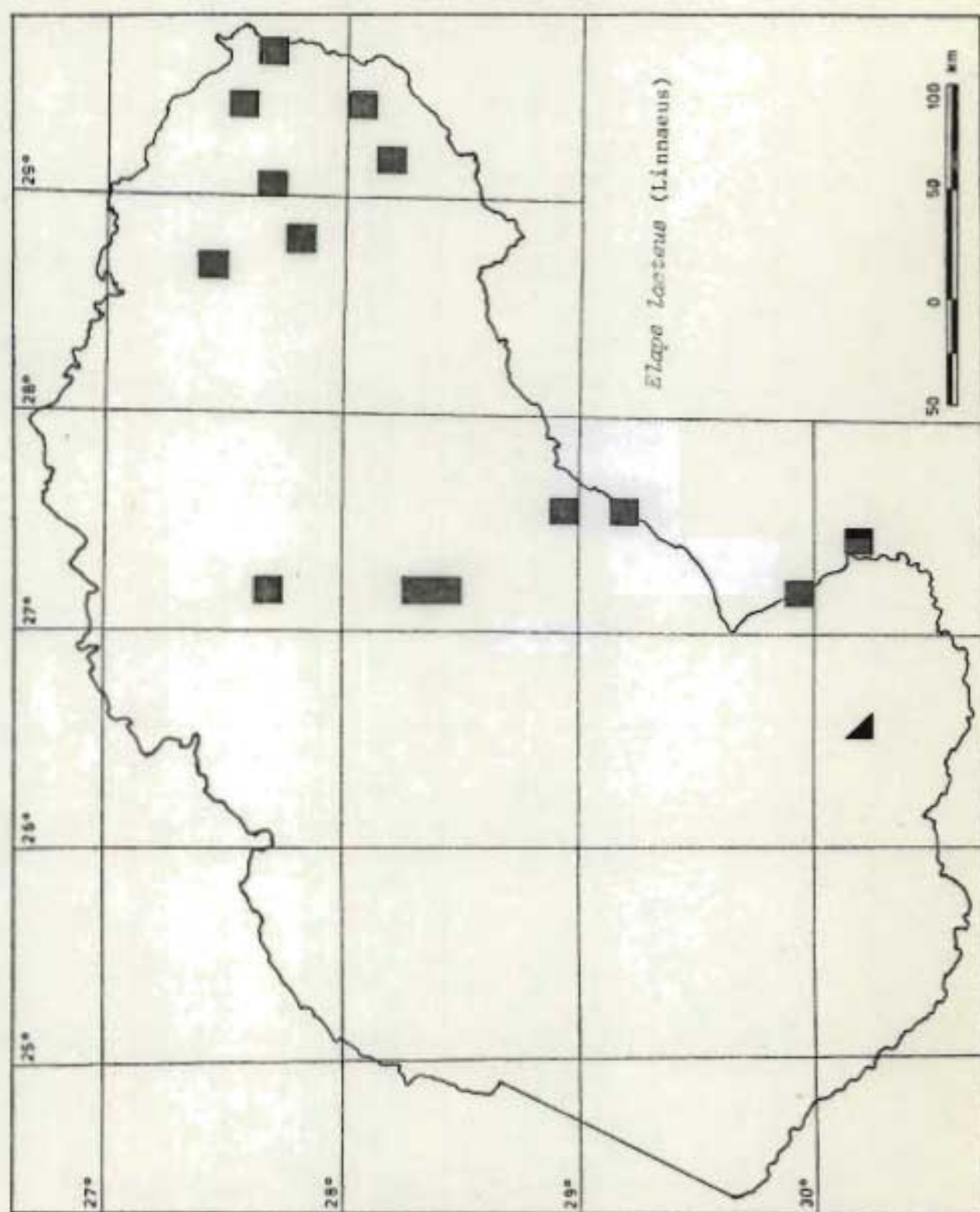
Note: In an analysis of the taxonomic affinities of the genus *Elaps*, McDowell (1968) lists a series of characters in which this type genus differs from the other members of the Elapidae. McDowell (1968) suggests that the south African snakes, *Elaps lacteus* and *Elaps dorsalis*, are more closely related to the colubrid subfamily Aparallactinae than to the Elapidae and that the generic name *Homorelaps* (as used by Boulenger, 1896) is to be preferred for these snakes. In an investigation of the taxonomic status of the genus *Elaps*, Kochva and Wollberg (1970) found that the venom gland of *Elaps* shows the major components typical of the Elapidae and no resemblance was found with the colubrid Aparallactinae. Kochva and Wollberg (1970) concluded that the evidence presented by McDowell (1968) is insufficient to require inclusion of *Elaps* within the Aparallactinae and that this genus should remain within the family Elapidae.

Key to the species of the genus *Elaps*

- 1a. Ventrals 165 to 203 ..... *E. lacteus*, p. 212
- 1b. Ventrals 210 to 237 ..... *E. dorsalis*, p. 212



Map 78



*ELAPS LACTEUS* (Linnaeus, 1754)

*Coluber lacteus* Linnaeus, 1754, Mus. Adolph. Frid., p. 28, pl. xviii, fig. 1: "In Indiis" = South Africa, fide FitzSimons, 1962.

\* *Elaps punctatus* A. Smith, 1826, New Phil.J., 1, p. 254: Cape.

(For further probable synonyms consult Boulenger, 1896).

Common name: Spotted Dwarf Garter-Snake; Kousbandslang.

Range: The coastal areas of the Cape Province, from Little Namaqualand eastwards to Natal and into the Orange Free State, northern Cape Province (Kimberley) and eastern Transvaal (FitzSimons, 1962).

Characters: Twenty specimens examined. Preocular one; postocular one; temporals zero + one, rarely one or one + one; supralabials six, third and fourth entering orbit; infralabials six or seven, exceptionally five, first three in contact with anterior sublinguals; dorsal scales in 15 rows on nape, at midbody and anterior to vent; ventrals 165 to 179 in males, 191 to 203 in females; anal plate divided; subcaudals 36 to 43 in males, 24 to 30 in females; colour above black, each scale with a yellow dot; yellow vertebral stripe; three outer rows of dorsal scales on side of body whitish-yellow and black-edged; transverse black band on each side of nape; ventrals yellowish-white, black-edged transversely.

Size: Largest male (NMB 2738 - Littlecote) 310 + 56 = 366mm.

Largest female (NMB 2932 - Tygerfontein) 371 + 32 = 403mm.

Habitat: Collected from old termitaria and under rocks.

Material examined from: Allanvale; Clocolan; Dipka; Kasteelkop; Kroonstad, 16km east of (TM); Lange Hoek; Littlecote; Maghaleen (TM); Mecklenburg; Rondeberg; Tafelberg; Tweefontein; Tygerfontein; Willem Pretorius Game Reserve (TM) (Map 78).

Literature records: Clocolan; Kroonstad; Smithfield (FitzSimons, 1962).

*ELAPS DORSALIS* A. Smith, 1849

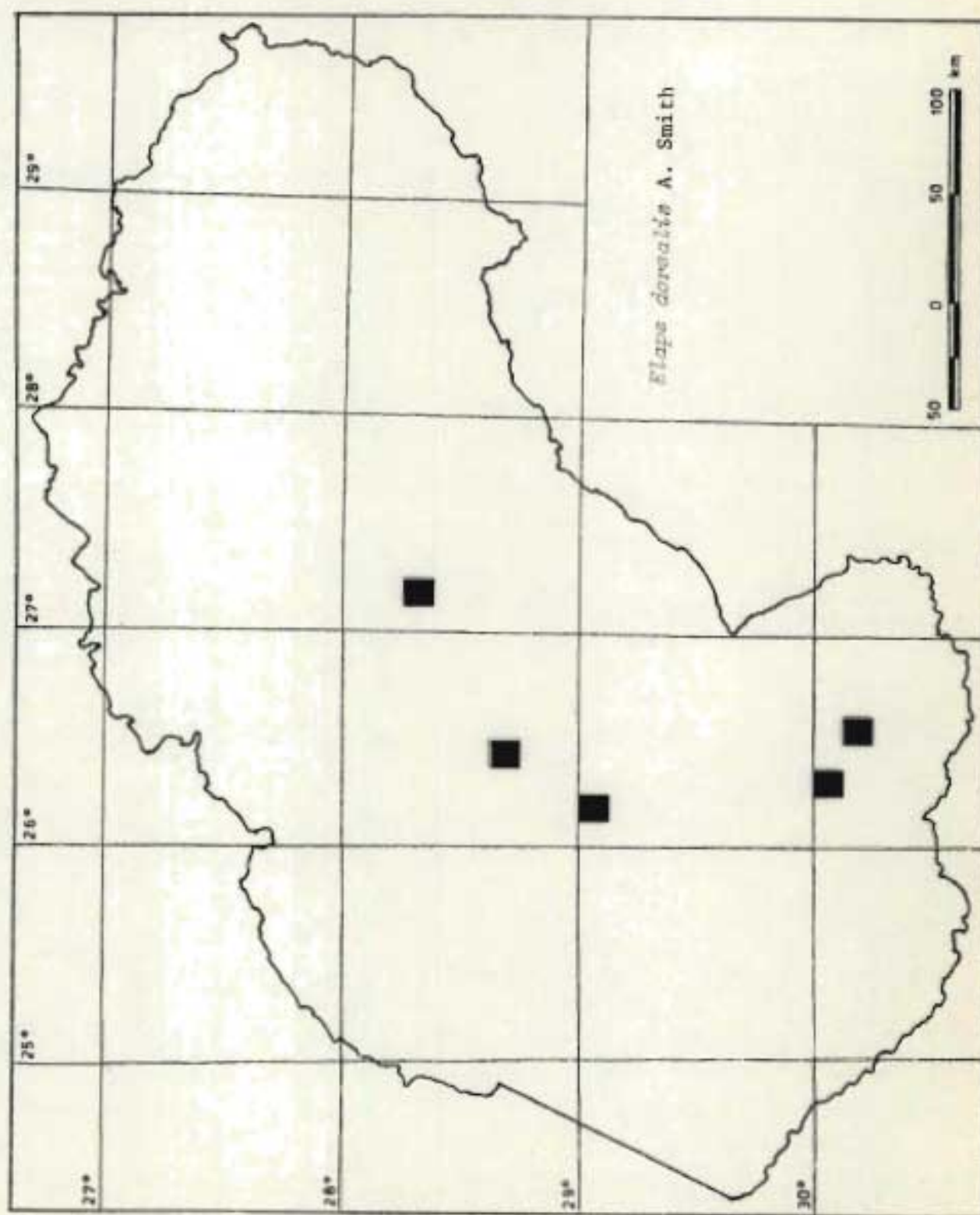
\* *Elaps dorsalis* A. Smith, 1849, Ill.Zool.S.Afr., Rept., App., p. 21: "Kaffirland and the country towards Port Natal".

Common name: Striped Dwarf Garter-Snake.

Range: From the Transvaal southwards to the Orange Free State and Natal (FitzSimons, 1962).



Map 79



Characters: Nine specimens examined. Preocular one; postocular one; temporals zero + one, rarely one or one + two; supralabials six, third and fourth entering orbit; infralabials six or five, first three in contact with anterior sublinguals; dorsal scales in 15 rows on nape, at midbody and anterior to vent; ventrals 210 to 218 in males, 228 to 237 in females; anal plate divided; subcaudals 29 to 33 in males, 22 to 28 in females; yellow vertebral stripe from snout to tip of tail; black dorsolateral band adjacent to vertebral stripe; three outer rows of dorsal scales on either side of body as well as supralabials and ventrals white.

Size: Largest male (NMB 495 - Bloemfontein)  $252 + 28 = 280\text{mm}$ .

Largest female (NMB 494 - Bloemfontein)  $286 + 29 = 315\text{mm}$ .

Material examined from: Bloemfontein; Brandfort (SAM); Hebron; Smithfield (SAM); Willem Pretorius Game Reserve (TM) (Map 79).

Literature records: Bloemfontein (Gough, 1908); Brandfort; Smithfield (Boulenger, 1910).

Note: Little is known of the habits of this rare snake. Since 1910 (Boulenger) only two additional specimens have been collected in the Orange Free State. One specimen was found in an old termitarium.

Genus *HEMACHATUS* Fleming, 1822

*Hemachatus* Fleming, 1822, Philos.Zool., 2, p. 295. Type-species:  
*Coluber haemachata* Lacépède, 1789, fide FitzSimons (1962).

*HEMACHATUS HAEMACHATUS* (Lacépède, 1788)

*Vipera haemachata* Lacépède, 1788, Hist.Nat.Quad.Ovip.Serp., 2, p. 115, pl. iii, fig. 2: "Japon et Perse" = South Africa, fide FitzSimons, 1962.

\* *Naja capensis* A. Smith, 1826, New Phil.J., 1, p. 252: Southern Africa.

Common name: South African Spitting-Cobra; Rinkals.

Range: Southern and eastern Cape Province, Orange Free State, Lesotho, Natal, Swaziland and south-eastern Transvaal (FitzSimons, 1962). Also a relict population on the Inyanga highlands of Rhodesia (Broadley, 1962).



Characters: Twenty-seven specimens examined. One preocular, exceptionally two; postoculars three; temporals two + three, exceptionally two + two, two + four or two + (one on two + two); supralabials seven, third and fourth entering orbit; infralabials eight, rarely nine, first four, rarely first three, in contact with anterior sublinguals; dorsal scales keeled, in 17 or 19 rows on nape, 19, exceptionally 17 or 18, at midbody and 13 anterior to vent; ventrals 133 to 139 in males, 141 to 150 in females; anal plate entire; subcaudals 40 to 47 in males, 38 to 45 in females; juvenile colour; head black; dorsum grey-brown with black markings; ventrum black with white laterally and white cross-bands on ventral part of neck; adult colour: dorsum black; ventrum grey-brown to black with one to three white cross-bands on ventral part of neck; white cross-bands and interscaly areas of spreaded hood sometimes orange tinged.

Size: Largest male (NMB 2615 - Karreepoort)  $1075 + 235 = 1310\text{mm}$ .

Largest female (NMB 2614 - Karreepoort)  $1152 + 213 = 1365\text{mm}$ .

Habitat: Often found in deserted mammal burrows in open grassland and sometimes under rocks.

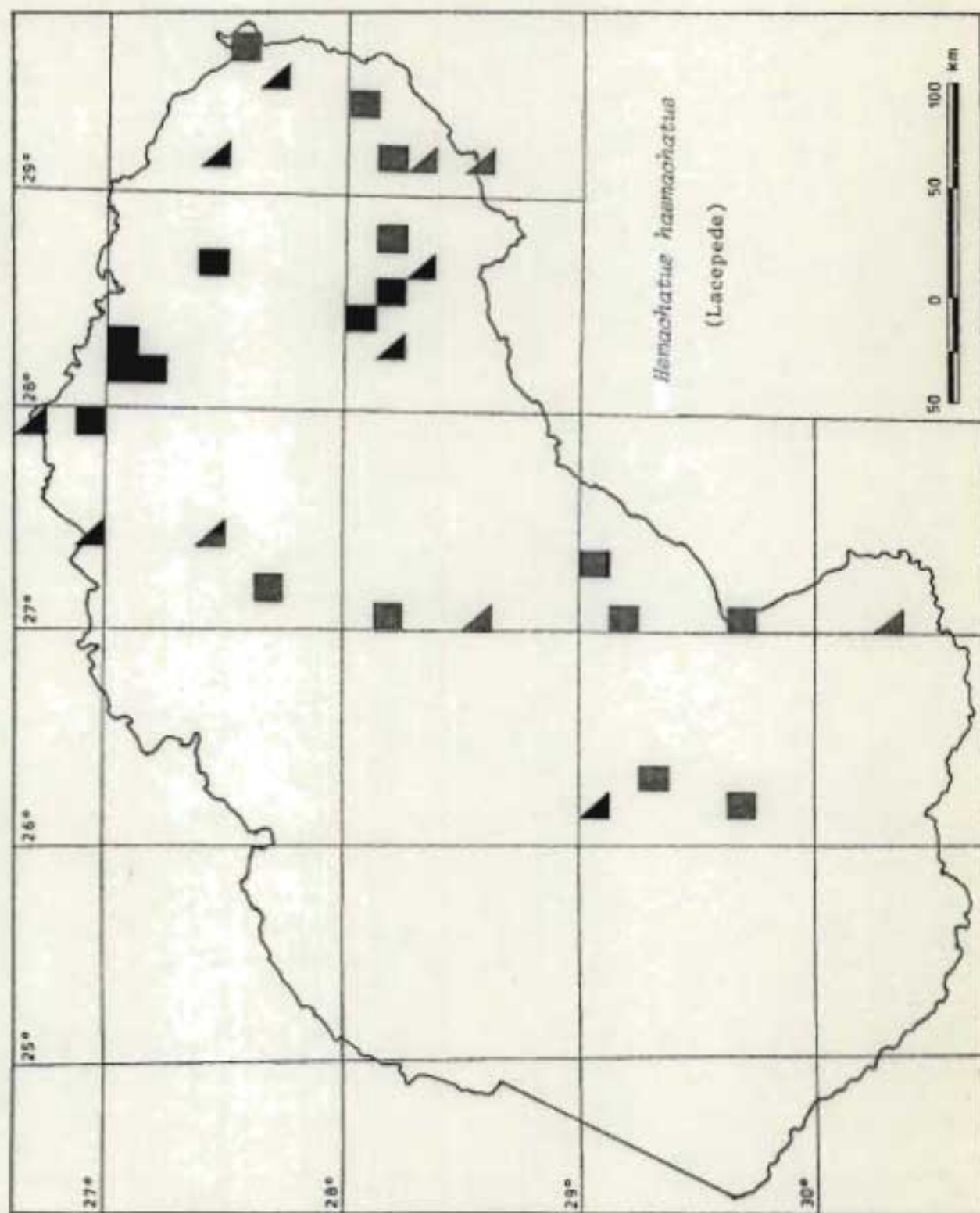
Breeding: Gravid females with 26 to 47 embryos were found from September to December.

