A HERPETOLOGICAL SURVEY OF THE TRANSVAAL

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1

A HERPETOLOGICAL SURVEY OF THE TRANSVAAL

BY

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ABSTRACT

This report discusses the taxonomy, distribution and ecology of the herpetofauna of the Transvaal based on a survey conducted over the past 10 years.

Seventeen new forms, apart from four new taxa described during the course of this study, are discussed in the section on Systematics. The distribution of many species has been considerably amended. A total of 265 species and subspecies were recorded from the province.

The biogeography of the herpetofauna is discussed in the light of past and present climatic events, as determined by palynological record.

Factors affecting reptile and amphibian distributions are incorporated in an attempt to elucidate current distribution patterns.

The conservation status of each species and subspecies is discussed and a final chapter on threats and conservation recommendations are incorporated.

PREFACE

The field work described in this thesis was carried out throughout the province of Transvaal from October 1978 to December 1982. The analysis of specimens was carried out at the Hartebeeshoek Research Station and at the Transvaal Museum under the supervision of Professor J.C. Poynton over the period January 1985 to December 1989. These studies represent original work by the author and have not been submitted in any form to another University. Where use was made of the work of others, it has been duly acknowledged in the text.

ACKNOWLEDGEMENTS

The reasons for this project are stated in the Introduction but I am grateful to the then Director of Nature Conservation, Dr. S.S. du Plessis for his insight, initiative and support of the project as well as approval to use it for higher degree purposes. This support has been continued by the current Director, Dr. P.F.S. Mulder.

The fieldwork was carried out on a great number of farms and in the homelands, two of which are now independent states. To all those people who have helped and befriended us in many ways I am deeply grateful and hope that this report will justify their good faith.

The fieldwork could not have been completed successfully without the dedication displayed by my assistants Richard Newbery, Wally Peterson, Errol Pietersen, Jack Makola, Daniel Ledwaba, Job Motsamai and Piet Majeke. Their unstinting endeavours, despite many hardships, have, I hope, herewith been vindicated.

The taxonomic work was carried out at the Hartebeeshoek Research Station and at the Transvaal Museum. I am extremely grateful to the Director of the Transvaal Museum, Dr C.K. Brain and Mr W.D. Haacke, Curator of Herpetology, for the facilities and many stimulating discussions. Their friendliness and the help of Mrs L. Brown also of the Department of Lower Vertebrates have been instrumental in egging me on to completion.

The number of friends and colleagues who have assisted in the survey either with specimens or, with discussions or with moral support are too numerous to name. I would however like to express my sincere thanks to the following:- B.J. Leslie, Nick Zambatis, Errol & Michelle Pietersen, Mike Crowther, Mac McKibben, P. le S. Milstein, W. Van der Maelen, Liz McClain, E. du Plessis, C. Stuart and P. Osborne.

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Janet Matthews photographed many specimens often with inadequate equipment but always managing to come up with a solution.

Material was kindly loaned by Dr D.G. Broadley, Curator of Herpetology, National Museums of Zimbabwe as well as making lists of Transvaal accessions in their collection available. Dr G.L. McLachlan provided specimens on loan which were housed in the South African Museum collection, which provided invaluable insight into hitherto complex distributions. I thank my supervisor Professor J.C. Poynton for his advice and guidance in the preparation of this work and for many interesting discussions. Dr W.R. Branch was always available for advice and discussions.

Finally a very special word of love, appreciation and thanks to my parents for initiating and encouraging my interest in all living things, a gift beyond compare.

CONTENTS

	Page
ABSTRACT	ii
PREFACE	iii
ACKNOWLEDGEMENTS	iv
LIST OF FIGURES	x
LIST OF PLATES	xiii
LIST OF MAPS	xiv
LIST OF TABLES	xlii
INTRODUCTION	1
CHAPTER 1: DESCRIPTION OF STUDY AREA	6
1.1 Topography, climate, geology, soils and vegetation	6
1.2 Palaeo-environments of the Transvaal	19
CHAPTER 2: METHODS AND MATERIALS	25

		Page
CHAPTER 3:	SYSTEMATICS	30
	3.1 Preface	31
	3.2 Key to the orders and suborders of the reptiles.	38
	3.3 Keys to the families and genera of the reptiles.	39
	3.4 Keys to the families and genera of the amphibians.	64
	3.5 Systematic checklist and index of Transvaal herpetofauna.	71
CHAPTER 4:	SYSTEMATIC DISCUSSION - REPTILIA	86
CHAPTER 5:	SYSTEMATIC DISCUSSION - AMPHIBIA	1209
CHAPTER 6:	ECOLOGY	1444
	6.1 Biotic zones	1444
	6.2 Adaptation to habitat	1450
	6.3 Hibernation	1455
	6.4 Food	1460
	6.5 Reproduction	1464
CHAPTER 7:	BIOGEOGRAPHY OF THE TRANSVAAL IN RELATION TO SOUTHERN AFRICA	1471
	7.1 Historical influences	1472
	7.2 Environmental influences	1480

Page

CHAPTER 8: CONSERVATION 1487

8.1 Conservation status 1487
8.2 Threats 1508

8.2.1 Habitat destruction 1508
8.2.2 Overexploitation 1519
8.2.3 Overpopulation 1523

8.3 Conservation recommendations 1524

BIBLIOGRAPHY 1537
GAZETTEER OF THE TRANSVAAL 1569

LIST OF FIGURES

		Page
Figure 1 :	Approximate number of species recorded per 1/4° square during the survey of the Transvaal herpetofauna, and, with the exception of the KNP, excluding literature and sight records.	3
Figure 2 :	Topography of the Transvaal showing major streams, rivers and mountain ranges.	7
Figure 3 :	Hypothetical vegetation of southern Africa, A. at 50-60% and B, at 140-150% of present rainfall.	23
Figure 4 :	Grouping of Transvaal *Afroedura* species according to morphological similarities.	104
Figure 5 :	Dorsal and lateral view of *Pachydactylus c. capensis*, showing tubercle arrangements.	211

Page

Figure 6 : Dorsum of head of Pachydactylus vansoni from three different localities; A. Thononda Peak 2230 cc - J1110 (near type locality); B. Pongola Nature Reserve 2731BD - N7223; C. Loopfontein 298JT 2530DA - N7904; showing tubercle arrangement. 221

Figure 7 : Dorsum of back of Pachydactylus vansoni from three localities (as for Figure 6). 223

Figure 8 : Lateral view of Pachydactylus vansoni from three localities (as for Figure 6). 225

Figure 9 : Pachydactylus affinis - dorsal view of head; A. Zandspruit 287KR 2428BB - N3513; B. Waaikraal 396JQ 2527DA - N8361; C. Morgendal 216KS 2429BB - JN 2876; showing tubercle arrangement. 233

Figure 10 : Pachydactylus affinis - dorsal view of back. (Legend as for Figure 9). 235

Figure 11 : Pachydactylus affinis - lateral view of body. (Legend as for Figure 9). 237

Page

Figure 12 : Variation in gular pattern in Transvaal *Agama aculeata*. (Note those in the middle from north of the Soutpansberg). 282

Figure 13 : The various forms of *Bradypodion* in the Transvaal. A. Soutpansberg; B. Woodbush; C. The Downs; D. Pilgrims Rest; E. Mariepskop; F. Sabie; G. Longtom Pass; H. Kaapsche Hoop; I. Barberton. 298

Figure 14 : Phenogram of Transvaal *Bradypodion* based on analysis of nine morphological characters. 303

LIST OF PLATES

Page

Plate 1. Male colouration in three *Platysaurus* species groups 642

LIST OF MAPS

		Page
Map 1.	Ptenopus g. garrulus. Recorded distribution in the Transvaal, and in southern Africa.	88
2.	Homopholis wahlbergi. Recorded distribution in the Transvaal, and in southern Africa.	94
3.	Homopholis mulleri. Recorded distribution in the Transvaal, and in southern Africa.	99
4.	Afroedura "Matlala". Recorded distribution in the Transvaal, and in southern Africa.	111
5.	Afroedura transvaalica transvaalica. Recorded distribution in the Transvaal, and in southern Africa.	115
6.	Afroedura multiporis haackei. Recorded distribution in the Transvaal, and in southern Africa.	119
7.	Afroedura multiporis multiporis. Recorded distribution in the Transvaal, and in southern Africa.	123
8.	Afroedura multiporis "Abel Erasmus". Recorded distribution in the Transvaal, and in southern Africa.	126

Page

9. Afroedura sp. nov. Recorded distribution in the Transvaal, and in southern Africa. 129

10. Afroedura pondolia marleyi. Recorded distribution in the Transvaal, and southern Africa. 133

11. Afroedura "Maripi". Recorded distribution in the Transvaal, and southern Africa. 137

12. Afroedura pondolia "Godlwayo". Recorded distribution in the Transvaal, and in southern Africa. 140

13. Afroedura langi "Soutpansberg". Recorded distribution in the Transvaal, and in southern Africa. 144

14. Afroedura langi "Waterberg". Recorded distribution in the Transvaal, and in southern Africa. 147

15. Afroedura langi "Lillie". Recorded distribution in the Transvaal, and in southern Africa. 150

16. Afroedura langi langi. Recorded distribution in the Transvaal, and in southern Africa. 154

17. Afroedura langi "Waterpoort". Recorded distribution in the Transvaal, and in southern Africa. 158

18. Afroedura langi "Tshipise". Recorded distribution in the Transvaal, and in southern Africa. 161

19. Afroedura langi "Shinokwen". Recorded distribution in the Transvaal, and in southern Africa. 165

Page

20. Afroedura langi "Leolo". Recorded distribution in the Transvaal, and in southern Africa. 168

21. Hemidactylus mabouia mabouia. Recorded distribution in the Transvaal, and in southern Africa. 174

22. Lygodactylus stevensoni. Recorded distribution in the Transvaal, and in southern Africa. 179

23. Lygodactylus capensis capensis. Recorded distribution in the Transvaal, and in southern Africa. 185

24. Lygodactylus ocellatus. Recorded distribution in the transvaal, and in southern Africa. 191

24A. Lygodactylus ocellatus complex. Recorded distribution in the Transvaal, and in Southern Africa. 195

25. Lygodactylus methueni. Recorded distribution in the Transvala, and in southern Africa. 197

26. Pachydactylus punctatus punctatus. Recorded distribution in the Transvaal, and in southern Africa. 204

27. Pachydactylus maculatus maculatus. Recorded distribution in the Transvaal, and in southern Africa. 208

Page

28. Pachydactylus capensis capensis. Recorded distribution in the Transvaal, and in southern Africa. 215

29. Pachydactylus vansoni. Recorded distribution in the Transvaal, and in southern Africa. 228

30. Pachydactylus affinis. Recorded distribution in the Transvaal, and in southern Africa. 241

31. Pachydactylus tigrinus. Recorded distribution in the Transvaal, and in southern Africa. 246

32. Pachydactylus bibronii. Recorded distribution in the Transvaal, and in southern Africa. 251

33. Agama atricollis. Recorded distribution in the Transvaal, and in southern Africa. 262

34. Agama atra atra. Recorded distribution in the Transvaal, and in southern Africa. 268

35. Agama aculeata distanti. Recorded distribution in the Transvaal, and in southern Africa. 274

36. Agama aculeata armata. Recorded distribution in the Transvaal, and in southern Africa. 280

37. Chamaeleo dilepis. Recorded distribution in the Transvaal, and in southern Africa. 287

38. Bradypodion transvaalensis. Recorded distribution in the Transvaal, and in southern Africa. 294

Page

38A. Bradypodion transvaalensis complex. Recorded distribution in the Transvaal, and in southern Africa. 296

39. Scelotes mira. Recorded distribution in the Transvaal, and in southern Africa. 308

40. Scelotes limpopoensis limpopoensis. Recorded distribution in the Transvaal, and in southern Africa. 311

41. Scelotes limpopoensis albiventris. Recorded distribution in the Transvaal, and in southern Africa. 314

42. Scelotes bidigittatus. Recorded distribution in the Transvaal, and in southern Africa. 317

43. Scelotes brevipes. Recorded distribution in the Transvaal, and in southern Africa. 321

44. Mabuya homalocephala smithii. Recorded distribution in the Transvaal, and in southern Africa. 328

45. Mabuya homalocephala depressa. Recorded distribution in the Transvaal, and in southern Africa. 331

46. Mabuya quinquetaeniata margaritifer. Recorded distribution in the Transvaal, and in southern Africa. 336

Page

47. Mabuya capensis. Recorded distribution in the Transvaal, and in southern Africa. 344

48. Mabuya varia. Recorded distribution in the Transvaal, and in southern Africa. 351

49. Mabuya sp. nov. Recorded distribution in the Transvaal, and in southern Africa. 358

50. Mabuya variegata punctulata. Recorded distribution in the Transvaal, and in southern Africa. 363

51. Mabuya striata striata. Recorded distribution in the Transvaal, and in southern Africa. 368

52. Mabuya striata punctatissimus. Recorded distribution in the Transvaal, and in southern Africa. 374

53. Distribution of intergrade specimens of M. s. striata and M. s. punctatissimus in the Transvaal. 377

54. Lygosoma sundevallii. Recorded distribution in the Transvaal, and in southern Africa. 382

55. Panaspis wahlbergii. Recorded distribution in the Transvaal, and in southern Africa. 391

56. Panaspis sp. nov. Recorded distribution in the Transvaal, and in southern Africa. 396

Page

57. Acontias plumbeus. Recorded distribution in the Transvaal, and in southern Africa. 403

58. Acontias percivalli occidentalis. Recorded distribution in the Transvaal, and in southern Africa. 407

59. Acontias gracilicauda gracilicauda. Recorded distribution in the Transvaal, and in southern Africa. 411

60. Acontias breviceps. Recorded distribution in the Transvaal, and in southern Africa. 414

61. Acontophiops lineatus. Recorded distribution in the Transvaal, and in southern Africa. 419

62. Typhlosaurus aurantiacus fitzsimonsi. Recorded distribution in the Transvaal, and in southern Africa. 425

63. Typhlosaurus cregoi cregoi. Recorded distribution in the Transvaal, and in southern Africa. 430

64. Typhlosaurus lineatus subtaeniatus. Recorded distribution in the Transvaal, and in southern Africa. 433

65. Typhlosaurus lineatus richardi. Recorded distribution in the Transvaal, and in southern Africa. 436

66. Nucras lalandii. Recorded distribution in the Transvaal, and in southern Africa. 433

Page

67. Nucras caesicaudata. Recorded distribution in the Transvaal, and in southern Africa. 447

68. Nucras intertexta. Recorded distribution in the Transvaal, and in southern Africa. 451

69. Nucras taeniolata holubi. Recorded distribution in the Transvaal, and in southern Africa. 457

70. Nucras ornata. Recorded distribution in the Transvaal, and in southern Africa. 463

71. Lacerta rupicola. Recorded distribution in the Transvaal, and in southern Africa. 468

72. Heliobolus lugubris. Recorded distribution in the Transvaal, and in southern Africa. 474

73. Pedioplanis lineo-ocellata lineo-ocellata. Recorded distribution in the Transvaal, and in southern Africa. 479

74. Pedioplanis lineo-ocellata pulchella. Recorded distribution in the Transvaal, and in southern Africa. 485

75. Pedioplanis burchellii. Recorded distribution in the Transvaal, and in southern Africa. 490

76. Ichnotropis squamulosa. Recorded distribution in the Transvaal, and in southern Africa. 497

Page

77. Ichnotropis capensis capensis. Recorded distribution in the Transvaal, and in southern Africa. 502

78. Varanus albigularis. Recorded distribution in the Transvaal, and in southern Africa. 507

79. Varanus niloticus. Recorded distribution in the Transvaal, and in southern Africa. 514

80. Tetradactylus eastwoodae. Recorded distribution in the Transvaal, and in southern Africa. 521

81. Tetradactylus breyeri. Recorded distribution in the Transvaal, and in southern Africa. 524

82. Gerrhosaurus validus validus. Recorded distribution in the Transvaal, and in southern Africa. 531

83. Gerrhosaurus flavigularis flavigularis. Recorded distribution in the Transvaal, and in southern Africa. 538

84. Gerrhosaurus nigrolineatus. Recorded distribution in the Transvaal, and in southern Africa. 544

85. Gerrhosaurus major major. Recorded distribution in the Transvaal, and in southern Africa. 548

86. Chamaesaura aenea. Recorded distribution in the Transvaal, and in southern Africa. 554

Page

87. Chamaesaura anguina. Recorded distribution in the Transvaal, and in southern Africa. 558

88. Chamaesaura macrolepis. Recorded distribution in the Transvaal, and in southern Africa. 561

89. Cordylus giganteus. Recorded distribution in the Transvaal, and in southern Africa. 570

90. Cordylus vandami. Recorded distribution in the Transvaal, and in southern Africa. 577

91. Cordylus warreni depressus. Recorded distribution in the Transvaal, and in southern Africa. 582

92. Cordylus warreni warreni. Recorded distribution in the Transvaal, and in southern Africa. 588

93. Cordylus warreni barbertonensis. Recorded distribution in the Transvaal, and in southern Africa. 590

94. Cordylus warreni breyeri. Recorded distribution in the Transvaal, and in southern Africa. 596

95. Cordylus polyzonus polyzonus. Recorded distribution in the Transvaal, and in southern Africa. 601

96. Cordylus tropidosternum jonesi. Recorded distribution in the Transvaal, and in southern Africa. 605

Page

97. Cordylus vittifer vittifer. Recorded distribution in the Transvaal, and in southern Africa. Small circles = form A, large circles = form B, Stars indicate parapatry. 613

98. Pseudocordylus melanotus melanotus. Recorded distribution in the Transvaal, and in southern Africa. 621

99. Pseudocordylus melanotus transvaalensis. Recorded distribution in the Transvaal, and in southern Africa. 629

100. Platysaurus guttatus. Recorded distribution in the Transvaal, and in southern Africa. 640

101. Platysaurus minor. Recorded distribution in the Transvaal, and in southern Africa. 646

102. Platysaurus orientalis orientalis. Recorded distribution in the Transvaal, and in southern Africa. 652

103. Platysaurus orientalis fitzsimonsi. Recorded distribution in the Transvaal, and in southern Africa. 657

104. Platysaurus relictus. Recorded distribution in the Transvaal, and in southern Africa. 662

105. Platysaurus intermedius intermedius. Recorded distribution in the Transvaal, and in southern Africa. 667

106. Platysaurus intermedius wilhelmi. Recorded distribution in the Transvaal, and in southern Africa. 673

Page

107. Platysaurus intermedius "Lebombo". Recorded distribution in the Transvaal, and in southern Africa. 679

108. Platysaurus intermedius rhodesianus. Recorded distribution in the Transvaal, and in southern Africa. 684

109. Platysaurus intermedius natalensis. Recorded distribution in the Transvaal, and in southern Africa. 689

110. Platysaurus intermedius parvus. Recorded distribution in the Transvaal, and in southern Africa. 693

111. Platysaurus intermedius "Glen Alpine". Recorded distribution in the Transvaal, and in southern Africa. 698

112. Platysaurus sp. nov. Recorded distribution in the Transvaal, and in southern Africa. 702

113. Monopeltis capensis capensis. Recorded distribution in the Transvaal, and in southern Africa. Stars = form A; circles = form B; squares = form C (Broadley et al 1978). 709

114. Monopeltis sphenorhynchus sphenorhynchus. Recorded distribution in the Transvaal, and in southern Africa. 713

Page

115. Monopeltis leonhardi. Recorded distribution in the Transvaal, and in southern Africa. 716

116. Dalophia pistillum. Recorded distribution in the Transvaal, and in southern Africa. 721

117. Zygaspis quadrifrons. Recorded distribution in the Transvaal, and in southern Africa. 726

118. Zygaspis violacea. Recorded distribution in the Transvaal, and in southern Africa. 730

119. Chirindia langi langi. Recorded distribution in the Transvaal, and in southern Africa. 735

120. Chirindia langi occidentalis. Recorded distribution in the Transvaal, and in southern Africa. 739

121. Typhlops schlegelii schlegelii. Recorded distribution in the Transvala, and in southern Africa. 744 A

122. Typhlops schlegelii mucruso. Recorded distribution in the Transvaal, and in southern Africa. 750

123. Typhlops bibronii. Recorded distribution in the Transvaal, and in southern Africa. 754

124. Typhlops lalandei. Recorded distribution in the Transvaal, and in southern Africa. 760

Page

125. Leptotyphlops longicaudus. Recorded distribution in the Transvaal, and in southern Africa. 776

126. Leptotyphlops nigricans nigricans. Recorded distribution in the Transvaal, and in southern Africa. 770

127. Leptotyphlops conjunctus conjunctus. Recorded distribution in the Transvaal, and in southern Africa. 773

128. Leptotyphlops conjunctus incognitus. Recorded distribution in the Transvaal, and in southern Africa. 779

129. Leptotyphlops scutifrons. Recorded distribution in the Transvaal, and in southern Africa. 783

130. Leptotyphlops distanti. Recorded distribution in the Transvaal, and in southern Africa. 787

131. Python sebae natalensis. Recorded distribution in the Transvaal, and in southern Africa. 792

132. Lycodonomorphus laevissimus fitzsimonsi. Recorded distribution in the Transvaal, and in southern Africa. 799

133. Lycodonomorphus rufulus. Recorded distribution in the Transvaal, and in southern Africa. 803

Page

134. Lycodonomorphus whytii obscuriventris. Recorded distribution in the Transvaal, and in southern Africa. 807

135. Lamprophis fuscus. Recorded distribution in the Transvaal, and in southern Africa. 813

136. Lamprophis aurora. Recorded distribution in the Transvaal, and in southern Africa. 816

137. Lamprophis inornatus. Recorded distribution in the Transvaal, and in southern Africa. 819

138. Lamprophis guttatus. Recorded distribution in the Transvaal, and in southern Africa. 823

139. Lamprophis fuliginosus. Recorded distribution in the Transvaal, and in southern Africa. 828

140. Lamprophis swazicus. Recorded distribution in the Transvaal, and in southern Africa. 832

141. Lycophidion capensis capensis. Recorded distribution in the Transvaal, and in southern Africa. 840

142. Lycophidion variegatum. Recorded distribution in the Transvaal, and in southern Africa. 845

143. Mehelya capensis capensis. Recorded distribution in the Transvaal, and in southern Africa. 850

Page

144. Mehelya nyassae. Recorded distribution in the Transvaal, and in southern Africa. 854

145. Duberria lutrix lutrix. Recorded distribution in the Transvaal, and in southern Africa. 859

146. Pseudaspis cana. Recorded distribution in the Transvaal, and in southern Africa. 864

147. Amplorhinus multimaculatus. Recorded distribution in the Transvaal, and in southern Africa. 870

148. Hemirhagerrhis nototaenia. Recorded distribution in the Transvaal, and in southern Africa. 875

149. Psammophylax rhombeatus rhombeatus. Recorded distribution in the Transvaal, and in southern Africa. 881

150. Psammophylax tritaeniatus. Recorded distribution in the Transvaal, and in southern Africa. 887

151. Rhamphiophis oxyrhynchus rostratus. Recorded distribution in the Transvaal, and in southern Africa. 892

152. Psammophis leightoni trinasalis. Recorded distribution in the Transvaal, and in southern Africa. 900

Page

153. Psammophis jallae. Recorded distribution in the Transvaal, and in southern Africa. 904

154. Psammophis subtaeniatus subtaeniatus. Recorded distribution in the Transvaal, and in southern Africa. 909

155. Psammophis sibilans brevirostris. Recorded distribution in the Transvaal, and in southern Africa. 914

156. Psammophis phillipsii. Recorded distribution in the Transvaal, and in southern Africa. 919

157. Psammophis crucifer. Recorded distribution in the Transvaal, and in southern Africa. 924

158. Psammophis angolensis. Recorded distribution in the Transvaal, and in southern Africa. 929

159. Aparallactus lunulatus lunulatus. Recorded distribution in the Transvaal, and in southern Africa. 935

160. Aparallactus capensis. Recorded distribution in the Transvaal, and in southern Africa. 939

161. Amblyodipsas concolor. Recorded distribution in the Transvaal, and in southern Africa. 946

Page

162. Amblyodipsas microphthalma microphthalma. Recorded distribution in the Transvaal, and in southern Africa. 950

163. Amblyodipsas microphthalma nigra. Recorded distribution in the Transvaal, and in southern Africa. 953

164. Amblyodipsas polylepis polylepis. Recorded distribution in the Transvaal, and in southern Africa. 956

165. Xenocalamus transvaalensis. Recorded distribution in the Transvaal, and in southern Africa. 962

166. Xenocalamus bicolor australis. Recorded distribution in the Transvaal, and in southern Africa. 965

167. Xenocalamus bicolor lineatus. Recorded distribution in the Transvaal, and in southern Africa. 969

168. Xenocalamus bicolor bicolor. Recorded distribution in the Transvaal, and in southern Africa. 973

169. Homoroselaps lacteus. Recorded distribution in the Transvaal, and in southern Africa. 978

170. Homoroselaps dorsalis. Recorded distribution in the Transvaal, and in southern Africa. 981

Page

171. Atractaspis bibronii. Recorded distribution in the Transvaal, and in southern Africa. 987

172. Atractaspis duerdeni. Recorded distribution in the Transvaal, and in southern Africa. 991

173. Prosymna sundevalii sundevallii. Recorded distribution in the Transvaal, and in southern Africa. 996

174. Prosymna sundevallii lineata. Recorded distribution in the Transvaal, and in southern Africa. 1000

175. Prosymna bivittata. Recorded distribution in the Transvaal, and in southern Africa. 1004

176. Prosymna ambigua stuhlmannii. Recorded distribution in the Transvaal, and in southern Africa. 1009

177. Meizodon semiornatus. Recorded distribution in the Transvaal, and in southern Africa. 1013

178. Philothamnus hoplogaster. Recorded distribution in the Transvaal, and in southern Africa. 1019

179. Philothamnus natalensis natalensis. Recorded distribution in the Transvaal, and in southern Africa. 1022

180. Philothamnus natalensis occidentalis. Recorded distribution in the Transvaal, and in southern Africa. 1026

Page

181. Philothamnus semivariegatus semivariegatus. Recorded distribution in the Transvaal, and in southern Africa. 1030

182. Crotaphopeltis hotamboeia. Recorded distribution in the Transvaal, and in southern Africa. 1037

183. Dipsadoboa aulica aulica. Recorded distribution in the Transvaal, and in southern Africa. 1044

184. Telescopus semiannulatus semiannulatus. Recorded distribution in the Transvaal, and in southern Africa. 1048

185. Dispholidus typus typus. Recorded distribution in the Transvaal, and in southern Africa. 1055

186. Thelotornis capensis capensis. Recorded distribution in the Transvaal, and in southern Africa. 1062

187. Dasypeltis inornata. Recorded distribution in the Transvaal, and in southern Africa. 1067

188. Dasypeltis scabra. Recorded distribution in the Transvaal, and in southern Africa. 1073

189. Elapsoidea semiannulata boulengeri. Recorded distribution in the Transvaal, and in southern Africa. 1082

Page

190. Elapsoidea sundevallii sundevallii. Recorded distribution in the Transvaal, and in southern Africa. 1085

191. Elapsoidea sundevallii media. Recorded distribution in the Transvaal, and in southern Africa. 1088

192. Elapsoidea sundevallii longicauda. Recorded distribution in the Transvaal, and in southern Africa. 1092

193. Hemachatus haemachatus. Recorded distribution in the Transvaal, and in southern Africa. 1098

194. Aspidelaps scutatus scutatus. Recorded distribution in the Transvaal, and in southern Africa. 1104

195. Aspidelaps scutatus intermedius. Recorded distribution in the Transvaal, and in southern Africa. 1108

196. Naja haje annulifera. Recorded distribution in the Transvaal, and in southern Africa. 1113

197. Naja nivea. Recorded distribution in the Transvaal, and in southern Africa. 1118

198. Naja mossambica. Recorded distribution in the Transvaal, and in southern Africa. 1123

Page

199. Dendroaspis polylepis. Recorded distribution in the Transvaal, and in southern Africa. 1129

200. Causus rhombeatus. Recorded distribution in the Transvaal, and in southern Africa. 1137

201. Causus defilippii. Recorded distribution in the Transvaal, and in southern Africa. 1142

202. Bitis caudalis. Recorded distribution in the Transvaal, and in southern Africa. 1147

203. Bitis atropos. Recorded destribution in the Transvaal, and in southern Africa. 1152

204. Bitis arietans arietans. Recorded distribution in the Transvaal, and in southern Africa. 1158

205. Geochelone pardalis. Recorded distribution in the Transvaal, and in southern Africa. 1162

206. Psammobates oculifer. Recorded distribution in the Transvaal, and in southern Africa. 1174

207. Homopus femoralis. Recorded distribution in the Transvaal, and in southern Africa. 1178

208. Kinixys belliana spekii. Recorded distribution in the Transvaal, and in southern Africa. 1184

Page

209. Kinixys natalensis. Recorded distribution in the Transvaal, and in southern Africa. 1188

210. Pelomedusa subrufa. Recorded distribution in the Transvaal, and in southern Africa. 1192

211. Pelusios sinuatus. Recorded distribution in the Transvaal, and in southern Africa. 1197

212. Pelusios subniger. Recorded distribution in the Transvaal, and in southern Africa. 1201

213. Crocodylus niloticus. Recorded distribution in the Transvaal, and in southern Africa. 1206

214. Xenopus laevis laevis. Recorded distribution in the Transvaal, and in southern Africa. 1211

215. Xenopus muelleri. Recorded distribution in the Transvaal, and in southern Africa. 1215

216. Heleophryne natalensis. Recorded distribution in the Transvaal, and in southern Africa. 1220

217. Bufo gariepensis nubicolus. Recorded distribution in the Transvaal, and in southern Africa. 1225

218. Bufo gutturalis. Recorded distribution in the Transvaal, and in southern Africa. 1229

Page

219. Bufo maculatus. Recorded distribution in the Transvaal, and in southern Africa. 1234

220. Bufo garmani. Recorded distribution in the Transvaal, and in southern Africa. 1239

221. Bufo rangeri. Recorded distribution in the Transvaal, and in southern Africa. 1244

222. Bufo vertebralis. Recorded distribution in the Transvaal, and in southern Africa. 1248

223. Bufo fenoulheti fenoulheti. Recorded distribution in the Transvaal, and in southern Africa. 1252

224. Schismaderma carens. Recorded distribution in the Transvaal, and in southern Africa. 1257

225. Breviceps verrucosus verrucosus. Recorded distribution in the Transvaal, and in southern Africa. 1263

226. Breviceps sylvestris sylvestris. Recorded distribution in the Transvaal, and in southern Africa. 1266

227. Breviceps sylvestris taeniatus. Recorded distribution in the Transvaal, and in southern Africa. 1269

Page

228. Breviceps adspersus adspersus. Recorded distribution in the Transvaal, and in southern Africa. 1273

229. Breviceps adspersus pentheri. Recorded distribution in the Transvaal, and in southern Africa. 1278

230. Breviceps mossambicus. Recorded distribution in the Transvaal, and in southern Africa. 1281

231. Phynomerus bifasciatus. Recorded distribution in the Transvaal, and in southern Africa. 1286

232. Pyxicephalus adspersus adspersus. Recorded distribution in the Transvaal, and in southern Africa. 1293

233. Pyxicephalus adspersus edulis. Recorded distribution in the Transvaal, and in southern Africa. 1297

234. Tomopterna cryptotis. Recorded distribution in the Transvaal, and in southern Africa. 1303

235. Tomopterna krugerensis. Recorded distribution in the Transvaal, and in southern Africa. 1307

236. Tomopterna marmorata. Recorded distribution in the Transvaal, and in southern Africa. 1310

Page

237. Tomopterna natalensis. Recorded distribution in the Transvaal, and in southern Africa. 1314

238. Rana angolensis. Recorded distribution in the Transvaal, and in southern Africa. 1321

239. Rana fuscigula. Recorded distribution in the Transvaal, and in southern Africa. 1326

240. Strongylopus grayi grayi. Recorded distribution in the Transvaal, and in southern Africa. 1332

241. Strongylopus fasciata fasciata. Recorded distribution in the Transvaal, and in southern Africa. 1336

242. Hildebrandtia ornata. Recorded distribution in the Transvaal, and in southern Africa. 1340

243. Ptychadena oxyrhynchus. Recorded distribution in the Transvaal, and in southern Africa. 1346

244. Ptychadena anchietae. Recorded distribution in the Transvaal, and in southern Africa. 1350

245. Ptychadena mascareniensis mascareniensis. Recorded distribution in the Transvaal, and in southern Africa. 1353

246. Ptychadena porosissima. Recorded distribution in the Transvaal, and in southern Africa. 1356

Page

247. Ptychadena uzungwensis. Recorded distribution in the Transvaal, and in southern Africa. 1360

248. Ptychadena mossambica. Recorded distribution in the Transvaal, and in southern Africa. 1363

249. Phrynobatrachus natalensis. Recorded distribution in the Transvaal, and in southern Africa. 1369

250. Phrynobatrachus mababiensis. Recorded distribution in the Transvaal, and in southern Africa. 1373

251. Cacosternum boettgeri. Recorded distribution in the Transvaal, and in southern Africa. 1378

252. Cacosternum nanum nanum. Recorded distribution in the Transvaal, and in southern Africa. 1382

253. Arthroleptis stenodactylus. Recorded distribution in the Transvaal, and in southern Africa. 1386

254. Chiromantis xerampelina. Recorded distribution in the Transvaal, and in southern Africa. 1391

255. Hemisus guttatum. Recorded distribution in the Transvaal, and in southern Africa. 1397

256. Hemisus marmoratum marmoratum. Recorded distribution in the Transvaal, and in southern Africa. 1400

Page

257. Hemisus guineensis broadleyi. Recorded distribution in the Transvaal, and in southern Africa. 1403

258. Leptopelis bocagei. Recorded distribution in the Transvaal, and in southern Africa. 1407

259. Leptopelis mossambicus. Recorded distribution in the Transvaal, and in southern Africa. 1410

260. Kassina maculata. Recorded distribution in the Transvaal, and in southern Africa. 1415

261. Kassina senegalensis. Recorded distribution in the Transvaal, and in southern Africa. 1419

262. Kassina wealii. Recorded distribution in the Transvaal, and in southern Africa. 1424

263. Afrixalus aureus. Recorded distribution in the Transvaal, and in southern Africa. 1429

264. Hyperolius semidiscus. Recorded distribution in the Transvaal, and in southern Africa. 1433

265. Hyperolius pusillus. Recorded distribution in the Transvaal, and in southern Africa. 1437

266. Hyperolius marmoratus taeniatus. Recorded distribution in the Transvaal, and in southern Africa. 1441

LIST OF TABLES

			Page
Table	1	Variations in key morphological characters in Transvaal *Afroedura*.	105
	2	Number of plates under the forearm of two *Nucras* species.	439
	3	Number of granules between supraciliaries and supraoculars in two *Nucras* species.	439
	4	Endemic species of the Transvaal.	1476
	5	Numbers of species and subspecies of reptiles and amphibians in southern Africa and those occurring in Transvaal conservation areas.	1488
	6	A list of herpetofauna not found to date in Transvaal conservation areas.	1488
	7	Criteria for the evaluation of conservation status.	1492
	8	Conservation status values of Transvaal herpetofauna.	1495

INTRODUCTION

The herpetofauna of the Transvaal has never been considered separately but has been incorporated as part of South Africa or the Southern African Subregion by various authors (FitzSimons 1943, 1962; Poynton 1964; Broadley 1983; Passmore & Carruthers 1978; Branch 1988; Boycott & Borquin 1988). More localised geographical surveys of portions of Southern Africa have been undertaken by Broadley (1966c), Broadley & Çock (1975), De Waal (1978), Auerbach (1987); Lambiris (1988a) and Poynton & Broadley (1985 a, b, 1987, 1988), these only marginally incorporating or affecting the Transvaal. The Transvaal was therefore largely ignored, with the exception of the Kruger National Park where detailed surveys have been in progress, (Pienaar 1966, 1978; Pienaar, Passmore & Carruthers 1976; Pienaar, Haacke & Jacobsen 1983; Jacobsen & Pienaar 1983), for some time.

Systematic revisions of various species and genera have been conducted by Broadley (1964 and onwards); Broadley & Gans (1975); Broadley & Watson (1976); Broadley, Gans & Visser (1976); Broadley & Gans (1978 a & b)); Parry (1978); Jacobsen (1984, 1986, 1987 a & b), and others - all including taxa represented in the Transvaal. In this respect Broadley has been the driving force behind herpetological studies while Poynton has focussed attention on the study of amphibian taxonomy and biogeography.

The specimen base for these studies was mostly restricted to existing museum collections, much of which had been collected in the early parts of the century and from limited localities with the result that the specimens had limited biogeographical importance.

The Transvaal Directorate of Nature and Environmental Conservation was in need of information pertaining to the conservation status of the herpetofauna of the province. However, following an assessment of the taxa occurring in the Transvaal and those listed in the Red Data Book - Reptiles and Amphibians (McLachlan 1978) - it was apparent that all efforts at determining conservation status were meaningless because of a lack of knowledge of the herpetofauna of the Transvaal. It was therefore deemed necessary to initiate a provincial survey of the number of species and distribution of the herpetofauna. This began during October 1978 and continued during each successive summer up to and including 1982, whereafter field surveys were basically completed (Figure 1).

Morphological analysis and identification of specimens housed in the Transvaal Museum and at Nature Conservation began in 1985, culminating in this report, an examination of 22 680 specimens. Greater emphasis was placed on the lizards than was accorded the snakes, terrapins and tortoises and amphibians, as the latter groups have been, and in many instances still are, the focus of attention. It was also evident that most taxonomic problems were among the Sauria, with fewer problems among the other reptilia and amphibia. The systematic section of this study attempts a comprehensive revision of all the sauria occurring in the Transvaal, with a more fundamental look at the remainder of the herpetofauna. Zoogeographical surveys of other areas have been mentioned earlier, and this study has been approached in such a way as to make

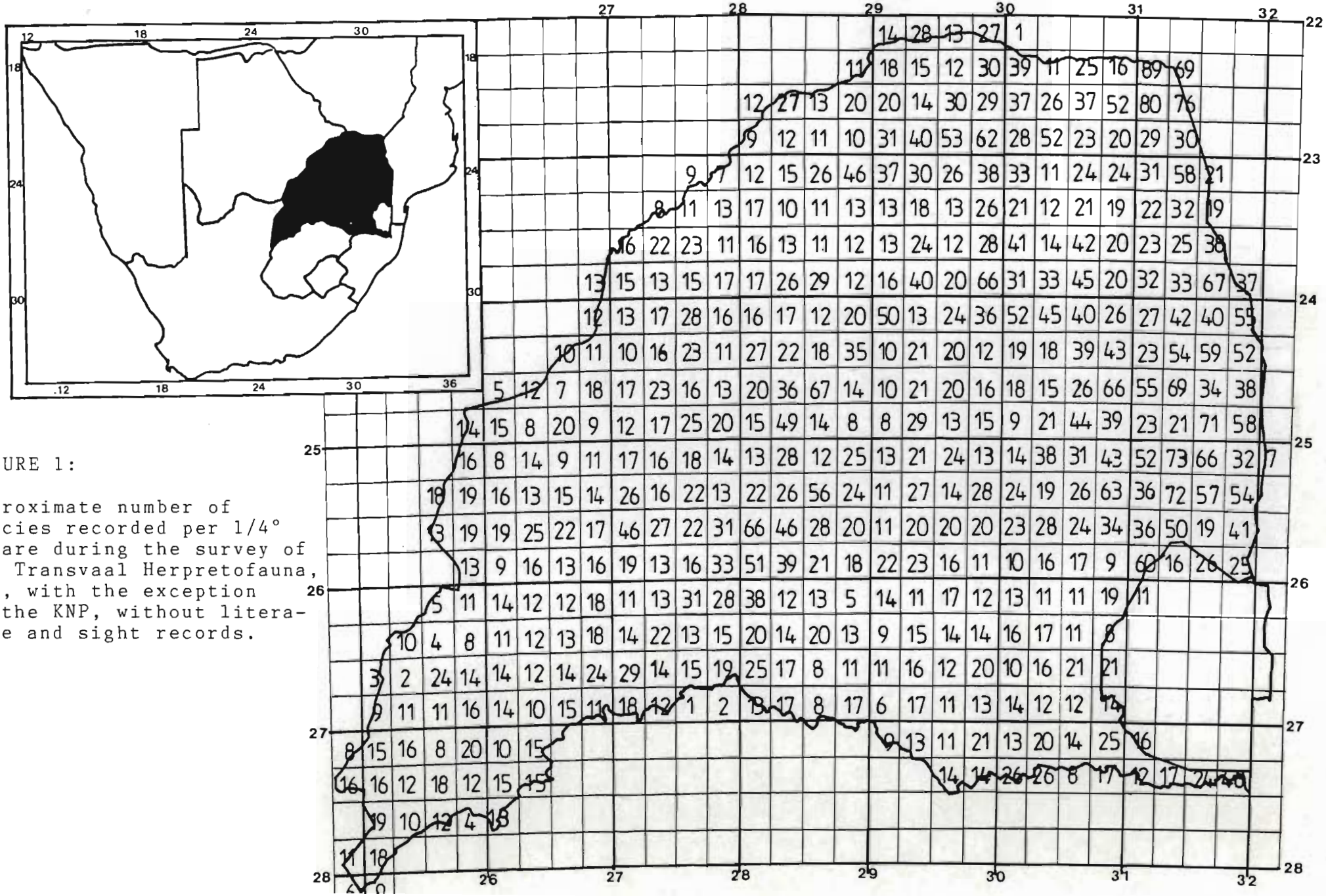


FIGURE 1:

Approximate number of species recorded per 1/4° square during the survey of the Transvaal Herpretofauna, and, with the exception of the KNP, without literature and sight records.

it contiguous with other studies of similar detail, thereby enhancing the analysis of the subregion as a whole.