Diet: One specimen contained as *Psammophylax rhombeatus* while another contained six crushed bird's eggs.

Material examined from: Groendraai; Karreepoort; Kasteelkop; Klipoog; Lange Hoek; Loskop; Louis Rust; Nova; Philippi; Reddersburg; Rietspruit; Seekoeivleipoort; Serfontein Dam; Slangheuvel; Tafelberg; Tweespruit; Uitzicht; Wepener; Wolvenfontein (Map 80).

Literature records: Kroonstad (Symonds, 1887); Bethlehem; Bloemfontein; Harrismith; Kestell; Maweni Heights; Memel; Parys; Rietspruit; Serfontein; Tweespruit; Viljoensdrift; Vrede; Winburg; Zastron (FitzSimons, 1962).

Map 80





Genus *NAJA* Laurenti, 1768

- \* *Naja* Laurenti, 1768, Syn.Rept., p. 90. Type by absolute tautonymy:  
*Coluber naja* Linnaeus, 1754.

*NAJA NIVEA* (Linnaeus, 1758)

- \* *Coluber niveus* Linnaeus, 1758, Syst.Nat., ed. 10, 1, p. 223:  
"Africa" = Cape of Good Hope, fide FitzSimons, 1962.  
\* *Vipera (Echidna) flava* Merrem, 1820, Tent.Syst.Amph., p. 154: Cape  
of Good Hope.  
\* *Naja gutturalis* A. Smith, 1838, Ann.Mag.nat.Hist., (2), 2, p. 92:  
Near the mouth of the Orange River.  
\* *Naja haje*, varieties "A & B" A. Smith, 1842, Ill.Zool.S.Afr., Rept.,  
pls. XVIII, XIX & XXI.  
*Naja intermixta* Dumeril & Bibron, 1854, Erp.Gen., 7, p. 1299 (based on  
A. Smith, 1842).

Common name: Cape Cobra; Koperkapel.

Range: Dry savanna of southern South West Africa and Botswana, most  
of the Cape Province, western Orange Free State, Lesotho and south-  
western Transvaal (Broadley, 1968a).

Characters: Sixteen specimens examined. One preocular; postoculars  
three; temporals one + two or one + three; supralabials seven,  
third and fourth entering orbit, rarely six supralabials with second  
and third entering orbit; infralabials eight or nine, first four in  
contact with anterior sublinguals; dorsal scales in 21 or 23 rows  
on nape, 21, exceptionally 19 or 23, at midbody and 15, exceptionally  
13, anterior to vent; ventrals 190 to 205 in males, 203 to 220 in  
females; anal plate entire; subcaudals 54 to 63 in males, 57 to 62  
in females; colour above coppery-yellow to beige or brown; tip of  
tail dark brown or black; ventral surfaces white posteriorly, brown  
anteriorly or with a black cross-band on neck.

Size: Largest male (NMB 591 - Albion) 1466 + 248 = 1714mm.

Largest female (NMB 4564 - Beginseisdam) 1275 + 225 = 1500mm.

Habitat: Collected from old mammal burrows and under rocks in the  
western Orange Free State.

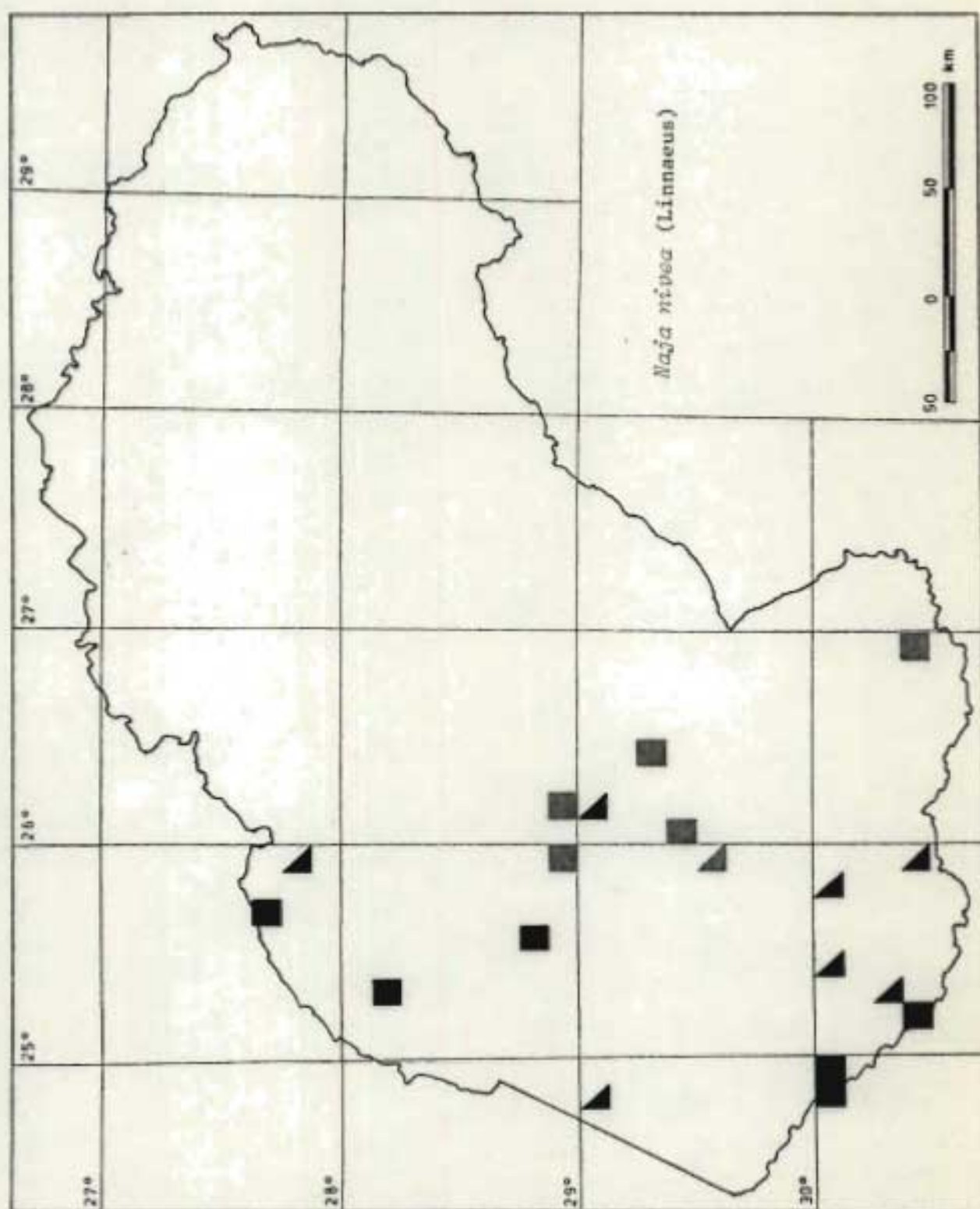
Diet: Stomach contents consisted of rodent remains, a *Bufo* sp. and a *Psemmophylax t. tritaeniatatus*.

Material examined from: Albion; Beginseisdam; Doornlaagte; Groenekloof; Heilbron, Philippolis; Holme's Dale; Krugersdrift Dam; Lemoenboord; Magdalen; Sweet Home; Vet River - Bloemhof Dam junction (Map 81).

Literature records: Bethany; Bethulie; Bloemendal; Bloemfontein; Driebaden; Hoopstad; Jacobsdal; Philippolis; Trompsburg (FitzSimons, 1962).



Map 81



Family VIPERIDAE Gray, 1825

Key to the genera:

- 1a. Head covered above with small keeled scales; pupil  
vertical ..... *Bitis*, p. 224
- 1b. Head covered above with large symmetrical, smooth shields;  
pupil round ..... 2
- 2a. Loreal absent; eye minute; subcaudals single .....  
..... *Atractaspis*, p. 220
- 2b. Loreal present; eye moderate; subcaudals paired .....  
..... *Causus*, p. 222

Genus *ATRACTASPIS* A. Smith, 1849

- \* *Atractaspis* A. Smith, 1849, Ill.Zool.S.Afr., Rept., footnote pl.  
LXXI. Type by monotypy: *A.bibronii* A. Smith, 1849.

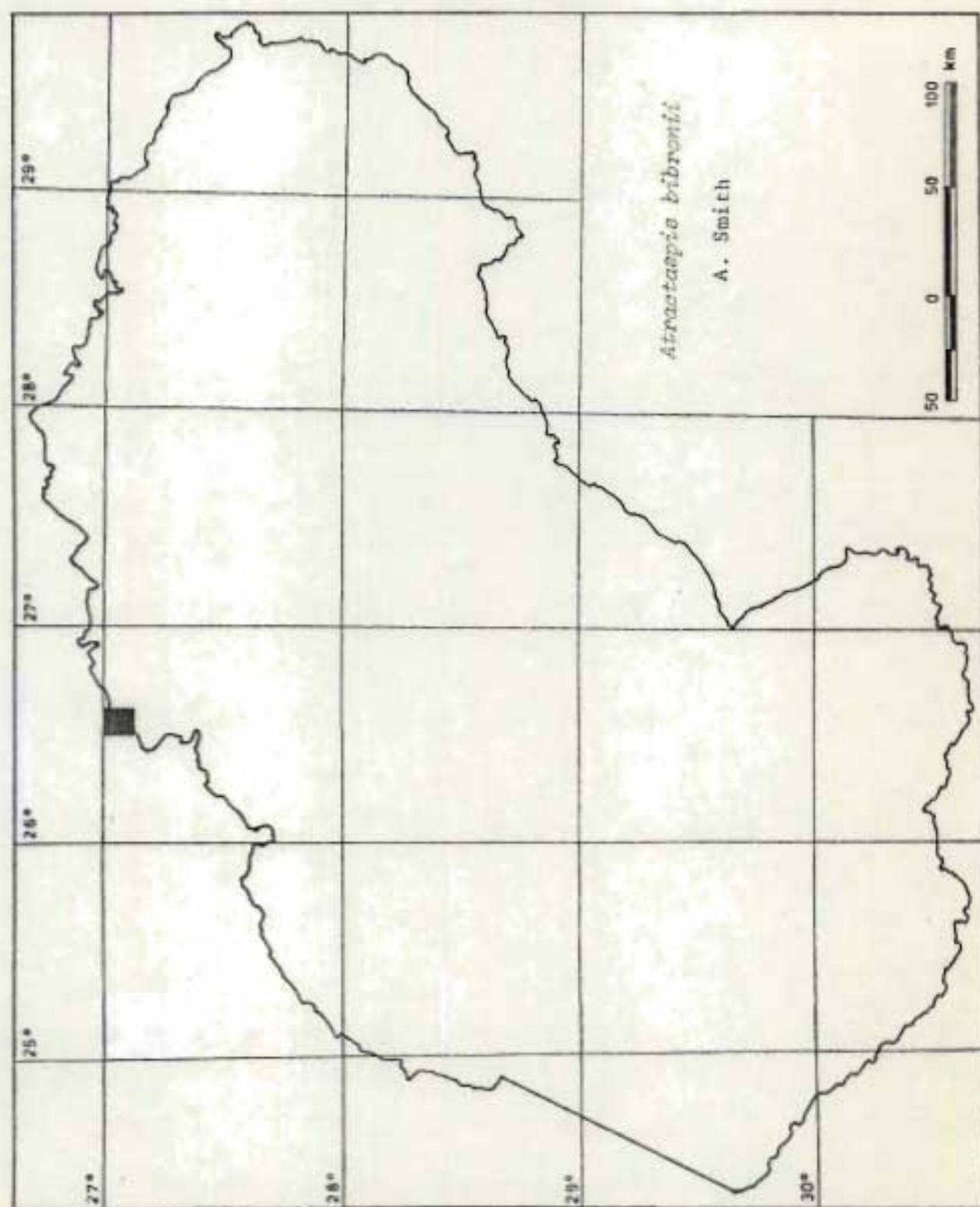
Note: Evidence has been presented indicating that the genus *Atractaspis* should be separated from the other Viperidae but no general agreement has been reached on the categorical level that best reflects the position of *Atractaspis*, as the relationship of this genus must await further studies (Kochva et al, 1967). Based on cranial morphology Bourgeois (1968) introduced a new colubrid subfamily, Aparallactinae, including inter alia the genus *Atractaspis*. After their studies on venom glands Kochva and Wollberg (1970) considered the evidence presented by Bourgeois (1968) as insufficient to justify the inclusion of *Atractaspis* within the Aparallactinae.

*ATRACTASPIS BIBRONII* A. Smith, 1849

- \* *Atractaspis bibronii* A. Smith, 1849, Ill.Zool.S.Afr., Rept., pl.  
LXXI: Eastern districts of the Cape Province.
- \* *Atractaspis rostrata* Günther, 1868, Ann.Mag.nat.Hist., (4), 1, p.  
429, pl. XIX, fig. 1: Zanzibar.
- Atractaspis katangae* Boulenger, 1901, Annls Mus.r.Congo belge Sér.  
4to, Zool., (1), 2, p. 13, pl. V, fig. 2: Lofoi, Katanga, Zaïre.



Map 82



*Atractaspis coarti* Boulenger, 1901, Annls Mus.r.Congo belge Sér.

4to, Zool., (1), 2, p. 14, pl. V, fig. 3: Albertville, Zaïre.

\* *Atractaspis duerdeni* Gough, 1907, Rec.Albany Mus., 2, p. 178, fig:  
Serowe, Botswana.

Common name: Bibron's Burrowing Adder.

Range: Kenya, south to Natal, west to southern Zaïre, Angola and South West Africa (Broadley, 1966).

Characters: One specimen examined. One preocular; one postocular; temporals one + two; supralabials five, third and fourth entering orbit; infralabials five, first three in contact with anterior sublingual; dorsal scales in 21 rows on nape and at midbody, 17 anterior to vent; ventrals 231; anal plate entire; subcaudals 22; dorsum black, fading to brown laterally; ventrals white with brown laterally.

Size: Female (NMB 1908 - Deelfontein, Bothaville) 285 + 19 = 304mm.

Habitat: Collected from an old termitarium.

Material examined from: Deelfontein, Bothaville (Map 82).

Literature records: None, new record for the Orange Free State.

Note: In his revision of the genus Laurent (1950) regarded *rostrata* as a northern race of *bibronii* on account of its higher number of midbody scales. According to Broadley (1966) this character is clinal and therefore does not justify the recognition of *rostrata*.

#### Genus *CAUSUS* Wagler, 1830

\* *Causus* Wagler, 1830, Nat.Syst.Amph., p. 172. Type by monotypy:  
*Sepedon rhombeata* Lichtenstein, 1823.

#### *CAUSUS RHOMBEATUS* (Lichtenstein, 1823)

\* *Sepedon rhombeata* Lichtenstein, 1823, Verz.Doubl.Mus.Zool.Berlin, p. 106: No locality.

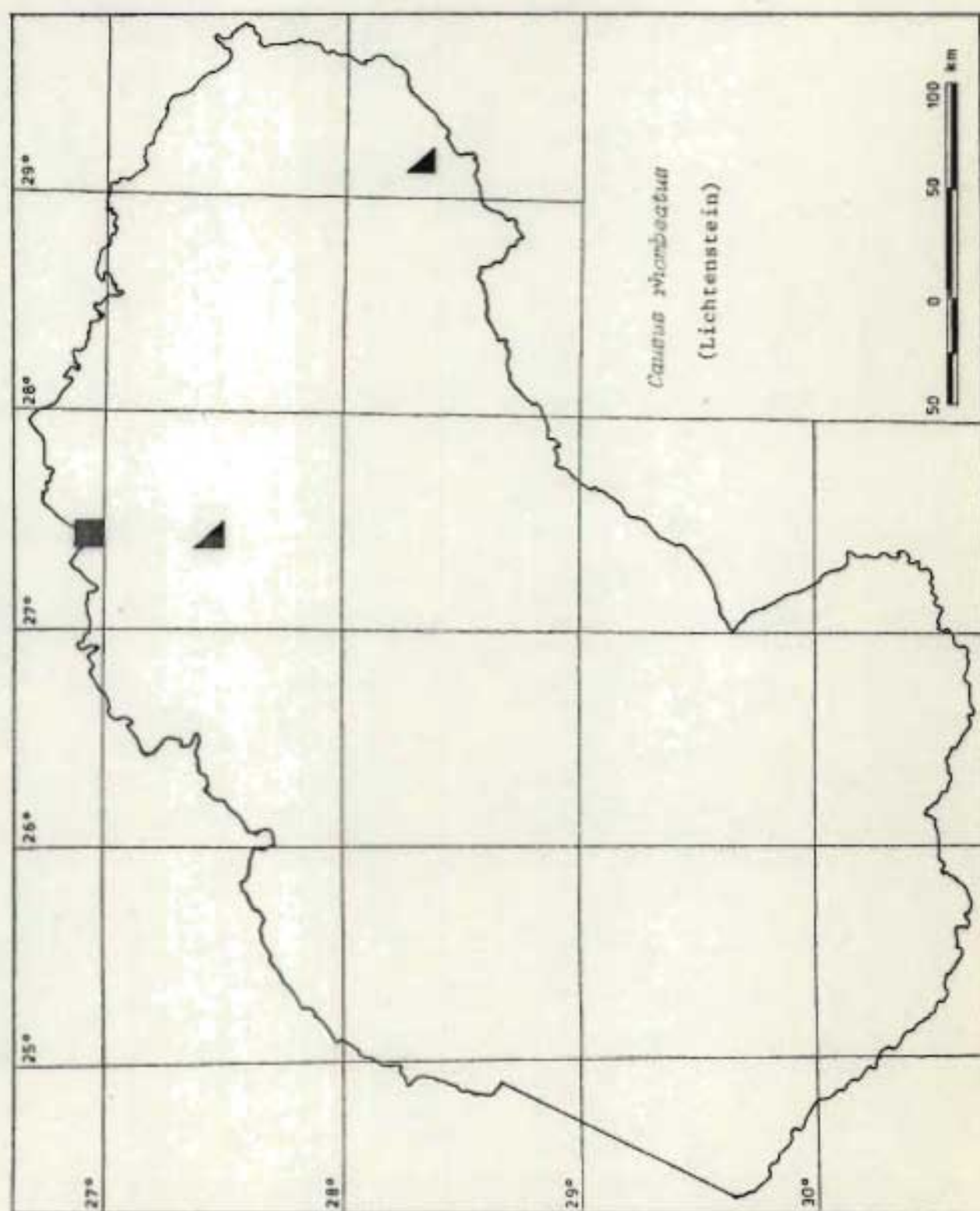
*Naja Coluber* v *nigra* Cuvier (sic) Boie, 1827, Isis Oken, 20, p. 557: Africa.

\* *Causus rhombeatus* var *taeniata* Sternfeld, 1912, Wiss.Ergebn.Deutsch. Zentral-Afrika-Exped. 1907-1908, 4, p. 276: No Locality.

Common name: Rhombic Night-Adder; Nagadder.



Map 83



Range: Sudan and Somalia south to the Cape Province, west to southern Zaïre and Angola, absent from the south-west arid areas (Broadley, 1966).

Description: One specimen examined (TM 5691). Scales in ocular ring six; temporals three + four (one side), or two + four (other side); supralabials six, excluded from orbit; infralabials ten, third and fourth in contact with anterior sublinguals; dorsal scales in 19 rows on nape and at midbody, 13 anterior to vent; ventrals 136; anal plate entire; subcaudals 23.

Material examined from: Parys (TM) (Map 83).

Literature records: Harrismith; Parys; Serfontein (FitzSimons, 1962).

Note: The occurrence of this snake in the Orange Free State could not be confirmed by my intensive collecting program.

Genus *BITIS* Gray, 1842

- \* *Bitis* Gray, 1842, Zool.Misc., p. 69. Type by virtual tautonymy:  
*Coluber bitis* (sic: error for *bitin*) Bonnaterre, 1789 =  
*Cobra lachesis* Laurenti, 1768 = *Vipera (Echidna) arietans*  
Merrem, 1820.

Key to the species:

- 1a. Midbody scales 32 to 38; nostrils directed vertically upwards  
..... *B. arietans*, p. 224  
1b. Midbody scales 29 to 31; nostrils directed upwards and outwards  
..... *B. atropos*, p. 226

*BITIS ARIETANS* (Merrem, 1820)

*BITIS ARIETANS ARIETANS* (Merrem, 1820)

- \* *Vipera (Echidna) arietans* Merrem, 1820, Vers.Syst.Amph., p. 152:  
Cape of Good Hope.

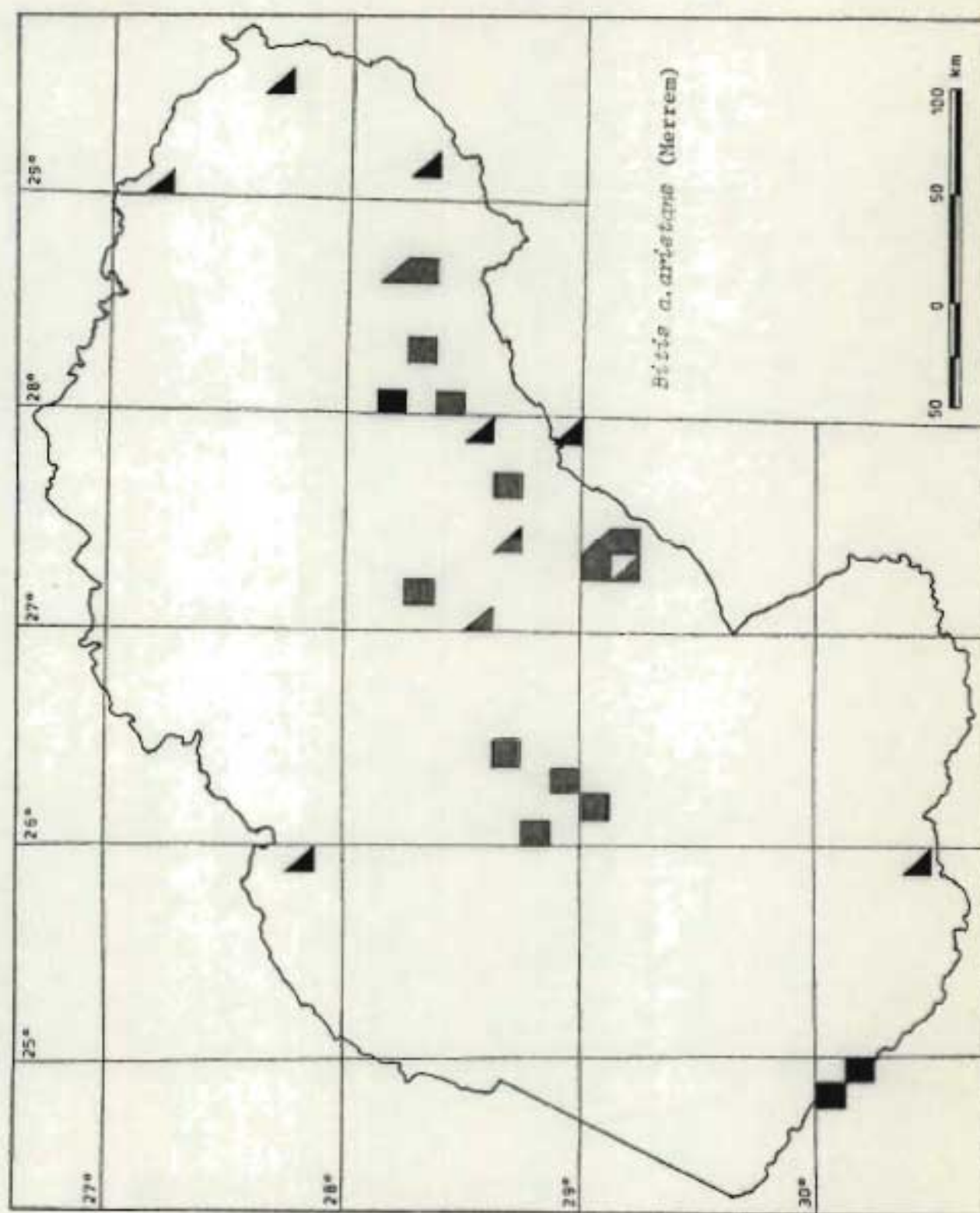
*Vipera inflata* Burchell, 1822, Travels S.Afr., 1, p. 469: Cape Province.

*Vipera brachyura* Cuvier, 1829, Regne Anim., ed. 2, 2, p. 90: No locality.

- \* *Clotho lateristriga* Gray, 1842, Zool.Misc., p. 69: Gambia.



Map 84



Common name: Puff Adder; Pofadder.

Range: Throughout Africa and southern Arabia, excluding rain forest and extreme desert (FitzSimons, 1962).

Characters: Thirty-seven specimens examined. Supralabials 13 to 15, excluded from orbit; infralabials 14 to 17, first three or four in contact with anterior sublinguals; dorsal scales in 32 to 40 rows at midbody; ventrals 135 to 142 in males, 134 to 146 in females; anal plate entire; subcaudals 26 to 32 in males, 16 to 20 in females; yellow or white interocular bar; dorsum with a series of black to brown, pale-edged chevrons pointing posteriorly; ventral surfaces white with black markings.

Size: Largest male (NMB 4603 - Ladybrand)  $988 + 135 = 1123\text{mm}$ .

Largest female (NMB 4629 - Lotters Rust)  $905 + 72 = 977\text{mm}$ .

Habitat: Open grassland and rocky areas.

Breeding: A female with 15 very well-developed embryos was collected in February.

Material examined from: Bloemendal; Bloemfontein; Boschkloof; Doornhoek; Glen; Kestell; Ladybrand; Lemoenboord; Lotters Rust; Merino, Bethlehem; Nova; Rayton; Stoomhoek; Willem Pretorius Game Reserve; Wittepoort; Zomervlakte (Map 84).

Literature records: Afrikaskop; Ascent; Bethulie; Ficksburg; Harrismith; Hoopstad; Kestell; Marquard; Marseilles; Memel; Modderpoort; Rosendal; Winburg (FitzSimons, 1962).

Note: For comment on the name *Cobra Lachesis* Laurenti, 1768, and other unavailable names see Peters and Broadley (1967).

*BITIS ATROPOS* (Linnaeus, 1754)

*BITIS ATROPOS ATROPOS* (Linnaeus, 1754)

*Coluber atropos* Linnaeus, 1754, Mus. Adolphi Frid., 1, p. 22, pl. xiii, fig. 1: "America", error, fide FitzSimons, 1962.

\* *Vipera montana* A. Smith, 1826, New Phil.J., 1, p. 252: Southern Africa.  
*Eohidna ocellata* Tschudi, 1845, Faun. Per., Herp., p. 60.

Common name: Mountain Adder; Bergadder.



Range: From Table Mountain eastwards along the southern mountain chain to the eastern Cape Province and then northwards along the Drakensberg escarpment to north-eastern Transvaal; also a relict population from the Chimanimani Mountains north to the Inyanga Highlands (FitzSimons, 1962).

Characters: Five specimens examined. Supralabials 10 to 12, excluded from orbit; infralabials 11 to 13, first three or four in contact with anterior sublinguals; dorsal scales in 29 to 31 rows at midbody; ventrals 134 to 137 in males, 139 in female; anal plate entire; subcaudals 26 to 31 in males, 20 in female; dark grey-brown above with dorsolateral and lateral series of black blotches; ventral grey; throat white with black markings on infralabials.

Size: Largest male (NMB 3353 - Sentinel)  $229 + 27 = 256\text{mm}$ .

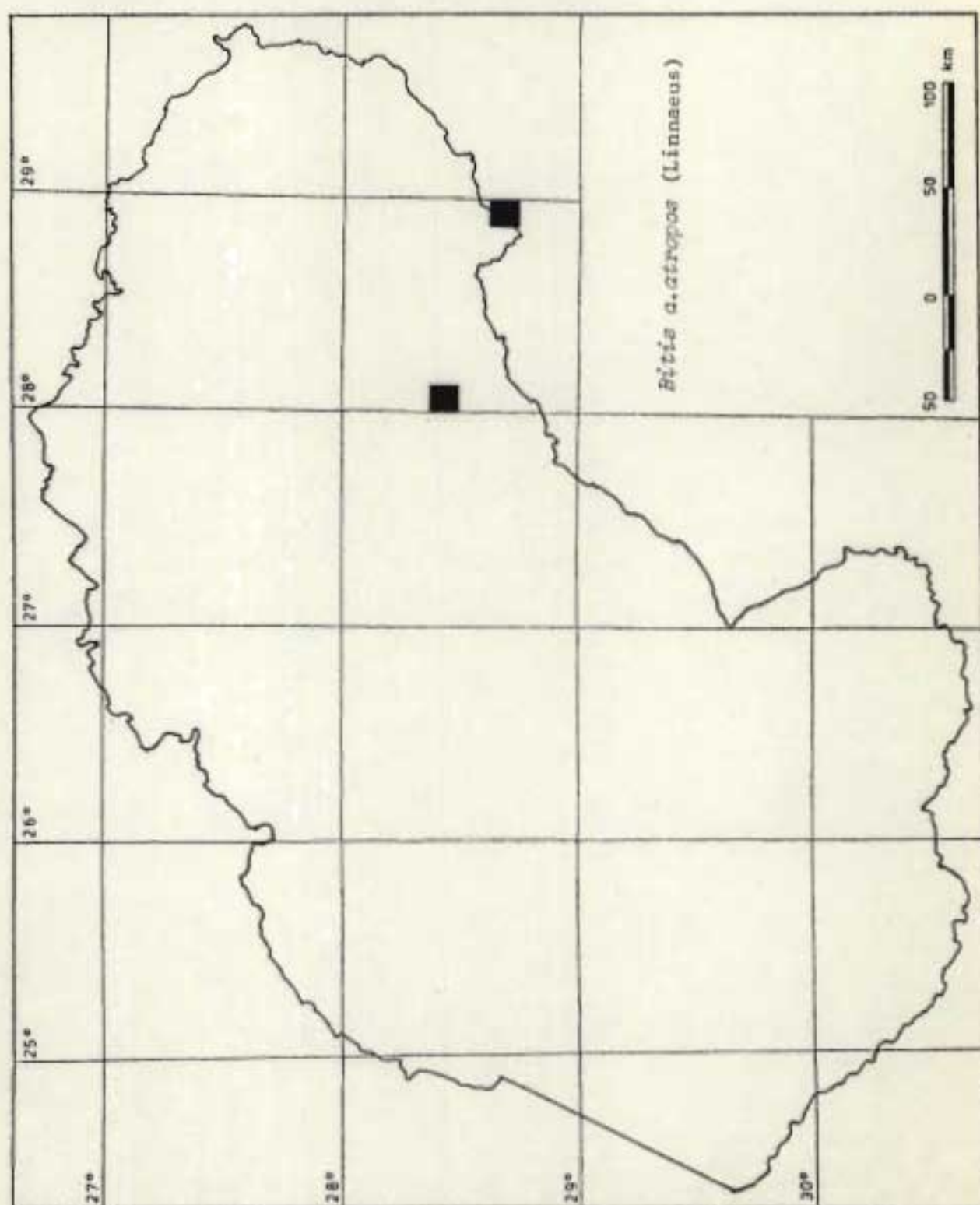
Largest female (NMB 3354 - Sentinel)  $205 + 15 = 220\text{mm}$ .