Many reptile species and genera are in need of revision on a subregional basis. The study of the genus Dasypeltis (Gans, 1959) was a milestone in taxonomy, but with an increased specimen base is in need of updating to further elucidate intraspecific geographic variation which would give further insight into species and subspecies concepts. Unfortunately a work of this magnitude is not feasible here but should be considered independently. This report incorporates most literature pertaining to the Transvaal herpetofauna, subsequent to FitzSimons (1943, 1962), Poynton (1964), Wermuth & Mertens (1961) and Loveridge & Williams (1957). Apart from the type and type locality reference, it does not list the nomenclature prior to the references referred to above. Such lists and synonymies are found listed in detail in these references and are considered superfluous to this study.

The number of species and subspecies recognised in the Transvaal total 53 amphibians and 212 reptiles. Species groups pertaining to Bradypodion transvaalensis Lygodactylus ocellatus, and Pedioplanis lineoocellata were not subdivided because of an insufficient specimen base, from which to assess intra- and interspecific range.

From the following report it is evident that the alpha taxonomic phase has not been completed in the Transvaal (and apparently not in southern Africa), at the present time. A checklist of the herpetofauna of Southern Africa (Branch 1988b) indicates many new taxa some of which are currently being described. Some approaches and research,

border on the beta phase but until the alpha phase is complete such studies may be premature. Nature Conservation requirements are at the alpha level and it is of utmost importance that this level is reached so that adequate conservation measures can be considered.

It is not the purpose of this report to provide extensive management proposals at this stage but rather to present the background data following which, more indepth recommendations will be made.

Much of the Transvaal is already degraded. This is continuing at an accelerated pace. It is therefore imperative that the threats facing our flora and fauna be contained.

CHAPTER 1

DESCRIPTION OF STUDY AREA

1.1 Topography, Climate, Geology, Soils and Vegetation

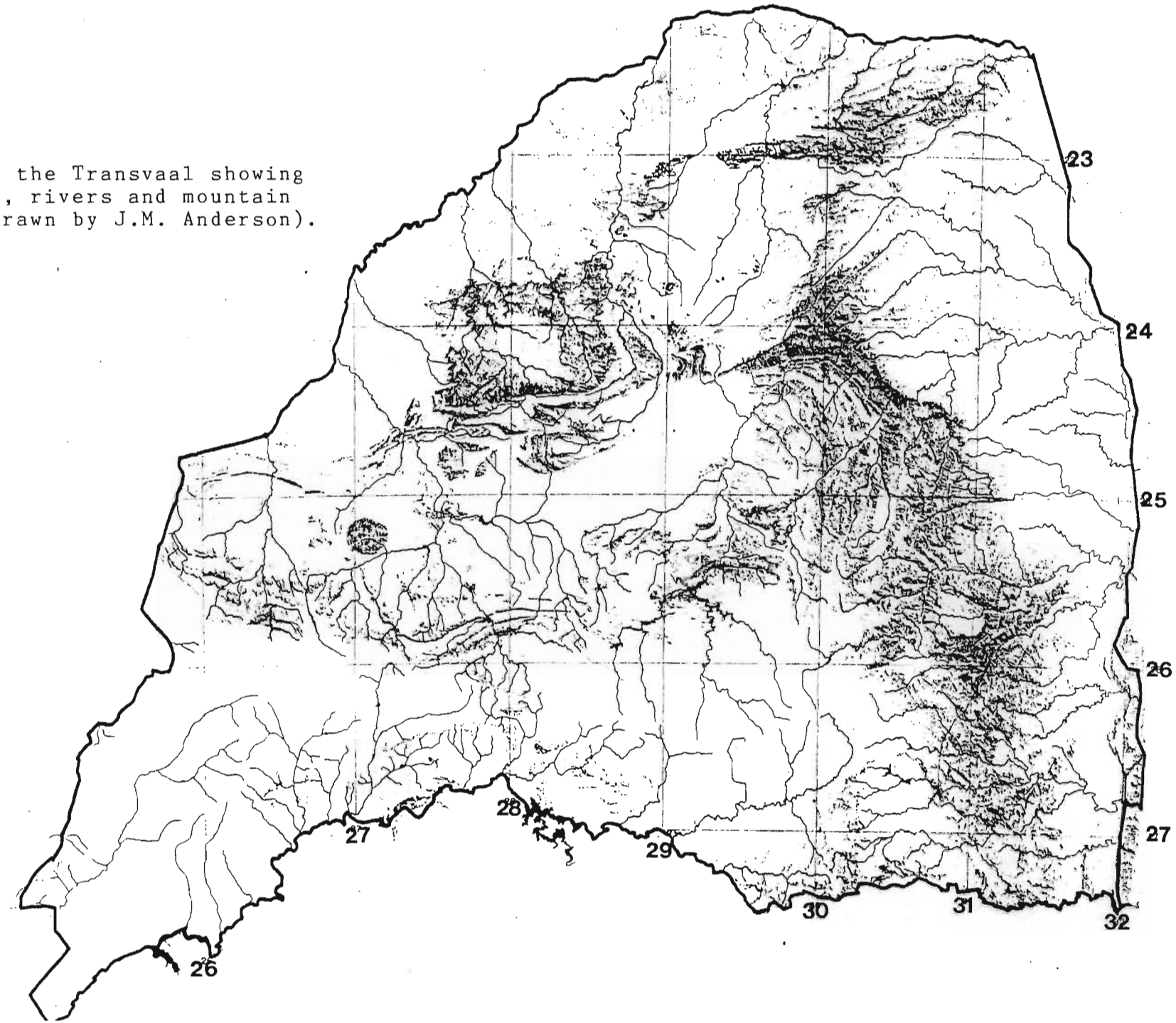
The Transvaal is, with the exception of Walvis Bay the most northern province of the Republic of South Africa. It extends from 22°14'S to 28°7'S latitude and between 24°10'E to 32°00'E longitude with an area of 262 499 sq. km. It is therefore the second largest province, encompassing approximately 23% of the land mass of South Africa. To the north it is bordered by Zimbabwe, to the east, Mozambique and Swaziland and to the west and northwest by Botswana. To the south lies the Orange Free State, in the south-east, Natal and in the southwest the northern Cape Province. This unique position coupled with habitat and climatic diversity is responsible for the diversity of fauna and flora found in the province.

Topography and Geology

The topography of the Transvaal is very diverse (Fig. 2) resulting from tectonic forces and geology upon which the climate and erosive forces have and are still promoting geomorphologic change. Much of the province consists of various steplike elevations forming plateaus with steep scarps. Broadly speaking

FIGURE 2:

Topography of the Transvaal showing major streams, rivers and mountain ranges (map drawn by J.M. Anderson).



however the lie of the land dips westward. Altitudes vary tremendously from 200 m a.s.l. in the east to 2300 m along the east-central highlands declining westwards to 1200 m and in the north-west to 600 m along the Limpopo trough.

Along the border with Mozambique are the Lebombo mountains, which are highest in Swaziland, tapering northwards at a height of 400 m until they peter out near the Shingwedzi river. To the north this range has been eroded away and what remains is covered by aeolian sands of the Mozambique plain. The Lebombos are mostly rhyolitic, in part forming large whale-backs or dwalas such as at Mananga, but elsewhere the bedrock is less exposed and scattered outcrops along the hillsides and crest form the major habitats. Deep gorges have been incised by eastward flowing rivers such as the Crocodile, Sabie and Olifants.

The lowveld is a large pediplain between the Lebombos in the east and the great escarpment in the west. It ranges in altitude from less than 200 m a.s.l. in some of the deeper gorges in the east to 600 m in the west. The terrain is almost flat, undulating gently, cut from west to east by large rivers originating in the central plateau and along the eastern scarp. Rocky outcrops are few, mostly of doleritic dykes. In the southern Lowveld large outcrops of granite are found, forming around White River and Nelspruit large whalebacks. Many of the outcrops further north and along drainage lines are schistose. At Mica, the granites

reappear, being highly decomposed and brittle. Further north, sandstone outcrops are evident. Much of the area on the crests of the hills is stony with most of the decomposed material being washed into the valleys. Occasional quartzite outcrops mostly of very low elevations occur.

The Transvaal Drakensberg escarpment extends from just south of the Soutpansberg, where the Luvuvhu, Shingwedzi and Letaba rivers are forcing back the eastern margin of the Pietersburg Plateau. It is less marked in the north with a height of 1 500 m a.s.l., possibly due to the weathering of the granites which erode relatively easily, and only becomes impressive again at Magoebaskloof. In the Wolkberg, Black Reef quartzites cap the dolomites of the Transvaal system creating a tremendous scarp over 1 800 m a.s.l. facing east, being especially striking at God's Window near Graskop and at the Duivels Kantoor where the fall to the Noord Kaap Valley is more than 600 m.

The inclusion of certain volcanic rocks in the upper Transvaal system has produced, in places, a second escarpment above the first. This is particularly evident behind Sabie where Mount Anderson and Mauchsberg rise to over 2 200 m above an intermediate platform of shale and dolomite. Further south the escarpment meets up with the Makonjwa range and disappears in the Carolina district, the quartzites having been eroded in pre-Karoo times.

Several rivers have incised or caused the escarpment to recede creating gaps which today form barriers to many species of reptiles along the escarpment. The most noteworthy is the Olifants river which has cut through the escarpment during Plio-Pleistocene times when downwarping of the coasts and upliftment of the escarpment took place. This accellerated degradation and the cutting back could have resulted in river capture (King, 1967: 225). Both the Sabi and Crocodile rivers also gouged away at the escarpment at this time forming incised valleys causing the escarpment to recede back, forming an intermediate terrace.

The highveld is a wide expanse of plateau from 1300 to 2300 m a.s.l. mostly flat to rolling grassland underlain by Karoo shales. It is bounded in the north by the Timeball hills, Daspoort ridge and Magaliesberg. In the east it extends to the escarpment, dipping gradually westwards. Various mountain ranges occur widely scattered, including the Madhlangampisi, probably a relict of the Escarpment, the quartzitic Suikerbosrand and Witwatersrand, the latter forming the watershed between the Vaal and Limpopo drainage systems. Westwards, Ventersdorp lavas have formed many outcrops particularly around Klerksdorp. Much of this area and that to the west are mostly undulating or flat grassy plains created by the dolomites. In the west, pans are common but few permanent rivers flow in this region due to seepage of water to underground reservoirs. Dolomite eyes are common in the area, some yielding large, amounts of water. Much of the south west is

underlain by alluvial gravels and calcrete. Rocky outcrops are scarce and where they occur, are of very low elevation.

To the north of the Magaliesberg, the bushveld basin extends 460 km east/west and about 240 km north/south. The general elevation is about 1100-1200 m a.s.l. but rising to greater heights in the east. The floor of the basin is mostly of quartzites and shales which are obvious along the Magaliesberg. Norites are also found in the centre forming inselbergs such as the Pyramids to the north of Pretoria. In the east the norites form concentric belts and also give rise to the Leolo mountains which reach a height of up to 1800 m a.s.l., and the Sekukuni mountains which tower above the Steelpoort river.

In the northwest the Waterberg sandstones and conglomerates and the Rooiberg felsites form parallel ranges fringing the Bushveld basin and the Waterberg Massif. To the north-east the basin is bordered by an outlier of the escarpment. The Strydpoort mountains border on the Pietersburg Plateau and are composed of Transvaal System rocks including dolomites.

The Bushveld basin is crossed by several rivers most of which have their origin on the highveld. Such rivers include the Marico, Crocodile and Olifants, the first flowing north to north westerly, the latter north to north-east. The geology of the Bushveld Igneous Complex is highly complex but provides numerous outcrops, ridges and mountains of rock formations and types which are favoured by rupicolous lizards.

The Waterberg Massif is composed of sandstone and conglomerates, rising to 1800 m in the south-west. A pronounced steep scarp extends from near Thabazimbi in the west, in a large semicircle to west of Potgietersrus. The Massif itself dips westwards. The Mogol river arises outside the massif and incises a narrow gap through the scarp to flow westwards, with its tributaries forming a wide shallow basin surrounded by a much faulted and incised rocky perimeter. The Mogol and Palala rivers exit from the massif through narrow gorges, to the flats of the Limpopo trough.

South of the Soutpansberg and reaching to the Strydpoort mountains is the Pietersburg Plateau, a flat undulating plain underlain by granites which have been heavily eroded in the past. Occasional granite inselbergs occur in the east and the west with Matlala being particularly prominent. At an altitude of 1 400 m near Pietersburg the plateau declines northwards to about 900 m. Owing to is relative aridity few perennial rivers flow from it. The Magalakwin flows north as do the Brak and the Sand rivers. The latter makes a pronounced water gap in its passage through the western Soutpansberg (King 1967).

The Soutpansberg lies east to west, reaching its highest point of 1 700 m a.s.l. at Lejume above the Waterpoort. The southern range of the Soutpansberg forms a steep scarp which continues north-eastwards to disappear in the Limpopo trough. Formed of sandstone, the Soutpansberg consists of one to four parallel ranges dipping northwards and separated by flat

bottomed valleys. The Soutpansberg is very rocky and in many places has extensive patches of scree. Rocky battlements are common along the southern range. North-facing slopes often exhibit large areas of layered bedrock.

In the west a large gap through which the Brak river flows, separates the Soutpansberg from the Blouberg and Makgabeng, both formed of Waterberg sandstone. Numerous smaller outcrops and ridges occur on the flats below, a situation which has resulted in curious biogeographical anomalies. The Blouberg rises to a height of 1 800 m a.s.l. and about 900 m above the surrounding plains.

To the north and west of these mountains, the Limpopo trough forms a broad flat plain from 60-100 km wide at altitudes of 300-600 m a.s.l., rarely interrupted by rocky outcrops. Granite outcrops are found between Messina, Tshipise and the Soutpansberg, and in the north west sandstone ridges have been carved by the elements into the most fascinating shapes. Few rivers flow through this plain, restricted in the west to the Magalakwin, Brak and Sand, all of which arise beyond the Soutpansberg and the Njelele and Nwanedzi rivers which rise in the Soutpansberg to the east. All are seasonal, and flows vary from one year to the next. The Limpopo trough may owe its origin to a continuation of the Rift Valley and came about through downfaulting (King 1967) during the late Tertiary.

Climate

The climate of the Transvaal is temperate to subtropical with pronounced seasons, manifest by variations in daylength. This varies according to latitude and is between 10,4-10,8 hrs during the winter solstice and 13,9-13,5 hours during the summer solstice as one proceeds from south to north (Ehlers s. d.).

The amount of sunshine possible varies from 75-85% in winter over most of the province, with the exception of the escarpment where mist may occur. During summer the eastern Transvaal is much more cloudy owing to the onshore flow of moist air which is forced to rise against the escarpment. The lowveld therefore may experience only 50% of possible sunshine over the period October to March. This increases westwards to in excess of 65% in the western and south-western Transvaal (Ehlers s.d.). Winters range from severe on the Highveld with a mean minimum of 0°C in July but reaching as low as -13°C, to the north-eastern Transvaal lowveld where there is a mean minimum of 8°C in midwinter whilst extremes may reach -2°C. There is a gradient in the mean lowest monthly minimum of the coldest month from -7,5% in the southern and south-eastern Transvaal to 7,5°C in the extreme north-east (Ehlers s. d.). Frost may occur over the whole province but mostly west of the Transvaal Drakensberg with varying incidence. In the south western Transvaal, frost may occur on average for a total of 10 days during May to September while the Highveld experiences on average 57-120 days

over the same period. In the Bushveld the incidence of frost is variable and usually in low lying and flat country, particularly along drainage lines. Along the escarpment the hillsides are frost free but frost may occur in the valleys and along streams, occasionally becoming quite severe. Below the escarpment in the Lowveld frost is exceptional and of low incidence. When it occurs it is usually confined to low-lying areas along drainage lines.

Snow is rare and usually confined to the south-eastern and eastern highveld, exceptionally reaching Johannesburg and Pretoria.

The Transvaal receives its rains mostly in summer from October to April. Winter precipitation is negligible although on rare occasions significant falls have been recorded. Their effect is however minimized as the vegetation is senescent at this time. Most rainfall in the Transvaal occurs in the form of thunderstorms with a high incidence of lightning. These storms are most common on the highveld where at Johannesburg they occur on average 61 days a year. Thunderstorms are usually of short but intense duration and falls may exceed 300 mm in one day. Against the escarpment orographic rain and mist predominate.

Rainfall decreases progressively westwards and to a lesser extent eastwards of the escarpment from 120 days to 50 days per annum. Along the

escarpment from Barberton to Entabeni in the Soutpansberg there are areas receiving 1000-2000 mm p.a. The highveld receives 700-800 mm, increasing in the east to 800-1000 mm p.a. This declines through the bushveld and western Transvaal to 600-700 mm, dropping to 500-600 mm in the north- and southwest (Ehlers s. d.).

The extreme southwest and northwest receive between 400-500 mm and north of the Soutpansberg only 300-400 mm falls. In the lowveld a similar reduction occurs eastwards from the escarpment although over a considerably shorter distance.

Hail occurs rarely and increases from less than once a year in the far north-eastern Transvaal to an average of six days per annum in the southern Transvaal.

Relative humidity varies according to the season but is greater along the escarpment and south-eastern lowveld. Mean relative humidity at 14h00 over the period October to March is between 50-60% along the escarpment, southern Lowveld and south-eastern highveld. This declines to below 40% in the western and southwestern Transvaal. From April to September the humidity isolines are narrower but nevertheless similar in extent, decreasing westwards from 40% along the escarpment to under 30% in the north- and southwest (Ehlers s. d.).

Soils

The great diversity of soils even on a macro association basis renders an analysis on a biogeographical basis meaningless unless sufficient soil descriptions at collection sites have been made. It is unlikely that reptiles and amphibians would confine their distributions to only one specific type. Such detailed analyses are beyond the scope of this report. Although some fossorial species are edaphically dependent, the few records available are insufficient to delineate specific soil types. Most fossorial species are found in sandy to loamy soils. Only more intensive and detailed studies will show whether any association exists.

Vegetation

The vegetation of the Transvaal is a manifestation of the soil and geology, together with the climate. Acocks (1975) recognised 21 veld types in the Transvaal. These can be broadly incorporated into five biomes based on climatic, floral and topographic considerations. These include the south west arid, the highveld, the escarpment and other mountain ranges, the bushveld and the lowveld. On a biogeographic basis, the latter two types, and incorporating the far northern Transvaal, may in fact each be subdivisions of a Woodland biome, as in many respects they are very similar. These biomes are most important in a comparison of endemic species and as indicators of evolutionary trends.

Veld types are most diverse under conditions of varied topography and this is borne out along the escarpment where east and west facing slopes differ radically from each other and from the vegetation of the crest. At least four veld types are represented along the escarpment. This is an oversimplification of the diversity of the flora of the area. Veld type 8 or north-eastern Mountain Sourveld actually consists of two important associations namely afro-montane forest of which scattered remnants are found along the escarpment and the eastern Soutpansberg, and montane grassland. The latter is highly fragmented and very little remains. Both of these habitats are important to the herpetofauna and are sites of evolutionary development (Broadley 1966c, Fourie et al 1988).

The vegetation of the Transvaal varies from highveld grassland, in the south, to bushveld in the central, southwestern and northern Transvaal. The Lowveld is also characterised by a closed to open woodland. In the western and north-western Transvaal a Grewia scrubland is found under conditions of aridity. The mountains are characterised by dry to moist open to closed woodland, and under conditions of higher rainfall afromontane forest and montane grassland, the latter in more exposed areas, where soils are more shallow and poorer.

1.2 Palaeo-environments of the Transvaal

Although insight into Transvaal palaeo-environments is still meagre, it is evident that considerable climatic fluctuations occurred in the past. How much took place in pre Pleistocene times, during the Tertiary era, is little known and fragmented on account of the limitations of C14 dating methods. The Kalahari as it is known today originated during the early Tertiary and was apparently moister than now (King 1967) but aridity had set in during the mid Tertiary. The knowledge is however insufficient to fit into a detailed chronological order. It is mostly during the last million years, from the Plio-Pleistocene to the present, that some knowledge of palaeo-environments has been acquired.

The Pleistocene in South Africa was marked by the upheaval of the subcontinent to its present plateau form. The valleys of most rivers along the steeply tilted marginal regions were dramatically deepened by the incising action of rejuvenated rivers. Apart from topographic change, the Pleistocene was marked by a series of well defined rainfall changes which can be summarised as follows (after Brain & Meester 1964):-

Present

3rd Pluvial (Gamblian Stage)
2nd Non Pluvial
2nd Pluvial (Kamesian-Kanjeran Stage)
1st Non Pluvial
1st Pluvial (Kageran Stage)

Plio-Pleistocene Boundary (1-2 million years)

Investigation of cave deposits at Sterkfontein, Makapan and Kromdraai revealed that during the 1st non-pluvial, the rainfall over much of the Transvaal was around 500 mm per annum which increased to between 1000-1125 mm during the 2nd pluvial (Brain & Meester 1964). Bond (1957) in Brain & Meester (1964) estimated that at the Khami Stone Age site the rainfall during the 3rd pluvial was also in the order of 875-1000 mm p.a. This is considerably higher than the current 625 mm and would greatly influence the vegetation. Continuity would vary with concommittant fluctuations in the faunistic complement. Brain & Meester (1964) illustrate this with the shrew genus Myosorex in which rainfall would act as an isolating mechanism.

Fluctuations in floral and faunal complements go hand in hand with fluctuations of the palaeoenvironment (Cooke 1964, Scott 1982c, 1987a, Avery 1981, 1987, Van Zinderen Bakker 1964). Scott (1987a) showed that at a late Pleistocene site in Venda, the climate vaccillated from cooler than today, approximately 12000 years BP, to like the present ca 10000 years BP, becoming much warmer about 6500 BP, and from 1500 BP much the same as it is now.

Simultaneously the vegetation in the eastern Soutpansberg ranged from open grassland and fynbos with well developed forests in ravines between 10000-12000 years BP, to more dry savanna woodland with reduced forest elements between 1000-6500 years BP. With increasing humidity these reduced forest patches expanded between 6500-1500 years BP, most of which has since been removed by human activity. This corroborates what Brain & Meester (1964) postulated, namely that the Afromontane forest would have been contiguous and more extensive allowing the free

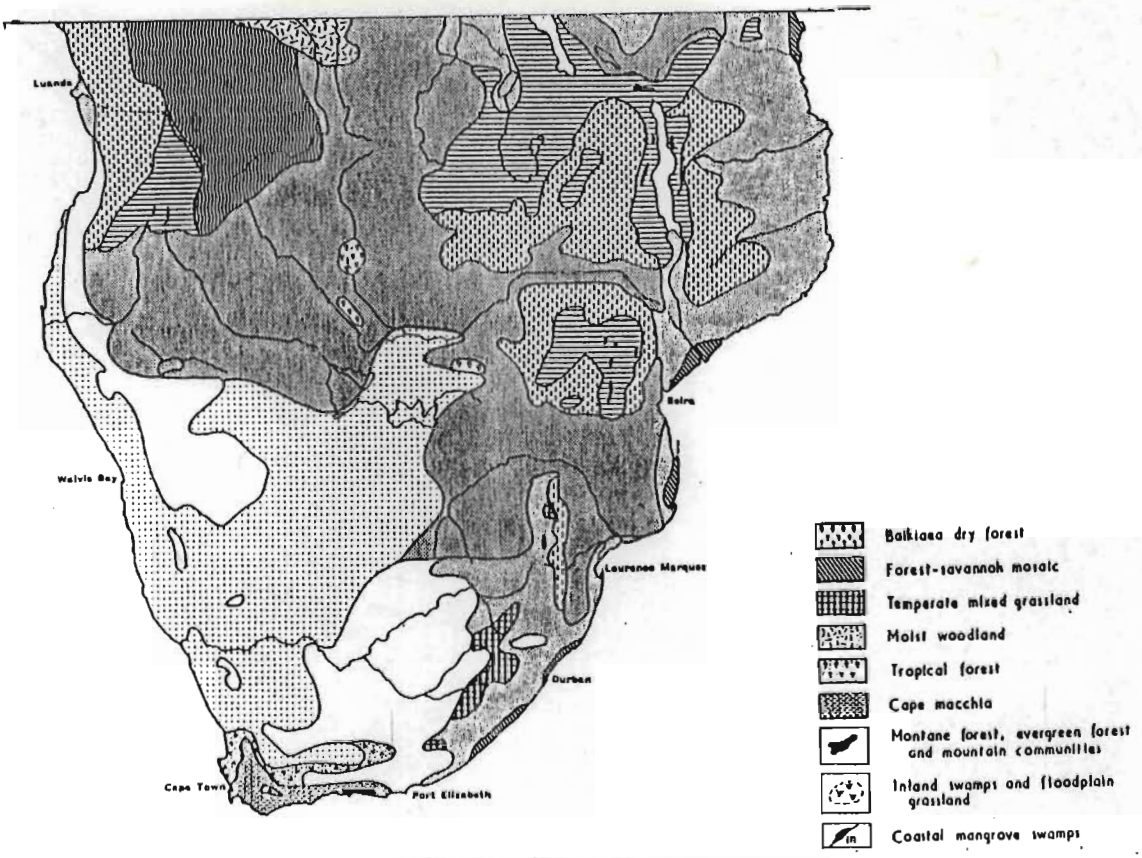
movement of arboreal and sylvicolous species. Scott (1982b) reported on palynological studies along the Moreletta stream near Pretoria. These indicated an increase in temperature and wetter conditions prior to 7300 years BP. Similar changes at Rietvlei were evident. However at circa 6000 years BP, there was a scarcity of typical bushveld tree pollen, suggesting cooler conditions than at present with the veld more open, drier and possibly more karroid. Between 6000-5220 years BP, more trees were evident including numbers of bushveld species indicating warmer, wetter conditions. In the last 1000 years, the veld was mostly bushveld and resembled present conditions with a slightly drier period 400-500 years BP.

Scott (1982c) summarised the findings of fossil pollen analyses of the late Cainozoic deposits in the Transvaal, indicating changes in temperature and moisture from different parts of the province. The resultant vegetation fluctuated from bushveld with bushveld species to more open grassland and a return to bushveld in more recent times. King (1967 p. 213) supports this with the view that the climate of central and southern Africa probably never oscillated very far from a semi- arid mean, and that landscapes under such a climatic regime may be sensitive to relatively slight changes in amount or intensity of precipitation, producing local oscillations of erosion and deposition. The Kalahari system which is mainly early Tertiary in origin (King, 1967) resulted from a deposition of sand, both alluvial as well as aeolian, 15-60 m deep, in a depression extending from the Congo to the northern Cape Province. During Pleistocene interpluvials, sands of the Kalahari were wind distributed on more than one occasion, reaching as far as the central Transvaal (King, 1967).

Simultaneously, species previously confined to Kalahari sand conditions were able to expand their ranges sometimes as far as the eastern Transvaal, meeting up with sands derived from coastal alluvium. Subsequent pluvials washed away the sand from more exposed places only to be re-established during another interpluvial. However it is difficult to determine the extent and chronology of successive sand invasions in the Transvaal. Clark (1950) and Bond (1946, 1957) in Cooke (1964) showed that successive invasions of Kalahari type sands occurred at both the Victoria Falls and elsewhere in Zimbabwe. Remnants of these sands have been documented in South Africa and were no doubt responsible for isolating herpetofaunal populations particularly of rupicolous species whose habitats were cut off when intervening lower areas were filled with sand (Broadley 1978).

However, due to changes in atmospheric circulation during the Pleistocene, it is difficult to predict the sequences. Expansion and contraction of the polar ice caps probably led to equatorward and poleward shifts of the major climatic belts during glacial and interglacial periods, the extent of which are not known (Cooke 1964) but which could have affected temperatures by as much as 4°C either way.

Cooke (1964) compiled hypothetical vegetation maps based on deviations of the rainfall from the present (Fig. 3). He concludes by saying that "the Pleistocene climatic changes must have had a considerable impact on the vegetation of the region and that such environmental changes would influence all the biological elements in one way or another. It must be expected that migrations of animals occurred, carrying with them their parasites and disease organisms, and also that particular communities may have remained isolated in favourable



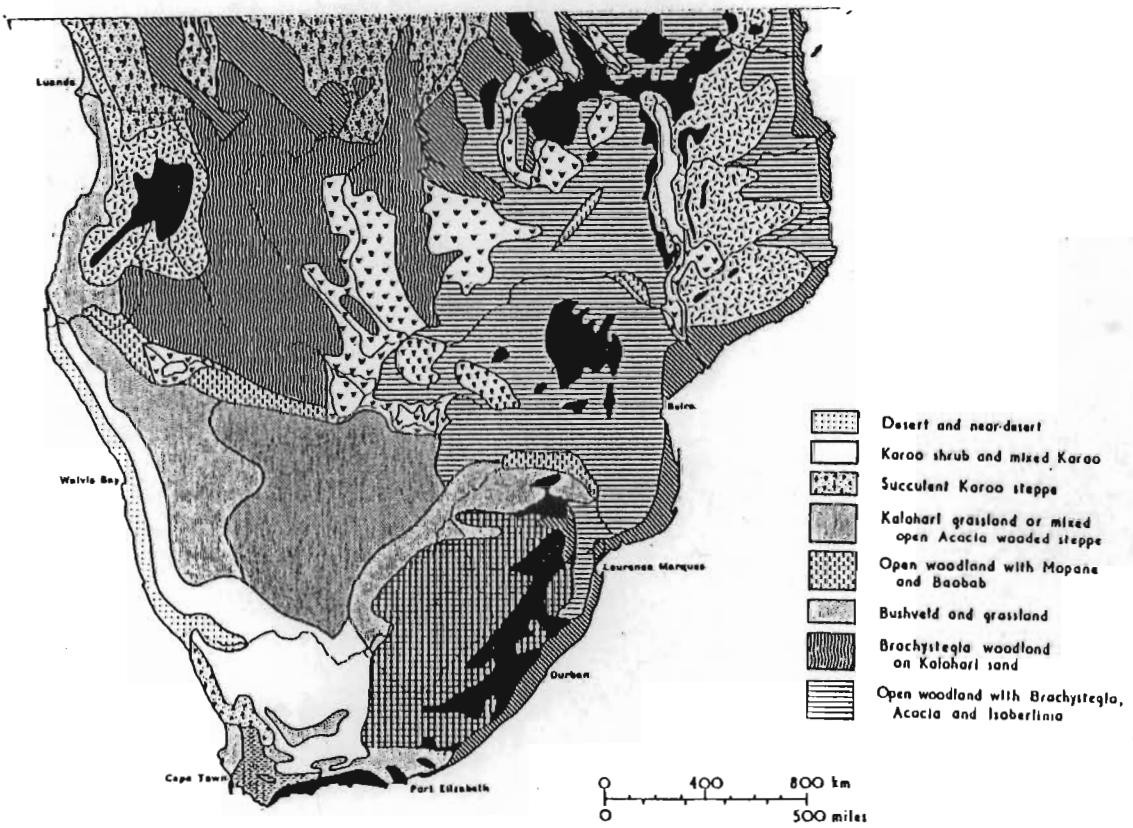


FIGURE 3:

Hypothetical vegetation of Southern Africa. A. At 50-60% and B. At 140-150% of present rainfall (after Cooke 1964).

oases while their kin moved elsewhere. At times barriers may have developed to cut off sections of a populations from their fellows, or changes may have occurred too drastic to allow the survival of narrowly adapted species".

Although Pleistocene climates vaccillated considerably with concomittant changes in the extent of vegetation types, many distributions of the herpetofauna were established prior to the Pleistocene at a time when the Limpopo depression with its mostly arid climate was not a barrier to Cape Temperate species. The fact that many tree species including Ilex mitis, Rapanea melanophloeos, Prunus africana and Hypericum revolutun occur from Ethiopia to the Cape Province indicates a period of continuity during which the species established themselves throughout the high lying eastern escarpment of Africa (White 1978). From the mid-Cretaceous until the mid-Tertiary over a time span of about 80 million years incorporating the Miocene and much of the Pliocene, the surface of Africa was undergoing planation by the forces of erosion. This created a vast pediplain in southern Africa with a concommittant retreat of the eastern scarp westwards. The marginal down-flexing of the coastal land surfaces provided a terminal date for the great planation. The Limpopo depression owes its existance to this period, about 7-15 million years ago prior to the crosswarping of the Kalahari-Zimbabwe axis which diverted the lower Okavango river from the Limpopo river to the Zambesi drainage system, thereby curtailing the strong erosive pressures which gave rise to this trough.

This would indicate the tremendous age of species which were already present at this time, as it is highly unlikely that the climate and other conditions were favourable for the movement of temperate species during the Pleistocene across the inhospitalbe Limpopo trough.

CHAPTER 2

METHODS AND MATERIALS

This study is based primarily on specimens collected in the Transvaal during the period 1978 to 1985 and those housed in the Transvaal Museum (TM). Field trips were planned using 1:250 000 topocadastral maps of the Transvaal, (Government Printer, Pretoria). Actual fieldwork was conducted on a 1/4° x 1/4° basis which approximated the 1:50 000 topocadastral maps (Government Printer, Pretoria). As there are 448 such maps representing the Transvaal or part thereof, it was only possible to spend one day in the area represented by each map. In this time as many species of the herpetofauna as possible were collected. Representatives of all major topographic features were investigated as time permitted.

Material was mainly collected over the period mid September to mid May, during which most reptiles and amphibians were active (Jacobsen 1982a). Specimens were collected from as many habitats as was possible during the period of a day. Usually three, rarely four collectors systematically combed an area, looking for free running specimens, in moribund termitaria, opening rock crevices, turning over rocks and logs and investigating holes in the ground and in trees.

In addition a 100 m trapline, using ten funnel traps separated by glass fibre 10 m x 30 cm drift fences was placed at the junction of four 1/4° squares. This was left in situ for four days while each of the 1/4° squares was investigated as described above. This was designed to assist in the capture of species not or poorly collected using active search techniques, such as nocturnal species or those active after a shower of rain.

Usually only a representative specimen of each species was collected from a 1/4° square. Where evidence of taxonomic deviations existed up to 10 specimens were collected from a square. All specimens were killed with ether at camp, with the exception of those killed during collecting. Measurements were taken from freshly killed specimens. Specimens were fixed in 4% formalin and preserved in 70% ethanol. Relevant information on each specimen was recorded on a field data sheet and on a tag tied to the specimen. Later this data was transcribed onto printed cards for easy filing and reference.

Material examined during this survey comprises 11 914 lizards, 138 amphisbaenians, 5 985 snakes, 4 372 amphibians and 271 tortoises and terrapins, a total of 22 680 specimens. Additional material of some species from the Kruger National Park, the National Museums of Zimbabwe and the South African Museum were examined to clarify peculiar anomalies. The following abbreviations of these institutions were used in the text:-

AJL ..... A.J. Lambiris Collection, Pietermaritzburg.

KNP ..... Kruger National Park, Skukuza.

NMZB ..... National Museums of Zimbabwe.

SAM ..... South African Museum, Cape Town

Records from the available literature were incorporated as far as possible. In cases of sibling species, literature records were omitted where the likelihood of overlap existed. Such species include Agama aculeata armata, Nucras taeniolata holubii, Nucras ornata and others.

In the case of the Kruger National Park, literature localities have been plotted on a 1/4° basis using an overlay of maps in Pienaar et al (1976, 1983), and the localities have been omitted from the gazetteer, although included in the species text. Unpublished locality data were supplied by Dr. D.G. Broadley, Curator of Herpetology, National Museums of Zimbabwe (NMZB) and A.J. Lambiris of Pietermaritzburg hereafter referred to as (AJL). All localities were alphabetically listed in the gazetteer together with the grid references. Farm names and numbers were obtained from the 1:50 000 maps and checked against an "Alphabetical list of farms in the Province of Transvaal" compiled by the Surveyor-General's Office, Pretoria (1960). Many historical and obscure place names and grid references were obtained from Leistner & Morris (1976) as well as from gazetteers in FitzSimons (1943, 1962). The distribution maps were compiled from these sources and the 1:250 000 and 1:50 000 topographical maps (Government Printer, Pretoria). While a detailed description of most species is available in the literature, those of the lizards were in many instances compiled from a limited specimen base and have therefore, where possible been updated. In the case of the other reptiles and amphibians, a brief diagnosis was incorporated with emphasis on Transvaal populations, as this in many instances differed from the written account. Unless otherwise stated, the range of character variation given in the text refers to the study area.

Measurements: Snout to vent length (SVL) was measured using a steel tape, from the tip of the snout to the cloaca. Tail length (T) represented the distance from cloaca to tail tip. Egg measurements were made using a sliding vernier caliper. Regenerated tails were

recorded. Mass was obtained using three Pesola Spring Balances, ranging from 0,1 to 10 g, 1 to 100 g and 10 to 1 000 g respectively. Specimens in excess of 1 000 g were weighed on a Salter dial scale of up to 10 kg capacity.

Scale counts of lizards, snakes and amphisbaenians were taken as follows:

Lizards: Longitudinal scale rows were counted at a point midway between armpit and groin. Dorsal scales were counted from behind the occipitals to above the cloaca. Similarly ventrals were counted from the collar to the preanal plates and longitudinal rows in some species from lateral fold to lateral fold. Subdigital lamellae were counted along the 4th toe unless stated otherwise, from the junction with the adjacent toe to the tip. Other counts included scales between nostril and anterior margin of eye, from posterior margin of eye to anterior border of earhole in *Afroedura* and number of granules between supraoculars and subpraciliaries in *Nucras*.