Habitat: Monticolous from 1981m (6500 ft) to 2591m (8500 ft).

Material examined from: Boschkloof; Sentinel (Map 85).

Literature records: None, new record for the Orange Free State.

Map 85





## V. ANALYSIS OF DISTRIBUTIONAL PATTERNS

### PREFACE:

The first objective of this analysis is to determine the main patterns of distribution of the Squamata of the Orange Free State by classifying distribution patterns to identify geographic areas of relative homogeneity separated from adjacent areas by zones of heterogeneity which will be called transitional zones. The second objective and ultimate goal is a causal analysis. As the distribution patterns of taxa are the result of partly ecological (and partly historical) factors the classification of distribution patterns into geographic areas reflects the position of major essential or influential environmental phenomena affecting distribution. Geographically derived zoogeographic areas are therefore ecological indicators: transitional zones between these areas represent major ecological barriers while the areas themselves have such ecological features that they support life of relative homogeneity. Zoogeographic areas are useful as a source of basic data in seeking a causal solution for the distribution patterns of individual species or subspecies.

### DETERMINATION OF AREAS OF RELATIVE HOMOGENEITY:

Due to different environmental requirements and limitations species have different distribution patterns and an exact geographical grouping is therefore not possible. However, the objective here is to determine the main patterns of distribution so a compromise is reached by making a geographical classification of those distributional patterns which group most of the species.

For methods of analyzing zoogeographical data the reader is referred to Udvardy (1969).

To determine the squamate areas of the Orange Free State two methods have been employed. The first consisted of grouping forms with similar distribution patterns, and making use of a map indicating the distribution boundaries of all forms. The second method is a mathematical one (see below) used to determine if the first was objective.

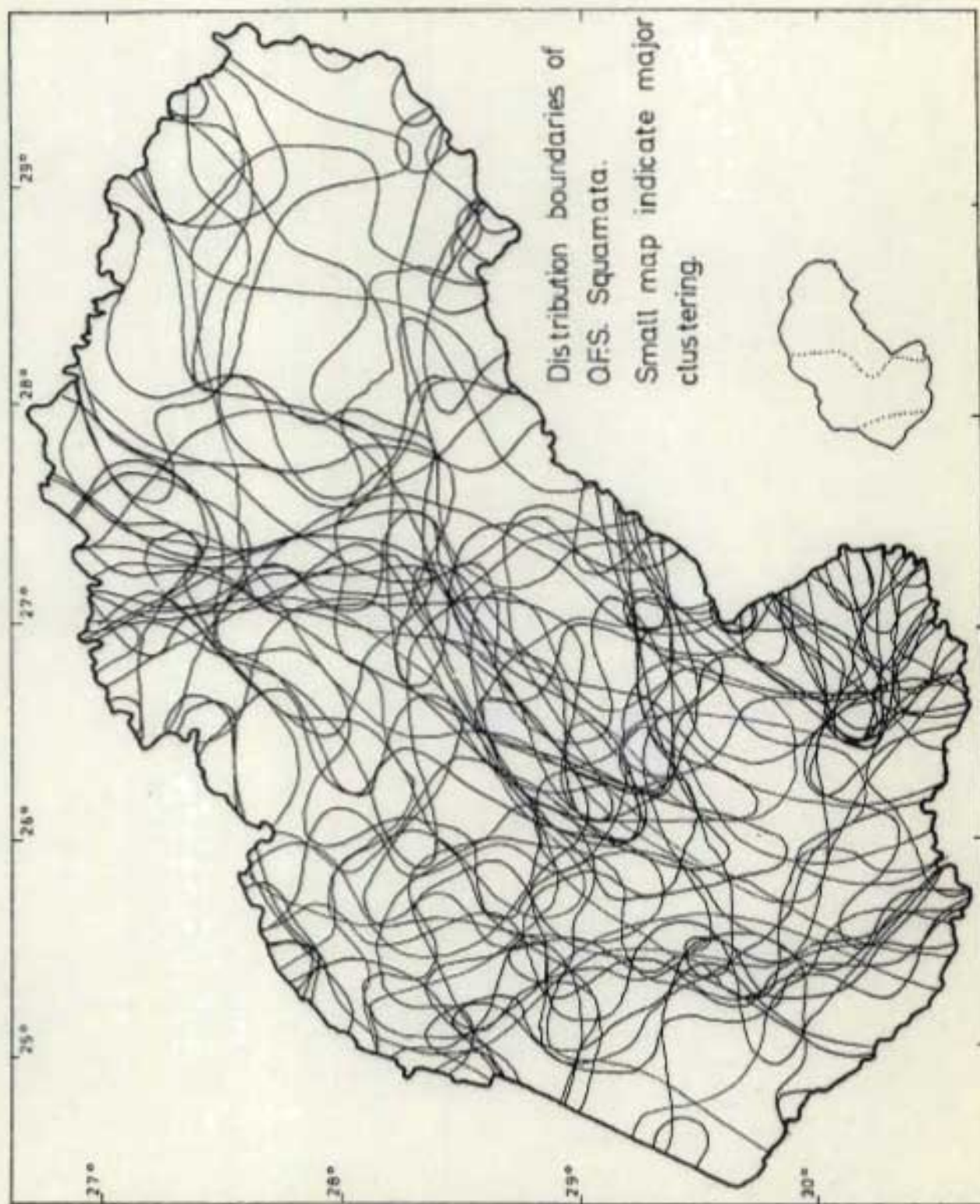
Owing to inadequate data the following forms were not considered in this analysis: *Varanus n.niloticus*; *Monopeltis c.capensis*; *Xenocalamus b.bicolor*; *Aspidelaps l.lubricus*; *Causus rhombeatus*. The distributional boundaries of the following forms could not be defined objectively (too few distributional data) and therefore have been excluded from the boundary map as well as the mathematical analysis: *Nucras intertexta*; *Lamprophis fuscus*; *Duberria l.lutrix*; *Bitis a.arietans*. Three forms have a blanket distribution in the study area, namely *Pachydactylus c.capensis*, *Mabuia capensis* and *Dazypeltis scabra*.

The taxonomic units used in this analysis are species and subspecies. A study of the geographic areas of higher taxa is not included because the distribution of a higher taxon is an artificial and composite area - there is no uniform definition available of the higher taxa and its distribution is made up of the sometimes sympatric distributions of two or more species, often with different ecological requirements. Geographic characteristics become progressively more generalized as we deal with higher taxa, until finally they become practically meaningless (Udvardy, 1969). For the purpose of this study the races of *Mabuia variegata* and *Pseudocordylus melanotus* as well as the two varieties of *Agama hispida* are treated as separate forms as their distribution patterns match those of other taxa.

In order that biogeographic areas can be mapped, two conditions must hold: firstly, some range limits must occur in the area under study and secondly, the distribution of range limits must be clumped or contagious, and not random or regular (Sokal & Sneath, 1963; Hagmeier & Stults, 1964). As only three forms have a blanket distribution in the study area the first of the required conditions is met. Examination of the map showing boundaries of all forms (Map 86) indicates two zones of major clustering of distributional limits, which represent two major natural barriers (Udvardy, 1969). Otherwise distributional limits seems to be rather randomly distributed but on the basis of distribution patterns of individual forms it appears that many forms are in fact contagiously distributed, so that the second condition is met to some extent. To delimit the two major zones of clustering



Map 86



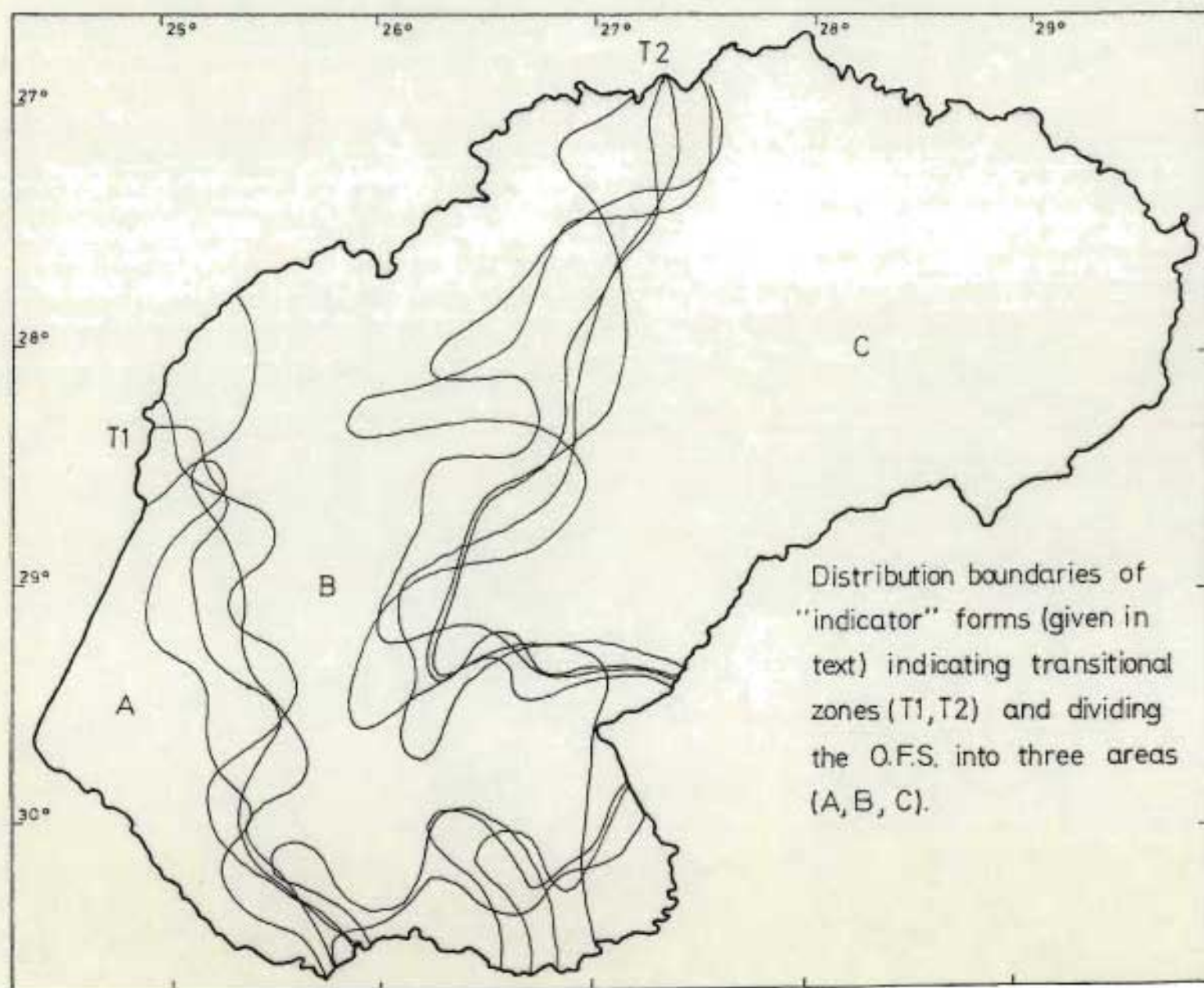
of distributional limits "indicator" forms were selected. The western zone of clustering (transitional zone 1; Map 87) is indicated by *Pachydactylus bibronii* (Map 18), *Agama hispida* (south-western var.; Map 20) *Mabuya s.sulcata* (Map 28) and *Mabuya p.punctatissima* (Map 29). The central zone of clustering (transitional zone 2, Map 87) is indicated by *Lamprophis aurora* (Map 56), *Crotaphopeltis hotamboeia* (Map 67), *Psammophylax rhombeatus* (Map 69), *Psammophis crucifer* (Map 73) and *Hemachatus haemachatus* (Map 80). Transitional zone 1 is indicated only by lizards and transitional zone 2 only by snakes. While some snakes do appear to be limited by transitional zone 1 and some lizards by transitional zone 2 it is not very obvious and it seems evident that the barrier at T1 is more important for lizards while the barrier at T2 is more important for snakes.

The two transitional zones divide the study area into three areas called provinces A, B and C (Map 87). To determine the squamate areas in the Orange Free State all the forms have been classified into these three provinces (Table 1) while transitional zones have been delimited where largely allopatric forms of two provinces meet, occur sympatrically or overlap (Map 88). In the process of delimiting transitional zone 2 it became evident that some forms occur exclusively in this narrow zone (*Afroablepharus whalbergii*, Map 30; *Elapsoidea sundevalli media*, Map 77; *Elaps dorsalis*, Map 79) and these forms have also been considered in delimiting this transitional zone.

Based on forms with similar distribution patterns provinces B and C can be subdivided, each into two areas (Map 88). The borders separating these areas (B1, B2; C1, C2; Map 88) are not so clearly indicated by distributional data as those separating provinces A-B and B-C (Map 88), for which reason they are regarded as of lesser status. For this reason I prefer to call these subareas (B1, B2, C1, C2) districts. The possibility exist that these districts represent distinct provinces and this will be discussed below.

A mathematical method of analysing biogeographical data was used by Hagmeier and Stults (1964) and Hueey (1965). Both workers employed essentially the same methods which will be used here to some extent





Distribution boundaries of  
"indicator" forms (given in  
text) indicating transitional  
zones (T1, T2) and dividing  
the O.F.S. into three areas  
(A, B, C).

Map 87

TABLE 1. Forms occurring in squamate areas as defined in Map 88.

	A	T1	B1	B2	T2	C1	C2
<i>Ptenopus g.garrulus</i>	X						
<i>Afroedura nivaria</i>						X	X
<i>A.karroica halli</i>						X	
<i>Lygodactylus c.capensis</i>		X	X				
<i>Pachydactylus m.mariquensis</i>	X	X		X	X		
<i>P.maculatus oculatus</i>	X	X					
<i>P. c.capensis</i>	X	X	X	X	X	X	X
<i>P. bibronii</i>	X	X					
<i>Agama atra</i>	X	X	X	X	X	X	X
<i>A. hispida (west. var.)</i>	X	X					
<i>A. hispida (east. var.)</i>		X		X	X	X	X
<i>A. makarikarica</i>			X		X		
<i>Chamasleo d.dilepis</i>			X				
<i>Mabiya homalocephala smithii</i>						X	X
<i>M. capensis</i>	X	X	X	X	X	X	X
<i>M. occidentalis</i>	X						
<i>M. varia</i>		X	X	X	X	X	X
<i>M.v.variegata</i>	X	X				X	
<i>M.v.punctulata</i>		X		X	X		
<i>M.s.sulcata</i>	X	X				X	
<i>M.p.punctatissima</i>		X	X	X	X	X	X
<i>Afroablepharus wahlbergii</i>					X		
<i>Acontias g.gracilicauda</i>			X	X	X	X	X
<i>Gerrhosaurus flavigularis</i>					X	X	X
<i>Tetradactylus breyeri</i>						X	
<i>T.a.africanus</i>							X
<i>Cordylus giganteus</i>					X	X	X
<i>C.p.polyzonus</i>	X	X		X	X		
<i>C.c.cordylus</i>					X	X	
<i>C.v.vittifer</i>					X	X	X
<i>Pseudocordylus m.melanotus</i>					X	X	X
<i>P.m.subviridis</i>							X
<i>P.spinosus</i>							X
<i>Nucras lalandii</i>					X	X	X



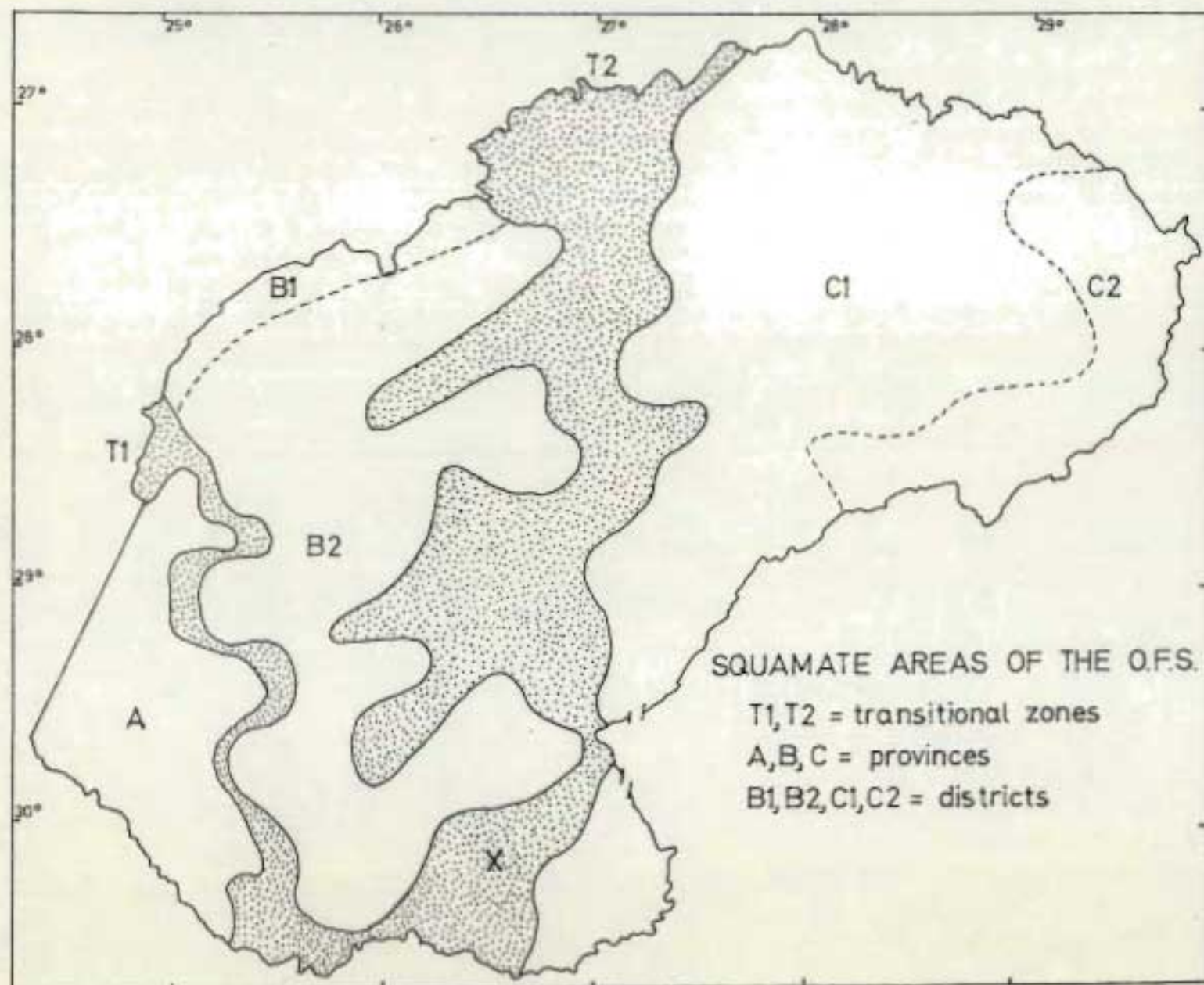
TABLE 1. (Continue)

	A	T1	B1	B2	T2	C1	C2
<i>N.intertexta</i>		X		X	X		
<i>N.taeniolata ornata</i>	X	X		X	X	X	
<i>Eremias namaquensis</i>	X						
<i>E.l.lineocellata</i>	X	X		X	X	X	
<i>E.burchelli</i>					X	X	X
<i>Ichnotropis squamulosa</i>			X		X		
<i>Varanus exanthematicus albigularis</i>		X	X	X	X		
<i>Typhlops bibroni</i>						X	X
<i>Rhinotyphlops lalandei</i>	X	X		X	X	X	
<i>Leptotyphlops s.scutifrons</i>		X	X	X	X	X	X
<i>Lycodonamorphus rufulus</i>					X	X	X
<i>Lamprophis fuscus</i>					X	X	
<i>L.aurora</i>					X	X	X
<i>L.inornatus</i>							X
<i>Boaedon guttatus</i>						X	X
<i>B.f.fuliginosus</i>	X	X	X	X	X	X	X
<i>Lycophidion c.capeense</i>	X	X	X	X	X	X	X
<i>Philothamnus natalensis occidentalis</i>							X
<i>Prosymna s.sundevalli</i>	X	X		X	X	X	
<i>Pseudaspis cana</i>		X	X	X	X	X	
<i>Duberria l.lutrix</i>					X	X	
<i>Dasypeltis scabra</i>	X	X	X	X	X	X	X
<i>Telescopus bestii</i>	X						
<i>Crotaphopeltis hotamboeia</i>					X	X	X
<i>Dispholidus t.typus</i>			X				
<i>Psammophylax rhombeatus</i>		X			X	X	X
<i>P.t.tritaeniatus</i>		X	X	X	X		
<i>Psammophis notostictus</i>	X	X		X	X		
<i>P.leightoni trinasalis</i>		X	X	X	X		
<i>P.crucifer</i>					X	X	X
<i>Aparallactus capensis</i>		X		X	X	X	
<i>Elapsoides sundevalli media</i>					X		
<i>Elaps lacteus</i>					X	X	X
<i>E.dorealis</i>					X		

TABLE 1. (Continue)

	A	T1	B1	B2	T2	C1	C2
<i>Hemachatus haemachatus</i>					X	X	X
<i>Naja nivea</i>	X	X	X	X	X		
<i>Atractaspis bibronii</i>			X		X		
<i>Bitis a. aristans</i>	X			X	X	X	X
<i>B. a. atropos</i>							X



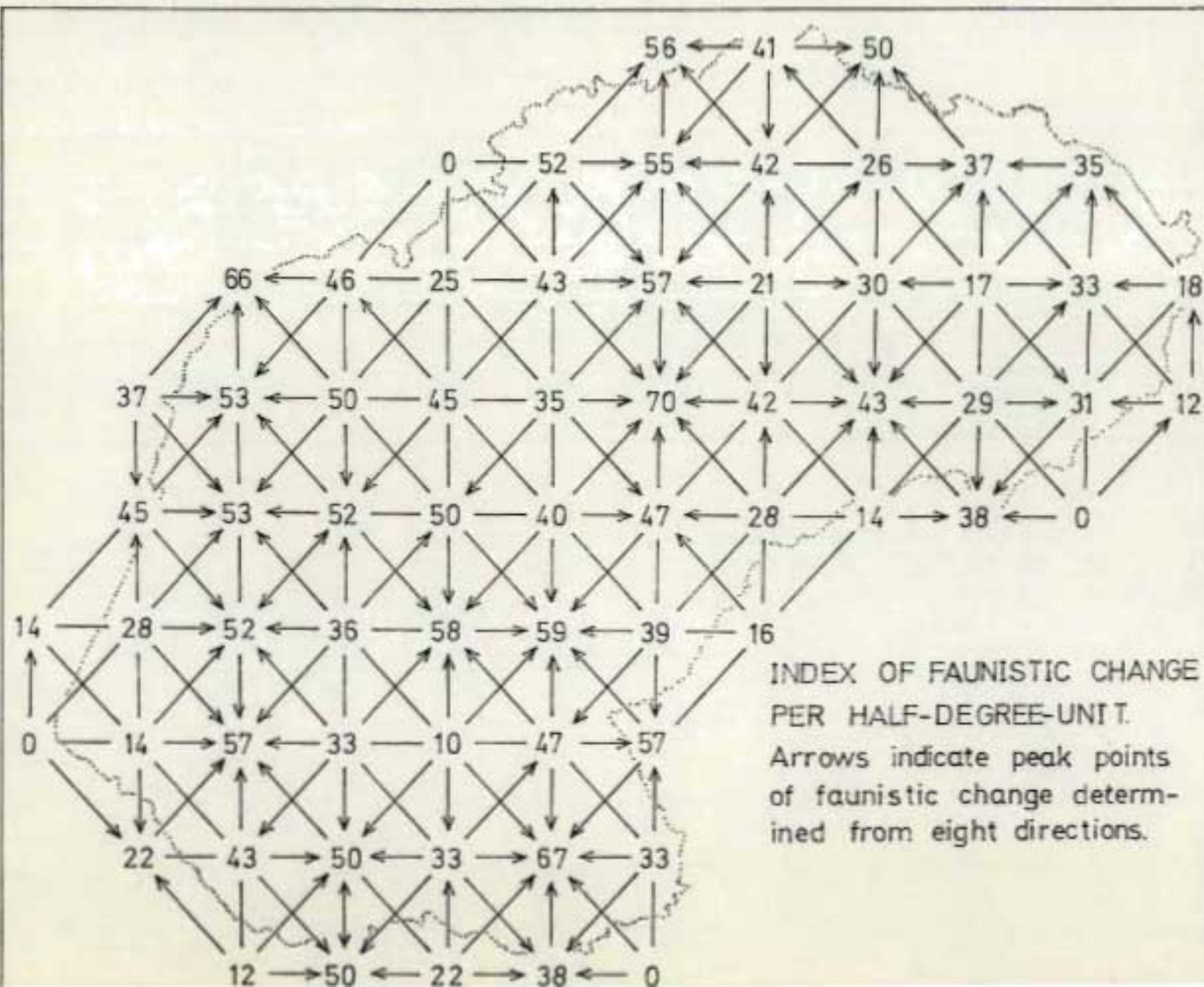


to determine how objectively the squamate areas of the Orange Free State, as illustrated in Map 88, have been defined. The boundaries (transitional zones) delimiting zoogeographical areas are the zones of greatest faunal change which can be expressed by Ekman's index of faunistic change (IFC; Hagmeier & Stults, 1964; Udvardy, 1969):  $IFC = 100L/n$ , where L is the number of range limits in an area (half-degree-units in our case) and n the number of species occurring there, whether their ranges end or not. Values for the index of faunistic change for each half-degree-unit of the study area have been determined and are indicated in Map 89.

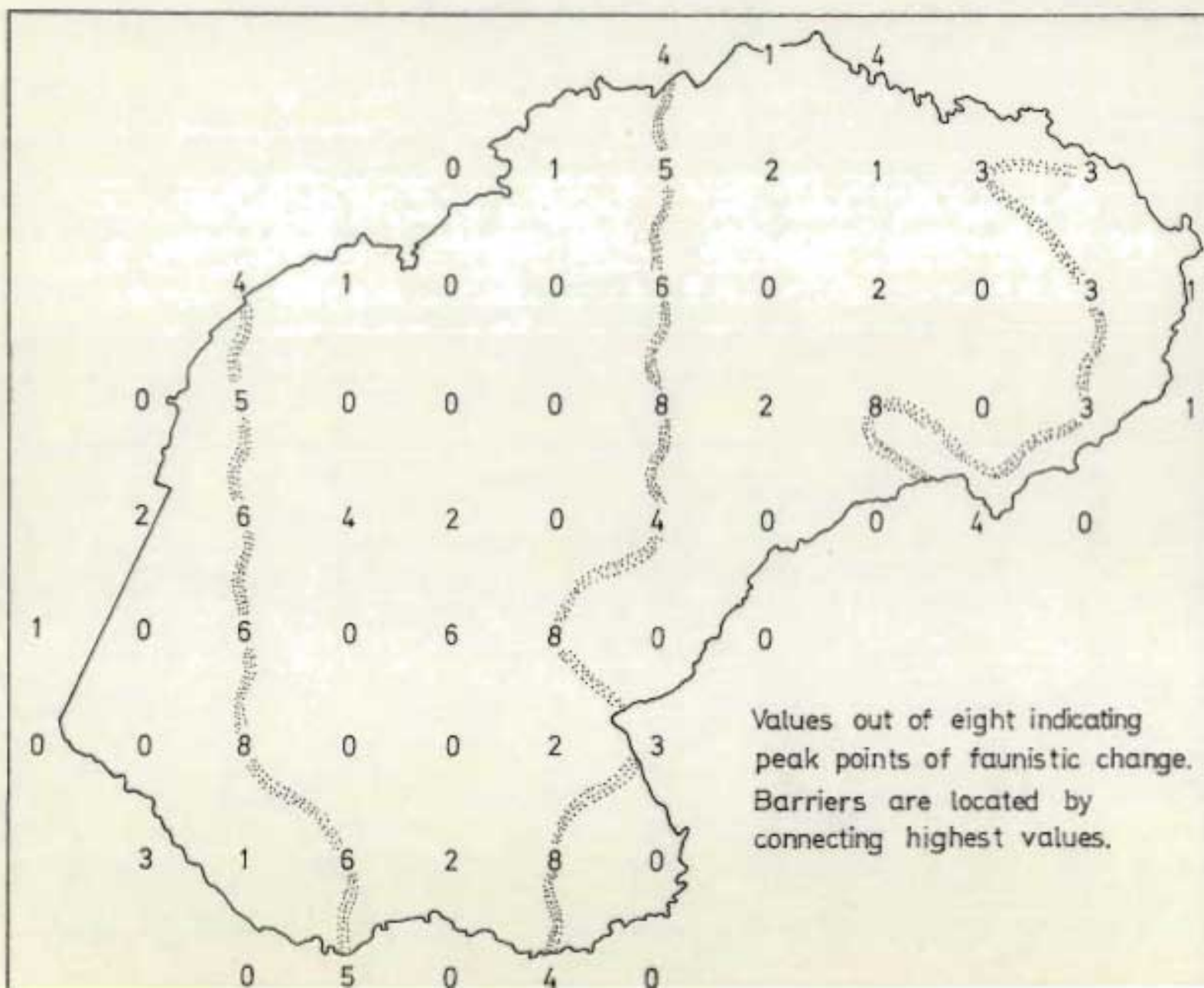
To determine the mammal provinces of North America, Hagmeier & Stults (1964) compiled a contour map of IFC values; areas with low IFC values representing areas of faunistic homogeneity while areas with high IFC values represent the barriers separating them. As the IFC values of the Squamata of the Orange Free State are very high in most cases (see Map 89) we have found the contour-map-method to be not very efficient in illustrating areas of relative homogeneity. However, based on the assumption that barriers affect species to be distributed contagiously it was thought that the location of these barriers (province boundaries) can be determined by determining where IFC values reach their peaks. In Map 89 peak points of faunistic change have been determined from eight different directions and the result is illustrated in Map 90 where barriers (province boundaries) are located by connecting high peak points of faunistic change. If we compare Maps 88 and 90 we see that the lines indicating the position of highest faunistic change agree well with the position of transitional zones 1 and 2 and the district boundary in province C. The position of the district boundary in province B is not illustrated by the IFC values because it is situated too near to the border of the study area - IFC values are needed from outside the study area to indicate the position of highest faunistic change. From the above the method used in delimiting the squamate areas of the Orange Free State as illustrated in Map 88 appears to be satisfactory objective.

To determine the degree of faunistic affinity between the squamate areas Jaccard's coefficient of community, or CC (Hagmeier & Stults, 1964) was employed:  $CC = 100C/n_1 + n_2 - C$ , where C is the number of forms common to both areas,  $n_1$  is the number of forms occurring in one





Map 90





area and  $n_2$  the number in the other area. The CC values of the squamate areas have been determined (Table 2) and the affinities of these areas are illustrated in figure 1. The two districts of province C show the highest affinity (60%). The districts of province B show less affinity (45%) and a faunal analysis of southern Africa may well indicate them to be distinct provinces, especially as district B2 is nearly as closely related to province A (42%) as to district B1 (45%). Province B is more closely related to province A than to province C. The coefficient of community for all five areas cannot be zero as several forms occur in all areas. Only parts of provinces are here dealt with and the affinities between these areas as reflected by the coefficient of community must be seen in the light of this restriction.