Although Pasteur (1964) and Broadley (1966c, 1977b) have found subcaudal and supracaudal scale arrangements useful in distinguishing between species and subspecies, I have not used this method, due to the large number of truncated or regenerated tails. These tend to restrict the usefulness of this technique.

Snakes: Longitudinal rows were counted transversely at a point midway between snout and vent. No additional transverse counts were made as this has already been documented, (Broadley 1966, 1983). In some snakes it was necessary to count the median dorsal scales from occipitals to tail tip. Ventrals were counted from the

first scale wider than long as most previous counts used this as a criterion. Provided an adequate specimen number is available it is not advantageous to use the Dowling System (Dowling & Duellman 1974-78), as subjectivity will be compensated for.

Subcaudal scales were counted from the first pair in median contact behind the cloaca and excluded the terminal spine.

Amphisbaenians: The number of scales in an annulus were counted at a point midway between snout and vent. Differentiation between the dorsal and ventral scales on a midbody annulus were counted in some species. The number of annuli between the occiput and tail tip and number of annuli on the tail were also meaningful scale counts made.

Tortoises and Terrapins: The chelonians were assessed according to carapacial and plastron scutes present. Notes of other morphological characters such as buttock tubercles, numbers of toes on fore and hind feet as well as beak morphology were incorporated.

Amphibians: Various measurements pertaining to physical characters such as the degree of webbing, the number of digits of 4th toe free of webbing, distance of nostril from eye and snout tip and presence or absence of dorsal skin folds were all assessed in the identification of specimens.

Colour: Where differences in colour were observed between individuals of species, these were noted. Such differences were especially important in some genera and species complexes.

Ecology: Some ecological data were collected for reptiles and amphibians during the period of fieldwork. Elsewhere details from published accounts have been incorporated, particularly where differences were observed. Most specimens were sexed, and data on clutch and egg size, and breeding season, were obtained where possible.

Localities were listed mostly under two, rarely three headings, including Distribution in the Transvaal, Literature Records and more rarely Sight Records. Under the former are listed the localities of all specimens examined, while the latter two categories are self explanatory. In the case of literature records all records even those which are very vague such as "Transvaal", "Letaba river" or Pietersburg district have been included. Sight records have been incorporated only for a few species where additional insight into distribution patterns and conservation are available to clarify a situation. Distribution maps were compiled from localities of specimens examined. A solid circle was used to denote such localities. A hollow circle is used to indicate literature and sight records. Localities were plotted on a quarter degree square basis in accordance with current accepted practices (FitzSimons 1962, Broadley 1983, Auerbach 1987, Poynton 1964).

CHAPTER 3

Systematics

3.1 Preface

The approach of the author concurs largely with that of Poynton (1964) and Mayr (1969). A concept of a biological species, reproductively isolated, has been used throughout this study. This tends to conflict with the view of Paterson (1982, 1985) who argues for a Recognition concept, in which species react only on the ability to recognise conspecifics, through a specific mate recognition system or SMRS. He further states that at the hub of the speciation process is the acquisition of a mate and a situation of homeostatis, which in a stable environment is maintained. He maintains that for speciation to take place, the species must be subjected to a pronounced habitat change "such as a flock of birds being blown out to sea onto an island on which their normal habitat is not to be found". This will initiate the process of selection. However this method appears to be too haphazard and a sink or swim alternative not of sufficient frequency to allow for the great degree of speciation evident in some species groups. Although the incidence of hybridization is manifest in several species, it is still more the exception than the rule. In some instances it may be a reflection of our inability to recognise and define specific morphological entities. Nelson & Platnick (1981) have defined a species as "simply the smallest detected samples of self perpetuating organisms that have unique sets of

characters". While this may be, it can be argued that this would make species out of subspecies. Even varieties and ecotypes have unique sets of characters and are self perpetuating. This remains therefore a nebulous definition and is not accepted in this report.

Reproductive isolation can be achieved in many ways including behaviourally, morphologically, spatially and ecologically, all of which are interlinked. Such isolation must in most instances have been achieved when related groups were sympatric or parapatric but still in contact at the fringes of their distribution. The resultant selection pressures favoured those individuals which remained reproductively isolated. Such isolation being maintained by call, body language, colour morphology and habitat specificity as well as the adaptive capability of the species to changing environmental circumstances. While reptiles are largely incapable of producing sounds (with the exception of many of the Gekkonidae) the amphibians have refined the use of sound and the mating calls of males are an excellent taxonomic aid even among species which are very difficult to separate morphologically and which may be sympatric. However as with most other taxonomic characters, calls may vary geographically and require caution in their interpretation. It also remains to be seen whether such geographic variation may not represent differences on a subspecific level.

Various morphological attributes have been used to separate species including squamation, osteology, body proportions and other physical atributes, dentition and hemipenal morphology. All of these

attributes may vary between immatures and adults and caution should be expressed when evaluating samples largely differing in ontogenetic development. Why should morphological differences exist between species if not for specific mate recognition and reproductive isolation? However no apparent advantage is incurred by having 20 or 25 scales at midbody. Yet on such definitions are species created, as such characters are quantifiable and remove problems of subjectivity. Yet it is likely that subjectivity was the reason for examining a specimen in greater detail. It is often easier to perceive differences than it is to quantify them. This is especially so of sibling species. Mayr (1969) has shown how widespread such entities are, but because of the lack of recognisable morphological characters, are often ignored or at best relegated to subspecies level, particularly if they are allopatric. Such perceptions are often supported by behavioural and ecological data. Despite such support it may still be difficult to find sufficient quantifiable differences. In such cases solutions may be found through the quantification of small differences each of which may not be sufficient to justify specific or even subspecific status but when combined in a morphometric or character analysis may confirm what the eye can see. Such statistical circumscription is essential from the viewpoint of cladists, yet without a traditional approach in which a subjective assessment of a specimen is made the cladists would have difficulty in coping, possibly resulting in the lumping of forms. It must also be considered that taxonomy is a tool to separate individuals which have differing attributes and although species are

real units, they are meaningless unless they can be defined by the field worker.

Colour and colour pattern have been a largely neglected morphological character among taxonomists. This is no doubt the result of the bleaching of preserved specimens and the resultant inability to reconstruct their appearance unless a detailed description of freshly dead or live specimen is available. The colours of many species were erroneously deduced from descriptions in older documentation, thereby making it difficult to compare to living specimens. Colour has perhaps not taken its rightful place in taxonomy and is usually omitted from keys. Like other morphological attributes colour also varies intraspecifically and ontogenetically. However colour where it reflects sexual dimorphism has, as with other morphological attributes come about through selection and is part of the specific mate recognition process. It is therefore of cardinal importance in decisions reflecting specific or subspecific status. Specific colours and their location, as well as morphological appearances and attitude, elicit specific responses from female and male conspecifics. This reflects a greater value of colour under these circumstances than number of scales at midbody.

The genera Bradypodion and Platysaurus are examples of such systems in which colour is important. It is therefore likely that what are currently regarded as different demes are in fact different species and not subspecies despite allopatry. In the case of Bradypodion, two colour patterns predominate in the Transvaal, one with two variants and the other with

six. In the latter case it is difficult to decide at what taxonomic level these populations are. What significance can be attached to a mauve eyelid as opposed to a black and yellow or a blue one? Being a focal point of interest, it may be great but such answers can only be found once indepth behavioural studies indicate which colours elicit responses which influence specific mate recognition.

Biochemical taxonomy is being increasingly used to distinguish between demes, phena and taxa in order to determine their true taxonomic and evolutionary status. While such means are invaluable to morphological taxonomy, it is not an end in itself and is also subject to geographical and intraspecific variation and should be based on an adequate sample size. In my experience the techniques of interpretation of the results are not sufficiently sophisticated to allow an objective assessment to be made. Such analyses should go hand in hand with morphometric data as each individual is phenotypically distinct.

Drewes (1985) in an assessment of Kassina wealii used starch gel electrophoresis to support a claim of paraphyly in the genus Kassina. Small sample size and geographic variation were evident, and a lack of comparative material of Kassina senegalensis sympatric to K. wealii were some of the drawbacks. In this instance I refer to Poynton (1964: 13 & 14) in his discussion of Laurent's splitting of Arthroleptis into three genera on the basis of osteological differences. I refer in particular to the following sentences (p. 14), "Now all the forms concerned adhere very closely to a highly distinctive external facies, affecting details in the colour pattern, skin structures and general

habitus. The peculiar and highly distinctive external features indicate a genetic similarity in a set of features which are amongst the most revealing in the expression of the genotype". With this expression I fully agree.

In this report the lowest taxonomic unit used is the subspecies. Although there are many taxonomists opposed to this approach, referring to such phena as merely representing intraspecific variation. However subspecific status serves to identify local differences in morphology, behaviour and ecology which are consistant and recognisable. Such definable units could be species which on account of our limitations in understanding and defining species attributes have, so to speak, to be placed on the shelf until concepts are clarified. They could also be manifestations of ecotypes. Subspecies can be recognised by exhibiting intergrades or hybrids at the contact zone with other closely related forms and are therefore not reproductively isolated. Problems however arise where allopatric species are morphologically poorly defined. Mayr (1969: 196) gives a detailed account of the pitfalls of the options and concludes that "It is preferable for various reasons to treat allopatric populations of doubtful rank as subspecies". Poynton (1964) states that subspecific status be accorded to allopatric forms only if morphological differences are trival and ecological differences virtually non-existant. Subsequently, Poynton & Broadley (1985a) have justified the retention of the subspecies concept by recognising the phylogenetic and biogeographical affinities of relict populations of species and those reflecting units of apparent stepwise clines. However, what

pressures are there on a deme, widely separated from any other deme of the same species, all rupicolous, to alter its appearance, physiology, behaviour or ecology? This is the crux of the matter. Using Transvaal forms of Afroedura, what significance can be placed on the presence or absence of an internasal, keeled dorsal scales, smooth dorsal scales, numbers of femoral pores (present in males only) and a verticillate or non-verticillate tail. All species are exclusively rupicolous, becoming clumsy on the ground. They have a low mobility and resistance to crossing open ground. Each population is restricted in distribution. Only two out of the 17 forms in the Transvaal are sympatric; all others appear allopatric with some possibly being parapatric. According to Mayr (1969) such demes will be subspecies. However adult size varies from one deme to the next mostly without continuity. Can this justify specific status? In my opinion it does.

Paterson (1985) viewed allopatry as essential to speciation, indicating that selection pressures operated better in total isolation. While this may occur, it is also a fact that selection pressures are probably greatest on the periphery of distributions, as this is the interface between the adaptive ability of a species and a changing environment. The greatest fluctuations in environmental conditions operate on the adaptive ability of the species in such situations. Allopatric species may simply reflect a final phase of a continuum which extends from the centre of the distribution of a species to the periphery and beyond, as exhibited by a cline. The fact that some allopatric species exhibit remarkably low degrees of

differentiation are indicative of (a) recent isolation or (b) a very slow rate of change. It is therefore difficult to determine which is more important. Obviously this varies from species to species.

Species development depends on the speed at which a species can adapt to a changing environment or occupy a changing habitat. Individuals of species on the fringes of populations would be prone to isolation in a changing or fluctuating environment because of the contraction and fragmenting of available habitat. Ultimately, if the original habitat totally disappears, the survival of the population will depend on the ability of its individuals to exist in the replacement habitat (Kemp, 1985).

What is evident from the preceding, is that unless all variables are taken into account, any taxonomic system cannot hope to avoid creating conflict amongst taxonomists. Poynton (1985a) has pointed out the discord amongst followers of various phylogenetic viewpoints but shares the view that all approaches are interlinked with each other, each one representing emphasis of biological attributes, processes and objects.

3.2 KEY TO THE REPTILIA OF THE TRANSVAAL

Key to the Orders and Suborders

1. Body encased by a bony shell consisting of a carapace and plastron 2

   Order Chelonii

   Body not enclosed in a bony shell 3

2.	Head withdrawn posteriorly into the shell, hiding the neck	Suborder Cryptodira (Family Testudinidae)
	Head withdrawn laterally into shell leaving neck exposed	Suborder Pleurodira (Family Pelomedusidae)
3.	Anal opening longitudinal	Order Crocodylia
	Anal opening transverse	4
		Order Squamata
4.	Body with or without limbs, covered with scales or granules which do not form regular rings or annuli from pectoral region to tip of tail	5
	Body mostly limbless and covered with regular rings of skin or annuli from pectoral region to tip of tail	Suborder Amphisbaenia
5.	Limbless; no moveable eyelid and with few exceptions, the median ventral scale row is much broader than deep. Lower jaw loosely connected by a nodule of cartilage or an elastic ligament	Suborder Serpentes
	Usually limbed and with few exceptions moveable eyelids. Median ventral scales similar in size to surrounding rows. Jaw rigidly attached anteriorly	Suborder Sauria

3.3 Key to the families and genera of the Reptilia

Order Squamata

Suborder Sauria (Lacertilia)

Key to the Families

1. Top head covered with granular or small irregularly arranged scales 2
   Top of head covered by a regular arrangement of enlarged head shields 5

2. Eyelids immobile with few exceptions being unable to close the eyes ..... Gekkonidae
   Eyelids mostly moveable, covering the eye 3

3. Head strongly triangular, much larger than neck. Dorsal scales keeled and imbricate; tongue short and broad ..... Agamidae
   Head not as above; dorsal scales smooth to granular and juxtaposed; tongue long and forked to elongate and clubshaped 4

4. Digits opposed or zygodactylus, adapted for an arboreal existance; tongue extensively eversible and club-shaped ..... Chamaeleonidae
   Digits separate, more or less plantigrade; tongue relatively long and forked at the tip ..... Varanidae

5. Dorsal scales mostly smooth to moderately keeled and imbricate; femoral pores absent ..... Scincidae
   Dorsal scales strongly keeled, juxtaposed to imbricate or granular, frequently in regular transversed rows. Femoral pores usually present 6

6. A lateral granular fold present
and/or limbs vestigial ..... Cordylidae
No lateral granular fold; limbs well
developed ..... Lacertidae

Family Gekkonidae

A varied family with members characterised by the immobile eyelids and mostly granular dorsal lepidosis. Both temporal and postorbital arcades are absent. The teeth are pleurodont and the tongue fleshy, broad and protrusible. The digits are frequently expanded terminally and possess adhesive lamellae. Many species have claws on the terminal phalanges. A very large family distributed throughout the warmer regions of the world. Several species are almost cosmopolitan as a result of their ability to adapt to changing circumstances and inadvertently using man made transport to spread to suitable habitats and climates in other parts of the world. There are 13 genera in South Africa (Branch 1988b) of which seven occur in the Transvaal.

Key to the Transvaal genera.

Family Gekkonidae

1. Digits not dilated and without adhesive lamellae below ..... *Ptenopus* (*P. garrulus*)
   Digits usually dilated distally and with adhesive lamellae below 2

2. Digits short and with a well developed terminal claw 3
   Digits clawless or with a minute inconspicuous claw 6

3. Digits with a long series of undivided lamellae below ..... *Homopholis*
   Digits with paired adhesive lamellae at the tip 4

4. Lamellae at distal digit joint in two or three pairs and obovate in profile ..... Afroedura
   Lamellae in more than three pairs distally and lanceolate to ovate in profile 5

5. Pupil of eye round; thumb or inner digit considerably reduced; no enlarged tubercles on body ..... Lygodactylus
   Pupil of eye vertical; no reduction of digits and enlarged tubercles scattered on body or forming segments on tail ..... Hemidactylus

6. Two transverse adhesive lamellae under toes distally ..... Colopus (C. wahlbergi)
   Three or more transverse lamellae beneath toe tips ..... Pachydactylus

Family Agamidae

South African forms tend to have very distinct more or less triangular heads, well developed limbs and short to moderately long tails. In the skull both temporal and postorbital arcades are present. The teeth tend to be differentiated into 'incisor', 'canine' and 'molar' types those anteriorly are pleurodont and posteriorly acrodont. The tongue is broad and not protrusible. The agamids are poorly represnted in South Africa with a single genus ..... Agama.

Family Chamaeleonidae

A group of highly specialised lizards essentially arboreal although a few species have re-descended to a terrestrial way of life in more recent times. These lizards are characterised by the rotating eyes which are enclosed by the upper and lower eyelids leaving only a small aperture. The teeth are acrodont and the tongue long and distensible using the action of the hyoid bone. The body is laterally compressed and the feet have digits opposed in groups of two and three for grasping. The tail is prehensile. Both live bearing (ovoviviparity) and oviparity occur in the family. There is little concensus among taxonomists as to the number of genera represented in the Chamaeleonidae. For instance Webb et al (1978) only recognise two genera while Hillenius (1986) recognises three. Southern African taxonomists have different views regarding the number of genera as opposed to taxonomists from the northern hemsphere. Raw (1976) distinguishes Microsaura (= Bradypodion) from Chamaeleo a move which is not generally accepted elsewhere but which I feel has decided merit in bringing together similar forms mostly South African but also including species from tropical Africa. This approach is followed here.

Key to the Transvaal genera.

Family Chamaeleonidae

1. Parietal narrow not roofing over temporal region of head and without lateral processes; Lungs with elongated sacs; gular crest simple; Occipital lobes mostly present ..... Chamaeleo
   Parietal broad covering large part of tempo-

ral region, sending out lateral processes; lungs simple without sacs; gular crest usually comprised of scaly lobes; occipital lobes absent ..... Bradypodion (B. transvaalensis)

Family Scincidae

A very varied and diversified group of lizards usually with stout cylindrical bodies. Limb reduction is particularly prevalent in this family, exhibiting the range and combinations possible. The smooth overlapping scales are supported by osteoderms. The skull is strong and shows various modifications. The temporal arcade is present but may be reduced, and the postorbital is usually absent. The premaxillae are separate. Teeth are pleurodont and the tongue is short, broad and distensible. Circumtropical in distribution they exhibit a great range of adaptations from fossorial to arboreal. There are seven genera in South Africa all of which occur in the Transvaal.

Key to the Transvaal genera.

1. Limbless, tails very short and rounded at the apex 2
   Limbs present and in many instances in various stages of degeneration. If limbless, tail elongate, as long as or longer than SVL. Tail tapered ending in a narrow tip 4

2. Eye covered by an elongate moveable eyelid; 3-4 supraciliaries ..... Acontias
Eye covered by an immovable lower eyelid or eyelid absent; Supraciliaries 1 or 2 3

3. Lower eyelid immobile, oval and transparent; 2 supraciliaries present ..... Acontophiops
Eyes covered by head shields and only discernible as dark spots; Supraciliaries 1-2 ..... Typhlosaurus

4. Eyelids immovable, the lower one with a large transparent disc or brille which completely covers the eye; limbs short but pentadactyle ..... Panaspis
Eyelids movable with or without a transparent disc or brille; limbs well developed to reduced, or totally absent 5

5. Lower eyelid scaly to more or less transparent; limbs short to totally absent 6
Lower eyelid with a transparant brille; limbs well developed; dorsal scales usually keeled, rarely smooth ..... Mabuya

6. Nostril well separated from rostral, pierced between 2 or 3 nasals; prefrontals and frontoparietals usually present ..... Lygosoma
Nostril pierced between rostral and a small nasal or between rostral, nasals and first UL; limbs reduced or absent; feet pentadactyle to monodactyle; prefrontals and frontoparietals absent or if present, very small ..... Scelotes

Family Cordylidae

A peculiarly variable family with some species covered by a subimbricate osteodermal armour (*Gerrhosaurus*; *Zonosaurus*, *Tetradactylus* and *Pseudolychas*) supporting the epidermal scales. In others the body and the tail in particular, are heavily armoured with spinose scales (*Cordylus*, *Chamaesaura*) while in others such as *Platysaurus* and *Pseudocordylus*, the dorsum is mostly granular. Temporal and postorbital arcades are present and the supratemporal fossa is covered. Teeth are pleurodont and the tongue is of variable length and not retractile. This family is African being found in most areas south of the Sahara including two genera exclusive to Madagascar and the Comores. Six genera occur in Africa with most forms centred on the south. All six genera are present in the Transvaal.

Key to the Transvaal genera.

1. Limbs well developed; body cylindrical to flattened and not serpentiform 2
   Limbs poorly developed to vestigial; body serpentiform with an excessively long tail 5

2. Dorsum covered with transverse rows of square subimbricate scales supported by osteoderms 3
   Dorsum covered in granular scales without osteoderms 4

3. Tail as long as to a little longer than SVL and spinose; frontoparietals present ..... *Cordylus*
   Tail much longer than SVL and non-spinose; frontoparietals absent ..... *Gerrhosaurus*

4. Head and body very depressed; granular scales mostly homogeneous; tail mostly non-spinose ..... Platysaurus
   Head and body moderately depressed; dorsal granules heterogeneous; tail spinose ..... Pseudocordylus

5. Ventrals smooth and distinct from dorsals; a granular lateral fold present ..... Tetradactylus
   Ventrals keeled and similar to dorsals; no lateral granular fold ..... Chamaesaura

Family Lacertidae

"True" lizards, the lacertids are typified by having a head distinct from the neck while the body is covered in small to granular, juxtaposed to subimbricate or imbricate scales, those on the head having osteoderms. The temporal and postorbital arcades are present but the temporal fossa is reduced and covered by the postfrontal. The premaxillary bones are fused. The teeth are pleurodont and the tongue long and forked. Little limb reduction is evident and most species have long tails and are capable of moving about at considerable speed. Mostly terrestrial, some have become rupicolous while two forms are arboreal. The family is restricted to the Palearctic, Oriental and Ethiopian regions being absent from Madagascar. There are about 20 genera (Webb et al 1978) of which seven occur in South Africa and five in the Transvaal. Szczerbak (1989) is of the opinion that the genus Eremias is of polyphyletic origin and considered that African species developed autonomously to those of Asia. This has been subsequently accepted by

Branch (1988b). A further subdivision of the genus Mesalina into the northern and eastern Mesalina sensu Szczerbak (1989) and the erection of the subgenus Pedioplanis Fitzinger to generic level for Southern African material was proposed (Balleto, 1968 in Mayer, 1989). This concept is herewith adhered to, particularly when it is evident that the genera are separated by a broad tract in central Africa in which other genera are to be found.

The retention of Lacerta Linnaeus for two species of lacertids from the mountains of South Africa is being investigated (Branch pers. comm.) as this represents a similar situation to that previously discussed. It is likely that these forms are closely related to the South African genus Tropidosaura Fitzinger. However until evidence of this is presented, the current arrangement of Lacerta follows that of FitzSimons (1943).

1. Subdigital scales smooth or tubercular; 2
   Subdigital scales mostly keeled, rarely smooth 3

2. Nostril pierced between 2 or 3 nasals, well separated from 1st UL; tail much longer than SVL .. Nucras
   Nostral pierced between 3 nasals, narrowly separated from 1st UL; tail up to 1,5 times SVL ..... Lacerta (L. rupicola)

3. Collar well marked; dorsal scales granular and smooth or small and keeled 4
   Collar absent; dorsal scales large, imbricate and strongly keeled ..... Ichnotropis

4. Ventral plates in 6 (rarely 8) longitudinal series; collar curved; an elongate upper temporal shield present ..... Heliobolus (H. lugubris)

Ventral plates in 10 or more longitudinal series; collar straight; no upper temporal shield present ..... Pedioplanis

Family Varanidae

Large lizards with well developed limbs and tail.
Body covered with smooth granular scales.
Head elongate and teeth rounded cusped and pleurodont.
Tongue forked and retractile. Oviparous. ..... Varanus

Order Squamata
Suborder Serpentes (Ophidia)

Key to the Families (adapted from Broadley 1983)

1. Body vermiform, covered by relatively homogeneous scales; head indistinct, eyes vestigial, situated below the head shields 2

Body not as above, head more or less distinct; an enlarged median row of ventral scales present; eyes well developed, covered by a transparent scale 3

2. Midbody scale rows 20 or more, teeth found only on the upper jaw ..... Typhlopidae

Midbody scale rows 14; teeth found only on the lower jaw ..... Leptotyphlopidae

3. Heat sensory pits in first 2-3 UL ..... Boidae

Heat sensory pits totally absent 4

4. Enlarged poison fangs present at front of upper jaw 5
   No enlarged fangs at front of upper jaw (with two exceptions) ..... Colubridae

5. Poison fangs rigid, not enclosed in a membranous sheath ..... Elapidae
   Poison fangs moveable, folded back at rest and covered by a membranous sheath ..... Viperidae

Family Typhlopidae

Cylindrical bodied snakes with a rounded to sharp-edged snout. Tail very short, scarcely longer than broad. Ocular shield excluded from lip. Teeth present on the maxilla. Fossorial snakes. Ovo-viviparous. Roux-Esteve (1974) separated the round snouted from the sharp-edged rostral species on generic level, reviving the genus, Rhinotyphlops Fitzinger for the latter. This has not been widely accepted according to most recent publications (Broadley 1983, Branch 1988), an approach followed here. Only one genus Typhlops Gray is recorded from the Transvaal.

Family Leptotyphlopidae

Small, seldom exceeding 15cm in total length, cylindrical snakes with a rounded snout. Tail considerably longer than broad. Ocular shield in contact with the lip. A few teeth on mandible only. Fossorial and oviparous. Only one genus, Leptotyphlops Fitzinger, is found in the Transvaal.

Family Boidae

Usually large heavy bodied snakes with regular small and smooth scales dorsally. Ventrally median row of scales moderately transversely enlarged. Head distinct from neck with anterior upper labials deeply pitted forming heat sensory organs. Mouth large with numerous solid recurved teeth on maxilla, pterygoid, palatine and dentary. Vestiges of the pelvis and hindlimbs remain, visible externally as lateral spurs anterior to the cloaca. Terrestrial and oviparous. Only one genus, Python Gmelin, is found in the province.

Family Colubridae

More advanced snakes than the previously discussed families, without vestiges of the pelvic girdle. Recognised by small overlapping dorsal and broad ventral scales. Head well developed with eyes large and well developed except in the more fossorial species but even here easily visible. Teeth are present on the maxilla, palatine, pterygoid and the dentary. The posterior, and in two genera the anterior, maxillary teeth may be enlarged and grooved to transport poison. In the world there are some 250 genera of which only 27 occur in the Transvaal.

Key to the Transvaal Genera (adapted from Broadley 1983)

1. No enlarged grooved poison fangs in the upper jaw 2
   A pair of enlarged grooved poison fangs in the upper jaw, usually below the eye but in the front of the jaw in two genera ... 11

2. Dorsal scales smooth 3
   Dorsal scales distinctly keeled 10

3. Nostril pierced between two nasal scales, tail moderate to long 4
   Nostril pierced in a single or semi-divided nasal; tail short 8

4. Anal entire; pupil vertically subelliptic (occasionally subcircular to round in Lycodonomorphus) 5
   Anal divided; pupil round or horizontal 6

5. Midbody scale rows 19 or 21; ventrals 153-177; ventrum usually yellow, orange or pink, often with a dark stripe below the tail and sometimes a dark stripe or scattered spots anteriorly; semi-aquatic ..... Lycodonomorphus

   Midbody scale rows usually 23 or more (rarely 17-21); ventrals 165-230; ventrum usually uniform white or dark grey; terrestrial ..... Lamprophis

6. Snout rather pointed, prominent and with vertical sides; internasal shield entering nostril; scales in 25-31 rows at midbody .. Pseudaspis

   Snout more or less rounded; internasal not entering the nostril; scales not exceeding 21 rows at midbody 7

7. Scales in not more than 15 rows at midbody; eye proportionately large; habit slender and length of tail contained 3 to 4 times in total length; usually bright green in life ..... Philothamnus

Scales in 21 rows at midbody; eye of moderate size; habit moderately slender and length of tail contained 4 to 5 times in total length; never bright green in life ..... Meizodon

8. Pupil vertically elliptic to subelliptic; loreal shield present; rostral well developed 9
Pupil round; loreal shield normally absent (when present much reduced in size); nasal shield single; rostral small ..... Duberria

9. Nostril pierced in a single nasal shield; snout rounded; rostral small; anterior maxillary teeth longest ..... Lycophidion
Nostril pierced in a semi-divided nasal; snout strongly depressed, projecting and with an angular, horizontal edge; rostral proportionately large; maxillary teeth very small, slightly larger posteriorly ..... Prosymna

10. Scales in 15-19 rows at midbody, without apical pits; vertebral row of scales enlarged and bicarinate; loreal present; nostril large and pierced between two nasal shields; teeth normal and distinct ..... Mehelya
Scales in 21-27 rows at midbody, with apical pits; vertebral row of scales not enlarged nor bicarinate; loreal absent; nostril moderate and pierced in a semi-divided nasal shield; teeth few and rudimentary ..... Dasypeltis

11. Eye moderate to large; loreal shield present; head more or less distinct from the neck; tail moderately long ... 12
Eye small to very small; loreal shield absent; head not distinct from the neck; tail very short 21

12. Pupil vertically elliptic; head much broader than neck 13
Pupil round or horizontal; head not or only moderately broader than neck 15

13. Anal usually divided (entire only in beetzii); loreal separated from eye by a preocular; maxillary teeth smallest in front; body and tail conspicuously banded with black ..... Telescopus

Anal entire; body and tail not banded with black 14

14. Loreal entering the orbit; subcaudals over 70 ..... Dipsadoboa

Loreal separated from orbit by a preocular; subcaudals less than 70 ..... Crotaphopeltis

15. Eye large; pupil horizontal when fully dilated, normally keyhole- or dumbbell-shaped when partly dilated in daylight; habit very slender; slender ..... Thelotornis

Pupil round; head short to moderately long; habit moderately slender 16

16. Scales keeled and in 19-21 rows at midbody; head very short and eye large ..... Dispholidus

Scales smooth and in 11-19 rows at midbody; head of moderate length and eye of moderate size 17

17. Rostral large and projecting; snout pointed and beak-like ..... Rhamphiophis

Rostral of normal size; snout rounded and not beaked 18

18. Nostril pierced between at least two shields 19

Nostril pierced in a single, semidivided nasal shield 20

19. Maxillary teeth interrupted below anterior part of eye by two much enlarged, fang-like teeth; nostril pierced between two or three nasal shields ..... Psammophis

Maxillary teeth subequal in size and continued without interruption to the interspace separating them from a posterior pair of enlarged poison-fangs ..... Psammophylax

20. Mandibular teeth small and subequal in size; snout distinctly excavate on either side, just anterior to the eye; anal entire ..... Amplorhinus

Mandibular teeth much enlarged in front; snout with sides non-excavate; anal divided ..... Hemirhagerrhis

21. Subcaudals in pairs 22
Subcaudals single 24

22. Internasals absent; scales in 15 rows at midbody ..... Amblyodipsas (part)
Internasals present; scales in 17-19 (exceptionally 21) rows at midbody 23
Internasals present; scales in 15 rows at midbody ..... Homoroselaps

23. Pseudo-preoculars (displaced prefrontals) present, snout strongly projecting, depressed and pointed; rostral very large and with an obtuse to sub-acute horizontal edge ..... Xenocalamus

Preocular absent; prefrontals present; snout not strongly depressed nor projecting; rostral of moderate size and with a rounded edge ..... Amblyodipsas (part)
Preocular and prefrontals present, snout not strongly depressed or projecting, rostral of moderate size and with a rounded edge ..... Atractaspis (part)

24. Scales in 15 rows at midbody; habit small and moderately slender ..... Aparallactus

Scales in 19-23 rows at midbody;
habit moderate; tail terminating
in a spine ..... Atractaspis
(part)

Family Elapidae

A very similar family to the Colubridae particularly in the number and arrangement of the head shields. However differences exist in the lack of a loreal and in the proteroglyphous dentition. This is manifest in the enlarged almost tubular poison fangs found at the anterior of the upper jaw. These are rigidly attached to the front of the short non-rotating maxillary bone. The body is covered in shiny overlapping scales being keeled in the rinkhals (Hemachatus), and posteriorly in Aspidelaps scutatus.
The pupils are round. Elapids are mostly terrestrial but many species are fossorial or semifossorial while some species are arboreal and a few are aquatic or semiaquatic. Many forms (genus Naja and others) have elaborate threat displays which have great survival value in the field but lead to its destruction in areas of high human density, selection possibly favouring those which are more unobtrusive. Most of the family are oviparous with few exceptions, one being the rinkhals (Hemachatus haemachatus) which produces live young. According to Branch (1988) there are about 236 species in 61 genera. In the Transvaal there are five genera, eight species and five subspecies.

Key to the Transvaal genera (adapted from Broadley 1983).

1. Preoculars 3, widely separated from nasal, prefrontals in contact with labials; subcaudals more than 90 ..... Dendroaspis

   Preoculars 1 or 2, in contact with nasal and separating prefrontals from labials; subcaudals less than 75 2

2. Internasal not bordering nostril; dorsal scales in 13 rows at midbody ..... Elapsoidea

   Internasal bordering nostril; dorsal scales in 17 (rarely 15) or more rows at midbody 3

3. Rostral very large, detached laterally and shield-like ..... Aspidelaps

   Rostral not enlarged and shield-like 4

4. Dorsal scales strongly keeled; ventrals 116-150; sub-caudals 33-47 ..... Hemachatus
   Dorsal scales smooth; ventrals 175-228; subcaudals 50-78 ..... Naja

Order Squamata
Suborder Amphisbaenia
Family Amphisbaenidae

Limbless worm-like reptiles with scales arranged in regular rings or annuli along the body from behind the head to the tail tip. Mostly unpigmented, reflecting their fossorial existance, these reptiles differ from lizards by having a reduced right lung as well as possessing an enlarged medial tooth on the premaxilla and a unique middle ear. Reinforcing their fossorial mode of life are the cylindrical body, strengthened cranium and vestigial eyes which are covered by semi-transparent scales. Most species retain vestiges of the pelvic girdle. Mosly small, seldom reaching 450,0 mm they feed on invertebrates including termites and ants. Rarely seen above ground and then only during the rainy season they are extremely secretive and solitary although occasionally being found in fair numbers at particular sites. Most species are oviparous although details of all South African species are not known. There are 15 genera and about 130 species in this family (Branch 1988) of which four genera and seven species occur in the Transvaal.

Key to the Transvaal genera

1. Segments of the pectoral region not elongate, snout rounded, without a sharp cutting edge 2
   Segments of pectoral region elongate; snout with sharp horizontal cutting edge 3

2. Body slender; head shields fused into 1 or 2 shields ..... Chirindia

   Body not slender; head shields all distinct ..... Zygaspis

3. Nasals well separated by rostral; tail short, bluntly rounded ..... Monopeltis

   Nasals usually touching above rostral; tail long, terminating abruptly in a callous pad ..... Dalophia

Order Testudinata
Suborder Cryptodira
Family Testudinidae

Tortoises in which the head is retractile while the temporal region of the skull is not roofed. The plastron is not hinged and without inframarginal plates in the plastral bridge. The carapace may be hinged posteriorly. South Africa is rich in species, but have relatively few genera. Five are known, four of which are represented in the Transvaal.

Key to the Transvaal genera

1.	Carapace usually hinged posteriorly in adults; shell generally slightly depressed and longer than broad	Kinixys
	Carapace domed, or if slightly depressed then not hinged posteriorly in adults ..	2
2.	Nuchal scale absent	Geochelone (G. pardalis)
	Nuchal scale present	3
3.	Carapace flattened and without a starred or rayed pattern	Homopus (H. femoralis)
	Carapace domed, usually with a starred or rayed pattern	Psammobates (P. oculifer)

Suborder Pleurodira
Family: Pelomedusidae

A small family of terrapins which are charactised by the head and neck being retracted laterally within the shell. They also lack the presence of nasal bones. Freshwater species incorporating five genera, two from north-eastern South America and two from Africa south of the Sahara, both of which occur in the Transvaal and one from Madagascar.

Key to the Transvaal genera

1. Plastron rigid without a hinge anteriorly ..... *Pelomedusa* (*P. subrufa*)

   Plastron hinged anteriorly ..... 2 *Pelusios*

Order Crocodylia
Suborder Crocodylinae
Family Crocodylidae

Snout moderately broad; range throughout subsaharan Africa (recently extinct in the Sahara) ..... *Crocodylus* (*C. niloticus*)

3.4 KEY TO THE AMPHIBIA OF THE TRANSVAAL

Key to the families and genera of the Anura

1.	Tongue absent; inner three toes clawed	Pipidae
	Tongue present; claws absent	2
2.	Tongue discoidal, not free behind ..	Heleophrynidae
	Tongue not discoidal and free posteriorly	3
3.	Upper jaw without teeth	4
	Upper jaw with teeth	6
4.	Snout hardened for digging and shovel-like; pupil vertically elliptic	Hemisotidae
	Snout not hardened and shovel-like; pupil horizontal, elliptic or subcircular	5
5.	Transverse folds or gland-like patches present on the palate; mouth small, downturned	Microhylidae
	No transverse folds or gland-like patches present on the palate; mouth wide and horizontal	Bufonidae
6.	Terminal phalanges of fingers not placed out of linear alignment by intercalary cartilages	Ranidae
	Terminal phalanges of digits placed out of linear alignment by intercalary cartilages	7

7. Outer two fingers oppposed to inner pair, and separated from them by a wide space ..... Rhacophoridae
Outer fingers not opposed or out of alignment of inner pair; no space or gap between second and third finger ..... Hyperoliidae

Family Pipidae

Dorso-ventrally depressed, smooth skinned frogs characterised by the fingerlike forefeet free of web, the clawed inner toes and fully webbed hind feet. Aquatic frogs, tropical in distribution including South America and most of subsaharan Africa. Three genera occur in Africa, one of which Xenopus is widespread in South Africa including the Transvaal. Two species are recorded from the province.

Family Heleophrynidae

An endemic South African family with a temperate origin, it is characterised by the toothed maxilla and arciferal pectoral girdle. Digits terminate in large expanded discs without intercalary cartilages. The frogs are chasmophilous, occurring in remote undisturbed areas where stream flow is rapid and water well oxygenated. Represented by a single genus Heleophryne with five species of which only one occurs in the Transvaal.

Family Bufonidae

The toads are easily recognisable by the mostly dry, mostly rough dorsal skin. Teeth are absent. Above the gonads, a vestigial ovary or organ of Bidder is present.

The digits are not expanded at the tip and the limbs are well developed for a terrestrial existance. Most species in the Transvaal display a developed parotid gland. Many species appear capable of reabsorbing water through the posterior abdominal wall. This enables them to take advantage of shallow ephemeral pools of rain water. Two genera occur in the Transvaal of the approximately 18 spread throughout the world.

Key to the Transvaal genera

1. Parotid glands present but not always visible ..... Bufo
   Parotid glands absent ..... Schismaderma

Family Microhylidae

A family whose South African representatives represent two seperate subfamilies. However the small mouth and absence of teeth in the upper jaw is mutual to both. Transverse ridges, representing glandular patches are present on the roof of the mouth. The pectoral girdle is firmisternal and the sacral diapophyses are broadly dilated. The digits are normally free and may or may not terminate in discs. Worldwide in distribution across the tropics, two of the approximately 56 genera (Webb et al, 1981) occur in the Transvaal.

Key to the Transvaal genera

1. Inner metatarsal tubercle small and not flanged ..... Phrynomerus
   Inner metatarsal tubercle large and flanged ..... Breviceps

Family Ranidae

"True" frogs characterised by the presence of maxillary and occasionally vomerine teeth (Lambiris 1988), although Webb et al (1981) state that teeth may or may not be present in the upper jaw. There are no transverse folds or glandular tissue on the roof of the mouth. The pectoral girdle is complete and firmisternous. Sacral hypophyses are cylindrical. The toes may be webbed or free. There are no accessory intercalary phalanges. The amphibians of the family Ranidae are a diverse group and relationships are obscure with widely diverging views among taxonomists. This diversity is also reflected in their habitat requirements and adaptations.