Preston (1948; 1960; 1962) working with similarity values of areas concluded that a similarity value of 73% represents the break between faunistic homogeneity and heterogeneity. Preston's similarity value of 73% corresponds to a coefficient of community value of 62% (Hagmeier & Stults, 1964). According to this criterion all provinces should be separated from all other provinces by a coefficient of community of at most 62% to be rated as distinctive. Considering the CC values of the five squamate areas of the O.F.S. no two areas have a CC value of higher than 60% and by Preston's criterion there are therefore five distinct provinces (fig. 1). To determine areas of higher categories Hagmeier & Stults (1964) used a CC value of 39% for superprovinces and by this criterion areas A, B and C (fig. 1) should be regarded as such. However, as previously stated, only parts of provinces are here dealt with and the exact status of each area can be determined only in an analysis of the entire southern Africa, when adequate distributional data become available.

TABLE 2: Jaccard's coefficient of community for the squamate areas of the Orange Free State as indicated in Map 88.

AB	36%
AC	22%
BC	29%
B1 B2	45%
C1 C2	60%
AB1	18%
AB2	42%
AC1	25%
AC2	13%
B1 C1	21%
B1 C2	22%
B2 C1	35%
B2 C2	24%

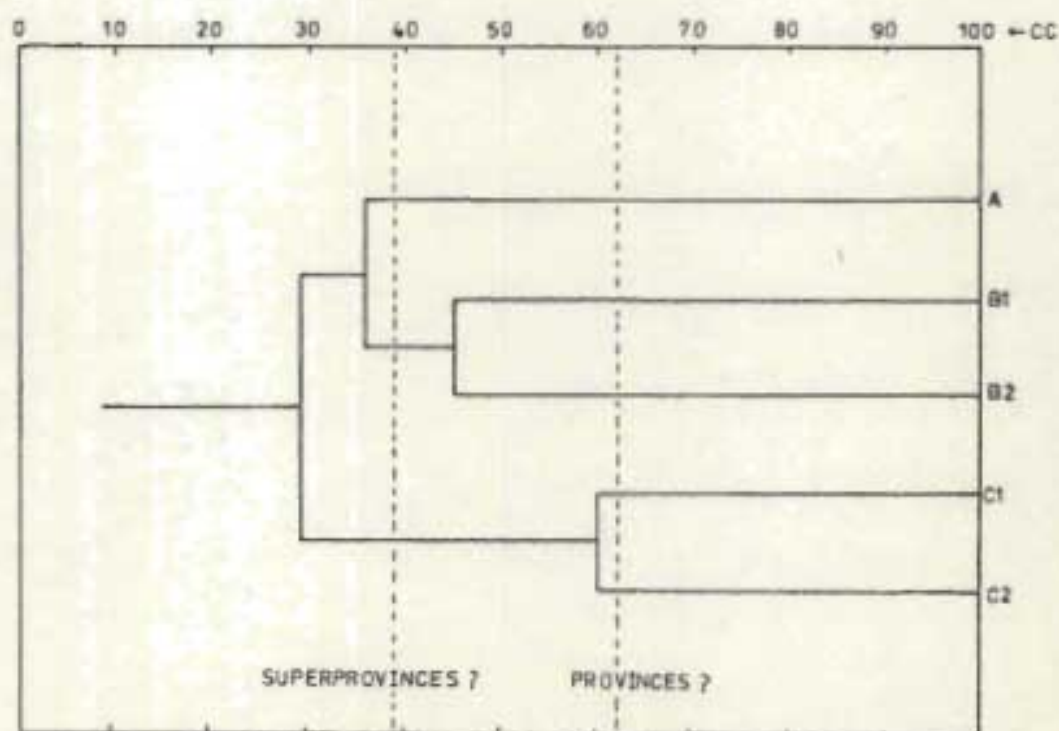


Fig. 1.

Dendrogram indicating affinities of the five squamate areas.  
CC = coefficient of community (percentage of forms common to pairs of areas).



### CAUSAL ANALYSIS:

From the following two laws it is evident that one must be very careful when making a causal analysis (Udvardy, 1969):

Rübel's law of substitution: Several essential or influential environmental components may induce the same response in an animal, and may therefore act in substitution. An organism is not concerned with how its requirements will be satisfied, as long as they are satisfied. Any external factor can be substituted by another as long as its impact on the organism is the same, for example low air temperatures can substitute for high moisture content - the lower temperature providing the correct moisture level due to reduced evaporation - and in this case the limiting factor is moisture content, not low air temperature.

Schwerdfeger's law of compensation and moderation: Since each individual animal is a coadapted responsive system, and the environment is also a composite and variable system, a limiting factor seldom acts alone; its action is usually influenced by the simultaneous action of other environmental factors.

A further complicating factor is that the complex of environmental components may change in space so that a species can be limited by different limiting factors in different parts of its distribution. Environmental factors also change in time (different seasons) and species may be limited by different environmental factors at different times of the year. For these reasons it is difficult to determine limiting factors and the possibility of finding a perfect correlation of distribution patterns with some single environmental factor seems to be remote.

### VEGETATION:

The squamate areas as defined in Map 88 correlate with Acock's (1953) vegetation areas (Map 10); Acocks (op. cit.) also defined five areas which can be regarded as the equivalent of the five squamate areas, although they have different boundaries:

SQUAMATE AREAS (MAP 88)

VEGETATIONAL AREAS (MAP 10)

A	Karoo
B1	Bushveld
B2	Sweet Grassveld
C1	Mixed Grassveld
C2	Sour Grassveld

However, vegetation has been subject to the influence of man: for instance overgrazing has favoured the eastward encroachment of the Karoo and the transition between Karoo and Sweet Grassveld would most probably be much more to the west under natural conditions (Mostert et al. 1971). The correlation between the squamate areas and vegetation areas is probably the result of similar response to the same environmental factors in most cases, rather than the Squamata being dependent upon vegetation. However, in the case of district B1 the correlation with Acocks's (1953) bushveld is at least partly due to the fact that some species e.g. the two arboreal species *Chamaeleo d.dilepis* and *Dispholidus t.typus* are dependent upon the specific type of vegetation.

TEMPERATURE:

There seems to be little correlation between temperature (Maps 4, 5 & 6) and the main patterns of distribution of the Squamata of the Orange Free State. Due to the fact that snakes and lizards are poikilothermous animals it was assumed that temperature would be an important ecological factor and thus influence distribution. The reason why temperature seems to be less important than expected is not clear but it may simply mean that the Squamata are eurytopically adapted towards the range of temperatures existing in the study area.

RAINFALL:

An outstanding characteristic of the squamate areas is that the provinces differentiate longitudinally, correlating with differentiation of rainfall (Map 8). Considering van der Wal's (1974) mean rainfall maps for individual months it becomes evident that the main distribution pattern



of O.F.S. Squamata correlate well with rainfall distribution during all the summer months (October to March) while during the winter (April to September) rainfall seems to be of little significance. Based on van der Wal's (1974) data the differentiation of rainfall for the period October to March was determined and expressed in isohyets (Map 9) and its correlation with the main distribution patterns of the Squamata (Map 88) is obvious. The position of the 294mm isohyet (Map 9) coincides essentially with transitional zone 1 (Map 88) while transitional zone 2 is situated around the 433mm isohyet. The 610mm isohyet (Map 9) corresponds to some extent with the border between the districts of province C (Map 88).

#### TOPOGRAPHIC RELIEF:

There is a vague correlation between topographic relief (Map 2) and the main distribution patterns (Map 88). At least in one area a very clear correlation exist, namely the southern part of transitional zone 2 (X in Map 88) which coincides with the Caledon River Valley (Map 2). This valley seems to act as a barrier to several species, probably indirectly due to its effect on rainfall - the lower-lying valley having a lower rainfall than the surrounding highland.

#### GEOLOGY:

The main distribution patterns of the Squamata do not correlate with geological formations (Map 11). However, certain geological phenomena are probably of importance to particular species. A lizard like *Cordylus polyzonus* occurs exclusively on dolerites in the study area. Unfortunately the distribution of dolerite has not yet been mapped and it is impossible to confirm that the distribution of *C. polyzonus* is limited to the occurrence of this geological phenomenon.

Based on the evidence presented there seems to be little doubt that rainfall is the major environmental factor influencing the distribution patterns of the O.F.S. Squamata. The question why rainfall is so important is an open one but the answer is probably to be found in Thieneman's law of tolerance in the critical stage: the most critical

stage of the life history of most animals is some phase of its reproduction (Udvardy, 1969). This is because environmental factors are more limiting on eggs, embryos and hatchlings (Goin & Goin, 1971) than on adult animals. Experience with the incubation of squamate eggs in the laboratory indicated that humidity is a very critical factor - eggs incubated with too little moisture dehydrate while eggs provided with too much moisture became overgrown with harmful mold (fungi).



## VI. COMPARATIVE ANALYSIS OF THE SQUAMATE AREAS

The squamate areas of the O.F.S. (Map 88) are areas of relative species homogeneity and for this reason they can be used in the analysis of other variable biogeographic phenomena, thus increasing our knowledge of the study area and also allowing further distinctions to be made between areas. These features are presented in Table 3 for each of the three provinces (A, B & C) and each of the four districts (B1, B2, C1, C2) and also for all the areas combined. The three species occurring exclusively in transitional zone 2 are excluded from this analysis.

### SPECIES DENSITY:

It is well known that species density, that is the number of different species present in an area, varies geographically. The causes of faunal diversity (and therefore species density) arise from the past history of the area and the reasons for the present maintenance of diversity are ecological (Udvardy, 1969). It is our purpose here to seek correlations between trends in species density and environmental factors. In the three squamate provinces (A, B & C; Map 88; Table 3) species density increases from west to east, correlating positively with mean annual rainfall (Map 8) and topographic relief (Map 2) both of which also increase from west to east. Although species density increases eastwards, it reaches a peak in district C1 and declines in district C2. It seems evident that species density in the study area increases with increasing rainfall and topographic relief, but up to a point where these environmental factors have an optimal influence, after which species density declines due to these factors increasing beyond the optimum and becoming too extreme and therefore less favourable to the occurrence of more species. This is in agreement with Thienemann's empirical rule that the more extreme the living conditions of a habitat, the fewer the species which can maintain themselves in these conditions (Udvardy, 1969). While rainfall has a positive correlation with topographic relief, temperature is negatively correlated (van der Wal, 1974) and the possibility that decreasing temperature may also influence species density cannot be excluded.

TABLE 3: VALUES FOR FIVE BIOGEOGRAPHIC PHENOMENA IN THE SQUAMATE AREAS OF THE ORANGE FREE STATE

SQUAMATE AREA:	A	B1	B2	B	C1	C2	C	ALL AREAS
SPECIES DENSITY:	24	21	27	33	42	35	48	-
PERCENTAGE ENDEMIC SPECIES:	29	29	7	33	12	17	58	-
TAXONOMIC DIVERSITY:	1,5	1,2	1,4	1,3	1,4	1,4	1,6	1,8
NOCTURNAL/DIURNAL RATIO:	1:1,1	1:2,8	1:2,4	1:2,8	1:1,9	1:1,7	1:1,9	1:2,1
OVOVIVIPAROUS/OVIPAROUS RATIO:	1:3,0	1:3,2	1:2,4	1:3,1	1:2,0	1:1,9	1:1,8	1:2,5



Hagmeier & Stults (1964) regard the high species density of certain North American mammal provinces as being due to greater variation in topographic relief and resultant increased variety of habitats. Rogers (1976), working with the herpetofauna of Texas, came to the same conclusion although he used a different method of determining species density, with which I do not agree since he expressed density in terms of arbitrary political divisions rather than natural biogeographic areas. Species density in any politically defined unit which contains part of a transitional zone between two biotic provinces must be higher than in adjacent units within the provinces themselves. In a transitional zone many species of the two provinces may have a common border or slightly overlap, and in any case the unit as a whole contains elements of two more or less different faunas. That a greater variety of topographic relief and the resultant increased variety of habitats can support more species in an area seems a logical deduction, but it can hardly be regarded as the only important causal factor - extreme climatic conditions will exclude more species from an area whether a great variety of habitats are present or not.

In conclusion it appears that at least rainfall and topographic relief are two important environmental factors influencing species density in the study area.

#### ENDEMIC SPECIES:

A species is considered endemic if it occurs in only one squamate area, and by this standard 37% of the species are endemic while 37% occur only in two areas, 10% only in three areas, 7% in four areas and 9% in all five squamate areas. If we consider the three provinces, 65,7% of the species are endemic while 18,6% occur in two provinces and 15,7% in all three provinces. This compares well with the findings of Hagmeier & Stults (1964) who indicated that 35% of the mammal species of North America occur in one province only.

The percentages of endemic species in each squamate area are indicated in table 3. The meaning of differences in the percentages of endemics in the five areas is not clear. However, if only the three provinces

are considered, the percentage of endemic species increases from west to east, correlating positively with rainfall (Map 8) and topographic relief (Map 2). It is suggested that the causes of variation in endemism are historic and the most important ecological factor maintaining this variation is rainfall. Topographic relief probably plays an indirect role due to its effect on rainfall.

#### TAXONOMIC DIVERSITY

The taxonomic diversity (mean number of species per genus) as indicated in table 3 shows little difference between the five areas and therefore seems to be of little significance, and in any case the determination of taxonomic diversity can be only as good as the state of the taxonomy on which it is founded. The taxonomic diversity as reflected in table 3 cannot be very meaningful due to the yet uncertain status of many genera, species and subspecies. Hagmeier & Stults (1964) and Rogers (1976) found taxonomic diversity to be correlated with species density. Why this is not the case in the Orange Free State is not clear.

#### NOCTURNALISM VERSUS DIURNALISM

For the purpose of determining the ratio of nocturnal to diurnal species (table 3), fossorial species (eyes rudimentary) were excluded. Based on FitzSimons's (1943; 1962) works and checking the pupils of the species on which this study is based, species were classified either as nocturnal or diurnal. However, it is known that some snake species tend to be nocturnal or crepuscular in deserts, whereas they are primarily diurnal in less rigorous environments (Mayhew, 1968). It should therefore be kept in mind that some flexibility exists in this respect.

Ratio values range from 1:1,1 to 1:2,8 indicating that diurnal species are in the majority in all five squamate areas. The ratio of 1:2,1 for the combined areas shows that more than two diurnal species are present for each nocturnal one. The biological significance of the variation in nocturnal versus diurnal species in the different squamate areas is not clear. However, a few factors can be considered:



- (i) Vegetational cover: Comparing all five squamate areas (table 3), province A has the highest degree of nocturnalism and district B1 the lowest. Province A has the poorest vegetational cover (Karoo) in the study area, in contrast to district B1, which has the most dense vegetational cover (Bushveld). It seems, therefore, that a higher degree of nocturnalism may be the result of poor vegetational cover.
- (ii) Temperature: Most squamates hibernate or at least undergo more or less prolonged periods of retraction in winter and it is therefore assumed that temperatures in winter can be excluded as a causal factor for variation in nocturnalism versus diurnalism. Due to their inability to use body water for cooling the squamates probably have to cope with unfavourably high day temperatures in summer, especially in the two areas under discussion (province A & district B1), both situated in the warmest parts of the study area (compare Maps 4 & 88).

It appears that in district B1 dense vegetation substitutes for low temperature (Rübel's law) by counteracting the influence of unfavourably hot sunshine (by providing shade) and thus allowing more species to be diurnal which results in a lower degree of nocturnalism. In contrast to district B1, the impact of hot sunshine would be much greater in Province A due to the poor vegetational cover and the resultant unfavourably high temperatures during the day may then be the reason why such a high degree of nocturnalism exists in this area. The basic causal factor is therefore temperature and not vegetational cover.

- (iii) Predators: The dense vegetation of district B1 would provide good cover for avoiding predators while active and diurnalism in this area would not be disadvantageous. On the other hand, the poor vegetation in province A would provide little cover for avoiding predators and this could also be a reason why relatively more species are nocturnal in this area.

# OVOVIVIPARITY VERSUS OVIPARITY

The ratio of ovoviviparous against oviparous species of each squamate area is indicated in table 3. The entire study area includes more than twice as many oviparous as ovoviviparous species. Primitively the squamates are oviparous (Fitch, 1970) and a large majority have retained this habit.

District B1, which is the warmest squamate area (Maps 88 & 4), has the highest, while district C2, which is the coldest, has the lowest ratio of oviparous species. Although temperature data are inadequate it seems clear that the number of oviparous species decreases with decreasing temperature, while ovoviviparous species increase with decreasing temperature. This agrees with the findings of Fitch (1970) who states that a high proportion of the species of cool temperate zones are ovoviviparous while the proportion of oviparous species increases rapidly as climate becomes progressively warmer. It seems, therefore, that ovoviviparity is an adaptation in certain species to avoid the unfavourable or lethal low temperatures of cold climates - an ovoviviparous female can take advantage of the most favourable aspects of the environment, because, in contrast to an oviparous female, she has the ability to "transport" the eggs between different microhabitats where the most favourable temperatures exist. This advantage applies especially in district C2 where the lowest summer (reproduction period) temperatures exist.



VII.

CONCLUSIONS

Data on morphological variation and distribution are still inadequate for many species of southern African Squamata. This is indicated by the present study in which 25% of the species listed have not previously been recorded in the O.F.S. In view of the incompleteness of data the taxonomy of many forms is still uncertain. The status of individual taxa can be definitely established only when it is known whether they are sympatric or allopatric and whether intergrades occur. Complete distributional data are essential for sound taxonomy and zoogeography and herein lies the value of intensive, methodical surveys of managably small regions.

Any conclusions based on an analysis of distributional patterns of a fauna are greatly affected firstly by the accuracy and completeness of distributional data and secondly by the state of knowledge of those features which make up the environment of the fauna. There can be little doubt regarding the accuracy and completeness of the distributional data on which this study is based. However, to find causal bases, there is a need for adequate information on environmental factors. Unfortunately this information is lacking in many cases; temperature limits are poorly known, as is the distribution of certain geological phenomena, for example the inclined dolerites which seem to be an important factor in the distribution of *Cordylus p. polyzonus*. Clearly there is a need for intensive study of those features which make up the environment of the O.F.S. squamate fauna.

The objectives set in the analysis of distributional patterns have been met. Areas of relative homogeneity and heterogeneity could be objectively defined due to the completeness of the distributional data. The method of using a map showing boundaries of all forms is especially valuable in that it shows the position of major transitional zones between more or less different faunas. Using these transitional zones one can then simply classify the distributional patterns of the different species. Although very simple the above method is believed to be valuable because it is repeatable and relatively objective when tested mathematically.

The restricted geographical scope of this study and the fact that squamate provinces could not be established or evaluated in their entirety may have led to some subjectivity. However, this can become known only when adequate material become available to analyse the entire southern African subregion.

With ever changing environmental components in time and space and the fact that a limiting factor seldom acts alone (Schwerdtfeger's law) it is surprising that such a good correlation could be illustrated between a single environmental factor (summer rainfall) and the main distribution patterns of the O.F.S. Squamata. However, the fact that it could be illustrated so well, so much more emphasize its importance and although other environmental factors may play a role there could be little doubt that summer rainfall is the most important. The principles on which rainfall functions as a causative factor are not clear and seem hard to explain in the absence of knowledge regarding the minimum requirements and ranges of tolerance of environmental factors of the different species.

In the comparative analysis of the squamate areas it is shown that each has its own distinct characteristics regarding species density, endemism, taxonomic diversity, nocturnalism/diurnalism and ovoviviparity/oviparity. The geographic variation of these phenomena could be correlated in some cases with certain environmental factors, particularly temperature, but the principles involved will remain hypothetical in the absence of adequate data on environmental requirements and the limitations of species.



VIII.

SUMMARY

1. In order to make an intensive systematic survey of the Squamata of the Orange Free State material has been collected from 221 localities over a period of three years. In total 4 491 specimens have been examined comprising 2 701 lizards, 86 amphisbaenids and 1 704 snakes.
2. Based on morphological and distributional data the status of O.F.S. Squamata has been found to consist of 13 families, 45 genera (of which seven have not previously been recorded for the O.F.S.) and 77 different species and subspecies, of which 25% comprise new records for this area.
3. Data on variation of taxonomically important characters as well as colour, size, habitat, breeding, predators and diet are provided.
4. Taxonomic changes have been made, but due to the restricted scope of this study these changes should be regarded as tentative until adequate material from the entire ranges of the forms concerned becomes available. The status of certain problematical forms is discussed.
5. Distribution maps for species/subspecies have been compiled on the basis of eighth-degree-units.
6. The main distribution patterns of the O.F.S. Squamata have been mapped (objectively as tested mathematically), indicating areas of relative homogeneity separated by zones of heterogeneity (i.e. transitional zones).
7. The study area was found to be divisible into five areas of relative homogeneity, two major transitional zones and two boundaries of lesser status.
8. Using Jaccard's coefficient of community the affinities between the five squamate areas are illustrated and the status of these areas is discussed.

9. A causal analysis of the main squamate distribution patterns indicates that the amount of summer rainfall is the major environmental factor influencing distribution.
10. The five squamate areas of relative homogeneity were compared with regard to the following variable geographic phenomena: Species density, endemism (exclusiveness to a particular squamate area), taxonomic diversity, nocturnalism versus diurnalism and ovoviviparity versus oviparity.
11. It is concluded that intensive methodical surveys of managably small regions like the O.F.S. are of great value in solving taxonomic and zoogeographic problems.



IX.

GAZETTEER

Localities are listed alphabetically and in the case of farm names the farm number is indicated. The administrative district and locus code of each locality are given. Administrative districts are according to the index of Orange Free State farms. These districts were frozen in 1956 and do not necessarily follow the boundaries of magisterial districts. The use of the locus code for plotting localities is indicated in figure 2 and can be described as follows: Each degree-unit (1 x 1 degree-"square") is designated by a four-figure number, made up of the values of the degrees latitude and longitude as indicated at its north-west corner (i.e. 2926 in fig. 2), followed by the code letter for the given half-degree-unit (i.e. A in fig. 2), then the code letter of the given quarter-degree-unit (i.e. a in fig. 2) and finally the code number of the given eighth-degree-unit (i.e. 2 in fig. 2). Each degree unit is therefore subdivided into 64 subunits of roughly equal size.

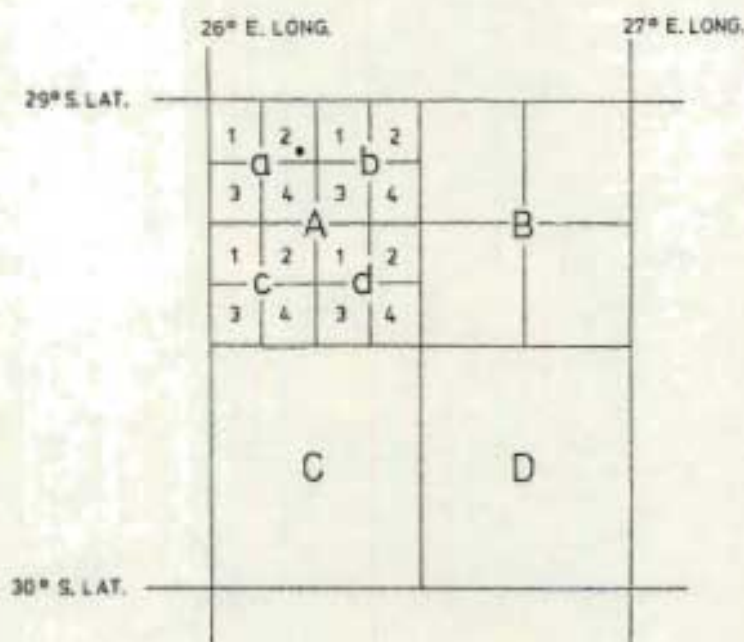


Fig. 2. Locality: Bloemfontein, 2926 - Aa2

Locality	District	Locus code
Aberdeen (245)	Harrismith	2829 - Ac3
Afrikaskop	Harrismith	2828 - Ba4
Albion (100)	Rouxville	3026 - Bd4
Allanvale (249)	Vrede	2729 - Da4
Alpha (125)	Smithfield	3026 - Ba3
Angra Pequina (8)	Bothaville	2726 - Bc3
Anna's Rust (1389)	Kroonstad	2727 - Cb2
Annies Rust (763)	Heilbron	2628 - Cc1
Ascent (79)	Vrede	2729 - Aa3
Atalanta (225)	Ladybrand	2927 - Ad1
Avalon (554)	Fauresmith	2925 - Da2
Babel (144)	Rouxville	3026 - Bb2
Bachelor's Home (800)	Harrismith	2829 - Ba3
Bainsvlei	Bloemfontein	2926 - Aa2
Baltespoort (998)	Vredefort	2727 - Aa4
Basberg (416)	Bultfontein	2826 - Ac3
Baunton (2164)	Bloemfontein	2926 - Ab1
Beginnelsdam (195)	Boshof	2825 - Ab3
Bergkloof (203)	Zastron	3027 - Ad1
Bergkraal (2213)	Bloemfontein	2926 - Ab2
Bergplaats (41)	Bloemfontein	2926 - Aa3
Bergplaats (234)	Dewetsdorp	2926 - Bc4
Berlin (497)	Vrede	2729 - Ac3
Bethany (16)	Edenburg	2925 - Db2
Beth Aven (905)	Ladybrand	2927 - Ac2
Bethel (6)	Senekal	2827 - Ba3
Bethlehem	Bethlehem	2828 - Ab3
Bethulie	Bethulie	3025 - Bd4
Beyersfontein (301)	Hoopstad	2825 - Bb1
Biddulphsberg (9)	Senekal	2827 - Bd1
Bloemendal	Bloemfontein	2926 - Aa2
Bloemfontein	Bloemfontein	2926 - Aa2
Boesmansberg (308)	Brandfort	2826 - Cb1
Bon Haven (1692)	Harrismith	2829 - Ac4
Boschkloof (589)	Bethlehem	2828 - Ac3
Boschkop (58)	Wesselsbron	2726 - Cb4



Locality	District	Locus code
Boschrand (361)	Bothaville	2726 - Bc3
Boshof	Boshof	2825 - Ca2
Boskop (165)	Boshof	2825 - Ba4
Bothaspas	Vrede	2729 - Da4
Bothaville	Bothaville	2726 - Bc3
Bozrah (449)	Fauresmith	2924 - Da1
Brabant (205)	Bloemfontein	2926 - Aa1
Brakfontein (636)	Boshof	2825 - Da3
Brakpan (18)	Jacobsdal	2924 - Bb1
Bramley's Hoek (52)	Bethlehem	2828 - Bc3
Brandfort	Brandfort	2826 - Cb4
Brandfort (10 miles NW of)	Brandfort	2826 - Cb1
Braunzijkop (1126)	Kroonstad	2726 - Dd2
Brockenhurst (273)	Lindley	2727 - Dc4
Bultfontein	Bultfontein	2826 - Ac2
Caledonspoort (190)	Fouriesburg	2828 - Ca4
Campan (308)	Harrismith	2829 - Ad1
Carlie (555)	Ventersburg	2826 - Bb2
Ceylon (290)	Wepener	2926 - Dd2
Chubani (9)	Thaba'Nchu	2926 - Bb2
Clifford (214)	Harrismith	2829 - Ac2
Clocolan	Clocolan	2827 - Dc3
Cornwall (1332)	Boshof	2825 - Cc3
Damfontein (169)	Bethulie	3025 - Bd2
Dam van Trane	Bloemfontein	2926 - Aa2
Dasklip (1371)	Frankfort	2728 - Ba3
Dealbata (363)	Reitz	2728 - Dc3
Dealesgift (2804)	Bloemfontein	2926 - Ab1
De Brug (197)	Bloemfontein	2925 - Bb3
Deelfontein (251)	Bethulie	3026 - Ac4
Deelfontein (482)	Bothaville	2726 - Ba1
Deelfontein (2)	Smithfield	3026 - Ad1
De Hague (786)	Reitz	2728 - Da4
De Rust (254)	Reddersburg	2926 - Cb1
Die Hoogte (225)	Bultfontein	2825 - Bd2
Dipka (200)	Vrede	2729 - Ca3
Di Poort (280)	Brandfort	2826 - Dc3

Locality	District	Locus code
Doornberg (384)	Winburg	2827 - Ad1
Doornbult (1310)	Hoopstad	2726 - Cc3
Doornfontein (337)	Boshof	2825 - Aa4
Doornhoek (158)	Philippolis	3024 - Bb4
Doornlaagte (865)	Boshof	2825 - Dc1
Doornland (649)	Kroonstad	2727 - Cb2
Doornplaat (435)	Bloemfontein	2925 - Ba1
Driebaden (493)	Fauresmith	3025 - Ab2
Driekop (677)	Brandfort	2826 - Da3
Dundee (416)	Fauresmith	2924 - Dc4
Edenburg	Edenburg	2925 - Db4
Edenville	Kroonstad	2727 - Da2
Elandsfontein (990)	Lindley	2728 - Cc3
Elim (926)	Vrede	2729 - Ad2
Emmaus (514)	Fauresmith	2925 - Ab3
Erinmore (1224)	Boshof	2825 - Ab1
Evenston A (115)	Ventersburg	2827 - Ab3
Exelsior (467)	Edenburg	2926 - Cc3
Falle Grange (632)	Reitz	2728 - Cb2
Fauresmith	Fauresmith	2925 - Cb3
Ficksburg	Ficksburg	2827 - Dd4
Florisbad (686)	Brandfort	2826 - Cc1
Francina (680)	Rouxville	3027 - Ca1
Francis Home (108)	Fauresmith	2925 - Cb2
Franshoek (106)	Ficksburg	2828 - Ca3
Geluk (718)	Boshof	2826 - Ca1
Geluk (14)	Kroonstad	2727 - Cc1
Geluk (498)	Philippolis	3025 - Aa4
Glen	Bloemfontein	2826 - Cd3
Glenisla (1096)	Harrismith	2829 - Ac4
Goedehoop (76)	Senekal	2827 - Bc4
Goedetrouw (465)	Reitz	2728 - Cd1
Golden Gate	Bethlehem	2828 - Da1
Groendraai (140)	Harrismith	2828 - Bb3
Groenekloof (16)	Philippolis	3025 - Ac4
Groenland (257)	Bethlehem	2828 - Da1



Locality	District	Locus code
Grootkloof (251)	Ficksburg	2827 - Db4
Grootkrans (71)	Heilbron	2727 - Db2
Gruiskop (2072)	Bloemfontein	2925 - Bd1
Gruisrand (59)	Fauresmith	2924 - Dc2
Haagen's Stad (665)	Brandfort	2826 - Ca3
Hamanskraal West (760)	Brandfort	2826 - Da3
Harrismith	Harrismith	2829 - Ac2
Hartebeestfontein (236)	Bloemfontein	2925 - Ba4
Hartebeestfontein (298)	Boshof	2825 - Ad2
Hebron (674)	Smithfield	3026 - Ab1
Heenenweerskop (49)	Fauresmith	2925 - Ca3
Heilbron Townlands	Heilbron	2727 - Bd2
Heilbron (148)	Philippolis	3024 - Bb2
Henneman	Ventersburg	2727 - Cc3
Hertzogville	Boshof	2825 - Ba3
Holme's Dale (95)	Bloemfontein	2826 - Cc4
Honingberg (411)	Fauresmith	2925 - Ad2
Hoogeveld (2439)	Kroonstad	2727 - Cc3
Hoogeveld (313)	Theunissen	2826 - Bc1
Hoopstad	Hoopstad	2725 - Dd2
Houmoed (516)	Brandfort	2826 - Cd1
Houtkop (326)	Koppies	2727 - Bc4
Inmigrant (200)	Bloemfontein	2925 - Ba1
Jacobsdal	Jacobsdal	2924 - Bb1
Jagersfontein	Fauresmith	2925 - Cd2
Jonkerskraal (475)	Bothaville	2726 - Ba1
Joostenberg (462)	Fauresmith	2924 - Dd1
Juist Zoo (281)	Dewetsdorp	2926 - Da4
Kades (1051)	Boshof	2825 - Cd2
Kafferskop (89)	Koppies	2727 - Ba4
Kalkdam (52)	Trompsburg	3025 - Bb2
Kalkfontein Dam	Fauresmith	2925 - Cb1
Kalkplaat (444)	Fauresmith	2924 - Cb4
Kameelpan (815)	Boshof	2824 - Dd2
Karee (543)	Brandfort	2826 - Cd1
Kareerand (60)	Bloemfontein	2925 - Bb3