A key to the genera appears below and I have continued reliance on the degree of webbing of the fourth toe to separate the genera Rana and Strongylopus although a measure of overlap exists (Channing 1979). Poynton (1964) showed that the omosternum of Rana species is not notched as opposed to that of the genus Strongylopus which is notched. Poynton & Broadley (1985a) use a ratio of length of foot to urostyle reaching to axil of arm or tympanum in a key to separate the two genera. However foot length is highly variable and cannot be used with reliability.

Of the approximately 36 genera (Webb et al, 1981) in the world, 12 occur in South Africa of which nine are represented in the Transvaal.

Key to the Transvaal genera

1. Vomerine teeth present 2
   Vomerine teeth absent 8

2.	Outer metatarsals bound into the sole and inner metatarsal tubercle strongly flanged	3
	Outer metatarsals separated from sole by a web and inner metatarsal tubercle not flanged	5
3.	Throat conspicuously marked with longitudinal dark bands	Hildebrandtia
	Throat not so marked	4
4.	Lower jaw with three prominent bony projections	Pyxicephalus
	Lower jaw without bony projections	Tomopterna
5.	Dorsal "hour-glass" mark and a fine middorsal skin ridge present; in males the third finger is elongated	Arthroleptis
	Markings variable and dorsal skin ridges present or absent; third finger in males not markedly elongate	6
6.	Dorsal skin ridges continuous in six or more rows; vomerine teeth abutting onto the anterior margins of the internal nostrils	Ptychadena
	Dorsal skin ridges discontinuous and never in six or more rows; vomerine teeth lying between the internal nostrils or if abutting choanae, at least three phalanges of fourth toe free of web	7
7.	Less than three phalanges on at least one side of fourth toe free of web ...	Rana
	At least three phalanges on both sides of fourth toe free of web	Strongylopus

8. Hindfeet variously webbed; tubercle midway on tarsus ..... Phrynobatrachus
Hindfeet without webbing; no tubercle on tarsus Cacosternum

Family Rhacophoridae

Treefrogs characterised by a zygodactylus manus and expanded discs at the tips of the digits. They construct foam nests on branches above water and in which the eggs are laid. These nests are constructed by the beating action of the legs of a male or males and a female on a fluid secreted by the female. Adapted to an arid environment, water loss by excretion is reduced by the ability to concentrate urea which is voided as a relatively solid mass. The family occurs throughout subsaharan Africa, southern India and the Far East. Only one genus Chiromantis is found in Africa with three species (Frost 1985), one of which is found in the Transvaal.

Family Hyperoliidae

A variable group with the reedfrogs on the one hand and the terrestrial kassinas on the other. Pupils vertical to horizontal. Vomerine teeth present or absent. Terminal phalanges are out of alignment due to the presence of intercalary cartilages, of which K. wealii represents the extreme in zygodactyly. Discs, lacking circum-marginal grooves are found in varying degrees of development in this family including species without expanded terminal phalanges. A vocal sac and pouch are

usually present. Pectoral girdle ossified and firmisternous. Feet variously webbed. Although usually associated with moist environments, dry season hibernation is a common phenomenon and species such as Kassina senegalensis may travel extensive distances to and from water where reproduction takes place. Four genera are found in South Africa with representatives of each in the Transvaal.

Key to the Transvaal genera

1.	Vomerine teeth present	2
	Vomerine teeth absent	3
2.	Inner metatarsal tubercle prominent, flanged; males without gular disc	Leptopelis
	Inner metatarsal tubercle poorly developed; gular disc present in males	Kassina
3.	Tympanum not visible; pupil vertical ...	Afrixalus
	Tympanum visible; pupil horizontal	Hyperolius

Systematic Checklist and Index of Transvaal Herpetofauna

Reptilia		Page
Order Squamata		
Suborder Sauria		
Family Gekkonidae		
Genus	Ptenopus	86
	P. garrulus garrulus (A. Smith)	86
Genus	Homopholis	91
	H. wahlbergii (A. Smith)	91
	H. mulleri Visser	97
Genus	Afroedura	101
	A. "Matlala"	109
	A. transvaalica transvaalica (Hewitt)	113
	A. multiporis haackei Onderstall	117
	A. multiporis multiporis (Hewitt)	121
	A. multiporis "Abel Erasmus"	125
	A. sp. nov.	128
	A. pondolia marleyi (FitzSimons)	131
	A. "Maripi"	135
	A. pondolia "Godlwayo"	138
	A. langi "Soutpansberg"	142
	A. langi "Waterberg"	146
	A. langi "Lillie"	149
	A. langi langi (FitzSimons)	152
	A. langi "Waterpoort"	156
	A. langi "Tshipise"	160
	A. langi "Shinokwen"	163
	A. langi "Leolo"	166

Page

Genus Hemidactylus 171
H. mabouia (Moreau de Jonnes) 171

Genus Lygodactylus 177
L. stevensonii Hewitt 178
L. capensis capensis (A. Smith) 182
L. ocellatus Roux 189
L. methueni FitzSimons 196

Genus Pachydactylus 200
P. punctatus punctatus Peters 202
P. maculatus maculatus Gray 207
P. capensis capensis A. Smith 210
P. vansonii FitzSimons 219
P. affinis Boulenger 231
P. tigrinus Van Dam 244
P. bibronii A. Smith 248

Genus Colopus 255
C. wahlbergii wahlbergii Peters 255

Family Agamidae

Genus Agama 258
A. atricollis A. Smith 259
A. atra atra Daudin 265
A. aculeata distanti Boulenger 271
A. aculeata armata Peters 278

Family Chamaeleonidae

Genus Chamaeleo 284
C. dilepis Leach 284

Genus Bradypodion 291
B. transvaalensis (FitzSimons) 292

Page

Family Scincidae

Genus Scelotes 305
S. mira (Roux) 306
S. limpopoensis limpopoensis FitzSimons 310
S. limpopoensis albiventris Jacobsen 313
S. bidigittatus FitzSimons 316
S. brevipes Hewitt 320

Genus Mabuya 324
M. homalocephala smithii (Gray) 326
M. homalocephala depressa (Peters) 330
M. quinquetaeniata margaritifer (Peters) 333
M. capensis (Gray) 341
M. varia (Peters) 347
M. sp. nov. 356
M. variegata punctulata (Bocage) 361
M. striata striata (Peters) 366
M. striata punctatissima (A. Smith) 371

Genus Lygosoma 379
L. sundevallii sundevallii (A. Smith) 379

Genus Panaspis 387
P. wahlbergii (A. Smith) 388
P. sp. nov. 395

Genus Acontias 400
A. plumbeus Bianconi 402
A. percivali occidentalis FitzSimons 406
A. gracilicauda gracilicauda Essex 409
A. breviceps Essex 412

Genus Acontophiops 417
A. lineatus Sternfeld 417

		Page
Genus	Typhlosaurus	422
	T. aurantiacus fitzimonsi Broadley	424
	T. cregoi cregoi Boulenger	427
	T. lineatus subtaeniatus Broadley	432
	T. lineatus richardi Jacobsen	435
Family Lacertidae		
Genus	Nucras	438
	N. lalandei (Milne-Edwards)	440
	N. caesicaudata Broadley	445
	N. intertexta (A. Smith)	448
	N. taeniolata holubi (Steindachner)	454
	N. ornata (Gray)	460
Genus	Lacerta	466
	L. rupicola FitzSimons	466
Genus	Heliobolus	471
	H. lugubris (A. Smith)	471
Genus	Pedioplanis	477
	P. lineoocellata lineoocellata (Dumeril & Bibron)	478
	P. lineoocellata pulchella (Gray)	483
	P. burchellii (Dumeril & Bibron)	488
Genus	Ichnotropis	493
	I. squamulosa Peters	494
	I. capensis capensis (A, Smith)	500
Family Varanidae		
Genus	Varanus	505
	V. albigularis (Daudin)	505
	V. niloticus niloticus (Linnaeus)	512

Page

Family Cordylidae

Genus Tetradactylus 519
T. eastwoodae Methuen & Hewitt 520
T. breyeri Roux 522

Genus Gerrhosaurus 527
G. validus validus A. Smith 528
G. flavigularis flavigularis Wiegmann 534
G. nigrolineatus Hallowell 542
G. major major Duméril 546

Genus Chamaesaura 552
C. aenea (Wiegmann) 553
C. anguina (Linnaeus) 556
C. macrolepis macrolepis (Cope) 560

Genus Cordylus 565
C. giganteus A. Smith 568
C. vandami (FitzSimons) 574
C. warreni depressus (FitzSimons) 580
C. warreni warreni (Boulenger) 586
C. warreni barbertonensis (Van Dam) 590
C. warreni breyeri (Van Dam) 594
C. polyzonus polyzonus A. Smith 599
C. tropidosternum jonesii (Boulenger) 603
C. vittifer vittifer (Reichenow) 609

Genus Pseudocordylus 619
P. melanotus melanotus (A. Smith) 620
P. melanotus transvaalensis FitzSimons 627

Genus Platysaurus 633
P. guttatus A. Smith 637
P. minor FitzSimons 644

Page

P. orientalis orientalis FitzSimons 649
P. orientalis fitzsimonsi Loveridge 655
P. relictus Broadley 659
P. intermedius intermedius Matschie 664
P. intermedius wilhelmi Hewitt 671
P. intermedius "Lebombo" 676
P. intermedius rhodesianus FitzSimons 681
P. intermedius natalensis FitzSimons 686
P. intermedius parvus Broadley 691
P. intermedius "Glen Alpine" 695
P. sp. nov. "Orange" 700

Suborder Amphisbaenia
Family Amphisbaenidae

Genus Monopeltis 705
M. capensis A. Smith 706
M. sphenorhynchus sphenorhynchus Peters 711
M. leonhardi Werner 715

Genus Dalophia 719
D. pistillum (Boettger) 719

Genus Zyaspis 724
Z. quadrifrons (Peters) 724
Z. violacea (Peters) 728

Genus Chirindia 733
C. langi langi FitzSimons 733
C. langi occidentalis Jacobsen 738

Suborder Serpentes
Family Typhlopidae

Genus Typhlops 742

Page

T. schlegelii schlegelii Bianconi 744
T. schlegelii mucruso (Peters) 748
T. bibronii (A. Smith) 752
T. lalandei Schlegel 758

Family Leptotyphlopidae

Genus Leptotyphlops 763
L. longicaudus (Peters) 765
L. nigricans nigricans (Schlegel) 768
L. conjunctus conjunctus (Jan) 772
L. conjunctus incognitus Broadley & Watson 777
L. scutifrons scutifrons (Peters) 781
L. distanti (Boulenger) 785

Family Boidae

Genus Python 790
P. sebae natalensis A. Smith 790

Family Colubridae

Genus Lycodonomorphus 797
L. laevissimus fitzsimonsi Raw 798
L. rufulus (Lichtenstein) 801
L. whytii obscuriventris FitzSimons 806

Genus Lamprophis 810
L. fuscus Boulenger 812
L. aurora (Linnaeus) 814
L. inornatus Duméril & Bibron 818
L. guttatus (A. Smith) 822
L. fuliginosus (Boie) 826
L. swazicus Schaefer 833

		Page
Genus	Lycophidion	837
	L. capense capense (A. Smith)	837
	L. variegatum Broadley	844
Genus	Mehelya	848
	M. capensis capensis (A. Smith)	848
	M. nyassae (Günther)	853
Genus	Duberria	857
	D. lutrix lutrix (Linnaeus)	857
Genus	Pseudaspis	862
	P. cana (Linnaeus)	862
Genus	Amplorhinus	868
	A. multimaculatus A. Smith	868
Genus	Hemirhagerrhis	873
	H. nototaenia nototaenia (Günther)	873
Genus	Psammophylax	878
	P. rhombeatus rhombeatus (Linnaeus)	879
	P. tritaeniatus (Günther)	885
Genus	Rhamphiophis	891
	R. oxyrhynchus rostratus Peters	891
Genus	Psammophis	896
	P. leightoni trinasalis Werner	898
	P. jallae Peracca	903
	P. subtaeniatus subtaeniatus Peters	906
	P. sibilans brevirostris Peters	911
	P. phillipsii (Hallowell)	917
	P. crucifer (Daudin)	922
	P. angolensis (Bocage)	927

		Page
Genus	Aparallactus	932
	A. lunulatus lunulatus (Peters)	932
	A. capensis A. Smith	936
Genus	Amblyodipsas	944
	A. concolor (A. Smith)	945
	A. microphthalma microphthalma (Bianconi)	949
	A. microphthalma nigra Jacobsen	952
	A. polylepis polylepis (Bocage)	955
Genus	Xenocalamus	960
	X. transvaalensis Methuen	961
	X. bicolor australis FitzSimons	964
	X. bicolor lineatus Roux	967
	X. bicolor bicolor Günther	971
Genus	Homoroselaps	976
	H. lacteus (Linnaeus)	977
	H. dorsalis (A. Smith)	980
Genus	Atractaspis	984
	A. bibronii A. Smith	984
	A. duerdeni Gough	990
Genus	Prosymna	993
	P. sundevallii sundevalii (A. Smith)	994
	P. sundevallii lineata (Peters)	999
	P. bivittata Werner	1003
	P. ambigua stuhlmannii (Pfeffer)	1007
Genus	Meizodon	1012
	M. semiornatus semiornatus (Peters)	1012

		Page
Genus	Philothamnus	1016
	P. hoplogaster Günther	1017
	P. natalensis natalensis (A. Smith)	1021
	P. natalensis occidentalis Broadley	1025
	P. semivariegatus semivariegatus A. Smith	1028
Genus	Crotaphopeltis	1034
	C. hotamboeia (Laurenti)	1034
Genus	Dipsadoboa	1042
	D. aulica (Günther)	1042
Genus	Telescopus	1046
	T. semiannulatus semiannulatus A. Smith	1046
Genus	Dispholidus	1052
	D. typus typus (A. Smith)	1052
Genus	Thelotornis	1059
	T. capensis capensis A. Smith	1059
Genus	Dasypeltis	1065
	D. inornata A. Smith	1066
	D. scabra (Linnaeus)	1070
Family Elapidae		
Genus	Elapsoidea	1079
	E. semiannulata boulengeri Boettger	1080
	E. sundevallii sundevallii (A. Smith)	1084
	E. sundevallii media Broadley	1087
	E. sundevallii longicauda Broadley	1090
Genus	Hemachatus	1095
	H. haemachatus (Lacepède)	1095

		Page
Genus	Aspidelaps	1102
	A. scutatus scutatus (A. Smith)	1102
	A. scutatus intermedius Broadley	1106
Genus	Naja	1110
	N. haje annulifera Peters	1111
	N. nivea (Linnaeus)	1117
	N. mossambica Peters	1120
Genus	Dendroaspis	1127
	D. polylepis (Günther)	1127
Family Viperidae		
Genus	Causus	1134
	C. rhombeatus (Lichtenstein)	1134
	C. defilippii (Jan)	1139
Genus	Bitis	1145
	B. caudalis (A. Smith)	1146
	B. atropos (Linnaeus)	1150
	B. arietans arietans (Merrem)	1155
Order Testudinata		
Suborder Cryptodira		
Family Testudinidae		
Genus	Geochelone	1164
	G. pardalis (Bell)	1164
Genus	Psammobates	1172
	P. oculifer (Kuhl)	1172
Genus	Homopus	1177
	H. femoralis Boulenger	1177

Page

Genus Kinixys 1181
K. belliana spekii Gray 1182
K. natalensis Hewitt 1187

Suborder Pleurodira
Family Pelomedusidae

Genus Pelomedusa 1190
P. subrufa Lacepède 1190

Genus Pelusios 1195
P. sinuatus (A. Smith) 1196
P. subniger (Lacepède) 1200

Order Crocodylia
Family Crocodylidae

Genus Crocodylus 1204
C. niloticus Laurenti 1204

Amphibia

Order Anura
Suborder Opisthocoela
Family Pipidae

Genus Xenopus 1209
X. laevis laevis (Daudin) 1209
X. muelleri (Peters) 1213

Family Heleophrynidae

Genus Heleophryne 1218
H. natalensis Hewitt 1218

Page

Suborder Procoela
Family Bufonidae

Genus Bufo 1222
B. gariepensis nubicolus Hewitt 1224
B. gutturalis Power 1227
B. maculatus Hallowell 1232
B. garmani Meek 1236
B. rangeri Hewitt 1242
B. vertebralis Smith 1247
B. fenoulheti fenoulheti Hewitt & Methuen 1250

Genus Schismaderma 1255
S. carens Smith 1255

Suborder Diplasiocoela
Family Microhylidae

Genus Breviceps 1261
B. verrucosus verrucosus Rapp 1262
B. sylvestris sylvestris FitzSimons 1265
B. sylvestris taeniatus Poynton 1268
B. adspersus adspersus Peters 1271
B. adspersus pentheri Werner 1277
B. mossambicus Peters 1280

Genus Phrynomerus 1284
P. bifasciatus (Smith) 1284

Family Ranidae

Genus Pyxicephalus 1290
P. adspersus adspersus Tschudi 1291
P. adspersus edulis Peters 1296

		Page
Genus	Tomopterna	1300
	T. cryptotis (Boulenger)	1301
	T. krugerensis Passmore & Carruthers	1306
	T. marmorata (Peters)	1309
	T. natalensis (Smith)	1313
Genus	Rana	1318
	R. angolensis Bocage	1319
	R. fuscigula Duméril & Bibron	1325
Genus	Strongylopus	1329
	S. grayi grayi Smith	1330
	S. fasciata fasciata Smith	1335
Genus	Hildebrandtia	1339
	H. ornata (Peters)	1339
Genus	Ptychadena	1343
	P. oxyrhynchus (Smith)	1344
	P. anchietae (Bocage)	1348
	P. mascareniensis mascareniensis (Dumeril & Bibron)	1352
	P. porosissima (Steindachner)	1355
	P. uzungwensis (Loveridge)	1358
	P. mossambica (Peters)	1362
Genus	Phrynobatrachus	1366
	P. natalensis (Smith)	1367
	P. mababiensis FitzSimons	1372
Genus	Cacosternum	1376
	C. boettgeri (Boulenger)	1376
	C. nanum nanum Boulenger	1381

Page

Family Arthroleptid

Genus Arthroleptis 1385
A. stenodactylus Pfeffer 1385

Family Rhacophoridae

Genus Chiromantis 1389
C. xerampelina Peters 1389

Family Hemisidae

Genus Hemisus 1395
H. guttatus Rapp 1396
H. marmoratus marmoratus (Peters) 1398
H. guineensis broadleyi Laurent 1402

Family Hyperoliidae

Genus Leptopelis 1405
L. bocagei (Günther) 1406
L. mossambicus Poynton 1409

Genus Kassina 1413
K. maculata (Duméril) 1414
K. senegalensis (Dumeril & Bibron) 1416
K. wealii Boulenger 1423

Genus Afrixalus 1427
A. aureus Pickersgill 1428

Genus Hyperolius 1432
H. semidiscus Hewitt 1434
H. pusillus (Cope) 1436
H. marmoratus taeniatus Peters 1439

CHAPTER 4
REPTILIA

Family GEKKONIDAE
Genus *Ptenopus* Gray, 1865

Ptenopus Gray, 1865, *Proc. Zool. Soc. Lond.*, p. 640.
Type: *Ptenopus maculatus* Gray, 1865 = *Ptenopus garrulus maculatus* Gray.

Stout, small to medium sized, terrestrial, nocturnal geckos, with loud characteristic calls.
Digits free and strongly clawed, with a row of narrow transverse scales ventrally. Fingers compressed or slightly depressed with a lateral fringe of short to elongated spinose scales. Toes depressed and fringed with elongated, pointed scales. Phalangeal formula: manus 2,3,4,5,3, pes 2,3,4,5,4. Head swollen with short, blunt snout; body cylindrical; tail cylindrical, tapering to a fine point. Body covered with small, subequal, smooth, juxtaposed granules or scales. Pupil vertical with straight margins (Rhoptropus-type; Underwood, 1954). Extrabrillar fingers very well developed and slightly movable. Preanal sacs present, preanal and femoral pores absent, (Haacke, 1975).
Haacke (1975, 1976b) extensively revised the genus, reinstating *maculatus* as a subspecies of *P. garrulus*. There appears to be considerable morphological variation within *Ptenopus garrulus garrulus* which can be grouped geographically into three relatively homogeneous units, (a) those from north-western South West Africa, (b) those from southern South West Africa and the north-western Cape Province and (c) those from eastern South West Africa, northern Cape Province, Botswana and the northern Transvaal.

Ptenopus garrulus garrulus (A. Smith, 1849)

Stenodactylus garrulus A. Smith, 1849, *Illus. Zool. S. Afr. Rept. App.* p. 6. Type locality: "Sandy districts

in the interior of South Africa".

Ptenopus garrulus garrulus (A. Smith). FitzSimons 1943, p. 12, Loveridge 1947, p. 31, Haacke 1966, p. 83; 1975(a), p. 197, Branch 1981, p. 147, 1988a, p. 212, Haacke 1976(b), p. 71; De Waal 1978, p. 17; Auerbach 1987, p. 92, pl. 9, fig. 3; Branch 1988b, p. 7.

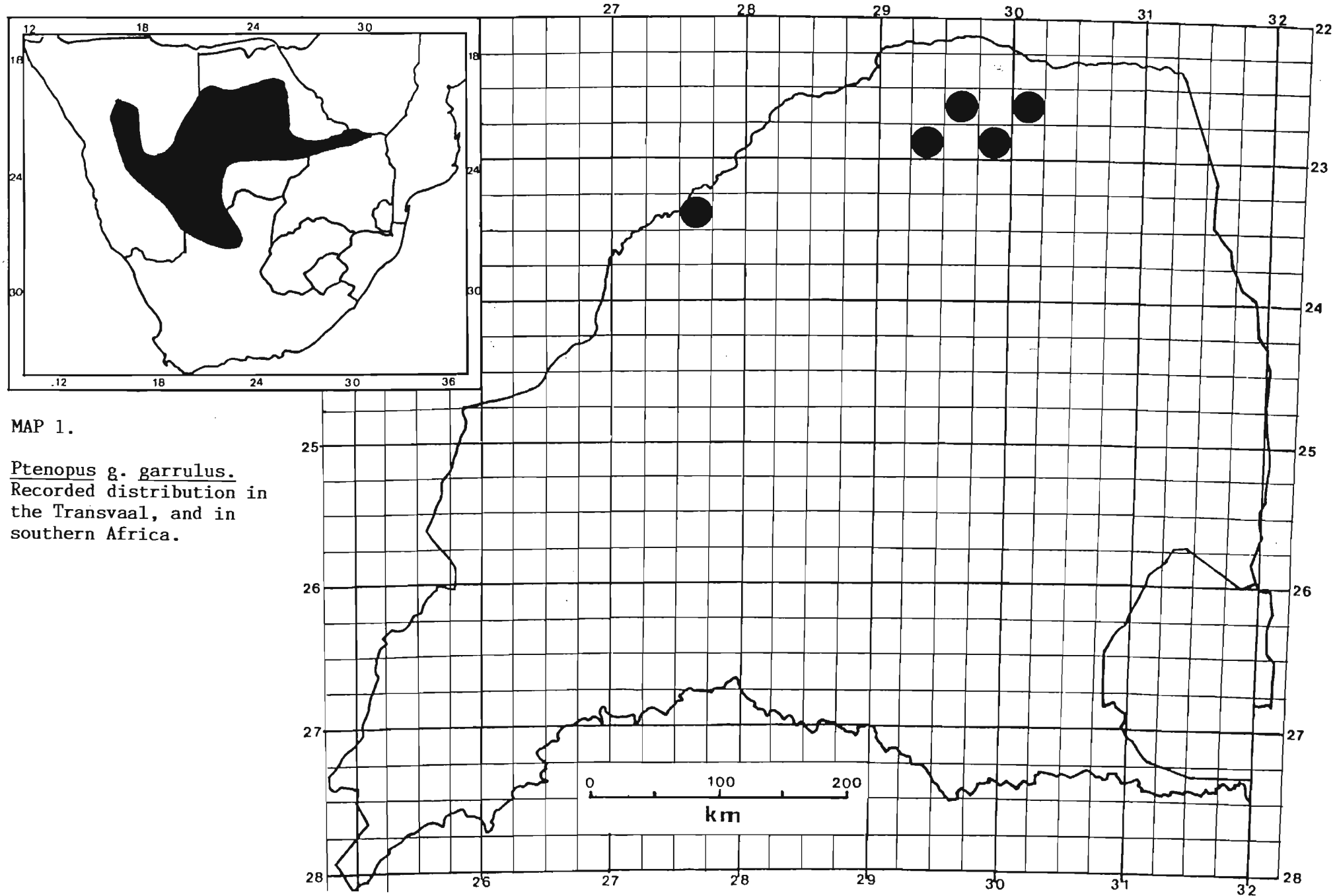
Ptenopus garrulus (A. Smith). Welch 1982, p. 19.

Description: 21 Specimens examined.

Colour: Variable yellow- to reddish-brown, mottled with irregular vermiculations and blotches of brown with off white speckles; irregular and often indistinct pale bands on the tail. Ventrally white, with roughly a heart-shaped yellow patch in the gular region in males. (For a more detailed description see Haacke (1975).

Lepidosis: Rostral small hexagonal and almost as broad as high. Nostril between two nasals, anterior largest and separated by one or two granules; UL 6-8; Mental small, narrower than adjacent labials, but slightly longer; LL 6-10; Gular scales small and granular; a transverse gular fold is present; Head and body covered with uniform granular scales, mostly in excess of 160 scales at midbody. Limbs covered with small overlapping scales; Digits slender, fringed laterally with long lanceolate scales; Subdigital lamellae of third finger range from 17-25; Digits terminate in long pointed claws; Tail short and cylindrical, tapered and covered with flat squarish, slightly overlapping scales; a series of from one to three flattened enlarged tubercles at base of tail in males, which is much reduced in size in females.

Size: Largest male SVL = 51,0 mm (TM27436-Tshipise); Largest female SVL = 48,85 mm (TM30407-35 km SW of Tshipise). Mean male SVL = 46,57 mm $\pm$ 2,35 (1SD) n=15; Mean female SVL = 43,32 mm $\pm$ 5,43 (1SD) n=6. Only the mass of one male is available = 2,15 g.



MAP 1.

Ptenopus g. garrulus.
Recorded distribution in the Transvaal, and in southern Africa.

Distribution:

Widespread in southern Africa from South West Africa through Botswana to the northern Transvaal south to the northern Cape Province and south-western Orange Free State.

Distribution in Transvaal (Map 1)

Bordeaux 555MS; Juliana 647MS; Limpopodraai; Tshipise 104MT; Zoutpan 459MS; 35km SW of Tshipise.

Habitat and Ecology

A detailed description of its habits and habitat requirements have been given by Haacke (1975). In the Transvaal the species is found in areas of suitably compacted Kalahari sand, in veld types 14 and 15 at altitudes ranging from 700-800 m above sea level. Vocalizations in the Transvaal are restricted to the rainy season unlike those from the Kalahari which may virtually be throughout the year.

Conservation Status.

Protected. Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. An unsubstantiated record from the Langjan nature reserve possibly indicates its presence on a reserve. Otherwise its patchy distribution has precluded it from being incorporated on a provincial nature reserve. These relict populations occur in areas where livestock and game farming predominate and are therefore under no immediate threat. Overgrazing and excessive trampling of the areas where burrows are found may have an effect but this has as yet not been investigated. A peripheral species, its distribution is

limited by areas of kalahari sand and a rainfall below 500 mm. A more detailed survey of its distribution is required.

Remarks:

The Transvaal specimens have the closest affinity to populations from the Kalahari and eastern South West Africa (see Haacke 1975, fig. 1 and p. 212).

Genus *Homopholis* Boulenger, 1885

Homopholis Boulenger, 1885, *Cat. Lizards Brit. Mus.*, 1, p. 191. Type: *Gecko wahlbergii* A. Smith.

Digits dilated, feebly webbed, with undivided transverse lamellae below and all but the inner digits armed with a well-developed retractile claw. Body covered above and below with small flat imbricate scales. Pupil vertical. Preanal and femoral pores absent.
FitzSimons (1943) originally regarded the genus to be monotypic and restricted to Southern Africa. However Loveridge (1947) recognised five forms as belonging to this genus with a distribution extending from Ethiopia to Zululand and Madagascar. However only one species was regarded as occurring south of Tanzania. Recently Visser (1987) described a new dwarf form *H. mulleri* from the northern Transvaal. During an examination of specimens housed in the Transvaal Museum the unique colour patterns of Natal specimens were noted, differing substantially from the typical *wahlbergii* pattern. This may warrant investigation.

Key to the Transvaal species

1. Scales between posterior margin of eye and anterior border of ear 26-30; scales at midbody 80-87 ..... *H. wahlbergii*
   Scales between posterior margin of eye and anterior border of ear 18-20; scales at midbody 65-72 ..... *H. mulleri*

Homopholis wahlbergii (A. Smith, 1849)

Gecko wahlbergii A. Smith, 1849, *Illus. Zool. S. Afr.* Rept. Pl. LXXV, fig. 1. Type locality: "country to the eastward of Cape Colony, Kafferland.

Homopholis wahlbergii (A. Smith). FitzSimons, 1943, pp. 18-20, Pienaar et al 1983, p. 39, pl. 7 & 7A, Pienaar, 1978, p. 24, pls 1 & 1A, 1966, p. 32, pls 1 & 1A, Auerbach 1987, pl. 8 gig. 8, Visser 1987, p. 110; Branch 1988a, p. 195, pl. 90, 1988b, p. 6.
Homopholis wahlbergi wahlbergi (A. Smith). Loveridge 1944, p. 303-305; Welch 1982, p. 28.
Homopholis wahlbergi arnoldi Loveridge 1947, p. 305-306.

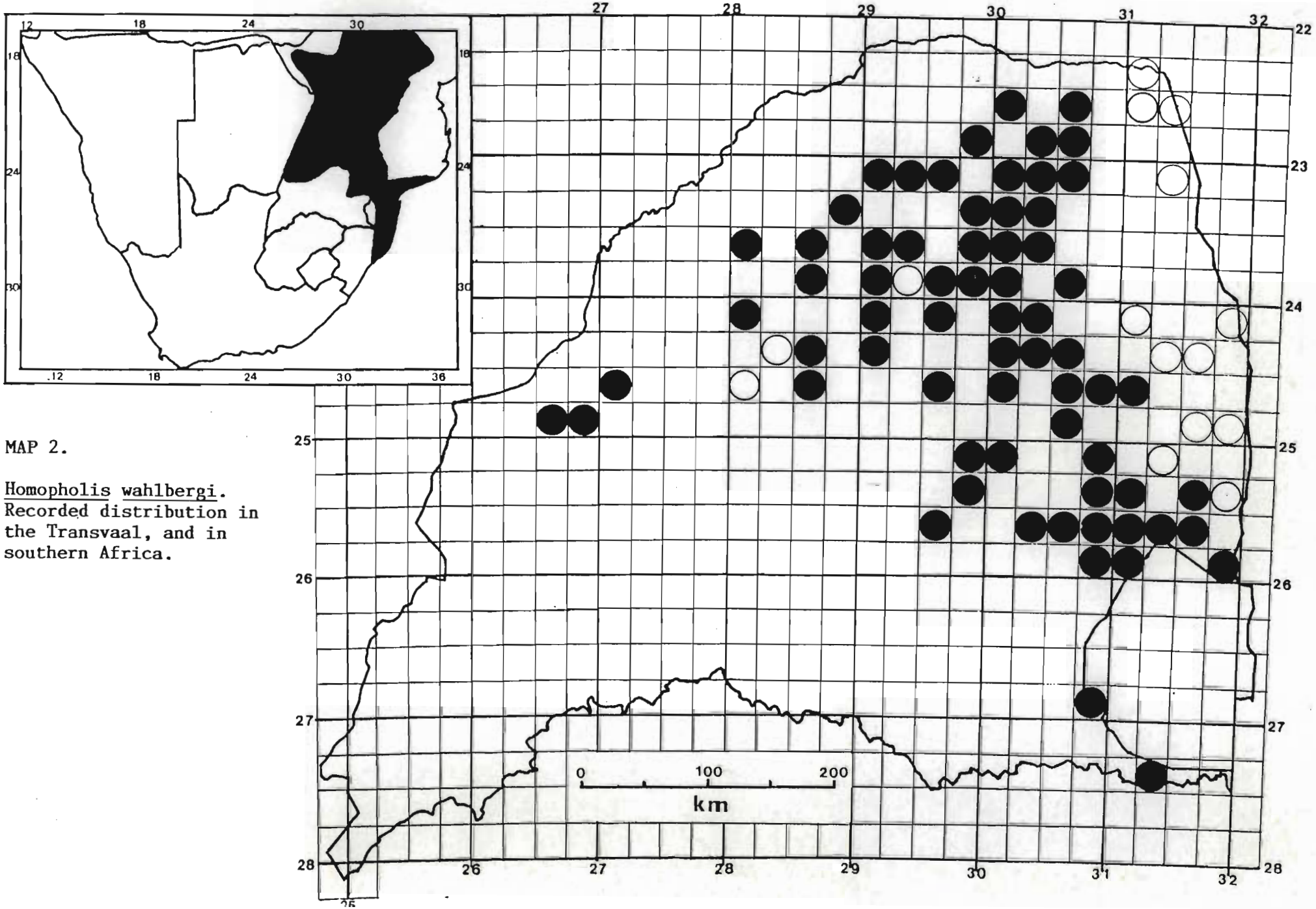
Description: 85 specimens examined.
Colour: A large grey to grey-brown gecko along with irregular to dark crossbands extending down the back. A pair of variable black dorsolateral stripes extend from the back of the head to about midbody in some specimens. Inside of mouth blackish. Ventrally paler, with or without dark spots or infuscations. A degree of colour change is possible depending on mood and background. Toes expanded and terminate in strongly recurved partly retractile claws. Tail autotomy is very prevalent. Most tails indicate a fracture plane about 10 mm posterior to the vent. Of the adults 64,8% (n = 54) show total or partially regenerating tails. Only 10% of the juveniles (n = 10) possessed regenerating tails.
Lepidosis: Nostril bordered by 5-8 small nasals and first upper labial. Upper labials 10-14, mostly 11-13; Lower labials 10-15, mostly 10-13. Subdigital lamellae of 3rd digit of right manus ranges from 10-16, but is mostly 11-13; 2-4 (mostly 3) enlarged scales at base of tail (n = 12). Scale rows at midbody 80-107, X = 87,83 ± 6,77.
Size: Largest male SVL 108,0 mm; (TM58500-Farm Buffelshoek 486LR), Mass = 42,0 g (TM 58485-Smaldale 225KP); Largest female SVL 123,0 mm (TM 58463-Mananga), mass = 47,4 g (TM58463). Mean male SVL = 93,88 mm ± 8,53 (1SD) n=26, mass = 23,51 g ± 7,39 (1SD) n=25; Mean female SVL = 99,44 mm ± 10,17 (1SD) n=26, mass = 25,55 g ± 8,67 (1SD) n=24.

Distribution

Widespread in Southern Africa from Mozambique in the east through Zimbabwe to eastern Botswana, northern and eastern Transvaal, Swaziland and northern Natal (Zululand).

Distribution in Transvaal (Map 2)

Barberton Townlands 369 JU; Beauley 260LR; Broedershoek 129JU; Buffelsdoorns 315KR; Buffelshoek 403LS; Buffelskraal 486LR; Calitzdorp 221LS; De Hoop 203JU; Draaikraal 48JT; Elandsfontein 335KQ; Elandsfontein 471JT; Excelsior 211JU; Galakwyns Stroom 745LR; Garatouw 282KT; Godlwayo; Goedeverwachting 334JT; Ha Madzhiga; Harriet's Wish 393LR; Holfontein 126KT; Houdkop 475IT; Houtbosdorp; Kaapsche Hoop 483JT; Koningstein 625JT; Lake Fundudzi; Lavhengwa Hills; Ledzee 559LT; Lomati 466JU; Mac Mac Pools; Manamela; Mananga; Mapochsgronde 500JS; Matalas Location 591LS; Matangari; Melkboomfontein 919LS; Molepos Location 187KS; Moletsi Location; NE slopes of Tshamavhudzi Peak; Newgate 802MS; Nooitgedacht 345JS; Nzulase; Ohrigstaddam Nature Reserve; Oostenryk 92KS; Ostend 104KT; Paardekraal 135LT; Parkfield 725MS; Perkeo 223KT; Rietfontein 440KT; Rivola Hill; Schrikfontein 715LR; Sionwe Mountain; Smaldale 225KP; Steynsdrift 145JS; The Downs 34KT; The Oaks 198KT; Tivoli 98KT; Tshipise 105MT; Uitzoek 63KR; Urk 10LS; Vreedzaam 822LS; Wonderboom 532KS.



MAP 2.

Homopholis wahlbergi. Recorded distribution in the Transvaal, and in southern Africa.

Literature Records

Brak R., N. Tvl; Geelhoutkop; Haenertsburg; Hartbeesfontein; Hectorspruit; Hookberg; Klaserie; Krabbefontein near Leydsdorp; Louws Creek; Machabezane; Malta 65KT; Meidingen 423LT; Munnik; Pietersburg; Pretoriuskop; Punda Milia; Schelem 32KT; Shilowane; Skukuza; Venice 40KU; Waterval Boven; Woodbush, (FitzSimons 1943). Wolkberg wilderness area, (Snyders 1987). 16 km SW of Bandolierkop; 8 km SE of Barberton, Klipfontein 53KR, (NMZB). Shingwedzi quarters; Hartebeesfontein; Pretoriuskop camp; Tshokwane; Pumbe picket; Mbyamiti experimental plot No. 7; Shipudze ridge; Mathlakuza pan; Pafuri ranger's quarters; Pafuri, W.N.L.A.; Satara (Pienaar et al 1983).

Habitat and Ecology

A rupicolous gecko, it is predominantly found on large rocky outcrops and cliffs where it inhabits crevices and rocky overhangs. A widely distributed species it has been recorded from veld types 6, 8, 9, 10, 11, 13, 14, 15, 18, 19, 20, 57, 61, 63 and 67 at altitudes between 300-1800 m above sea level. It is both diurnal and nocturnal, frequently seen on rock faces in the late afternoon basking in the rays of the sun. Broadley (1966c), mentions that this species feeds both during the night and during the day. Occasionally this species may be found inside hollow tree trunks and it is a frequent resident of human dwellings where it roosts under the roof descending to the lighted windows at night to feed on insects attracted to the light.

Apart from tail autotomy, the skin of these lizards is loose and tears easily, which enables the lizard to escape from predators. A captured gecko may squeal extensively (FitzSimons, 1943), and bite vigorously.

The species is oviparous, eggs having been recorded

during Febrary, March and July indicating an extended reproductive period. The paired ova are large measuring 17,0 - 19,2 mm x 13,0 - 16,8 mm with a mass of 2,0 - 2,7 g (Haagner, 1988, Boycott & Morgan 1988, Douglas, 1986).

Conservation Status.

Protected under Schedule 1 of the Transvaal Nature Conservation Ordinance 12 of 1983. Currently secure. The lizard has a wide distribution including most of the Kruger National Park as well as several provincial nature reserves (Jacobsen et al 1986). It occupies a habitat from which it can only be removed with difficulty and densities are low, necessitating great inconvenience for those attempting to capture large numbers. Trade in the species is currently the only threat.

Remarks

It is generally accepted that the status of H. w. arnoldi Loveridge is invalid owing to the great variability in the degree of speckling of the ventrum in Zimbabwe (Broadley 1966c). This is also the case in the Transvaal where varying degrees of speckling have been observed. The Natal specimens appear to lack crossbars on the body and appear more speckled. They also are larger than those recorded for the Transvaal and may warrant a more detailed analysis. Both Russell (1978) and Welch (1982) appear to ignore Broadley's (1962, 1966) rejection of H. w. arnoldi, which taxon, as pointed out by Visser (1987) is untenable.

Homopholis mulleri Visser, 1987

Homopholis mulleri Visser, 1987, S. Afr. J. Zool. 22(2), p. 110; figs. Type locality: Farm Command 588MS, 2229DB, Messina dist. Branch 1988a, p. 195, pl. 90, 1988b, p. 6.

Description: Four specimens examined.
Colour: A medium sized gecko, grey to light brown with curved black crossbands extending from behind the head to the base of the tail. Paler broad crossbars occur along the tail. Three pale grey blotches occur from immediately behind the head to just posterior to the fore limbs. A characteristic feature is the black bar running from anterior to the earhole across the front of the snout to the other side. The upper and lower labials are white. The toes are expanded terminating in strong recurved claws which with the exception of the first finger and toe are partly retractile. Ventrally, throat, sides of neck and gular white, with or without darker speckling. Chest and ventrum progressively off white with numerous spots some of which fuse to form dark lines.
Lepidosis: Nostril bordered by 3-5 scales and first upper labial. Upper labials 9-11; lower labials 8-11; 65-72 scale rows at midbody; subdigital lamellae of 3rd finger, manus ranges from 10-13; Dorsal scales subimbricate. Enlarged scales at base of tail 1-3.
Size: Largest male SVL = 70,8 mm Farm Command 588 MS (Visser 1987 p. 110); Largest female SVL = 80,5 mm (TM47098 - Vivo); Mean male SVL = 65,95 mm ± 3,98 (1SD) n = 4. Mean female SVL = 77,25 mm ± 4,59 (1SD) n = 2. The mass of only one female was recorded (TM58469) = 8,35 g.

Distribution

Only known from the Transvaal to date but likely to be found in southern Zimbabwe.

Distribution in Transvaal (Map 3)

Vivo, Tshipise.

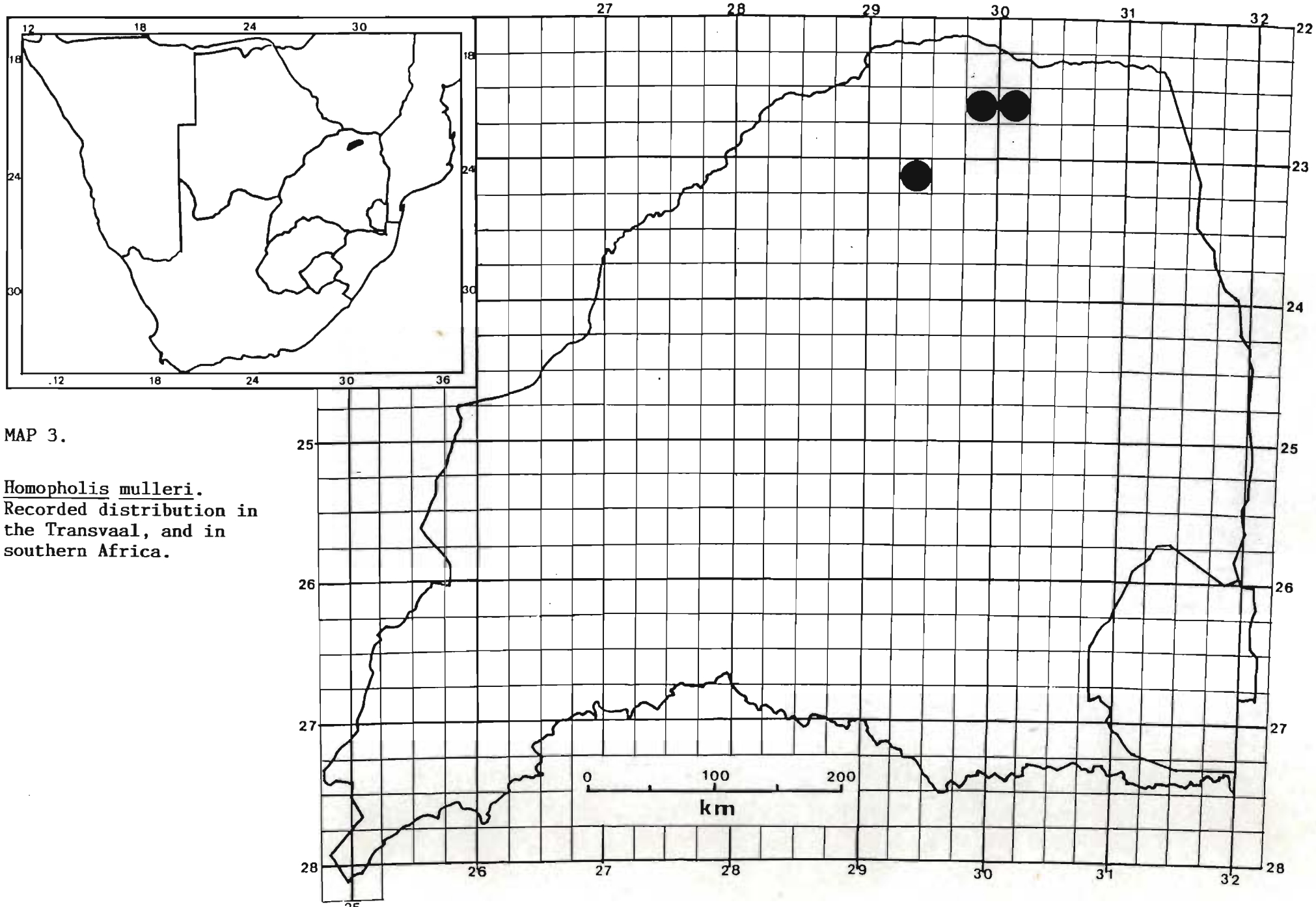
Literature Records.
Farm Command 588MS (Visser, 1987)

Habitat and Ecology

Apparently solely arboreal, having to date only been collected from under loose dark and holes in trees such as Marula Sclerocarya birrea subsp. caffra and Knobthorn Acacia nigrescens in open mixed mopane veld (Visser 1987), and foraging at the base of a marula (TM58469). Appears restricted to veld types 14 and 15 at altitudes ranging from 700-800 m above sea level.

Conservation Status.

Protected; Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. An endemic species with a restricted distribution north of the Soutpansberg. Although to date not recorded from any nature reserve it is likely to occur in the Langjan and Messina Nature Reserves. More detailed surveys are needed to establish its total distribution. Over most of the area the current land use practice is cattle or game ranching. Provided no extensive alterations to this occurs and illegal commercial harvesting contained, the gecko is considered safe.



MAP 3.

Homopholis mulleri.
Recorded distribution in the Transvaal, and in southern Africa.

Remarks

A small species which has been overlooked due to the relatively limited material available in museums, until the type series became available.

Genus *Afroedura* Loveridge, 1944

Afroedura Loveridge 1944, *Amer. Mus. Novit* 1254, p. 1, Fig. 1. Type: *Afroedura karroica bogerti*.
Oedura Gray, 1842. FitzSimons (1943), p. 29

Digits free, moderate, dilated throughout, with slightly raised distal joints bearing a somewhat enlarged discoid dilation at apex, covered above with scales, not denticulate laterally, below on basal portion by scales or transversely dilated shields and one or two pairs of scansors slightly separated from another pair on the distal dilation, clawed, the claw retractile between the distal scansors.
Pupil vertical, upper eyelid distinct, lower vestigial; dorsal lepidosis of small, subequal, smooth, juxtaposed granules; tail depressed, verticillate (scarcely noticeably so in *pondolia*), tapering posteriorly; males with preanal pores.
Loveridge (1944b) placed all African members of the genus *Oedura* into *Afroedura* on the basis of the numbers of pairs of scansors beneath the fourth toe. All African material has 1-3 pairs of scansors whereas Australian forms have 4 or more pairs. Another character, that of a verticillate tail not being present in Australian forms can also apply to many South African phena, and is not strictly valid. However the Australian species do appear to have very swollen tails, which is a feature in only a few South African forms and those mostly with verticillate tails. Many species do however develop fat tails under conditions of autotomy.

The genus Afroedura is notably depauperate in the number of morphological characters which can be used to separate the various phena most of which occur within the Southern African subregion. Characters used include number of pairs of scansors; precloacal pores; verticillate or non-verticillate tails; keeled or flattened dorsal scales and the presence or absence of 1-3 internasal granules or scales. Other useful measurements include numbers of scales between the nasal and the anterior margin of the eye and those between the posterior border of the eye and the earhole. Both measurements are made across the shortest distance between the points. Midbody scale rows are of limited use and maximum size of individuals of the various forms also assist in the compilation of a key.

The Transvaal is exceptionally well endowed with these geckos. With one exception all known populations appear to be allopatric and relict, a fact which makes an interpretation of the limited morphological features available more difficult. A total of 17 forms are recognised. Onderstall (1984) has followed Loveridge's (1947) interpretation of the importance of various characters in the determination of taxonomic status. He retained Loveridge's basic approach with the exception that he re-instated langi as a valid subspecies of pondolia with which Loveridge (1947) had synonymized it. FitzSimons (1943) however retained langi on species status based on the absence of the internasal, present in pondolia. There is therefore uncertainty as to the weight a particular character carries. There is also uncertainty how to interpret allopatry and how it affects speciation. An attempt has been made to group the various Transvaal forms according to particular characters. Following FitzSimons (1943) these forms have been elevated to species status. In view of all these unresolved problems, provisional names have been allocated to the various phena in the thesis to indicate

that an understanding of the variation within the genus as a whole is needed, as well as in some cases, additional specimens. A formal naming of taxa should be done only after the pattern of vicariance within the genus as a whole is known and understood.

Transvaal Afroedura can be grouped on the basis of morphological characters. The following characters appear to be important in the Transvaal.

(a) Verticillate tail, 2 forms.

(b) Tail smooth, faintly verticillate, 16 forms

(c) Internasal(s) present (at least in 95% of individuals), 8 forms.

(d) Nasals in narrow to broad contact behind rostral, 10 forms.

(e) Bluntly keeled dorsal scales, 4 forms

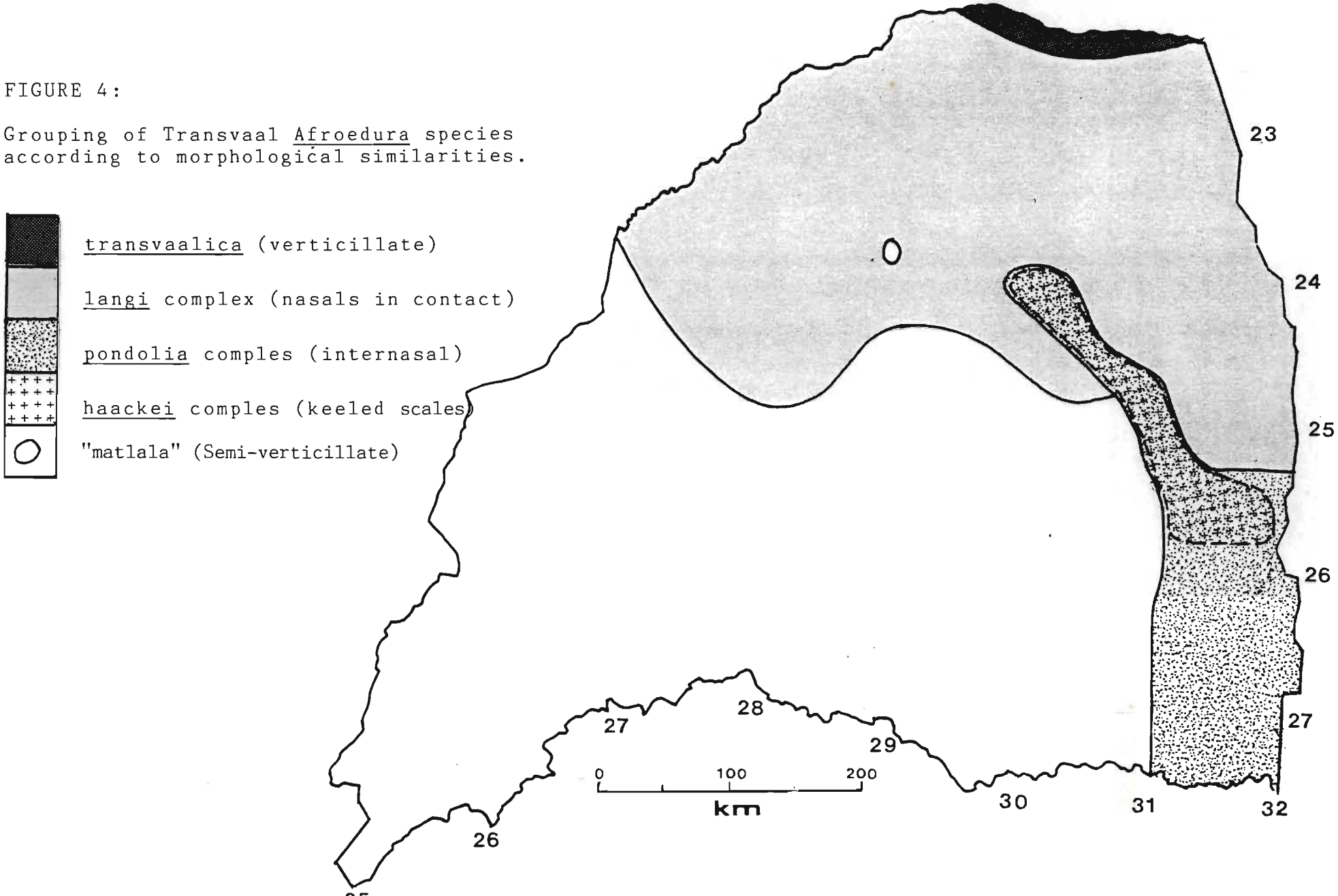
(f) Rounded, flattened dorsal scales, 14 forms.

Figure 4 illustrates the above grouping. It is suggested that the following complexes are involved:-

"transvaalica" group incorporating one species namely A. t. transvaalia
"pondolia" group incorporating A. p. marleyi, A. p. "Godlwayo" and A. "Maripi"
"multiporis" group including A. m. haackei, A. m. "Abel Erasmus", A. m. multiporis and A. "Lebombo".
"langi" complex incorporating A. langi langi, A. l.

FIGURE 4:

Grouping of Transvaal Afroedura species according to morphological similarities.



"Lillie", A. l. "Shinokwen", A. l. "Tshipise", A. l. "Waterpoort", A. l. "Soutpansberg", A. l. "Leolo", A. l. "Waterberg" and A. "Matlala".

The pondolia and multiporis groups have an internasal in common but are separated by the keeled dorsal scales. The langi complex are lumped purely on the basis of nasals in contact.

Table 1 illustrates the disparities and similarities of the 17 forms known from the Transvaal on the basis of the characters discussed previously.

Table 1. Variations in key morphological characters in Transvaal Afroedura.

Species	PP	VT	KS	IN	N-E	E-E	MBS	Max S (mm)
transvaalica	5-8	P	X	P	9-12	17-22	100-117	64,0
"matlala"	8-10	P	X	X	10-13	19-22	90-102	54,0
marleyi	10-14	X	X	P	10-12	16-24	88-99	36,0
"godlwayo"	21-23	X	X	P	10-12	20-23	95-103	40,0
"maripi"	11-13	X	X	P	12-13	20-23	98-105	63,0
haackei	20-28(24)	X	P	P	11-14	16-18	87-94	52,0
"abel erasmus"	20-24	X	P	P	12-14	16-18	88-95	62,0
multiporis	16-17	X	P	P	11-14	17-19	94-101	66,5
"Lebombo"	-	X	P	P	10	± 12	-	-
langi	14-17	X	X	X	10-12	15-18	96-101	45,5
"lillie"	13-16	X	X	X	10-12	18-22	96-106	58,0
"shinokwen"	15-16	X	X	X	10-11	15-18	89-94	52,0
"tshipise"	13-15	X	X	X	10-11	15-16	80-92	42,5

Species	PP	VT	KS	IN	N-E	E-E	MBS	Max S (mm)
"waterpoort"	14-19	X	X	X	10-11	17-22	86-98	52,0
"soutpansberg"	8-12	X	X	X	10-13	18-23	88-103	56,0
"leolo"	30-35	X	X	X	9-12	16-18	87-94	40,5
"waterberg"	3-7	X	X	X	10-12	15-19	92-99	46,0

PP = precloacal pores; VT = verticillated tails; KS = keeled dorsal scales; IN = internasals; N-E = nasals to eye; E-E = eye to earhole; MBS = midbody scales; Max S = maximum SVL recorded; P = present; X = absent.

Key to the Transvaal *Afroedura* Species

1. Internasal absent (rarely present) 9
   Internasal present 2

2. Size large reaching 55,0 mm SVL
   when adult 3
   Size small rarely reaching
   52,0 mm SVL 6

3. Tail verticillate ..... *A. t. transvaalica*
   Tail non-verticillate 4

4. Dorsal scales keeled 5
   Dorsal scales smooth ..... *A. 'Maripi'*

5. Scales at midbody 94-101;
   precloacal pores in males only,
   16-17 ..... *A. multiporis multiporis*
   Scales at midbody 88-95;
   precloacal pores in males only,
   20-24 ..... *A. m.* 'Abel Erasmus'

6. Dorsal scales keeled 7
   Dorsal scales smooth 8

7. Keeled scales spaced and verticils on tail end in row of enlarged keeled scales ..... A. 'Lebombo'
   Keeled scales irregular and in contact; verticils on tail not ending in keeled scale row ..... A. multiporis haackei

8. Precloacal pores in males only, 10-14; midbody scales 88-99; range - Lebombo mountains ..... A. pondolia marleyi
   Precloacal pores in males only, 21-23; midbody scales 95-103; range - SE Transvaal ..... A. p. 'Godlwayo'

9. Size small seldom reaching 46,0 mm when adult 10
   Size medium exceeding 46,0 mm when adult 13

10. Precloacal pores in males only, 13-17; ranges - Olifants river valley and the north-eastern Soutpansberg 11
    Precloacal pores in males only, 3-7 or 30-35; ranges Waterberg or Leolo mountains 12

11. Midbody scales 96-101; precloacal pores in males only, 14-17; range - Olifants R. valley ..... A. langi langi
    Midbody scales 80-92; precloacal pores in males only, 13-15; range - northern slopes of the Soutpansberg ..... A. l. 'Tshipise'

12. Precloacal pores in males only,
3-7; midbody scales 92-99;
range - Waterberg ..... A. 1. 'Waterberg'
Precloacal pores in males only,
30-35; midbody scales 87-94;
range - Leolo mountains ..... A. 1. 'Leolo'

13. Tail moderately verticillate;
precloacal pores in males only,
8-10; range - Matlala inselberg ..... A. 'Matlala'
Tail feebly verticillate or verticils
only visible under magnification 14

14. Scales between eye and anterior
margin of earhole, 15-18; midbody
scales, 89-94; range - extreme
northern Kruger National Park ..... A. 1. 'Shinokwen'
Scales between eye and anterior
margin of earhole 17-23;
range - Soutpansberg and eastern
Transvaal lowveld 15

15. Precloacal pores in males only
8-12; midbody scales 88-103;
range - southern Soutpansberg
and Blouberg mountains ..... A. 1. 'Soutpansberg'
Precloacal pores in males only,
13-19; range - northern and western
Soutpansberg mountains and eastern
Transvaal lowveld 16

16. Range - Farm Lillie 148KT; midbody scales 96-106; adults reach 58,0 mm SVL; precloacal pores in males only, 13-16 ..... A. l. 'Lillie'

Range - Northern and western ranges of the Soutpansberg; midbody scales 88-103; adults reach 52,0 mm SVL; precloacal pores in males only, 14-19 ..... A. l. 'Waterpoort'

Afroedura "Matlala"

Description. 20 specimens examined.

Colour: Pale grey-brown to brown above with 6 irregular wavy dark brown to blackish crossbars extending from the occipital region to the sacrum. The crossbars are flanked posteriorly by narrow black and white margins. The areas between the crossbands may be spotted with whitish particularly laterally. A dark brown stripe extends from the nostril through the middle of the eye to link up with the occipital bar. The crown of the head is variously marked with dark brown; limbs heavily spotted with off white and streaked or spotted with dark brown to blackish. Original tail barred with 7-8 dark brown to black bands above. Ventrally white to pinkish. Underside of tail spotted or mottled with brown.

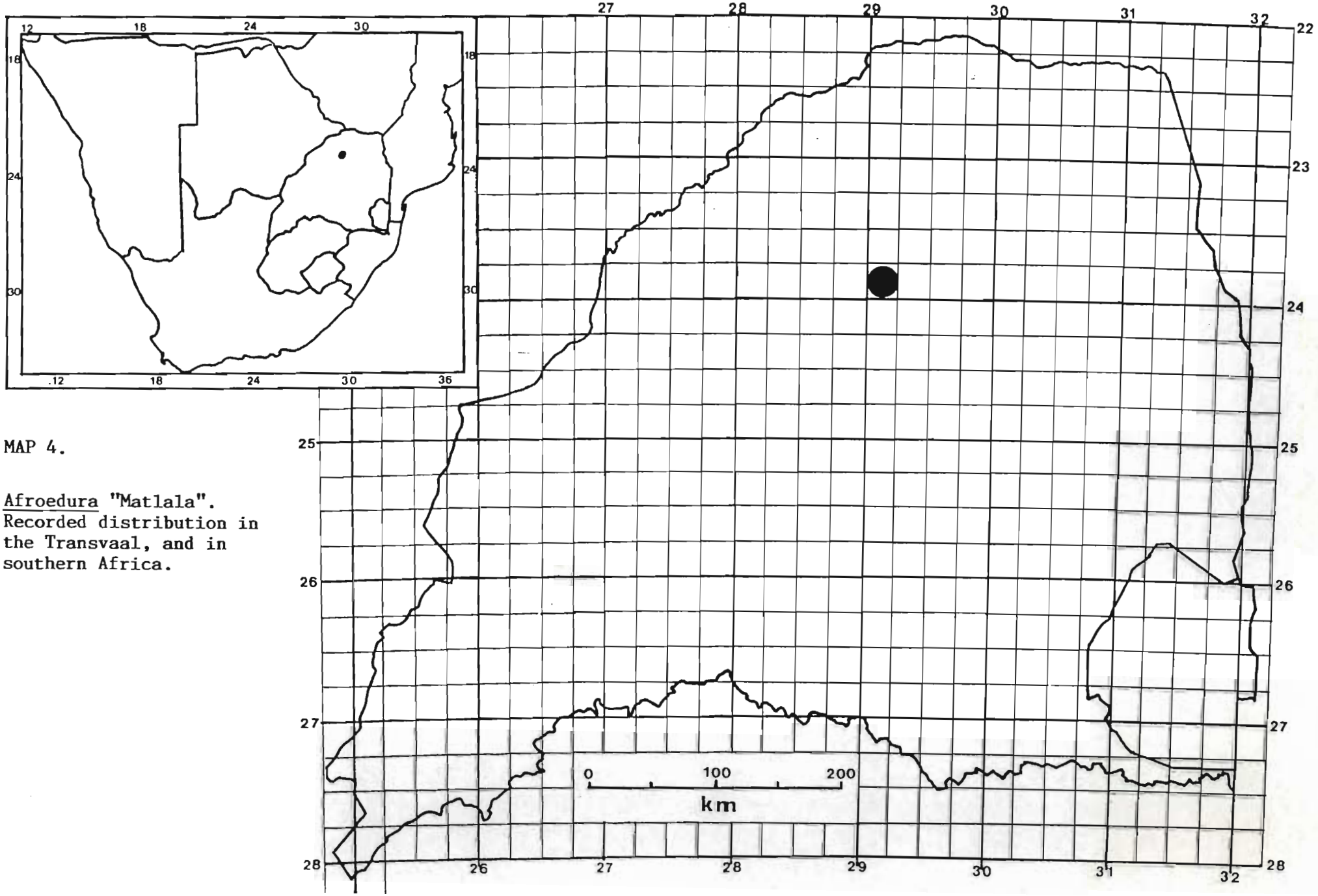
Lepidosis: The geckos are moderately depressed in head, body and tail. Limbs well developed but slender, pentadactyle. Head oval, wider than neck, body moderately slender. Tail broad at base tapering to a fine tip. Tail verticillate, longer than SVL and ranging from 50,49-55,81% of total length. Rostral more than twice as long as high and roughly rectangular; nostril

pierced between rostral, 1st upper labial and 3 nasals; Supranasals in broad contact behind rostral; Scales on snout much larger than those on crown of head and slightly conical; scales between nasals and anterior margin of eye 10-13, and 19-22 rows of granular scales between eye and anterior margin of ear opening; UL 8-11 (mostly 9 or 10); Mental broad wedge-shaped and from 1,0 - 1,5 times as long as broad; postmentals 2 rarely 1; LL 7-9 (mostly 8); Dorsals variable, rounded and slightly flattened, heterogeneous, larger dorsolaterally than on the back. Granules juxtaposed and 90-102 at midbody. Ventrals smooth, roughly hexagonal or rounded and imbricate. Digits terminally expanded with two pairs of scansors and 7-11 enlarged inferomedian lamellae under the 4th toe; Precloacal pores in males only, from 8-10; 1-4 enlarged scales at base of tail on either side. Original tail verticillate with 7-8 scale rows per verticil dorsally and 4 rows ventrally, dorsal scales rounded to squarish and juxtaposed; ventrally scales larger than dorsals, subimbricate and squarish with rounded posterior margins. Caudal autotomy present with 8/20 (40%) of tails regenerating.

Size: Largest male SVL = 54,0 mm (N7657 - Matlala hill), mass = 3,65 g (N7657); Largest female SVL = 54,0 mm (N7655 - Matlala hill), mass = 3,7 g (N7655). Mean male SVL = 45,44 mm ± 8,47 (1SD) n = 9, mass = 2,12 g ± 1,14 (1SD) n = 9; Mean female SVL = 46,56 mm ± 6,22 (1SD) n = 8, mass = 2,11 g ± 0,98 (1SD) n = 8.

Distribution

Endemic to the northern Transvaal.



MAP 4.

Afroedura "Matlala". Recorded distribution in the Transvaal, and in southern Africa.

Distribution in Transvaal (Map 4).

Matlala's Location

Habitat and Ecology

An exclusively rupicolous gecko living in narrow crevices of exfoliating flakes under overhanging rocks. Found in veld type 67 at an altitude of 1400-1700 m above sea level.

Conservation Status

Protected. Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. Although an extremely localised species which apparently does not occur on other inselbergs separated by several kilometres from Matlala, this species is secure provided the habitat is maintained.

Remarks

Although superficially resembling species from the Blouberg it differs in the less accentuated mental, greater number of midbody scales, heterogeneous head scalation and juxtaposed dorsal caudal and subimbricate ventral caudal scalation. The verticillate tail in adults indicates a link with A. t. transvaalica, from which it differs in the lesser development of the verticillations, the nasals in contact, the lower number of midbody scales, imbricate ventrals and lower numbers of ventral scale rows per verticil as well as the higher number of precloacal pores. A unique form in extreme isolation deserving of specific recognition.

Afroedura transvaalica transvaalica (Hewitt, 1925)

Oedura transvaalica Hewitt 1925 (b), Rec. Alb. Mus. 3, p. 350, pl. xvi, Fig. 1, pl. xvii, fig. 1. Type locality: Njelele river, Zoutpansberg district, Transvaal.

Oedura transvaalica transvaalica Hewitt. FitzSimons 1943, p. 39-40.
Afroedura transvaalica transvaalica (Hewitt). Loveridge 1947, p. 267-268, Onderstall 1984, p. 497-509; Pienaar et al 1983, p. 33, pl. 5A; Pienaar 1978, p. 38, pls. 8A & 8; Welch 1982, p. 14.
Afroedura transvaalica (Hewitt). Auerbach 1987, p. 93; Branch 1988a, p. 192, pl. 88, 1988b, p. 5.

Description. 37 Specimens examined.
Colour: A pale grey-brown to pinkish brown species with 6 irregular, wavy blackish crossbands or blotches extending from the occiput to the sacrum. The crown of the head is pale with varying degrees of dark speckling and mottling. Limbs speckled with grey black. Original tail with up to 9 dark crossbands while regenerated tails are spotted and streaked. Body pinkish white below, while the tail is brownish heavily speckled ventrally, with a dark continuous median line.
Lepidosis: A somewhat slender dorsoventrally flattened gecko. Head oval, widest posteriorly and distinct from neck. Body slender to broad. Limbs stout, well developed and pentadactyle. Original tail depressed, markedly verticillate, broad tapering distally to a fine tip and longer than SVL, between 50,67 - 52,0% of total length. Rostral twice as broad as deep; nostril between rostral, 1st upper labial and 2-4 (mostly 3) nasals; Supranasals separated (rarely in contact) behind rostral;

Scales on head heterogeneous, larger on snout than on crown, nodular and rounded. Scales from nasals to anterior margin of eye 9-12; 17-22 scales from posterior margin of eye to anterior margin of earhole; UL 8-11 (mostly 9 or 10); Mental as long as to longer than broad; postmentals 2 or 3; LL 8-10, mostly 9; Dorsal scales slightly heterogeneous, rounded flattened and juxtaposed; midbody scales 100-117; Ventrals rounded, flattened and juxtaposed to subimbricate; Digits expanded at the tip with 2 prs of scansors; an inferomedian row of 0-6 transversely enlarged scales. Tail strongly depressed and verticillate, 6-9 scale rows per vertial above and 5-7 below; A transverse row of pores ranging between 5-8, but is mostly 6. Many specimens exhibit calcium bodies on either side of the neck, under the skin.

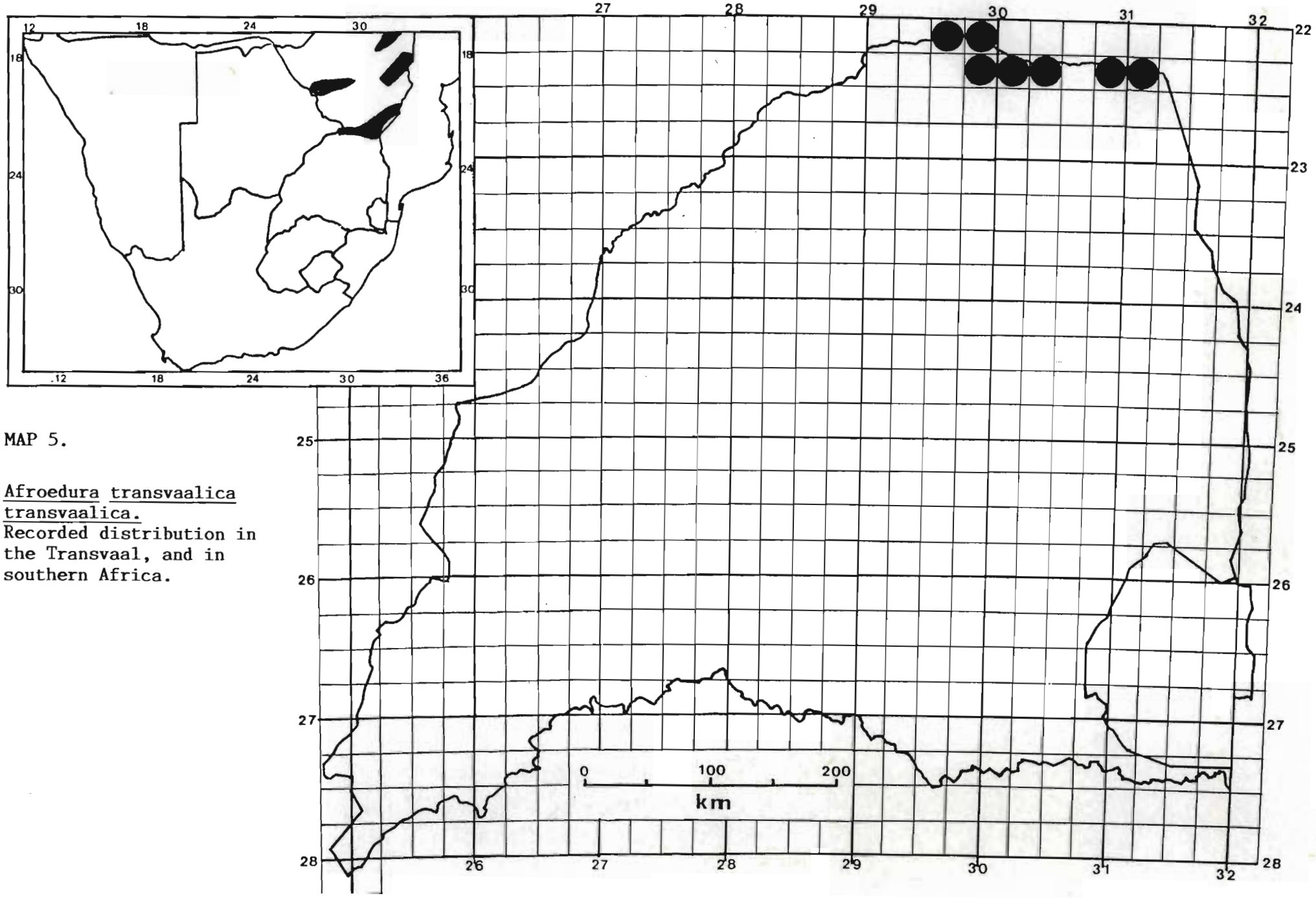
Size: Largest male SVL, 64,0 mm (N11632 - Scrutton 23MT) mass = 4,5 g; (N11632); Largest female SVL 64,0 mm (N831 - Border 135MS); mass = 5,4 g (N831). Mean male SVL = 59,5 mm ± 2,03 (1SD) n=9, mass = 3,51 g ± 0,54 (1SD) n=9; Mean female SVL = 59,39 mm ± 2,55 (1SD) n=9, mass = 4,07 g ± 0,84 (1SD), n=9.

Distribution

Ranges from the northern Transvaal to north-eastern Zimbabwe and adjacent Mozambique.

Distribution in Transvaal (Map 5).

Border 136MS; Doreen 108MT; Haddon 27MT; Mabyeni Hill; Madimbo; Ostend 63MT; Petershof 131MS; River 141MS; Scrutton 23MT.



MAP 5.

Afroedura transvaalica transvaalica.
Recorded distribution in the Transvaal, and in southern Africa.

Literature Records

Leonhardi ridge, between Luvhuvhu and Limpopo R; Mabueni Hill, 3 km S. of Beit Bridge (NMZB) (Pienaar et al 1983).

Habitat and Ecology

Rupicolous, this gecko is mostly restricted to granite outcrops but may also inhabit those of sandstone. The exfoliating granite provides extensive narrow fissures for these animals. Fissures chosen are normally found in shade or sheltered from the intense rays of the sun under overhangs or under the rounding of boulders. Fissures which open downwards or inwards so that water cannot penetrate are chosen. The species is crepuscular to nocturnal and gregarious with up to a dozen individuals found under a single flake.

Conservation Status.

Protected. Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. Although restricted to the Transvaal north of the Soutpansberg this species can be considered secure. Illegal collector pressure can pose a threat due to destruction of habitat necessitated to obtain specimens. However the larger deeper fissures between boulders and those out of reach should still provide a haven for the species. Any mining or quarrying of these outcrops should be monitored and contained. The species occurs in the Messina nature reserve.

Remarks

A relatively distinct species.

Afroedura multiporis haackei Onderstall, 1984

Afroedura pondolia haackei Onderstall, 1984. Ann. Tvl. Mus. 33(30), p. 497 figs. Type locality: Farm Rhenosterkop 195 JU, 2531 CA, Nelspruit dist. Transvaal. Jacobsen & Pienaar 1983, p. 140, fig. 5; Branch 1988a, p. 191, Branch 1988b, p. 5.

Description. 19 Specimens examined.
Colour: Greyish brown to brown with darker irregular crossbands tending from behind the head down the back and onto the tail. A series of pale vertebral patches aoutt into the crossbands posteriorly from the occiput to the sacrum. Dorsum very mottled. Ventrum whitish and translucent.
Lepidosis: Rostral approximately twice as broad as deep. Nostrils pierced between first upper labial and three nasals. Upper nasals or nasorostrals in contact in only three of 16 specimens, mostly separated by an internasal or a small granule; Head scales, heterogeneous, those on snout larger, round and flattened than those on crown of head; Scales between nasals and anterior border of eye 11-14; scales between posterior margin of eye and anterior margin of earhole 16-18; UL 8-10, mostly 9; Mental as broad as deep to slightly longer than broad, pentagonal; 2 postmentals; LL 7-9, mostly 8 or 9; Dorsals rounded and conical to bluntly keeled, juxtaposed to subimbricate. Midbody scales 87-94; Ventral scales flat and imbricate; Digits terminate in two pairs of

scansors and a claw; (0-7) mostly 1-2 enlarged inferomedian scales under 4th toe; preclocal pores in males only 20-28, mostly 24-28; 2-4 enlarged scales at base of tail; Original tail rounded and tapering, faintly verticillate with 6 dorsal and 4 ventral scale rows per verticil; dorsally caudal scales squarish to rounded and subimbricate, ventrally scales much larger and squarish to hexagonal and subimbricate.
Size: Largest male SVL = 50,0 mm (N7776 - Broedershoek 129 JU); mass = 2,2 g (N7776); Largest female SVL = 52,0 mm (N7774 - Broedershoek 129 JU); mass = 2,3 g (N7774); Mean male SVL = 42,9 mm ± 4,51 (1SD), n=10, mass = 1,29 g ± 0,66 (1SD), n=6; Mean female SVL = 46,67 mm ± 7,57 (1SD), n=3, mass = 2,05 g ± 0,35 (1SD), n=2.

Distribution

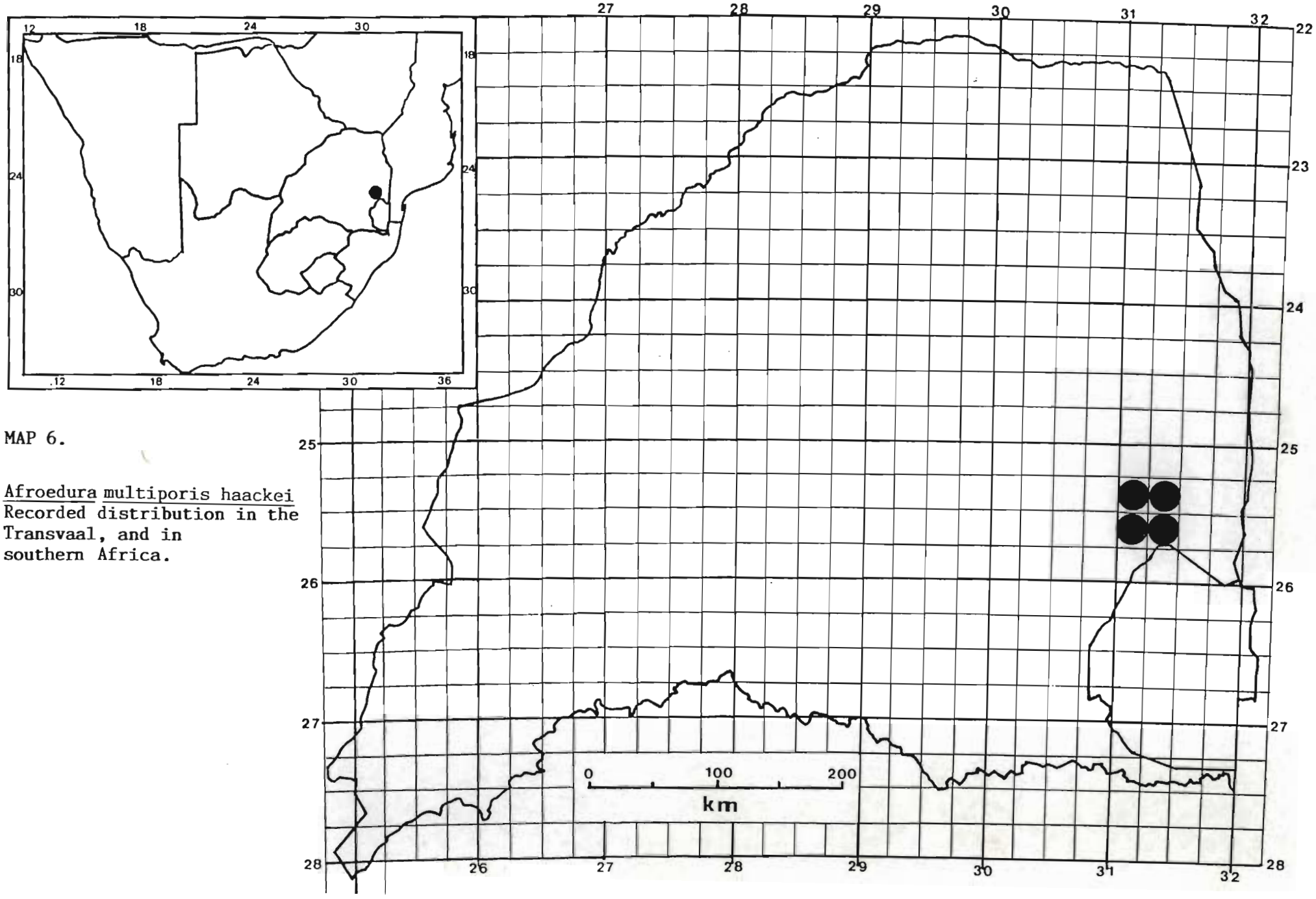
Restricted to the southern Lowveld, eastern Transvaal.