Locality	District	Locus code
Karreeboomsvallei (258)	Theunissen	2826 - Bc4
Karreelaagte (158)	Jacobsdal	2924 - Bc3
Karreepoort (624)	Ventersburg	2827 - Aa3
Kasteelkop (156)	Frankfort	2728 - Bc4
Kelly's View	Bloemfontein	2926 - Aa3
Kestell	Bethlehem	2828 - Bc2
Kleinplaas (490)	Bethulie	3025 - Db1
Klipbankfontein (116)	Philippolis	3025 - Bc3
Klipdrift (10)	Bloemfontein	2926 - Ab2
Klipfontein (35)	Rouxville	3026 - Da3
Klipoog (148)	Frankfort	2728 - Ab1
Klippiespan (205)	Boshof	2824 - Dd2
Klipplaat (380)	Vrede	2728 - Bd2
Klipplaatdrift (260)	Edenburg	2925 - Db1
Klipplaatdrift (28)	Winburg	2827 - Ca3
Kolbe (1538)	Bloemfontein	2926 - Aa4
Koortshoek (302)	Trompsburg	3025 - Ba3
Kopjeskraal (11)	Clocolan	2827 - Dc4
Koppiesdam (473)	Bloemfontein	2925 - Ba3
Kraaifontein (109)	Rouxville	3026 - Db2
Kranskop (392)	Zastron	3027 - Ab1
Kromhof (530)	Harrismith	2729 - Dc3
Kroonstad	Kroonstad	2727 - Ca4
Krugersdrift Dam	Bloemfontein	2825 - Dd4
Kwaggafontein (2300)	Bloemfontein	2926 - Aa1
La Belle France (458)	Rouxville	3026 - Bd2
Ladybrand	Ladybrand	2927 - Ab4
Lakeview (505)	Bloemfontein	2926 - Ab3
Lange Hoek (352)	Harrismith	2829 - Ab2
Langhoek (56)	Jacobsdal	2924 - Bc2
Lang Zeekoegat (66)	Trompsburg	2925 - Dc4
Lanquedoc (1179)	Heilbron	2728 - Ca1
La Riviera (111)	Bultfontein	2826 - Ab1
Last Poort (361)	Reddersburg	2926 - Cd1
Laveno (318)	Dewetsdorp	2926 - Db1
Leeuwberg (465)	Fauresmith	2925 - Bc3
Leeuwfontein (10)	Boshof	2825 - Ca2



Locality	District	Locus code
Leeuwfontein (256)	Theunissen	2826 - Bd1
Leeuwkop (230)	Marquard	2827 - Cb2
Leeuwkuil (384)	Boshof	2824 - Db2
Leliehoek (748)	Boshof	2825 - Da4
Lemoenboord (320)	Philippolis	3024 - Bb1
Lemoenhoek (415)	Ladybrand	2927 - Ac4
Lentelus (1119)	Fauresmith	2925 - Ac3
Lessingskop (92)	Dewetsdorp	2926 - Dc1
Lindley	Lindley	2727 - Dd4
Lismore (420)	Zastron	3027 - Ad3
Littlecote (46)	Wepener	2927 - Cc4
Lomagundi (736)	Bothaville	2726 - Ad4
Lorenzo (1352)	Kroonstad	2727 - Ac4
Loskop (819)	Bethlehem	2828 - Ab2
Lotters Rust (464)	Brandfort	2826 - Cb4
Louis Rust (1073)	Heilbron	2728 - Aa2
Lovedale (1844)	Bloemfontein	2825 - Dc4
Luckhoff	Fauresmith	2924 - Db3
Luiperfontein (334)	Fauresmith	2925 - Cc4
Luiperskop (130)	Jacobsdal	2924 - Ad4
Lusthof (1456)	Kroonstad	2727 - Bc4
Maanhaar (854)	Harrismith	2828 - Bd2
Machbela (595)	Harrismith	2729 - Cd1
Nagdalen (1471)	Bloemfontein	2926 - Ad2
Maghaleen (287)	Zastron	3027 - Ab4
Manchester (466)	Ladybrand	2927 - Ac2
Mandyville (787)	Frankfort	2728 - Bb1
Mara (395)	Parys	2627 - Dc1
Mara (855)	Vredefort	2727 - Ad1
Marquard	Marquard	2827 - Cb4
Marseilles (37)	Ladybrand	2927 - Ab3
Maseru (64)	Thaba'Nchu	2927 - Aa3
Matjesfontein (82)	Bethulie	3025 - Bb4
Maweni Heights (644)	Harrismith	2829 - Ca2
Mazelspoort	Bloemfontein	2926 - Ab2
Meadows (225)	Dewetsdorp	2926 - Bc4

Locality	District	Locus code
Mecklenburg (64)	Harrismith	2728 - Dd1
Memel	Vrede	2729 - Da3
Merino (1487)	Bethlehem	2828 - Ad1
Merino (1375)	Bloemfontein	2925 - Bb4
Merriesfontein (70)	Boshof	2825 - Cb1
Meyerskraal (20)	Hoopstad	2725 - Dd1
Middelbron (501)	Philippolis	3025 - Aa1
Middelpunt (105)	Brandfort	2826 - Cd3
Middenspruit (151)	Kroonstad	2727 - Ca2
Mierdam (638)	Boshof	2825 - Da3
Milambi (235)	Marquard	2827 - Cd2
Mimosa (1188)	Brandfort	2826 - Da3
Modderpoort (34)	Ladybrand	2927 - Ab2
Moirton (679)	Hoopstad	2725 - Cd2
Monontsa Pass (Witzieshoek)	Harrismith	2828 - Da2
Mooigelegen (863)	Harrismith	2828 - Bb1
Mooivlei (2823)	Bloemfontein	2925 - Bd2
Moreson (407)	Marquard	2827 - Cc2
Morgenzon (73)	Ficksburg	2827 - Dd2
Morgenzon (370)	Harrismith	2729 - Cc4
Morgenzon (123)	Senekal	2827 - Db1
Morgenzon (143)	Zastron	3027 - Ac4
Mount Nelson (330)	Winburg	2827 - Cc4
Naval Hill	Bloemfontein	2926 - Aa2
Newlands A (760)	Ladybrand	2927 - Aa4
Niekerk (276)	Hoopstad	2725 - Dc1
Noodhulp (81)	Edenburg	2925 - Dd2
Northfield (1374)	Bloemfontein	2925 - Bb3
Nova (667)	Ladybrand	2927 - Ab1
Odendaalsrus	Odendaalsrus	2726 - Dc2
Oever (645)	Harrismith	2729 - Dc4
Olive Hill	Bloemfontein	2926 - Ab1
Ongegund (1119)	Winburg	2826 - Db2
Onze Rust (1204)	Boshof	2825 - Aa4
Oorsprong (135)	Heilbron	2727 - Bb2



Locality	District	Locus code
Op-die-Rivier (621)	Ficksburg	2828 - Cc1
Ospoort (44)	Philippolis	3025 - Ad2
Oudefontein (29)	Jacobsdal	2924 - Bb4
Palmietfontein (99)	Parys	2627 - Dc1
Paradys (137)	Viljoenskroon	2726 - Bb2
Parva Sed Mea (865)	Harrismith	2828 - Bb4
Parys	Parys	2627 - Cd4
Patrijsdraai (906)	Kroonstad	2727 - Cd1
Perth (1084)	Harrismith	2829 - Ac4
Petra (451)	Senekal	2827 - Ad2
Petrusburg	Fauresmith	2925 - Ab2
Philadelphia (316)	Wesselsbron	2726 - Cd4
Philippi (952)	Bethlehem	2828 - Ba3
Philippolis	Philippolis	3025 - Ad1
Pietersberg (751)	Brandfort	2826 - Da3
Platberg (539)	Boshof	2824 - Bd2
Platberg	Harrismith	2829 - Ac2
Platkop (1069)	Boshof	2825 - Cd3
Platrand (136)	Kroonstad	2727 - Cb2
Poortje (92)	Edenburg	2925 - Da4
Poortje (990)	Fauresmith	2925 - Ac4
Prior (249)	Bethulie	3025 - Bc3
Proces (1293)	Boshof	2825 - Ca4
Quaggaspruit (115)	Lindley	2727 - Da4
Ramalitse (22)	Thaba'Nchu	2926 - Ba4
Rambouillet (396)	Lindley	2727 - Dd1
Rayton	Bloemfontein	2926 - Aa2
Reddersburg	Reddersburg	2926 - Ca4
Reitz	Reitz	2728 - Cd2
Rhenosterspruit	Bloemfontein	2926 - Ab1
Ribblesdale (1506)	Bloemfontein	2926 - Ab1
Richmond West (135)	Bothaville	2726 - Db3
Rietfontein (144)	Brandfort	2826 - Dc4
Rietfontein (328)	Bultfontein	2826 - Ca1
Rietfontein (9)	Rouxville	3026 - Cb1

Locality	District	Locus code
Rietfontein (288)	Vrede	2729 - Ad2
Rietkuil (62)	Bothaville	2726 - Db1
Rietput (117)	Fauresmith	2924 - Db2
Rietspruit (2251)	Bloemfontein	2926 - Ad1
Riverside (927)	Ladybrand	2927 - Ad2
Rodenbeck	Bloemfontein	2926 - Aa4
Rohallion (280)	Wepener	2927 - Ca3
Rondavel (627)	Kroonstad	2727 - Ca4
Rondeberg (112)	Ladybrand	2927 - Ba3
Rondebult (193)	Bethlehem	2828 - Aa4
Roodedraai (92)	Hoopstad	2725 - Cd1
Rooilaagte (344)	Jacobsdal	2924 - Bb3
Rorich's Hulp (505)	Fauresmith	2924 - Da4
Rosendal	Ficksburg	2827 - Db2
Rouxville	Rouxville	3026 - Bd3
Ruigtepoort (61)	Fauresmith	2925 - Cd1
Rustfontein Dam	Bloemfontein	2926 - Bc1
Rusthof (17)	Heilbron	2728 - Ac4
Rydal Mount (469)	Harrismith	2828 - Db1
Schoongezicht (237)	Theunissen	2826 - Ad2
Seekoeivleipoort (1316)	Vrede	2729 - Da2
Sentinel (Witzieshoek)	Harrismith	2828 - Db4
Serfontein (438)	Koppies	2727 - Ad4
Serfontein Dam	Kroonstad	2727 - Ca4
Shannon	Bloemfontein	2926 - Ab3
Slangheuvel (192)	Heilbron	2627 - Dd4
Smaldeel (1245)	Hoopstad	2726 - Ca3
Smitherton (753)	Harrismith	2828 - Bb3
Smithfield	Smithfield	3026 - Ba3
Smithskraal (1519)	Boshof	2825 - Aa1
Somerset (393)	Dewetsdorp	2926 - Bc3
Spijtfontein (639)	Kroonstad	2726 - Db2
Spitzkop (56)	Zastron	3027 - Aa4
Stoffelfontein (407)	Lindley	2827 - Bb2
Stoltzkop (134)	Reitz	2728 - Da3



Locality	District	Locus code
Stoomhoek (826)	Bloemfontein	2826 - Cc1
Straalfontein (117)	Ladybrand	2927 - Ab1
Strijdfontein (189)	Heilbron	2727 - Bb4
Strijdfontein (72)	Philippolis	3025 - Cb1
Sunny Hills (1784)	Winburg	2827 - Ca3
Susannasfontein (370)	Winburg	2826 - Dd1
Sweet Home (2570)	Bloemfontein	2926 - Ac3
Sweetwaters (674)	Vrede	2729 - Da2
Tafelberg (815)	Harrismith	2829 - Aa4
Tempe	Bloemfontein	2926 - Aa2
Thaba'Nchu	Thaba'Nchu	2926 - Bb3
Thaba Paocha Berg (668)	Thaba'Nchu	2927 - Ac1
Theunissen	Theunissen	2826 - Bc4
Tienfontein (137)	Wepener	2926 - Dd2
Torbek (67)	Reddersburg	2926 - Cb1
Triangle (254)	Ventersburg	2827 - Ab2
Trompsburg	Trompsburg	3025 - Bb1
Tussen-die-Riviere Game Farm	Bethulie	3026 - Ac4
Tweefontein (390)	Winburg	2827 - Ac4
Tweespruit	Thaba'Nchu	2927 - Aa3
Twee Zusters (251)	Ladybrand	2927 - Ab2
Tygerfontein (240)	Vrede	2729 - Cb2
Uitkijk (536)	Wepener	2926 - Db2
Uitkomst (558)	Thaba'Nchu	2926 - Bb4
Uitkyk (486)	Boshof	2825 - Ac3
Uitvlugt (227)	Vrede	2729 - Ad4
Uitzicht (630)	Harrismith	2828 - Bb3
Usherwood (2412)	Bloemfontein	2926 - Ab3
Utopia (1690)	Winburg	2827 - Ca2
Vaalbank (135)	Welkom	2726 - Dc3
Vaalbank Zuid (1853)	Bloemfontein	2926 - Ab1
Vaalkop (66)	Thaba'Nchu	2926 - Bd1
Van Aswegen's Hoek (493)	Boshof	2725 - Cc4
Van der Walt's Rust (1021)	Vredefort	2627 - Cc3

Locality	District	Locus code
Van Reenen	Harrismith	2829 - Ad2
Veepost (738)	Brandfort	2826 - Cd3
Ventersburg	Ventersburg	2827 - Aa2
Venus (165)	Parys	2627 - Dc1
Verdun (230)	Fouriesburg	2828 - Cb1
Verdun (617)	Reitz	2728 - Da1
Verdun (752)	Ladybrand	2927 - Ab3
Vergaderrand (49)	Rouxville	3026 - Bc4
Verkeerdevlei	Brandfort	2826 - Dd1
Verwoerd Dam	Bethulie	3025 - Da1
Vet River-Bloemhof Dam junction	Hoopstad	2725 - Da4
Viljoensdrift (713)	Heilbron	2627 - Db4
Viljoenskroon	Viljoenskroon	2726 - Bb4
Vissershoeck West (129)	Philippolis	3025 - Ab2
Vrede	Vrede	2729 - Ac4
Vredefort	Vredefort	2727 - Ab1
Waterbron (2576)	Bloemfontein	2926 - Aa1
Waterfall (1157)	Harrismith	2829 - Ad2
Waterhoek (156)	Jacobsdal	2925 - Aa3
Welbedacht (285)	Wepener	2926 - Dd3
Welgedacht (108)	Brandfort	2826 - Ca1
Welgegund (1781)	Bethlehem	2828 - Ba3
Welkom	Welkom	2726 - Dc4
Weltevrede (395)	Reddersburg	2926 - Ac4
Weltevreden (126)	Jacobsdal	2924 - Bc3
Weltevreden (257)	Heilbron	2727 - Bd2
Weltevreden (94)	Smithfield	3026 - Ad2
Wepener	Wepener	2927 - Ca3
Westminster	Ladybrand	2927 - Aa4
Wilhelmshoek (693)	Boshof	2825 - Ba1
Willem Pretorius Game Reserve	Winburg	2827 - Ac2
Winburg	Winburg	2827 - Ca1
Wintershoek (41)	Jacobsdal	2924 - Bd2
Winterspoort (86)	Trompsburg	3025 - Bb3
Wittekopjes (169)	Vredefort	2727 - Ab1



Locality	District	Locus code
Wittepoort (789)	Ficksburg	2827 - Da4
Witzieshoek	Harrismith	2828 - Db1
Wolvekop (446)	Fauresmith	2924 - Db1
Wolvekop (314)	Kroonstad	2727 - Cd1
Wolvenfontein (256)	Heilbron	2728 - Aa4
Wonderkop (471)	Boshof	2825 - Da2
Woudzicht (492)	Vrede	2728 - Db2
Zandfontein (4)	Smithfield	3026 - Aa4
Zandvoort (218)	Bloemfontein	2926 - Aa3
Zastron	Zastron	3027 - Ac1
Zoetbron (151)	Vrede	2729 - Aa4
Zoetvlei (630)	Boshof	2725 - Cd1
Zomervlakte (295)	Bethlehem	2828 - Aa3
Zoutpan (722)	Fauresmith	2924 - Cb2
Zoutpan (33)	Jacobsdal	2924 - Ba4
Zuurfontein (2022)	Bloemfontein	2926 - Ab2
Zwartfontein (93)	Philippolis	3024 - Bb2
Zwartkoppies (520)	Frankfort	2728 - Ad2

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