Distribution in Transvaal (Map 6)

Broedershoek 129JU; De Hoop 203JU; Eureka City; Excelsior 211JU; Khandizwe; Luphisi; Naudes Rust 272JU; Rhenosterkop 195JU.

Habitat and Ecology

The type series were collected in a pile of bricks, while others were observed in a house. Most specimens collected were however found under sheets of exfoliating granite in well wooded areas. They also inhabit other crevices and may even be found on shale. The crevices under exfoliating granite open downwards keeping the



MAP 6.

Afroedura multiporis haackei
Recorded distribution in the Transvaal, and in southern Africa.

lizards dry. The gecko are nocturnal and solitary to semicommunal and live between 500-1100 m above sea level. According to Onderstall (1984), these gecko are vociferous, uttering a rapid clockwork-like "churr".

Conservation Status (RDB 1988, Restricted)

Protected. Schedule 2, Transvaal Nature Conservaton Ordinance 12 of 1983. A rupicolous species it is found widespread in the southern Lowveld largely confined to granite outcrops although apparently also moving onto human dwellings (Onderstall, 1984). It is therefore an adaptable species. The large number of granite dwalas ensure the survival of the species. It also occurs in the Kruger National Park. Large-scale removal of exfoliating rock could be detrimental to the species.

Remarks

A well differentiated species characterised by the keeled dorsal scales, a character shared only with A. m. multiporis (Hewitt) A. m. "Abel Erasmus", a juvenile Afroedura sp. from the Lebombo mountains and an aberrant specimen from the farm Scrutton 23 MT on the Limpopo river. This specimen, a male, has 25 preanal pores and as such falls within the range of A. m. haackei. The only Afroedura occurring in that area is A. t. transvaalica which is easily separated from the aberrant specimen. How this specimen arrived at Scrutton can only be speculated on. It is however of dubious occurrence and until the matter can be clarified there seems little point in speculation.

Afroedura multiporis multiporis (Hewitt, 1925)

Oedura pondolia multiporis Hewitt 1925, Rec. Alb Mus. III, p. 348. Type locality: "Clearwaters", Haenertsburg, Transvaal. FitzSimons 1943, p. 36.
Afroedura pondolia multiporis (Hewitt), Loveridge 1947, p. 260, Onderstall 1984, p. 497-509; Welch 1982, p. 14; Branch 1988a, p. 191, 1988b, p. 5.

Description. 11 Specimens examined.
Colour: Greyish to olive brown above with 6 wavy, irregular blackish crossbands extending from the occiput to the sacrum. Crown of head uniform or speckled with brown; a dark streak extends from the nostril through the eye to link up with the occipital bar. A row of pale white to whitish spots or blotches extend down the back, each spot in an indentation in the posterior margin of the crossbars. Limbs mostly uniform but may be mottled. Original tail barred with up to 9 blackish crossbands. Ventrally whitish; undersurface of tail greyish and speckled.
Lepidosis: A large flat gecko, moderately depressed with well developed limbs and feet pentadactyle. Toes slender. Head oval and very distinct from the neck. Body slender. Original tail longer than SVL ranging from 50,8-53,43% of total length. Rostral rectangular, twice as broad as high; nostril pierced between nostral, 1st upper labial and 3 or 4 nasals; supranasals separated by an elongated scale behind rostral; scales on head heterogeneous, those on snout much larger than those on crown of head and bluntly keeled to conical; UL 8-10 (mostly 9); Mental subpentagonal, as broad as long or broader than long; postmentals 1-2 (mostly 2); LL 9 rarely 7 or 8; Dorsals more or less homogeneous, rounded, bluntly keeled or conical juxtaposed to subimbricate; Midbody scales 94-101; Ventrals flat, imbricate and with rounded posterior margins; Digits

expanded at the tip with 2 prs of scansors and 1-3 enlarged inferomedian scales under the 4th toe; Femoral pores in males only, 16-17; Original tail non-verticillate with caudal scales in rows; dorsally scales elongate with rounded margin and imbricate; ventrally median scales much enlarged, variable and rounded posteriorly.

Size: Largest male = 63,0 mm SVL (N11691 - Acre 2 KT), Heaviest male = 3,4 g (N11691 - Acre 2KT); Largest female = 66,5 mm (N11693 - Acre 2KT), Heaviest female = 5,5 g (N11688 - Acre 2KT). Mean male SVL = 59,0 m ± n = 3 5,29 (1SD), mass = 3,3 g ± 0,14 (1SD) n = 2. Mean female SVL = 61,5 mm ± 5,01 (1SD), n = 7, mass = 4,4 g ± 1,16 (1SD) n = 7.

Distribution

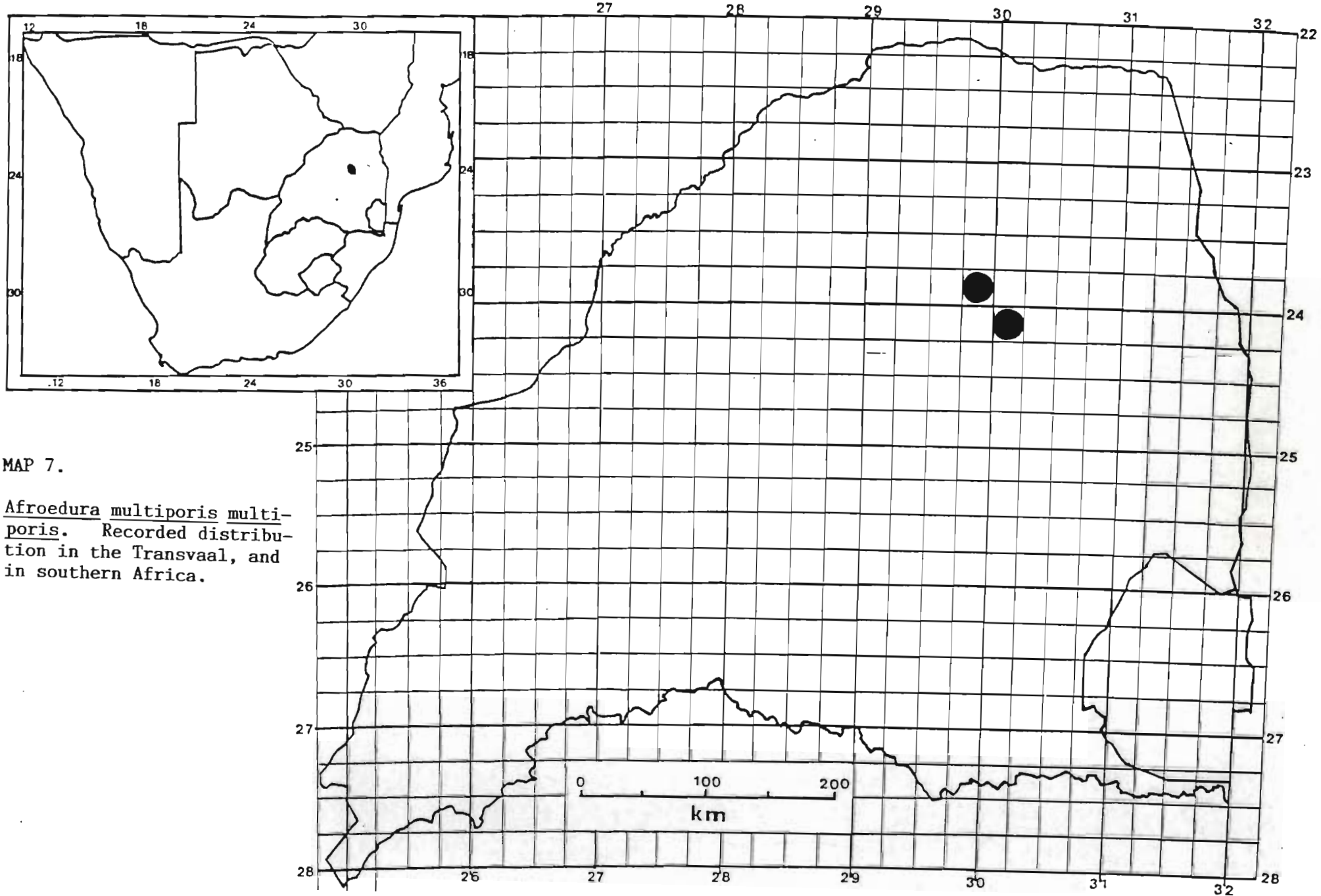
Only known from the Woodbush and Wolkberg, Transvaal.

Distribution in Transvaal (Map 7)

Farm "Clearwaters", Haenertsburg; Farm Acre 2 KT; Haenertsburg.

Habitat and Ecology

Large rocky outcrops, boulders and cliffs. Specialized fissure-inhabiting rupicolous geckos. Nocturnal, they spend the day in crevices between rocks and under overhangs in shade. Occurring singly or in pairs they are found in veldtype 8 at altitudes ranging from 1400 - 1800 m above sea level.



MAP 7.

Afroedura multiporis multiporis. Recorded distribution in the Transvaal, and in southern Africa.

Conservation Status (RDB 1988, Restricted)

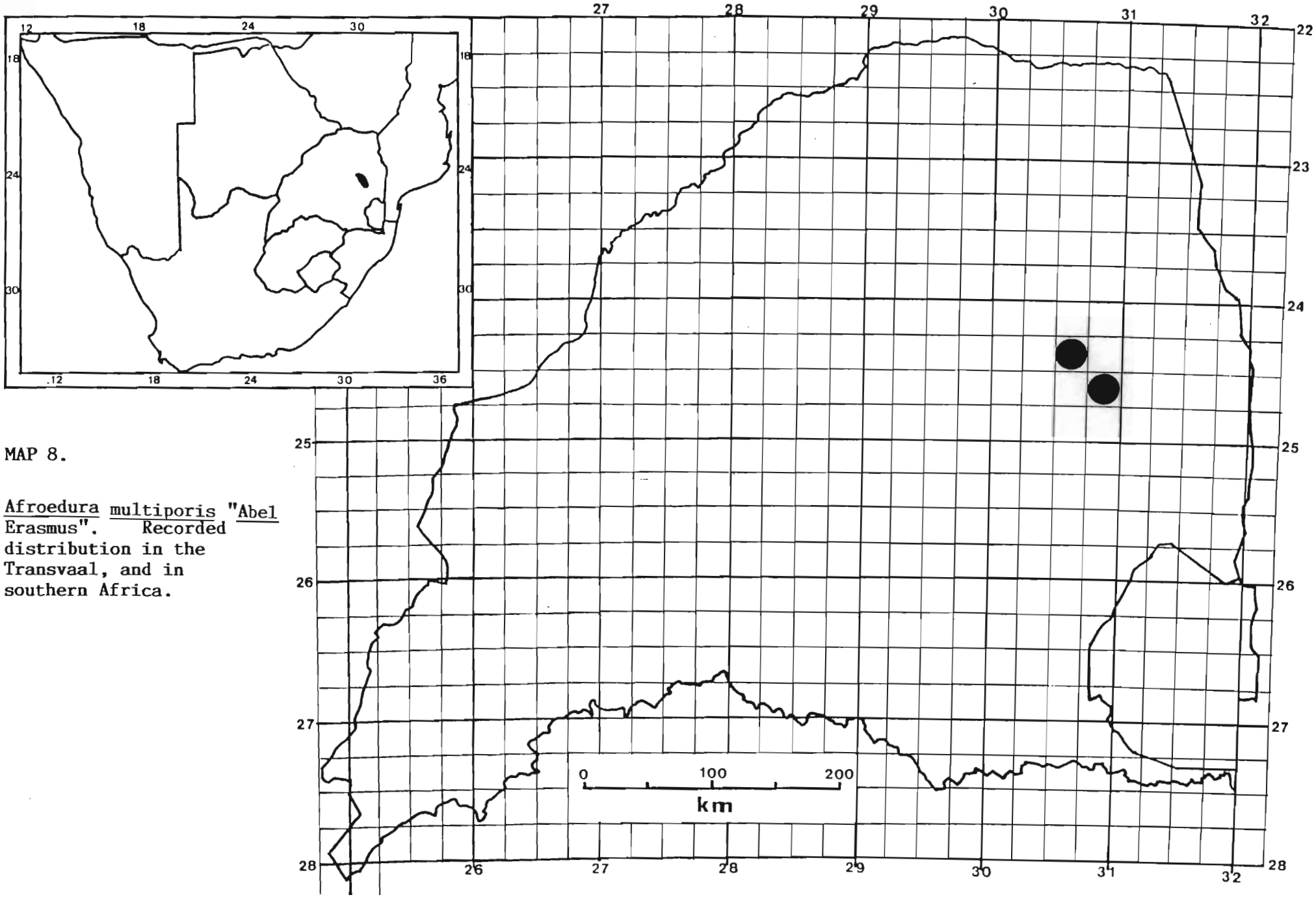
Protected: Schedule 2, Nature Conservation Ordinance 12 of 1983. At the type locality the species could not be located on a recent visit, a fact also stated by Miss L.C. Thompson in Onderstall (1984). The only other locality where sightings had been made near three waterfalls is now under the Ebenezer dam. Most of the area is also under pine afforestation and further searches for the species here have resulted in failure to obtain additional material. A juvenile specimen collected in the Wolkberg and subsequently a series of adult specimens from the farm Acre 2KT in the Wolkberg Wilderness Area have established its extant status. In the latter area its future appears secure provided no additional afforestation measures are planned.

Remarks

Although the range of femoral pores falls within that of *Afroedura pondolia* (Hewitt) as stated by Loveridge (1944) the fact that *A. m. multiporis* has keeled dorsal scales differentiates this species from most others of the genus. It shows affinities in this respect to *A. m. haackei* Onderstall, *A. m.* "abel erasmus", *A.* "Lebombo" and to an aberrant specimen from the farm Scrutton 23 MT Messina district. The keeled dorsals cannot be observed in the subadult type specimen. Whether this is due to its long immersion in fixative and preservative or whether it actually does not have keeled dorsals can only be speculated on. In most other characters it overlaps those specimens from the Wolkberg. The number of femoral pores of the type preclude any other interpretation at this stage.

Afroedura m. "Abel Erasmus"

Description. 14 Specimens examined.
Colour: Olive brown above with 6 rarely 7 blackish wavy irregular crossbands extending from the occiput to the sacrum. Pale whitish spots may be found at the posterior margin of the cross bands but are often absent. Limbs pale olive brown with reticulate darker patterns on the thighs or wavy stripes and spots. Crown of head paler mostly without strong markings. A darkish stripe extends from nostril to anterior margin of eye; two stripes extend from posterior margin of eye to above ear opening. Occasionally a single stripe extends through eye to link up with occiptial bar. Tail with up to 10 crossbars. Whitish below with tail brownish with darker speckling.
Lepidosis: Large moderately depressed gecko with an oval head and short moderately developed limbs and slender body. Tail longer than SVL and between 51,76 - 54,31% of total length. Rostral broader than high (± 1,5 X); nostril pierced between rostral, 1st upper labial and 3 nasals; Supranasals separated by a granular scale (rarely 2,3 or 0); Scales on head heterogeneous, those on snout bluntly keeled and larger than those on crown of head; Scales from posterior margin of nasals to anterior margin of eye 12-14 and 16-18 from posterior margin of eye to anterior margin of earhole. UL 8-12 (mostly 9 or 10); Mental triangular from broader than long to longer than broad; postmentals 1-3; LL 8 or 9 rarely 7; Dorsal scales granular, heterogeneous, bluntly keeled or conical and juxtaposed; Scales at midbody 88-95; Ventral scales smooth, larger than dorsals and imbricate; Digits well developed with 2 prs scansors and 1-6 enlarged median subdigital scales under the 4th toe; pores in males only, range 20-24; tail long and tapered to a fine tip with 3 or 4 (rarely 1 or 2) enlarged scales at the base on either side. Caudal scales in



MAP 8.

Afroedura multiporis "Abel Erasmus". Recorded distribution in the Transvaal, and in southern Africa.

verticils with 7 scale rows per verticil; dorsal scales squarish with a rounded posterior margin and imbricate; ventral scales larger than dorsals, smooth with rounded posterior margins and imbricate. Caudal autotomy present with 5/11 (45,45%) of tails regenerating.
Size: Largest male SVL = 62,0 mm (N Perkeo 223 KT), mass = 5,75 g (N); Largest female SVL = 56,0 mm (N 9888 - Perkeo 223 KT), mass = 3,90 g (N9888). Mean male SVL = 54,48 mm ± 4,01 (1SD) n=9, mass = 3,47 g ± 1,08 (1SD) n=8; Mean female SVL = 54,67 mm ± 1,53 (1SD) n=3, mass = 3,03 g ± 1,03 (1SD) n=3.

Distribution

Endemic to the eastern Transvaal.

Distribution in Transvaal (Map 8).

Bourke's Luck; Perkeo 223 KT.

Habitat and Ecology

An exclusively rupicolous species living under flakes of exfoliating rock along cliff faces in veld type 8 at altitudes between 850 - 1200 m above sea level. Found along kloofs but also along rocky outcrops on top of the cliffs.

Conservation Status

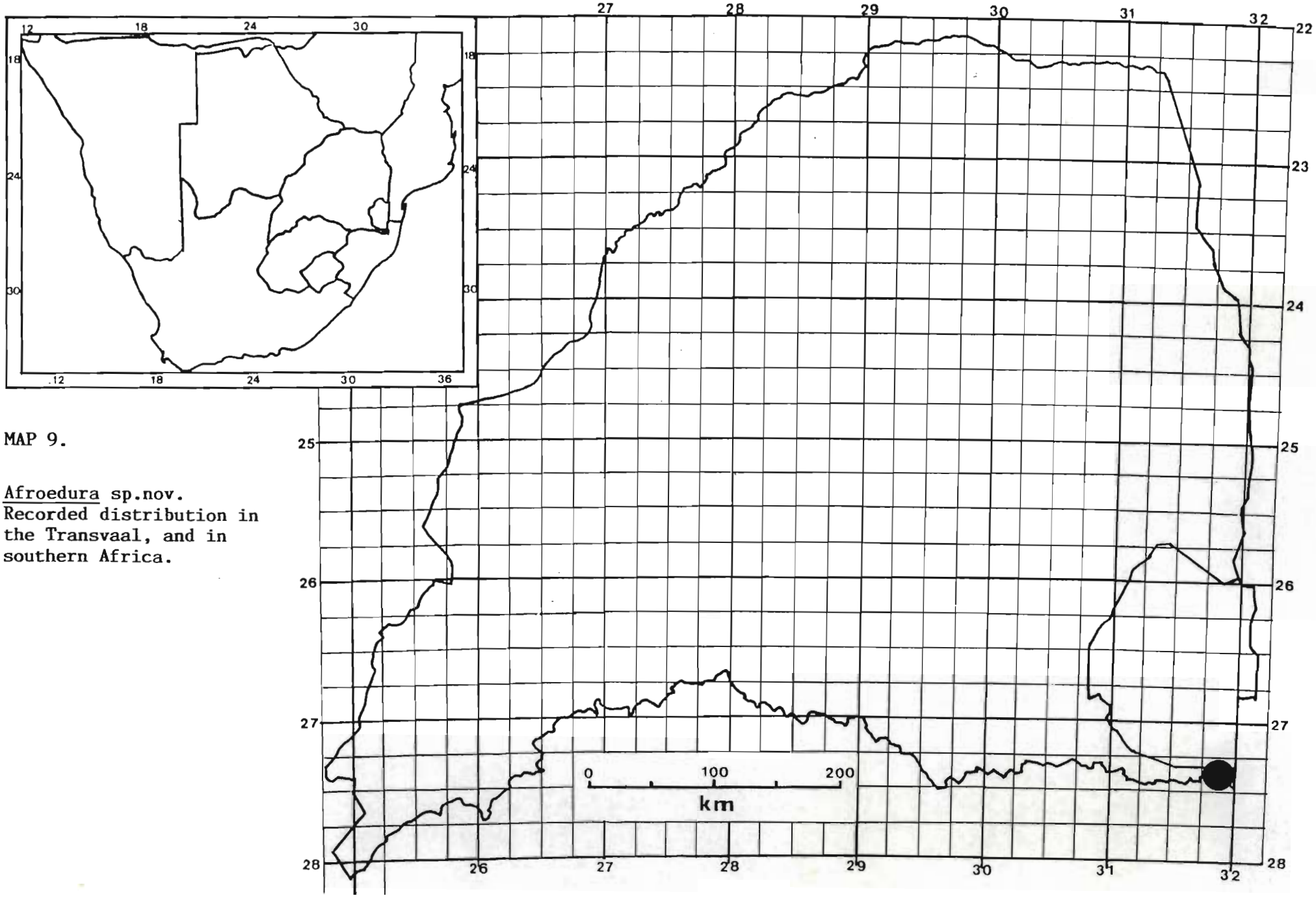
Protected. Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. The species is known to occur within The Blyde river nature reserve. Its habitat renders it secure end under no threat.

Remarks

A closely related species to A. m. haackei by virtue of the keeled dorsal scales, a character shared with A. m. multiporis and A. m. "Abel Erasmus", and therefore significant indicating a relationship between these three forms with the lowest number of precloacal pores in "multiporis" followed by "Abel Erasmus" and lastly "haackei" has the most. The keeled dorsals indicates specific status for these forms as it is of very infrequent occurrence and divergent from A. pondolia.

Afroedura sp. nov. ("Lebombo")

Description. 1 juvenile specimen examined.
Colour: Pale brown to grey brown above with 6 dark brown to blackish crossbands extending from occiput to sacrum. Tail grey brown or olive brown with 11 blackish crossbands. Limbs variegated with dark brown to blackish. A dark brown stripe extends from the nostril through the middle of the eye to meet the occipital bar posteriorly. Ventrally pinkish white under chin, chest and abdomen. Tail greyish-brown below.
Lepidosis: A juvenile gecko with oval head, slender body, well developed limbs and slender tapering tail. The tail appears longer than SVL. Rostral rectangular, much wider than high; nostril pierced between rostral, 1st upper labial and 3 nasals; Supranasals, separated by two vertical granules; Scales on head heterogeneous, those on snout larger and slightly conical, than those on crown of head; scales from nostril to anterior margin of eye 10; scales from posterior margin of eye to anterior margin of earhole ± 12, markedly heterogeneous and the larger ones are keeled, UL 9; Mental approximately as wide as long; postmentals 2; LL 7; Dorsals heterogeneous with large keeled tubercles interspersed



MAP 9.

Afroedura sp.nov.
Recorded distribution in the Transvaal, and in southern Africa.

between smaller flattened and rounded granular subimbricate scales; Ventrals smooth and imbricate; Digits expanded at the tip with 2 prs scansors and 7 enlarged subdigital scales under the 4th toe; 2 enlarged scales at the base of the tail; Tail faintly verticillate with verticils terminated by a row of large keeled scales and from 4-5 scale rows per verticil. Caudal scales imbricate.

Size: Owing to its dehydrated condition, appearance size was not measured.

Distribution

Only known from a single specimen from the Lebombo mountains, south-eastern Transvaal.

Distribution in Transvaal (Map 9).

Pongola nature reserve

Habitat and Ecology

This gecko appears to inhabit scree along the western slopes of the Lebombo mountains in veld type 10 at an altitude of 600 m above sea level.

Conservation Status

Protected. Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. Only known from the Pongola nature reserve but likely to occur elsewhere along the Lebombo mountains. Very rare and difficult to locate.

Remarks

A distinctive Afroedura only known from a juvenile specimen. However the scattered enlarged keeled

tubercles on the back and the termination of each caudal verticil with a row of enlarged keeled tubercles is not shown by any other species. It is also parapatric with Afroedura pondolia marleyi and warrants specific status.

Afroedura pondolia marleyi (FitzSimons, 1943)

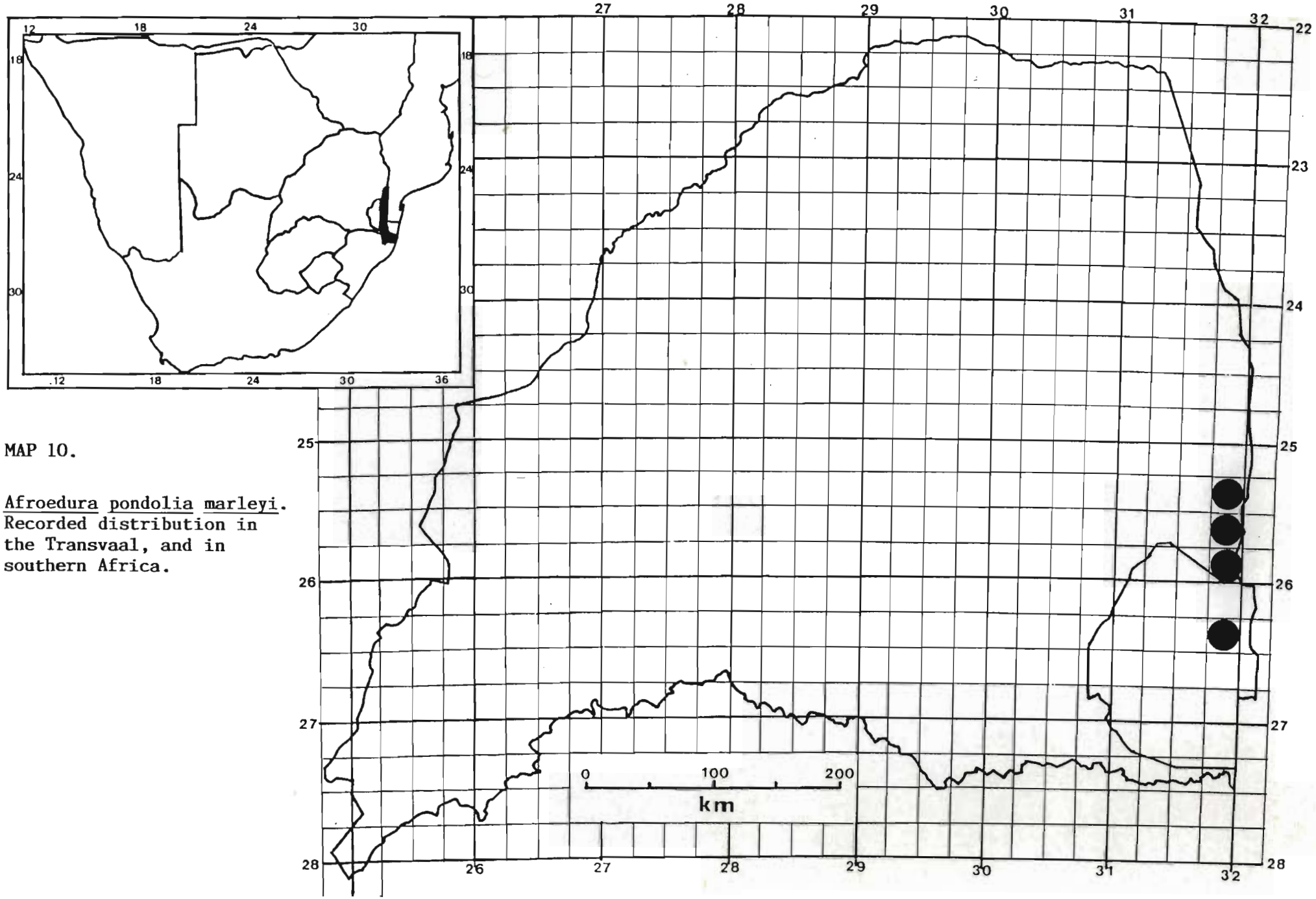
Oedura marleyi FitzSimons 1930. Ann. Tvl. Mus. XIV, p. 22, figs. 4 & 5. Type locality: False Bay Zululand.
Oedura pondolia marleyi FitzSimons. FitzSimons 1943, p. 35-36, figs. 10 & 11.
Afroedura pondolia marleyi (FitzSimons). Loveridge 1947, p. 260, Onderstall 1984, p. 497-509; Jacobsen & Pienaar 1983, p. 137, fig. 2; Welch 1982, p. 14; Branch 1988a, p. 191, 1988b, p. 5.

Diagnosis. Eighteen specimens examined.
Colour: A pale brown gecko with 6 very irregular and occasionally incomplete dark brown crossbars extending from the occiput to the sacrum. Crown of head mottled with dark brown. A dark brown streak extends from the nostril through the middle of the eye to above the ear and may or may not extend as far back as the shoulder. A median vertebral row of white spots mostly present, each spot in an indentation in the posterior margin of the crossbars. Dorsolaterally spotted and blotched with dark brown. Limbs pale brown with scattered dark brown spots or variegations. Original tail banded with up to 11 dark brown crossbands. Regenerated tail fat and spotted or streaked with dark brown. Ventrally pinkish white with a darker tail; Tail grey-brown with narrow dark crossbars or speckling in the case of a regenerated tail.
Lepidosis: A dwarf Afroedura, moderately depressed; Head oval and wider than neck. Body moderately slender. Limbs slender and pentadactyle. Tail rounded and tapered. Original tail longer than SVL and between 50,0

- 58,33% of total length. Rostral about twice as broad as high; nostril pierced between rostral, 1st upper labial and 3 nasals; Supranasals separated by a granular scale; Scales on head heterogeneous, much larger on snout than on crown of head; 10-12 scales between nasals and anterior margin of eye; 16-24 scales between posterior margin of eye and earhole. UL 7-10 (mostly 8 or 9), Mental as broad as longer to twice as broad as long; postmentals 2 rarely 3; LL 7-10, mostly 8, Scales on back homogeneous, round, flat, and juxtaposed to subimbricate. Scales at midbody 88-99; Ventrally flat, larger than dorsals and subimbricate to imbricate. Two pairs of scansors at the tip of the dilated digits, with inferomedian row of subdigital scales slightly enlarged; Femoral pores in males 10-14 although in Transvaal material these range from 12-14 (n = 5). 1-3 enlarged scales at base of tail; caudals in rows, dorsally subimbricate and squarish with a square to rounded posterior margin; Ventrally scales much larger, also squarish with a rounded posterior margin and imbricate.
Size: Largest male SVL = 34,0 mm (J6944 - Halfkroon-spruitmond, KNP), mass = 0,85 g (J6944); Largest female SVL = 36,0 mm (J6464 - Duikerhoek 489 JU), mass = 1,20 g (gravid, J6464). Mean male SVL = 29,8 mm ± 3,85 (1SD) n = 5. Mean female SVL = 31,92 mm ± 3,12 (1SD) n = 10. Mean male mass = 0,71 g ± 0.09 (1SD) N = 4. Mean female mass = 0,75 g ± 0,30 (1SD) n = 9.

Distribution

Restricted in distribution to Zululand, Swaziland and the Transvaal including coastal forest and the Lebombo mountain range.



MAP 10.

Afroedura pondolia marleyi. Recorded distribution in the Transvaal, and in southern Africa.

Distribution in Transvaal (Map 10)

Duikerhoek 489JU; Halfkroonspruit KNP; Mananga.

Habitat and Ecology

Rupicolous and arboreal this small gecko is found in rocky outcrops scattered along the Lebombo mountains, living in crevices between rocks. Usually single or in pairs, it is nocturnal. In Zululand the species has been collected from under the loose bark of trees in coastal woodland (Onderstall 1984). This is one of only two species which are found inhabiting trees as all other members of the genus are rupicolous. Occurs in veld types 10 and 11 at altitudes ranging from 400-600 m above sea level.

Conservation status.

Protected; Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. A non-threatened gecko particularly along the Lebombo mountains where development is not likely to take place with the exception of farming and pastoral activities which promote a reduction in vegetation cover and expose the outcrops to the sun's rays. Some of the smaller outcrops are likely to be depopulated but this is not likely to seriously influence the species. It occurs along the Lebombo in the southern Kruger National Park (Jacobsen & Pienaar 1983) which should adequately ensure its survival.

Remarks:

The peculiar range of habitats occupied by this species indicates that two species are under consideration. However, insufficient material of the arboreal form precludes adequate comparisons. Both FitzSimons (1943)

and Loveridge (1947), mention the apparant immature status of the type specimen due to its small size but as can be seen from the Lebombo material this lizard rarely reaches 36,0 mm SVL in females and 34,0 mm SVL in males. This means that the type specimen may be mature after all. Onderstall (1984) gives A. p. marleyi as having from 10-12 precloacal pores (fig. 7) with 10, 11 and 12 being represented. The latter is likely from the Lebombo mountains. While continuous distribution between the Lebombo and coastal populations has not been established yet, it seems prudent to consider these two forms conspecific at this stage.

Afroedura "Maripi"

Description. 25 Specimens examined.
Colour: Olive brown to olive grey above with variable blackish crossbars extending from the occiput to the sacrum. Crown of head variably marked, filigreed to reticulate. The interstices between the bars laterally are reticulate. Limbs barred or variegated; Tail barred with black, becoming more irregular posteriorly but roughly numbering 10. Ventrally chin, throat, chest and belly whitish while the underside of the tail is greyish brown faintly barred with blackish.
Lepidosis: A distinctive velvety appearing gecko moderately to little depressed. Head oval, wider than neck. Body broad. Limbs short and digits stout. Tail longer than SVL and tapered being from 52,07 - 53,91% of total length. Rostral much broader than high; nostril pierced between rostral, 1st upper labial, and 3 nasals; Supranasals separated by a single internasal granule; head scales heterogeneous, larger on the snout than on the crown of the head; 12-13 scales between posterior nasals and anterior margin of eye; 20-23 scales between posterior margin of eye and anterior margin of earhole;

UL 9 or 10 (rarely 11); Mental large as broad as, to broader than long; postmentals 2 or 3; LL 7-9; Dorsals rounded, granular and flattened, juxtaposed to subimbricate roughly homogeneous; Midbody scales 98-105; Ventrals smooth, imbricate with rounded posterior margin; Digits stout with 2 prs of scansors and 5-8 median enlarged subdigital scales under the 4th toe; Femoral pores in males only 11-13; Original tails broad and tapered and caudal scales in faint verticils with 8 rows per verticil; dorsally caudal scales squarish to rectangular with rounded posterior margin and imbricate; ventrally larger, rounded and overlapping. Regenerating tails very broad. Caudal autotomy evident with 18/23 (78,26%) of tails regenerating.

Size: Largest male SVL = 63,0 mm (N9877 - Mariepskop), mass = 3,8 g (N9875 - Mariepskop); Largest female SVL = 63,0 mm (N9877 - Mariepskop), mass = 6,5 g (J6096 - Mariepskop). Mean male SVL = 56,71 mm ± 5,15 (1SD) n=7, mass = 2,98 g ± 0,48 (1SD) n=7; Mean female SVL = 56,72 mm ± 5,06 (1SD) n=9, mass = 3,34 g ± 1,42 (1SD) n=9.

Distribution

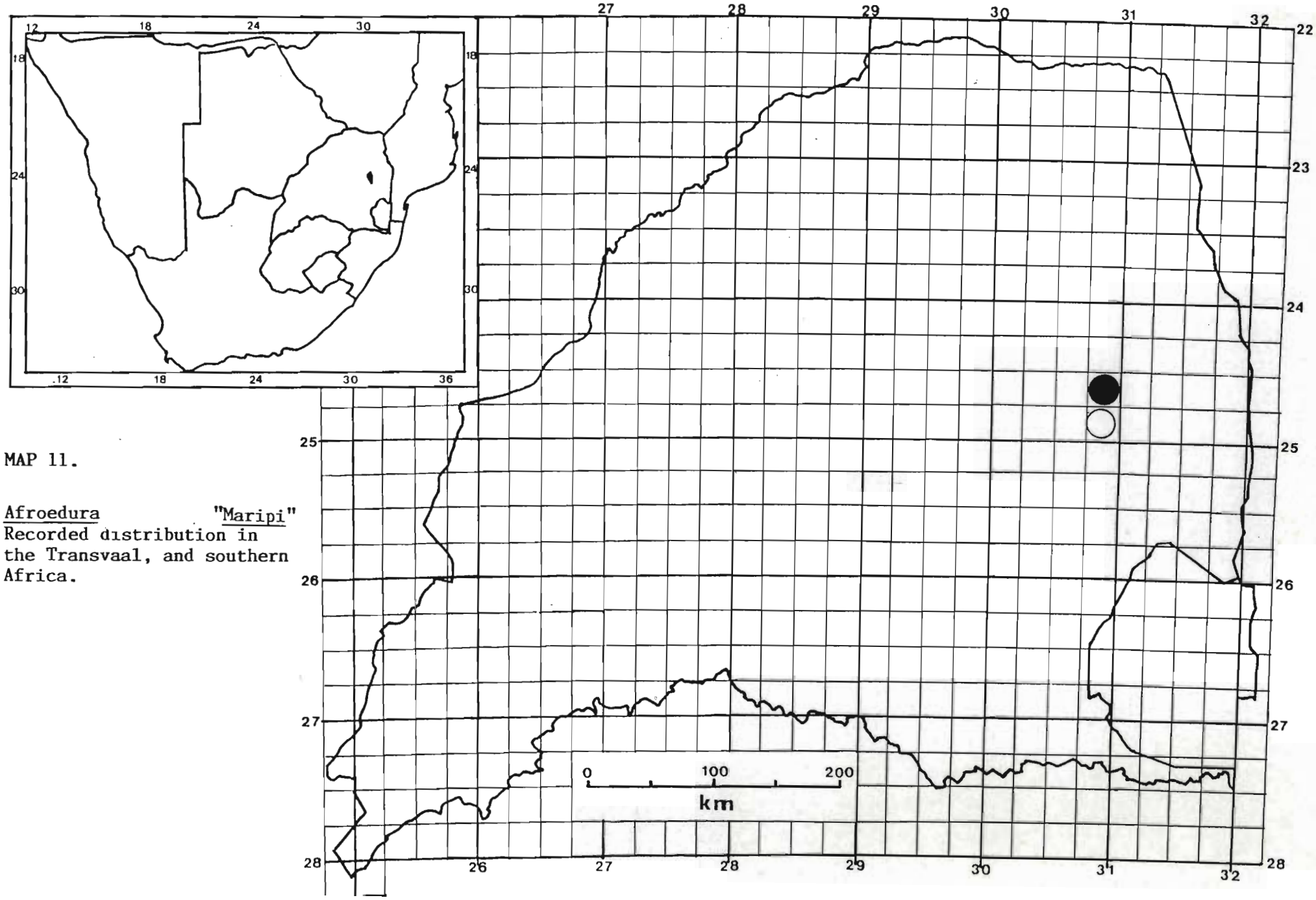
Endemic to the eastern Transvaal

Distribution in Transvaal (Map 11).

Mariepskop; God's Window.

Habitat and Ecology.

A rupicolous gecko inhabiting crevices under pieces of exfoliating rock and in crevices between rocks as well as clinging to rocks under dark overhangs. A large gecko and one of the most distinctive of the genus it is found in veld type 8 at altitudes of 1700-1900 m above sea



MAP 11.

Afroedura "Maripi"
Recorded distribution in the Transvaal, and southern Africa.

level. Some individuals were removed from boulders in pine forests indicating a degree of adaptability. Oviparous, two eggs are laid at a time during August, September and October. The ova are soft when laid but adhere to the rock and harden. The eggs measure 9,5-10,9 x 7,8-9,3 mm and take approximately 2 months to hatch. Neonates measure 23,0 mm SVL, 21,0 mm tail with a mass of 0,25-0,3 g.

Conservation Status

Protected. Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. Also occurs within the boundaries of the Blyde River nature reserve. Coupled with its habitat requirements and apparent adaptability makes this species secure. Research is needed on the habits of this species.

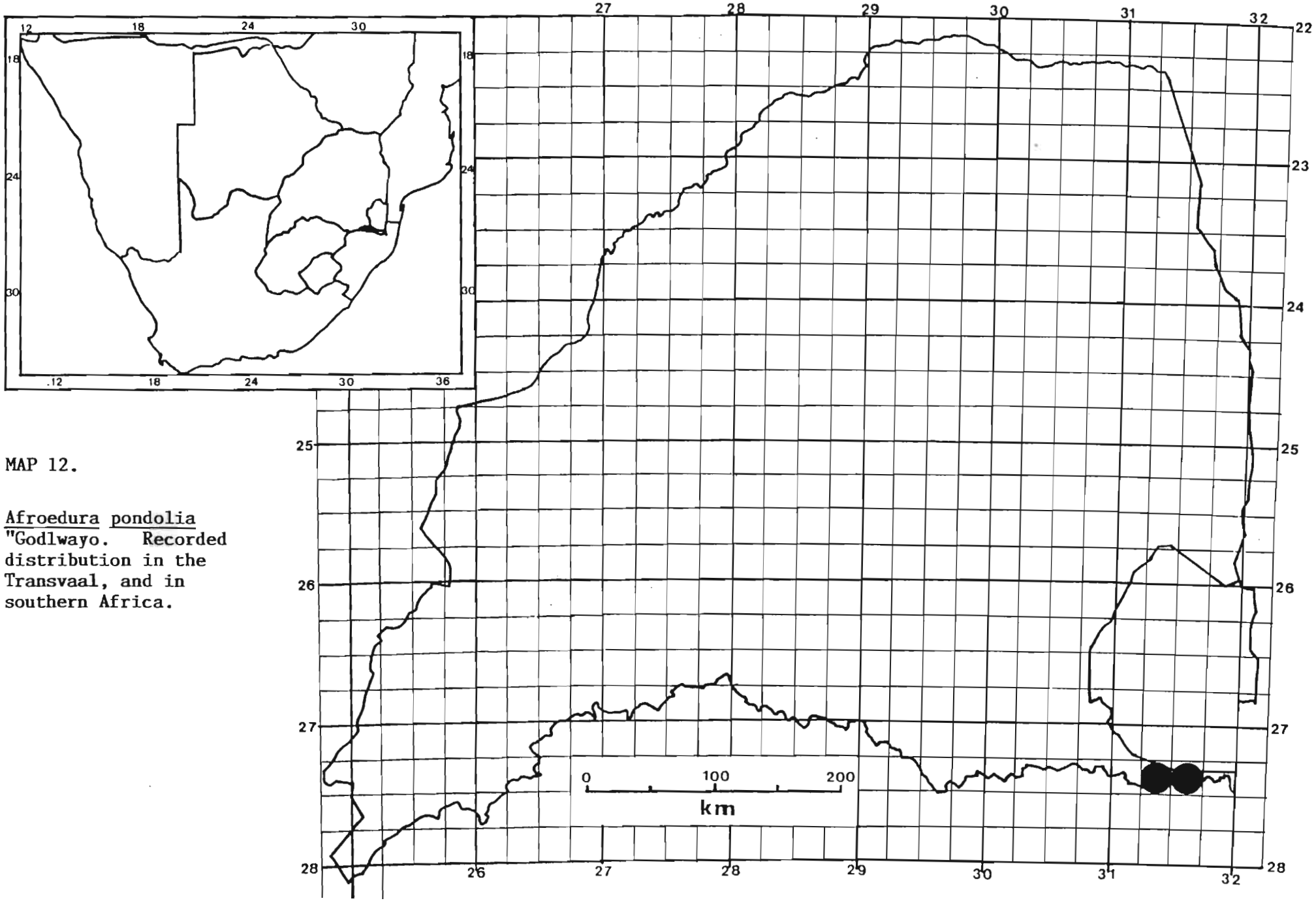
Remarks

A distinctive gecko, differing in its large size, lower number of precloacal pores and number of scales at midbody from others of the genus in the area.

Afroedura pondolia "Godlwayo"

Description. 13 Specimens examined.
Colour: Pale brown to brown with 6-8 dark brown, irregular, wavy crossbands extending from occiput to sacrum. A white spot or spots occurs adjacent to the crossbars along the vertebral line. Crown of head pale with brown to dark brown patches. A dark brown stripe extends from the nostrils through the middle of the eye to link up with the occipital bar. Orbits of eyes show up dark grey to blackish through skin. Limbs spotted and mottled with brown to dark brown. Original tail with 9

dark brown crossbands down the length. Ventrally pinkish white with slightly darker pigmentation under the tail.
Lepidosis: A very small Afroedura, and depressed. Head oval, wider than neck. Body moderately slender; Limbs and digits well developed and pentadactyle; Tail slender and tapered as long or longer than SVL and between 50,46 - 52,78% of total length. Rostral rectangular, much broader than high; nostril pierced between rostral, 1st upper labial and 3 nasals; Supranasals separated by 1, rarely 2 scales; Scales on head heterogeneous, those on snout larger than those on crown; scales from posterior nasal to anterior margin of eye 10-12; 20-23 scales from posterior margin of eye to anterior margin of earhole; UL 9, occasionally 8 or 10; Mental wider than long; postmentals 2 or 3; LL 8 rarely 7; Dorsal scales more or less homogeneous becoming larger laterally; rounded, flattened and juxtaposed to subimbricate; midbody scales 95-103; Ventrals larger than dorsals, rounded posterior margin and imbricate; Digits slender and expanded at the tip with 2 prs of scansors and mostly 0, rarely 3-5 enlarged subdigital scales under the 4th toe. Femoral pores in males only 21-23; original tail faintly verticillate with 6 scale rows per verticil; dorsal caudal scales imbricate, squarish to rectangular with rounded posterior margins; Ventrally scales larger than dorsals, irregularly shaped, smooth and imbricate. Caudal regeneration apparent with 8/12 (66,67%) showing caudal autotomy.
Size: Largest male SVL = 35,0 mm (N 7357 - Godlwayo), mass = 1,0 g (N 7357); Largest female SVL = 40,0 mm (N 7273 - Zwartkloof 60 HU), mass = 0,9 g (N 7257). Mean male SVL = 34,1 mm ± 0,55 (1SD) n=5, mass = 0,8 g ± 0,17 (ISD) n=5; Mean female SVL = 38,0 mm ± 1,41 (1SD) n=5, mass = 0,75 ± 0,05 (1SD), n=3.



MAP 12.

Afroedura pondolia "Godlwayo. Recorded distribution in the Transvaal, and in southern Africa.

Distribution

Currently endemic to the south-eastern Transvaal but likely to be found in northern Natal and southern Swaziland.

Distribution in Transvaal (Map 12).

Godlwayo; Zwartkloof 60 HU.

Habitat and Ecology

A small, flat gecko found in narrow crevices between rocks and under slabs of exfoliating flakes of granite. Found in veld types 10 and 63 at altitudes of 750-850 m above sea level.

Conservation Status

Protected. Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. Does not occur in a provincial nature reserve, but in its habitat it is rare and difficult to obtain and is therefore considered secure. However more detailed surveys needed of the total range of the species.

Remarks

A distinctive little gecko which can only be confused in appearance with those from the Lebombos and those from Sekhukhuneland but the latter has the nasals in contact and the highest number of precloacal pores in the genus. The former has half the number of precloacal pores but is otherwise very similar and the two appear to be closely related.

Afroedura langi "Soutpansberg"

Description. 56 Specimens examined.
Colour: Pale grey to buffy or pinkish brown to whitish brown above with 6-7 dark brown to blackish very wavy and irregular crossbands extending from occiput to sacrum. Crossbands darkest posteriorly incompletely edged with white. A white spot is found on each crossband mesially along the vertebrae. Crown of head heavily spotted or mottled with dark brown; an anteriorly pointing dark-brown V-shaped mark extends to along the canthus rostralis; a dark streak extends from the nostril through the middle of the eye to above the ear, meeting the occipital band. Limbs spotted with white and dark-brown; original tail banded with 10 regular dark brown to blackish crossbars edged with black posteriorly followed by a narrow band of white. Ventrally whitish-pink; underside of tail mottled and spotted with white and brown.
Lepidosis: Head and body moderately depressed; tail depressed but long and tapering, longer than SVL and between 50,0-55,5% of total length. Head oval, wider than neck; body broadest posteriorly; Limbs well developed with stout toes. Regenerating tails broader than originals. Rostral more or less rectangular - approximately twice as broad as high; nostril pierced between rostral, 1st upper labial and 3 nasals; supranasals largest and in moderate median contact (rarely separated by a granale) behind rostral; Scales on snout flattened and much larger than those on crown of head; Scales on crown, rounded nodular and juxtaposed; Scales between nasals and anterior margin of eye 10-13, and from 18-23 between posterior margin of eye and earhole; UL 7-10 (mostly 8 or 9); Mental wedge-shaped and from 1,0-2,0 as long as wide; postmentals 1-3 (mostly 2); LL 6-9 (mostly 7 or 8); Dorsals granular, rounded and flattened, juxtaposed and homogeneous. Scales at midbody 88-103; Ventrals smooth, rounded, subimbricate; Digits terminally expanded with 2 pairs of

scansors and a third undivided to partially divided but appearing functional; 0-8 inferomedian lamellae under 4th toe; Femoral pores in males only, range from 8-12 (mostly 11 or 12) with a single median scale frequently without a pore; 1-4 (mostly 2 or 3) enlarged scales at the base of the tail; Tail almost imperceptibly verticillate with 6 scale rows per verticil; Scales on tail dorsally small rounded at the tip, squarish and in regular imbricate rows; Ventrally much larger, overlapping and rounded. Caudal autotomy present with 26/56 (46,43%) of tails regenerating.
Size: Largest male SVL = 56,0 mm (N11619 - Leipzig 264 LR), mass = 3,0 g (N11616 - Leipzig 264 LR). Largest female SVL = 55,0 mm (N7419 - Newgate 802MS), mass = 4,5 g (N7418). A. Soutpansberg. Mean male SVL = 45,75 mm ± 4,45 (1SD) n=10, mass = 2,13 g ± 0,60 (1SD) n=10; Mean female SVL = 46,15 mm ± 5,14 (1SD) n=13, mass = 2,26 g ± 0,94 (1SD) n=13. B. Blouberg. Mean male SVL = 48,06 mm ± 4,91 (1SD) n=9, mass = 2,26 g ± 0,63 (1SD) n=9; Mean female SVL = 45,25 mm ± 5,46 (1SD) n=12, mass = 1,99 g ± 0,79 (1SD) n=12.

Distribution

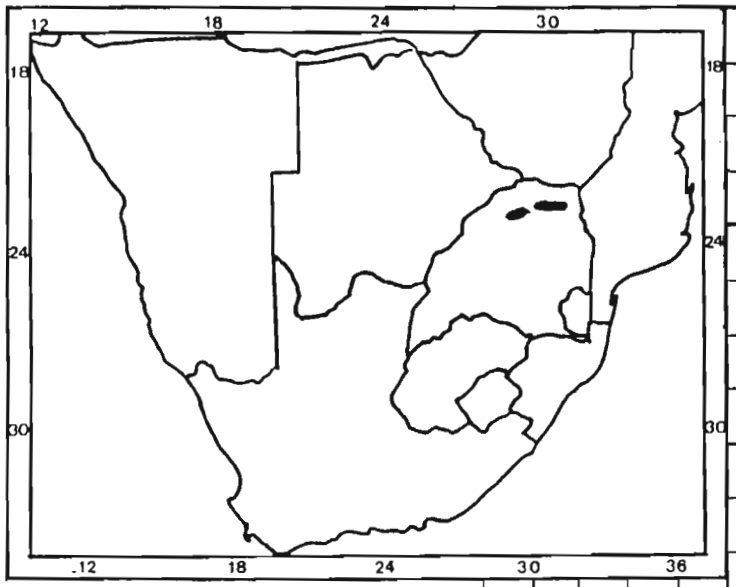
Endemic to the Soutpansberg and Blouberg, Transvaal.

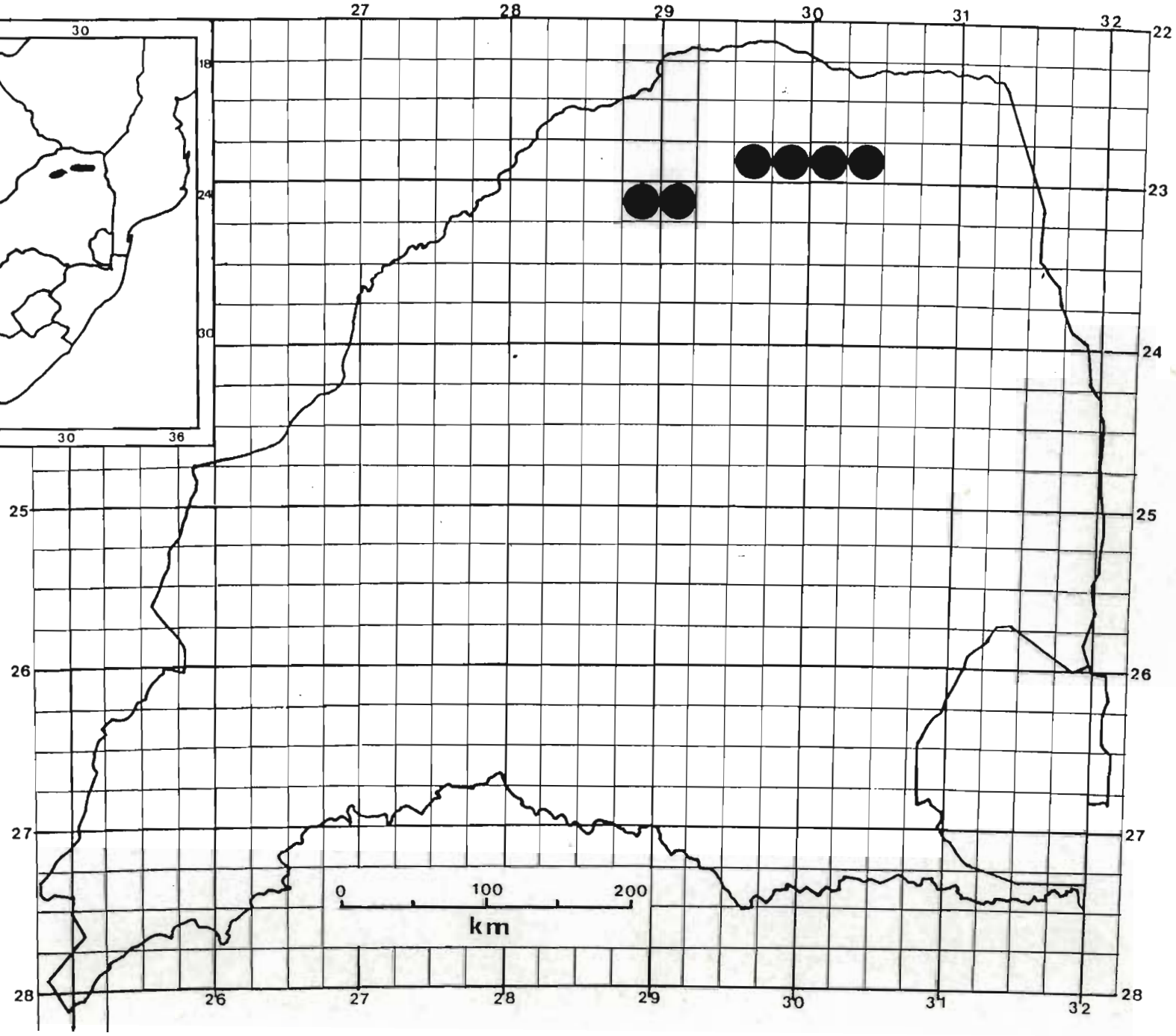
Distribution in Transvaal (Map 13).

Leek 769MS; Leipsig 264LR; Mutshenzhene; Newgate 802MS; Outlook 789MS; Peover 772MS; Urk 10LS; Vhuswinzhe.

Literature Records

8 km N. of Louis Trichardt, (NMZB).





MAP 13.

<u>Afroedura langi</u>
"Soutpansberg".
Recorded distribution in the Transvaal, and in southern Africa.

Habitat and Ecology

A rupicolous gecko, it frequents crevices and fissures between rocks as well as under flakes on rocky outcrops along the summit of the southern ranges of the Soutpansberg. Usually found singly or in small family groups these oviparous lizards lay two eggs at a time during midsummer. Communal nesting is prevalent with more than 20 eggs found under a rock on rock. The eggs adhere to the substrate prior to hardening. The geckos are nocturnal and occur on outcrops in veld types 8, 19 and 20 at altitudes of 1000-1650 m above sea level.

Conservation Status

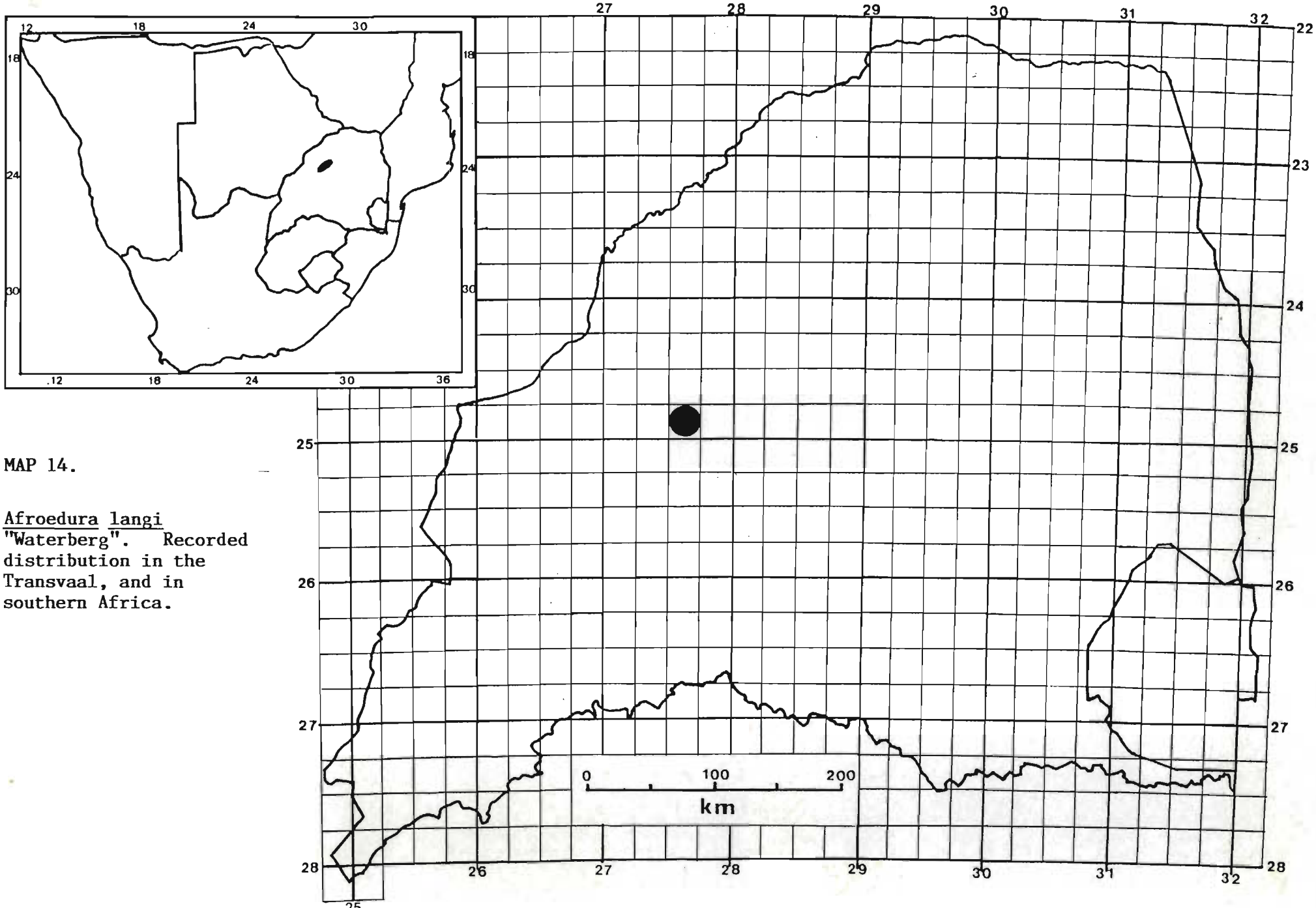
Protected. Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. Endemic to the Soutpansberg it occurs in the Happy Rest Nature Reserve. Elsewhere its habitat is secure and the gecko is under no threat although locally afforestation may create a problem.

Remarks

A phenon restricted to the Blouberg and Soutpansberg, occurring mostly along the southern range. Three populations are known, each of which appearing to differ slightly from the other. Morphologically the overlap of character variables renders it difficult to separate them. In the case of the Soutpansberg form it is separated from those of the Blouberg by a different taxon along the Waterpoort. In addition male Blouberg male specimens have precloacal pores ranging from 8-11 (mostly 9 or 10) while those from the Soutpansberg have 9-12 (mostly 11 or 12). Due to the similarities of these forms they have provisionally been placed together until such time and evidence becomes available to separate them.

Afroedura langi "Waterberg"

Description. 8 Specimens examined.
Colour. Brown to pale brown above with 6-7 wavy dark brown to blackish crossbands extending from the occiput to the sacrum. Posterior margin of crossbands darker and with white spots in identations. The vertebral row of white spots most pronounced. Crown of head marbled with dark brown and a dark brown stripe extends from the nostrils trhough the eye merging into the occipital crossbar. Limbs striped with dark brown with spaces between spotted and a reticulate pattern on the thighs. Tail with 7 crossbands at regular intervals. Ventrally white to whitish pink. Underside of tail brown with incomplete pale crossbars.
Lepidosis. Relatively small depressed geckos with a depressed tail. Head roughly oval and wider than neck. Body slender and limbs well developed and pentadactyle. Tail tapering gradually to a narrow tip. Tail longer than SVL and between 50,0 - 56,38% of total length. Rostral elongate at least twice as long as broad; nostril pierced between rostral, 1st upper labial and 3 nasal scales; Supranasal in broad contact behind rostral; scales on snout round and flattened but several times as large as those on crown of head. Head scalation heterogeneous; 10-12 scales from nasals to anterior border of eye; 15-19 scales between posterior margin of eye and anterior of earhole. UL 8-11 (mostly 9 or 10); Mental squat as wide as long to longer than wide; postmentals 2; LL 7 less frequently 8 or 9. Dorsals roughly homogeneous and granular. Scales at midbody 92-99; Ventrals smooth and imbricate, slightly hexagonal; Digits slender and expanded tip with two pairs of scansors; 6 rarely 7, 8 or 2 enlarged subdigital inferomedian scales under 4th toe. Femoral pores in males only, 3-7; Tail faintly verticillate with



MAP 14.

Afroedura langi "Waterberg". Recorded distribution in the Transvaal, and in southern Africa.

7 scales rows per verticil, broad at base tapering to a narrow point; dorsal scales square in regular rows flattened and subimbricate; Ventral caudal scales largest mesially, flattened and rounded on posterior margin and subimbricate; From 0-3 enlarged scales at base of tail.

Size: Largest male SVL = 41,0 mm (JN11771 - Waterval 601LQ), mass = 1,8 g (JN11771); Largest female SVL = 46,0 mm (JN11772 - Waterval 601LQ), mass = 2,8 g (JN11771). Mean SVL = 40,64 mm ± 7,12 (1SD) n=7, mass = 1,83 g ± 0,72 (1SD)n=7.

Distribution

Endemic to the Waterberg, Transvaal.

Distribution in Transvaal (Map 14).

Fancy 556 LQ; Fouriesskloof 557 LQ; Waterval 601 LQ.

Habitat and Ecology

A small rupicolous gecko found in crevices between rocks on rocky outcrops and on cliff faces. Inhabits dry crevices usually horizontal but also vertical. Has only been observed in veld type 20 at an altitude of 1 000 m above sea level.

Conservation Status

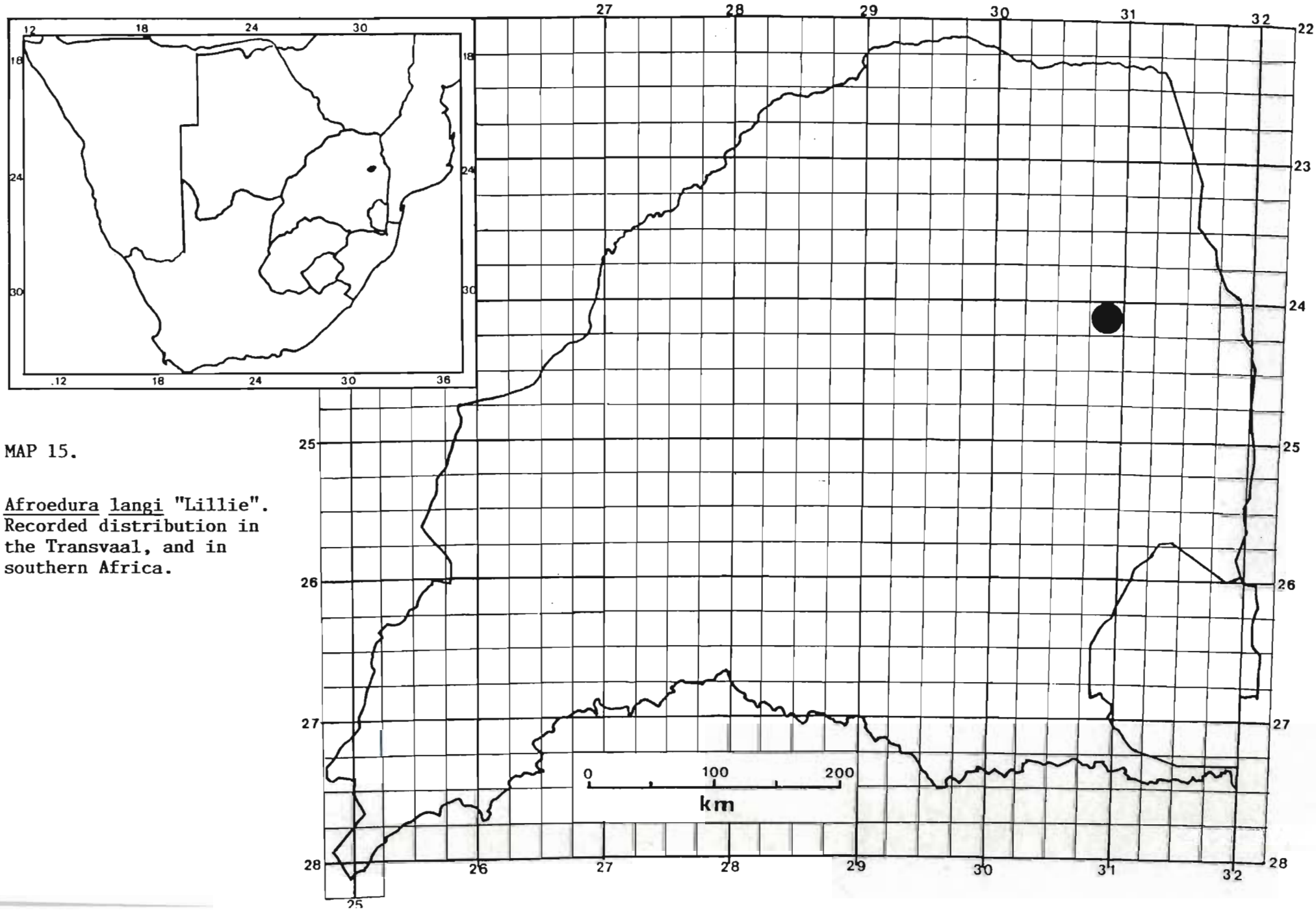
Protected. Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. Is not known to inhabit any provincial nature reserve but could occur in the newly acquired D'Nyala nature reserve and possibly the Hans Strijdom dam nature reserve. However its habitat is secure and this also pertains to the lizard.

Remarks

A small species with the lowest number of precloacal pores in the Transvaal. The phenon is well separated from other forms, the nearest being those from the inselberg at Matlala.

Afroedura langi "Lillie"

Description. 10 Specimens examined.
Colour: Pale grey-brown to brown dorsally with 6 wavy dark brown irregular crossbars between occiput and sacrum. The crossbars are edged with black posteriorly. In the posterior indentations of the crossbars are white or whitish spots particularly along the vertebral column. The crown of the head is pale brown with dark brown spots and stripes, these also found on the snout. A dark brown stripe extends from the nostrils through the eye, above the earhole to link up with the occipital bar. On the body between the stripes are variable pale and dark spots and blotches. The limbs have a dark brown reticulate pattern but this is variable. The dorsal surface of original tails with at least 10 dark brown to blackish crossbands with half bands also found between the crossbands. Areas between the crossbands are speckled. Ventrally white, while the underside of the tail is speckled with brown.
Lepidosis: Medium to large flat geckos with an oval head distinct from the neck. Body slender and limbs and digits well developed. Tail tapered and only moderately depressed. Original tail longer than SVL being between 53,18 - 58,27% of total length. Rostral approximately twice as wide as long; nostril pierced between rostral, 1st upper labial and 3 nasal scales; Supranasals in broad contact, rarely separated by a granule. Head scales heterogeneous, those on the snout, flattened,



MAP 15.

Afroedura langi "Lillie". Recorded distribution in the Transvaal, and in southern Africa.

rounded and much larger than those on the crown; scales between nasals and anterior border of eye 10-12; scales from posterior border of eye to anterior margin of earhole 18-22; UL 9 or 10; Mental wedge-shaped tapering posteriorly and between 1,2 - 1,5 times as long as wide; postmentals 2 rarely 1; LL 8 more rarely 7; Dorsal body scales homogeneous, rounded, flattened and juxtaposed; Scales at midbody 98-106; Ventrals roughly hexagonal, smooth, flat and imbricate; Digits expanded at the tip with 2 pairs of scansors and from 1-2 (exceptionally as much as 6) enlarged inferomedian scales under the 4th toe; Femoral pores in males only, 13-16; Enlarged scales at base of tail 1, occasionally 2, rarely 0; Original tail verticillate under microscope with 7 dorsal rows and 4 ventral scale rows per verticil. Caudal scales subimbricate, squarish to more or less rectangular with a rounded posterior margin; Ventral scales, much larger than dorsals, squarish to hexagonal with rounded posterior margin, subimbricate.

Size: Largest male SVL = 58,0 mm (N11661 - Lillie 148KT), mass = 3,0 g (N11661); Largest female SVL = 54,0 mm (N11659 - Lillie 148KT), mass = 3,6 g (N11659). Mean male SVL = 51,44 mm ± 4,48 (1SD) n=8, mass = 2,38 g ± 0,61 (1SD) n=7; Mean female SVL = 52,75 mm ± 1,77 (1SD) n=2, mass = 3,05 g ± =,78 (1SD) n=2.

Distribution

Endemic to the eastern Transvaal Lowveld.

Distribution in Transvaal (Map 15).

Lillie 148 KT

Habitat and Ecology

Restricted to decomposing granite outcrops and hillsides on the farm Lillie 148 KT in veld type 11 at altitudes of about 600-800 m above sea level. These flat geckos inhabit crevices on the underside of boulders formed by exfoliating sheets, although also found in crevices between rocks. Occasionally in the company of large scorpions Hadogenes troglodytes.

Conservation status.

Protected. Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. The distribution is almost totally incorporated in the Lillie flora reserve and the species is therefore secure.

Remarks

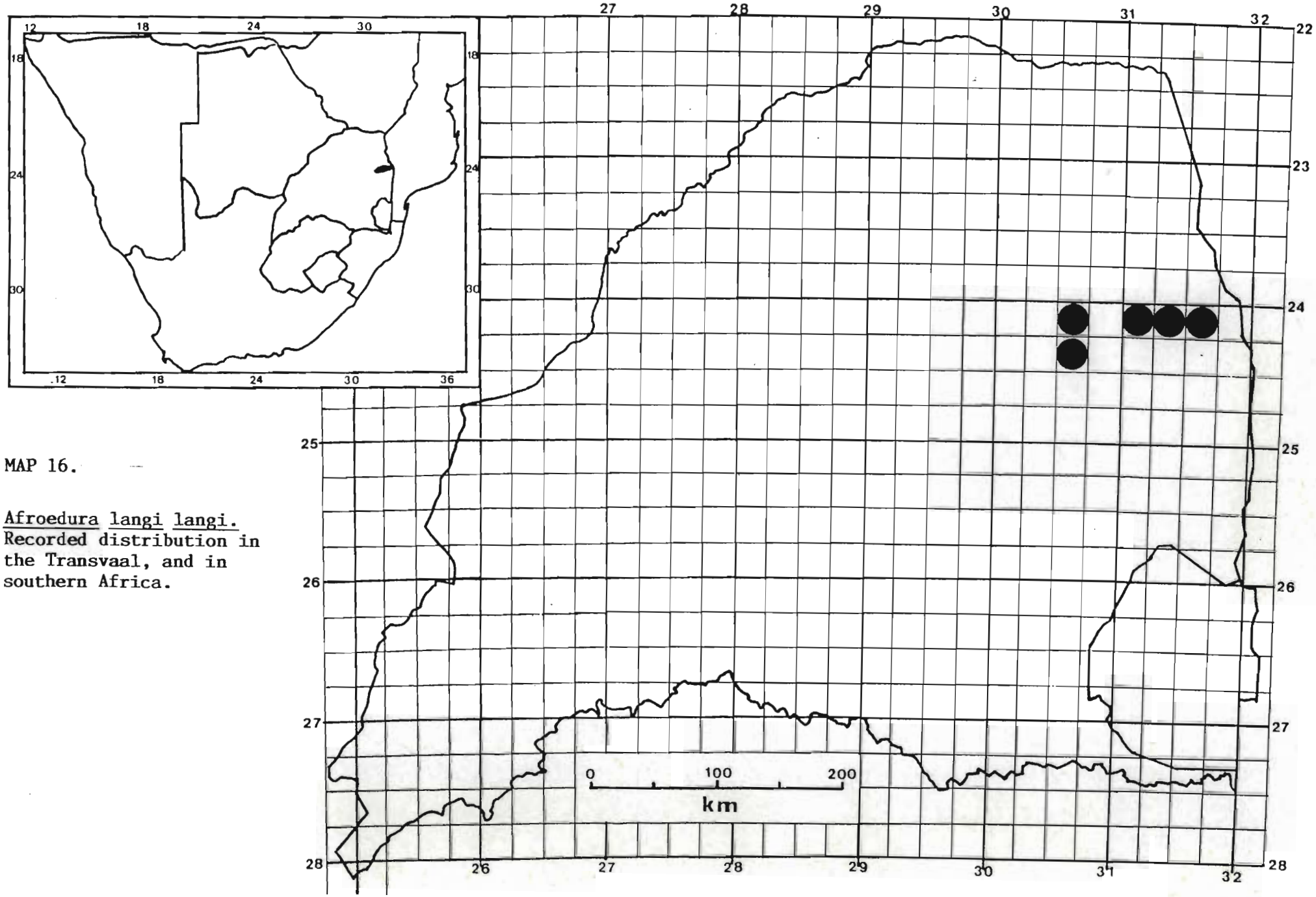
A distinct phenon occurring in this area in company with Lygodactylus stevensoni and a rare snake Aparallactus l. lunulatus. Distinguished from A. l. langi its closest affiliate by its greater size, greater number of midbody scales as well as greater number of scales between eye and earhole. Many of the morphological characters overlap with that of langi, but the frequencies exhibit different modes. In colour they are dissimilar and it is clear that two phena are involved and not one.

Afroedura l. langi (FitzSimons, 1930)

Oedura langi FitzSimons 1930 Ann. Tvl. Mus. 14, p. 21, figs. 1-3. Type locality: Farm Venice, on the Brakriver, Lydenburg dist., eastern Transvaal. FitzSimons 1943, p. 42, figs. 12-14.
Afroedura pondolia pondolia (Hewitt) part. Loveridge 1947, p. 260; Welch 1982, p. 14.

Afroedura pondolia langi (FitzSimons). Onderstall 1984, p. 497; Branch 1988a, p. 191, 1988b, p. 5.
Afroedura langi (FitzSimons). Pienaar et al 1983, p. 32, pl. 5.

Description. 29 Specimens examined.
Colour: A slender, brown to pinkish grey gecko with a long tapering tail. Dark blackish brown to black irregular wavy crossbands occur down the back and onto the tail. Below pinkish offwhite due to the translucency of the skin.
Lepidosis: A small to medium sized gecko. A squat species, the head is oval, larger than the neck. Limbs well developed and pentadactyle. Body slender to broad; Original tail moderately depressed and tapered to a narrow tip. Tail longer than SVL being between 50,0 - 55,75% of total length. Rostral much broader than deep; nostril between rostral, 1st upper labial and 3 nasal scales; supranasals in broad median contact; Scales on head heterogeneous, those on snout much larger, roughly hexagonal and conical, than those on the crown of the head which are rounded and flattened; Scales between nasals and anterior border of eye 10-12; Scales from posterior margin of eye to anterior border of earhole 15-18; UL 7-10, mostly 8 or 9; Mental wedge shaped, tapering posteriorly, from 1,1 - 1,3 times as long as wide; postmentals 2 exceptionally 1; LL 7 or 8; Dorsal scales homogeneous, round flat and juxtaposed; Midbody scales 96-101; Ventrals smooth, flat and subimbricate; Digits terminate in two pairs of scansors with 1-9 enlarged inferomedian scales under the 4th toe; Precloacal pores in males 14-17 but appear to be mostly 14; 2, rarely 1 or 3 exceptionally 0, enlarged scales at base of tail; Tail depressed and virtually non-verticillate with caudal scales in 7 rows dorsally and 4 ventrally; caudal scales squarish dorsally, with rounded



MAP 16.

Afroedura langi langi.
Recorded distribution in the Transvaal, and in southern Africa.

posterior margin and subimbricate, ventrally squarish to hexagonal much larger than dorsals and with rounded posterior margin and subimbricate.

Size: Largest male SVL 44,0 mm (J6748 - Tseri River, KNP), mass = 1,9 g (J6748); Largest female SVL 45,5 mm (TM429855 - Venice 40KU), mass = 1,75 g (J6763 - Mashatulmond, KNP). Mean male SVL 40,57 mm ± 3,27 (1SD), n=7, mass = 1,85 g ± 0,07 (1SD) n=2; Mean female SVL = 41,68 mm ± 3,85 (1SD), n=4, mass = 1,38 ± 0,31 (1SD), n=5.

Distribution

Restricted to the Transvaal along the Olifants River and part of the tributaries.

Distribution in Transvaal (Map 16).

Harmony 140KT; Hlaralumi River KNP border; Mashatumond; Picket Road, Tseri River; Venice 40KU.

Literature Records

Nkomichi, Olifants R (Pienaar et al, 1983).

Habitat and Ecology

Restricted to rocky outcrops in the Lowveld at altitudes ranging from 250-300 m. It inhabits crevices between rocks. Nocturnal, solitary or in pairs they are found clinging to the sides or undersides of the rock depending on the type of crevice.

Conservation Status.

Protected. Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. A rupicolous lizard its survival is dependent on rocky outcrops throughout its range. These habitats are secure and the species occurs in the Kruger National Park as well as on several private nature reserves.

Remarks

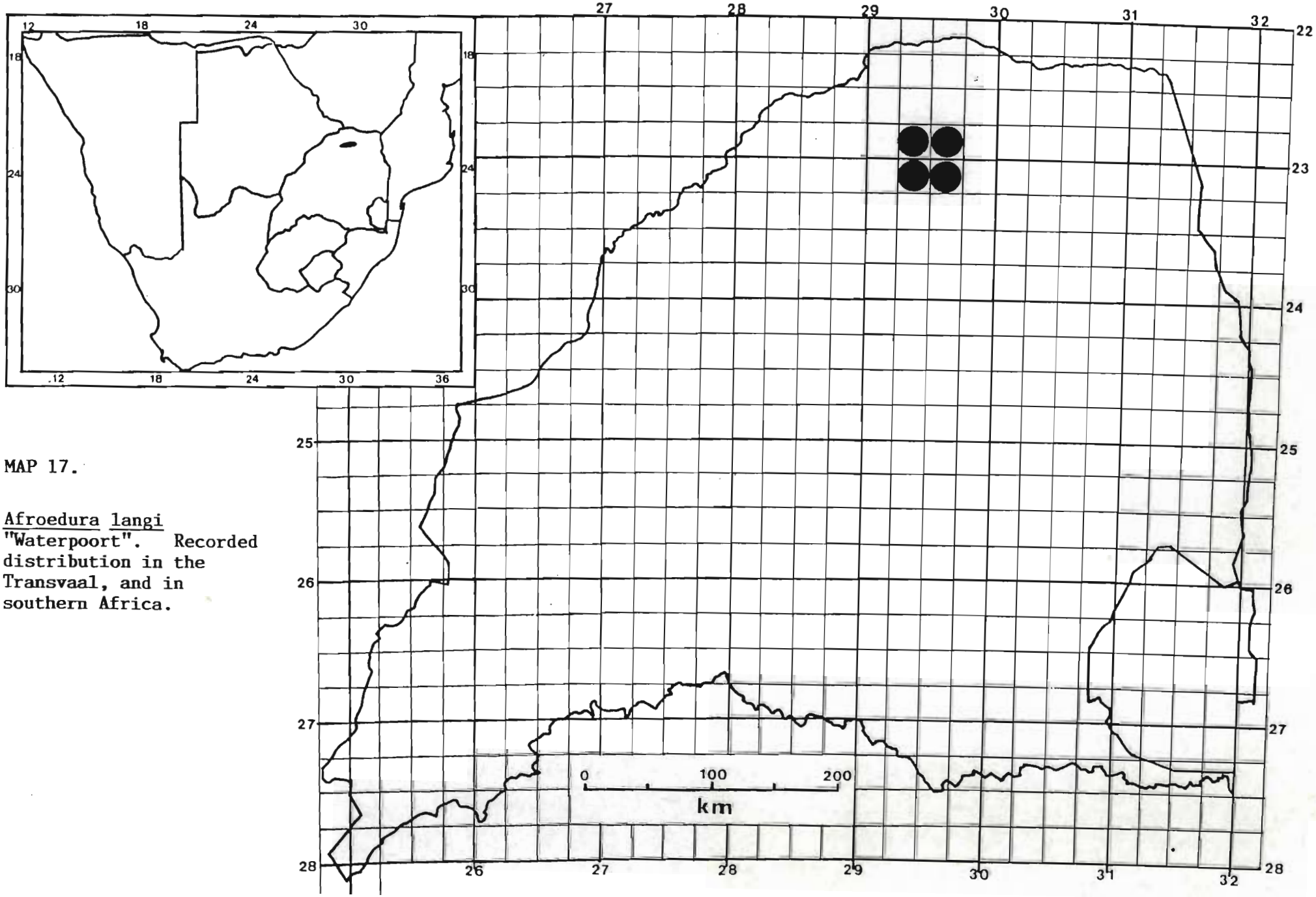
FitzSimons (1930) originally described the gecko as a full species, an opinion which he retained (FitzSimons, 1943). Loveridge (1944) argued that the definitive characters used by FitzSimons (1930) to separate A. pondolia pondolia from A. langi were unstable and therefore lumped the latter with the former. Onderstall (1984), on an examination of a series of specimens from the type locality reinstated langi as a subspecies of pondolia. However, on an evaluation of the group, this volume, pp. 101-105, fig. 4, langi is reinstated as a full species, based on the absence of internasals.

Afroedura langi "Waterpoort"

Description. 48 Specimens examined.
Colour. Grey-brown to brown dorsally with 6-7 irregular dark brown to blackish crossbars occasionally bordered posteriorly by black followed by white. The white may also only be evident as a median spot. The dorsum is greatly variegated, mottled with brownish black and off white. Head mottled dorsally; a dark stripe extending from nostrils through eye to rear of head linking up with the second crossbar in the neck region. Limbs brownish with pale and dark spotting and marbling. Original tail with 8-13 crossbars, with areas inbetween spotted or marbled. Ventrally whitish to pinkish mesially.

Lepidosis: A moderately depressed gecko with a pronounced head, widest posteriorly. Limbs moderately developed, feet pentadactyle. Tail slender and tapered to a slender tip (original) while regenerated tails are fat and depressed basally tapering to a fine tip. Original tail longer than SVL and between 50,0 - 58,40% (mostly 51,5%) of total length. Rostral much broader than high, roughly rectangular; nostril pierced between rostral, 1st upper labial and three nasal scales; supranasals in broad contact behind rostral; scales adjacent to nasals not enlarged; head scales rounded, flattend juxtaposed and heterogeneous; scales on snout larger than those on crown of head; Scales from nasals to anterior border of eye 10-14; Scales from posterior border of eye to earhole 17-22; UL 8-12 (mostly 9-11); Mental wedge-shaped and from 1,2 - 2,3 times as long as broad; postmentals 2 rarely 1; LL 7-10 (mostly 8 or 9). Dorsals granular, rounded, slightly flattened and juxtaposed; scales at midbody 86-98, including ventrals; Ventrals smooth, flat and subimbricate; 0-4 enlarged scales on either side of tail base (usually 2-3). Digits expanded at the tip with two pairs of scansors, a third pair small divided but without scansors; 1-8 (mostly 5-7) enlarged subdigital scales under 4th toe. Femoral pores in males only 14-19 (mostly 17-19) as some scales in the middle of the pore row without pores in some specimens; original tail verticilled under enlargement, with 7 scale rows per verticil; dorsal caudal scales squarish, flattened and smooth, juxtaposed; ventral scales smooth, flat and imbricate. Caudal autotomy present with 10/31 (32,25%) of tails regenerating. Regenerated tails may become fat accentuating the verticillations.

Size: Largest male SVL = 51,0 mm (N7609 - Calitzdorp 221LS), mass = 3,3 g (N7609): Largest female SVL = 52,0 mm (N7592 - Bristol 760 MS), mass = 2,6 g (N7578 -



MAP 17.

Afroedura langi "Waterpoort". Recorded distribution in the Transvaal, and in southern Africa.

Bristol 760 MS). Mean male SVL = 44,56 mm ± 3,08 (ISD) n=16, mass = 1,89 g ± 0,63 (ISD) n=15; Mean female SVL = 47,12 mm ± 3,72 (ISD) n=16, mass = 2,05 g ± 0,54 (ISD) n=16.

Distribution.

Endemic to the northern slopes of the western Soutpansberg, Transvaal.

Distribution in Transvaal (Map 17).

Bristol 760MS; Calitzdorp 221LS; Crimea 747MS; Robertson 748MS; The Moss 763MS; Vivo area; Waterpoort 695MS; Zoutpan 459MS.

Habitat and Ecology

Rupicolous geckos, inhabiting crevices and fissures in and between boulders on rocky outcrops, favouring pieces of exfoliating rock particularly those with openings facing downwards so that no water runs in. Nocturnal, they are normally found singly, more rarely in pairs although occasionally three individuals in the same crevice. Found on both north and south facing slopes in veld types 14, 15, 18, 19 and 20 at altitudes of 800-1200 m above sea level. Oviparous, two egges are laid at a time. The soft eggs adhere to the underside of the rock and harden. Communal nesting in more favourable crevices takes place.

Conservation Status

Protected. Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. Another species which is not

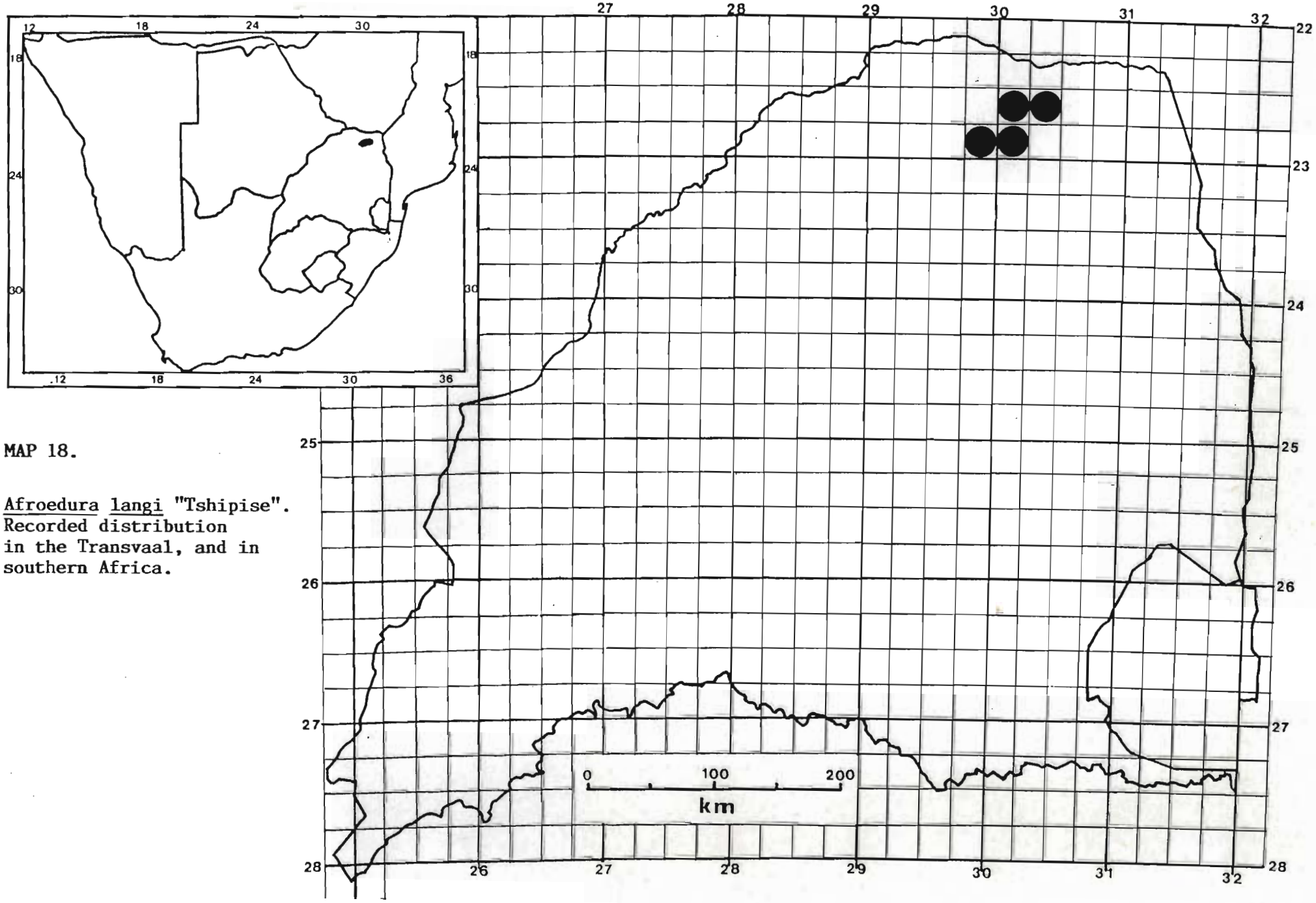
represented in any provincial nature reserve. Its habits, habitat and dispersion is responsible for its secure status.

Remarks

Morphologically similar to other similar sized Afroedura species, differing in the number of precloacal pores. The well developed paired lamella lack scansorial filaments but give the impression of a third pair.

Afroedura langi "Tshipise"

Description. 9 Specimens examined.
Colour: Grey-brown to brown dorsally with 6 irregular dark brown crossbars from behind the head to the sacrum. The crossbars are bordered posteriorly with black, followed by white or beige; Areas between the crossbars may be spotted or blotched or marbled. Crown of head brown with darker spots; a dark stripe extends from the nostrils through the eye to meet the crossbar on the occiput. Laterally labials speckled as are the sides of the body; Limbs mottled and spotted dorsally; Tail long and tapering with 7 or more dark crossbands along the tail. Ventrally whitish under chin, throat and belly; underside of tail brown spotted or mottled with dark brown.
Lepidosis: Small, depressed geckos, with egg-shaped head, widest posteriorly. Body broadest posteriorly with proportionate limbs. Tail longer than SVL ranging from 52,34 - 55,68% of total length. Rostral rectangular forming a bar at front of snout; nostril pierced between rostral, 1st upper labial and three nasals; supranasals in broad contact behind rostral; scales adjacent to nasals not larger than surrounding scales; scales on head heterogeneous, larger on snout than on crown of



MAP 18.

Afroedura langi "Tshipise". Recorded distribution in the Transvaal, and in southern Africa.

head; head scales rounded, flattened and juxtaposed; Scales between nasals and anterior border of eye 10-11 and from posterior margin of eye to earhole 15-16; UL 9-10 (rarely 8). Mental wedge-shaped, long and narrow, from 1,5-2 times as long as broad; postmentals 1 or 2 rarely 3; LL 7 or 8. Dorsals granular, rounded, flattened, juxtaposed and homogeneous on the back; scales at midbody 80-92 . Ventrals smooth, rounded and imbricate; Digits expanded with 2 pairs of scansors and 4 rarely 3 or 6 subdigital lamellae under 4th toe; 2 more rarely 3 enlarged scales at base of tail; femoral pores in males 13-15; Original tail long and tapered, with scales in microscopic verticils with 6 scale rows per verticil; Dorsally scales are rounded posteriorly, flattened and subimbricate; Ventral scales smooth, squarish and imbricate. Caudal autotomy prevalent with 4/9 (44,44%) of tails regenerated.

Size: Largest male SVL = 42,5 mm (N7463 - Lavhalisa) mass = 1,8 g (N7463); Largest female SVL = 39,0 mm (N7412 - Gumela), mass = 1,25 g (N7412). Mean male SVL = 39,6 mm ± 2,16 (1SD) n=5, mass = 1,44 g ± 0,26 (1SD) n=5; Mean female SVL = 34,5 mm ± 6,36 (1SD) n=2, mass = 0,93 ± 0,46 (1SD) n=2.

Distribution

Endemic to the northern ranges of the Soutpansberg, northern Transvaal.

Distribution in Transvaal (Map 18).

Gumela; Lavhalisa; Musekwas Location; 35 km SW of Tshipise.

Habitat and Ecology

A nocturnal, exclusively rupicolous lizard inhabiting crevices on the underside of boulders under exfoliating sheets of rock or in crevices between rocks. Found in veld types 15 and 19 at altitudes between 800-1100 m above sea level. The gecko may emerge in the afternoon and cling upside down under overhanging rock.

Conservation Status

Protected. Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. Does not occur in a provincial nature reserve but on account of its habitat can be considered secure.

Remarks

A small flat gecko similar to those from Waterpoort but differing mostly in size and lower number of femoral pores. However additional work needs to be done to establish the total distribution of this gecko and how it links up with others along the northern Soutpansberg.

Afroedura langi "Shinokwen"

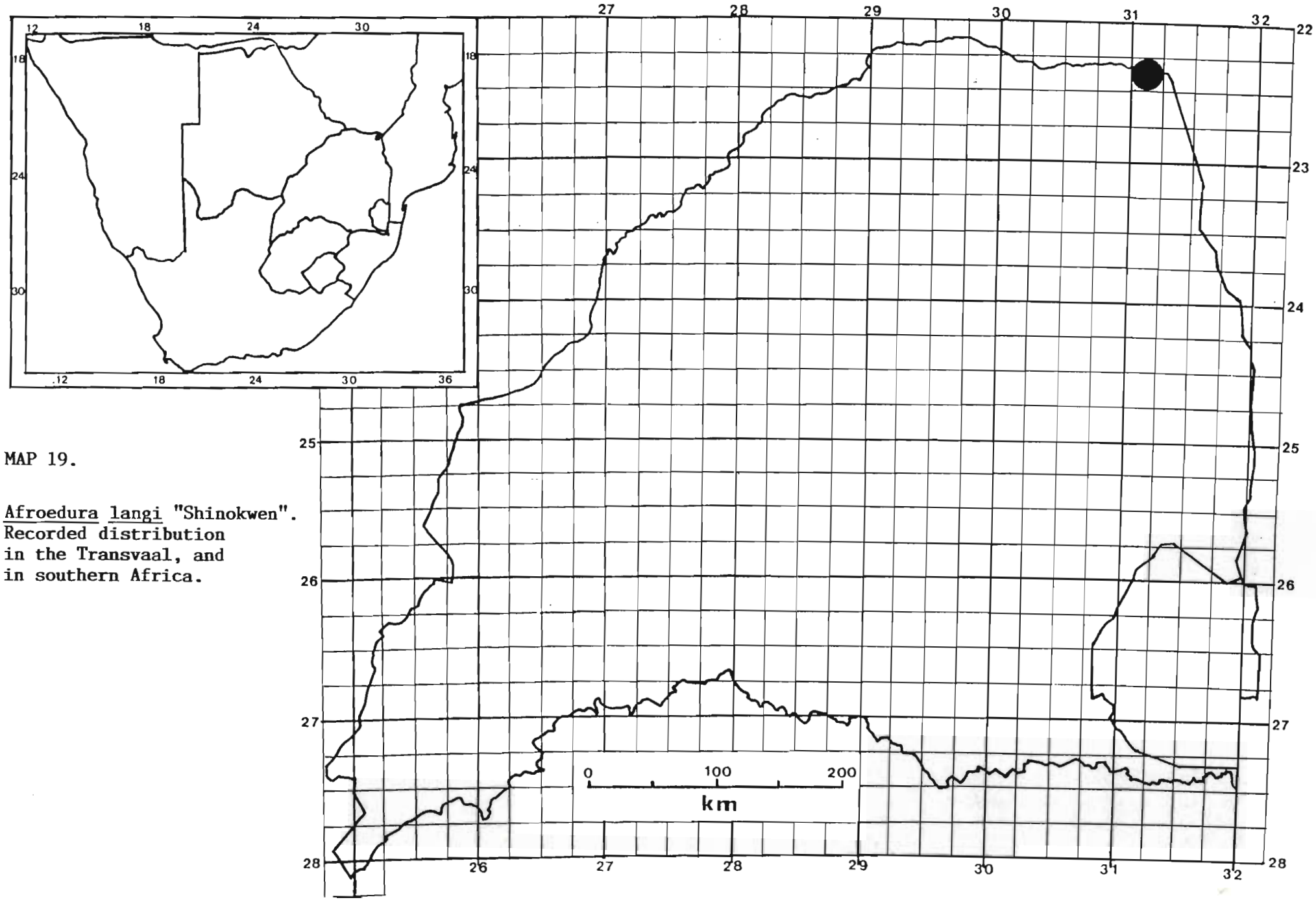
Description. 4 Specimens examined.
Colour: Grey-brown to brown above with 6-7 irregular broad dark-brown crossbars extending from the nape to the sacrum. Crown of head heavily spotted and mottled with dark brown as are the limbs. Original tail barred ar regular intervals; regenerating tail paler and very irregularly barred. A dark line extends from the nostrils through the lower part of the eye to the ear opening in some specimens meeting with the occipital band. Ventrally pink. (See also Pienaar et al, 1983).

Lepidosis: A depressed gecko with well developed limbs and stout toes. Tail also depressed. Head oval broader than neck. Body moderately slender. Tail longer than SVL but tails all regenerated and therefore not representative. Rostral approximately pentagonal much broader than high. Nostril pierced between five scales, rostral, 1st upper labial and three nasal scales; supranasals largest and in broad contact behind rostral. Scales on head heterogeneous with those on snout thrice or more as large as those on crown of head; Scales rounded and juxtaposed; Scales from nasals to anterior border of eye 10-11 and from posterior border of eye to earhole 15-18; UL 9-11; Mental wedge-shaped much longer than wide, 2-2,5 times; 2 rarely 1 postmental; LL 7 or 8; Dorsals granular, rounded flattended and juxtaposed more or less homogeneous; Scales at midbody 89-94; Ventrals smooth rounded to roughly hexagonal, and imbricate; Digits expanded at the tip and well developed with 2 pairs of scansors and 4-7 enlarged inferomedian subdigital lamellae under the 4th toe; 2 enlarged scales at base of tail; 15-16 precloacal pores in males; original tail microscopically verticillate with 6-7 scale rows per verticil. Scales on tail rounded and subimbricate above, ventrally imbricate much larger than above and rounded and squarish. Caudal autotomy prevalent with 4/4 (100%) of tails examined were regenerated.

Size: Largest male SVL = 52,0 mm (J6725 - nr Shinokwenfontein), mass = 3,45 g (J6725); Largest female SVL = 52,0 mm (J6727 - nr Shinokwenfontein KNP), mass = 3,35 g (J6727).

Distribution

Endemic to the north-eastern Transvaal.



MAP 19.

Afroedura langi "Shinokwen". Recorded distribution in the Transvaal, and in southern Africa.

Distribution in Transvaal (Map 19)

Shinokwenfontein.

Habitat and Ecology

An exclusively rupicolous, nocturnal gecko apparently possibly restricted to caves or deep overhangs with suitable fissures, crevices and rock flakes on the ceiling. The species is communal with as many as seven specimens seen under one flake. Only known to date from a single cave/overhang in veld type 18 at an altitude of about 300 m above sea level.

Conservation Status

Protected. Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. Only known from the north-western KNP. Additional specimens are needed to establish its true taxonomic and conservation status.

Remarks

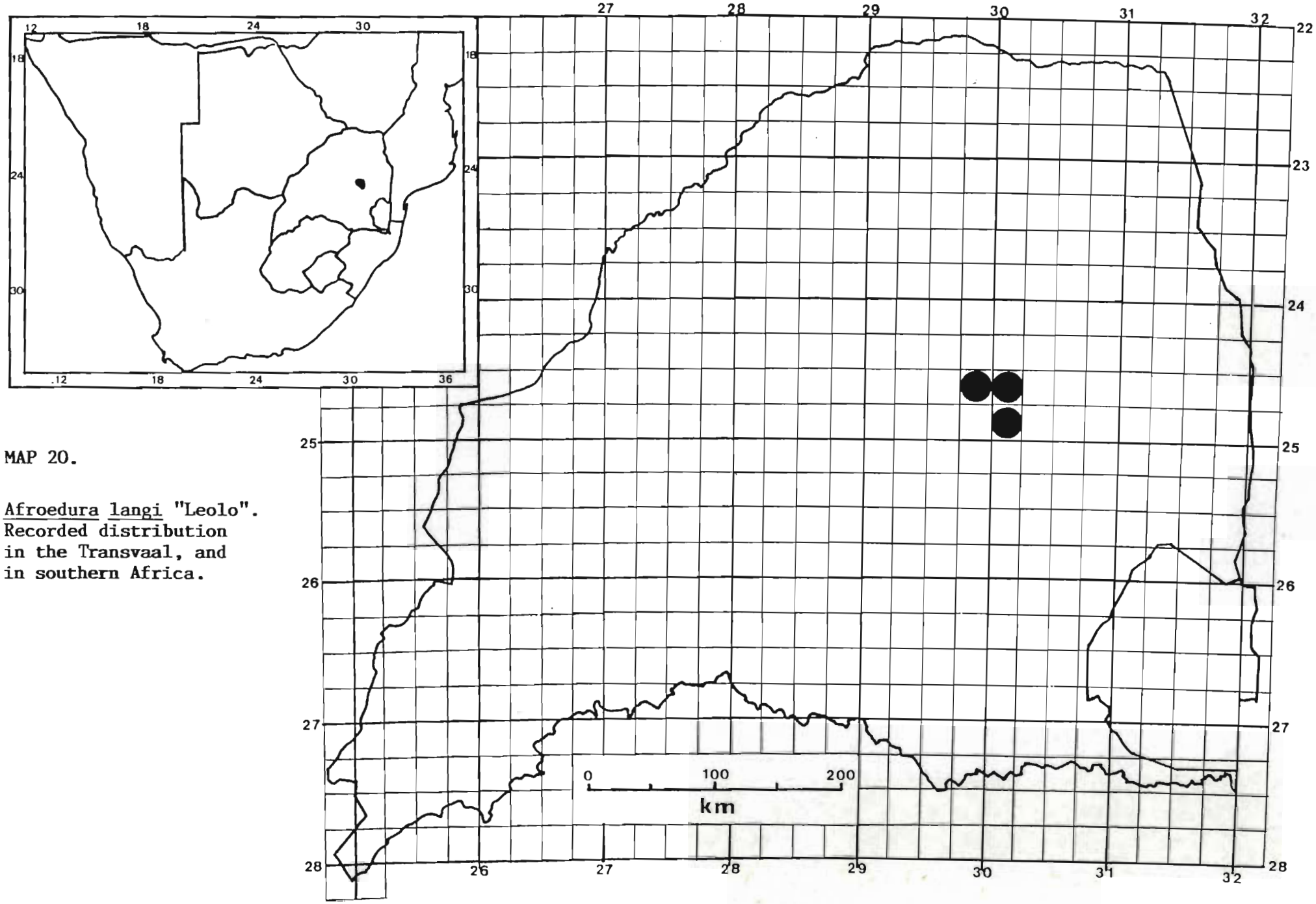
Appears to be part of a complex extending from the western Soutpansberg along the northern ranges to the north-western Kruger National Park. Additional specimens are needed to help clarify how restricted the species is and simultaneously determine the closest links.

Afroedura langi "Leolo"

Description. 17 Specimens examined.
Colour: Pale brown to brown dorsally with 7 to 8 dark brown irregular crossbands extending from the occiput to the sacrum. Crossbands have darker posterior margins. A white vertebral spot corresponding with the posterior

margin of the crossbands occurs in most specimens. Limbs longitudinally striped while some have bands. The paler areas between the stripes are spotted with dark brown. Crown of head pale brown with darker spotting and other variegations. Tail with 10 blackish crossbands from base to tip. Ventrally pinkish; tail brownish with darker markings.

Lepidosis: A very small species, depressed, with head oval, wider than neck and a slender body. Limbs small and reduced, pentadactyle; tail long and tapering and between 50,0 - 55,94% of total length. Rostral about twice as broad as high; nostril pierced between rostral, 1st upper labial and 3 nasals; Supranasal in broad contact, exceptionally separated by a granular scale; Scales on snout much larger than these on crown of head and are also slightly conical; Scales between nasals and anterior margin of eye 9-12 (mostly 10); 16-18 scales between posterior margin of eye and anterior margin of earhole; UL 8-10; Mental as long as broad to 1,5 times as long as broad; 2-3 postmentals; LL 6-10; Dorsals homogeneous, rounded, flattened and subimbricate; Scales at midbody 87-94; limbs reduced with slender digits. Digits expanded at the tip with two pairs of scansors; from 0-8 enlarged subdigital scales under 4th toe; femoral pores in males only 30-35 (one individual - J6646 has only 11 developed pores but this is exceptional). Tail slender and tapered; 3 enlarged scales (rarely 2 or 4) at the base on each side; Caudal scales in regular rows, elongate with rounded margin and subimbricate to imbricate dorsally; on the underside caudal scales smooth, squarish with rounded margins and imbricate. Caudal autotomy prevalent with 6/11 (54,54%) of tails showing regeneration.



MAP 20.

Afroedura langi "Leolo". Recorded distribution in the Transvaal, and in southern Africa.

Size: Largest male SVL = 39,0 mm (NP 11704 - Kalkfontein 367KT), mass = 1,2 g (NP 11704); Largest female SVL = 40,5 mm (NP 11703, 11701 - Hendriksplaats 281KT), mass = 1,1 g (NP 11701). Mean male SVL = 35,55 mm ± 2,42 (1SD) n=10, mass = 0,69 g ± 0,22 (1SD) n=10. Mean female SVL = 38,75 mm ± 1,44 (1SD) n=6, mass = 0,87 g ± 0,12 (1SD) n=6.

Distribution

Endemic to the eastern Transvaal.

Distribution in Transvaal (Map 20).

De Grooteboom 373 KT; Hendriksplaats 281 KT; Kalkfontein 367 KT; Kgoloko location; Maandagshoek 254 KT.

Habitat and Ecology

Exclusively rupicolous this species appears limited to granitic formations above the Steelpoort river and in the Leolo mountains. Lives in narrow crevices provided by exfoliating rock. The flakes are usually found on the underside of large boulders with the opening downwards so that rain cannot enter the crevices. Found in veld types 18, 19 and 57 at altitude of 1200 - 1800 m above sea level. Oviparous, the eggs when laid measure 8,9 - 9,0 x 6,1 - 6,4 mm with a mass of about 0,2 g. The eggs appear to be laid in midsummer and initially soft they adhere to the rock and harden.

Conservation Status

Protected. Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. Not found in any provincial nature reserves. However the habitat is secure and it is likely that this pertains to the species.

Remarks

A very small species well separated from other Afroedura phena. It has the highest number of precloacal pores in the genus. Most other morphological characters overlap with other phena. However the size, pore count and its isolated occurrence, lend credence to the view that this phenon warrants specific status, although currently considered as a subspecies of langi until a more detailed analysis can be carried out.

Genus Hemidactylus Oken, 1817

Hemidactylus Oken, 1817 Isis, P. 1183 (based on "Hemidactyles" of Cuvier, 1817, Regne Animal, 2 p. 47). Type: H. tuberculosus Daud. = mabouia Moreau de Jonnes. (Broadley, 1966).

The genus is characterised by having dorsal scales uniformly granular or intermixed with enlarged tubercles; ventral scales smooth, flat and imbricate. Pupil vertical. The digits are free or partly webbed, dilated, with a double series of adhesive lamellae below. The terminal phalanges are long, slender and clawed, arising angularly from within the expansion. Preanal pores and (or) femoral pores are present in males.
The genus is represented in the Transvaal by a single species H. mabouia Moreau de Jonnes although the possibility of H. platycephalus Peters being found in the extreme northern Transvaal cannot be excluded.

Hemidactylus mabouia mabouia (Moreau de Jonnes, 1818)

Gecko mabouia Moreau de Jonnes, 1818. Bull. Soc. Philom. Paris., p. 138. Type locality: St. Vincent Island in the Lesser Antilles.
Hemidactylus mabouia (Moreau de Jonnes). FitzSimons 1943, p. 46-48, Loveridge, 1947, p. 167 - 179; Pienaar et al 1983, p. 41, pl. 8 & 8A; Pienaar 1978, p. 26, pls. 2 & 2A. 1966, p. 34, pl. 2.
Hemidactylus mabouia mabouia (Moreau de Jonnes). Auerbach 1987, p. 82, pl. 8 fig. 1; Patterson & Bannister 1987, p. 42, fig; Welch 1982, p. 25; Branch 1988a, p. 194, pl. 89, 1988b, p. 6.

Description. 167 specimens examined.
Colour: Variable according to mood, background and time

of day. Grey to greyish-brown and brown with broad dark wavy crossbands along the back and onto the tail. Below whitish to translucent. At night these geckos become very pale almost flesh colour while those found on dark backgrounds during the day may be almost black due to the emphasis on the darker barring and speckling.

Lepidosis: Rostral almost twice as broad as deep, nostril between rostral, first upper labial and three (rarely four) nasal scales; supranasals in contact; UL 7-11, usually 9-11; LL 6-9, usually 8-9. Mental large, two postmentals. Scales on snout small and convex; dorsum covered with small granules somewhat flattened with 10-18 rows of larger weakly keeled tubercles;

Ventrals smooth, rounded and overlapping; Limbs well developed; digits terminating in an expanded tip of 6-7, mostly 6 pairs of subdigital lamellae on the fourth toe, rarely 5, and a strong recurved claw. Tail long, tapered and verticillate, with 7-10 scale rows per verticil (mostly 8); preano-femoral pores 10-36, mostly 28-33, immature males having very low counts 10-19, adults from 26-36. Caudal autotomy evident with 59/94 (60,2%) having regenerated tails.

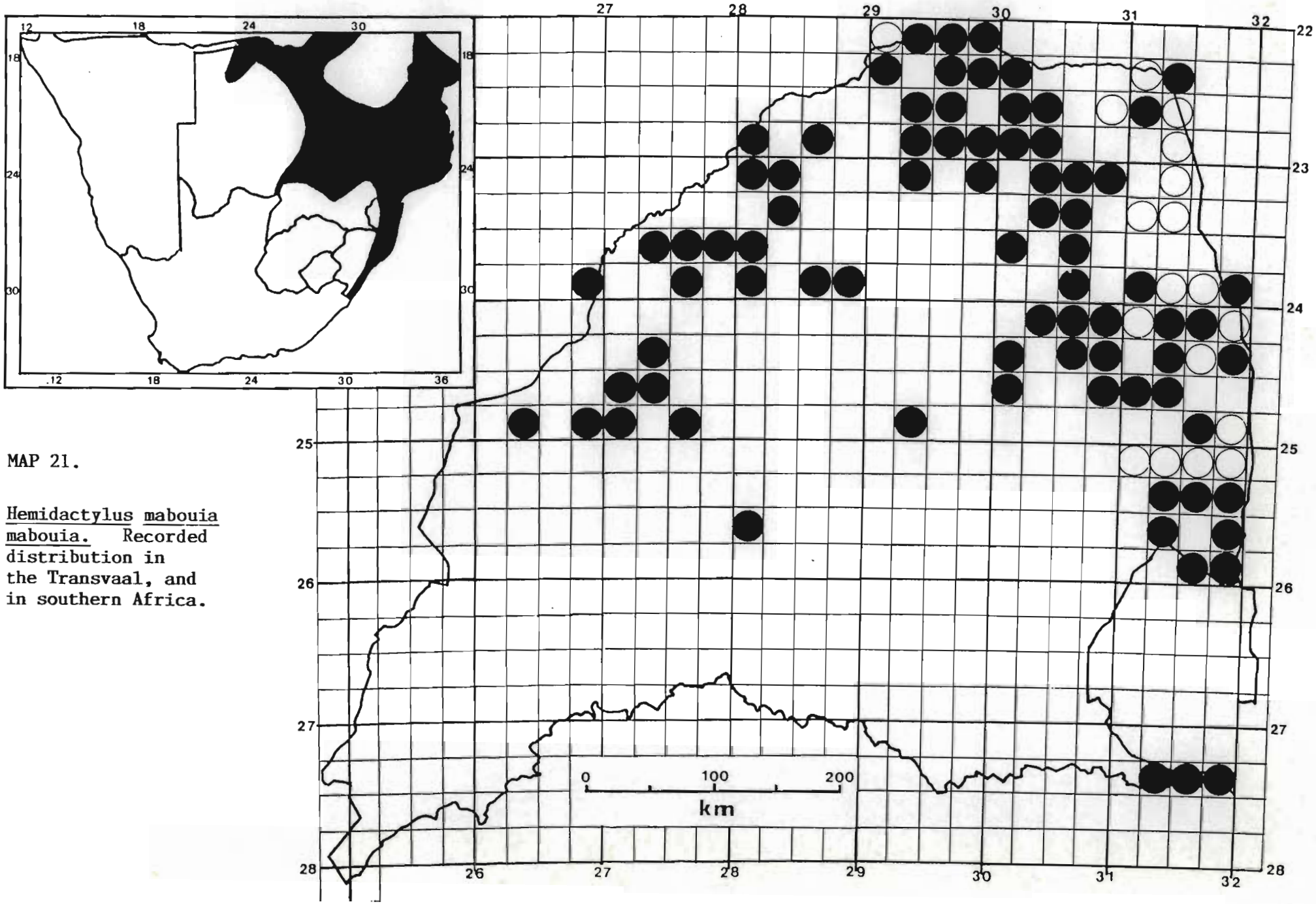
Size: Largest male SVL = 55,5 mm (J4129 - Vlaknak 392 KQ) heaviest male = 4,4 g (J4129); Largest female SVL = 59,0 mm (N2317 - Groote Zwart Bult 290LQ), heaviest female = 4,7 g (N2689 - Vogelstruisfontein 765 LR). Mean male SVL = 47,2 mm ± 4,53 (1SD) n=29; mass = 2,43 g ± = 0,80 (1SD) n=28; Mean female SVL = 50,15 mm ± 6,09 (1SD) n=29, mass = 2,93 g ± 1,04 (1SD) n=26.

Distribution

From southern Somalia south to Durban, west to Liberia and Sierra Leone (Broadley 1977); Madagascar; Comoro Islands; Seychelles; Mauritius. Also along the east coast of South America and the Antilles (Kluge, 1969).

Distribution in Transvaal (Map 21)

35 km S. of Tshipise; 4,8 km S. of Sibasa, 16 km NE of Mokeetsi; Bangu Gorge, KNP; Belvedere 184MS; Ben Lavin Nature Reserve; Boschjeskop 251JT; Breslau 2MS; Bristol 760MS; Buffelskraal 486LR; Carpediem 76KT; Crimea 747MS; Dirleton 276MS; Dixie 240KU; Doreen 108MT; Dublin 218KT; Elandsfontein 335KQ; Ellisras; Epsom 189KT; Freya 145MS; Galakwyns Stroom 745LR; Gravelotte; Groote Zwart Bult 290LQ; Grootfontein 352KQ; Grootvley 558LQ; Gwalali; Ha Madzhiga; Hans Merensky Nature Reserve; Hartz 233MS; Hectorspruit; Hendriksplaats 281KT; Holland 237KP: Ka Mininginisi; Kalkfontein 84LR; Kalkheuwel 454MS; Klaserie; Komatipoort; Kransberg 357KQ; Langalanga 141KT; Langjan Nature Reserve; Leeuwbosch 129KQ; Leeuwenhoek 112KP; Leydsdorp; Lillie 148KT; Louws Creek; Lucerne 198MS; Lophisi; Malamala 359KU; Malelane; Mananga; Manyeleti Game Reserve; Marble Hall; Mariepskop; Mazila 97LR; Mecklenburg 112KT; Mondplaisier 494MS; Moonlight 111LR; Morgenrood 354LT; New Belgium 608LR; New York 490LQ; Olifantscamp; Pafuri; Parkfield 725MS; Phalaborwa; Pongola Nature Reserve; Pretoria; Punda Milia; Rooy Hoogte 347MR; Ross 55KU; S.A. Bantu Trust; Schiettocht 25LU; Shamiriri; Shingwidzi Agricultural Stn.; Sunnyside 532LQ; Swartwater; The Oaks 198KT; Thor 147MS; Thornhill Farm 171JU; Tonga 475JU; Trevenna 119MT; Tshikuyu; Tshipise; Vivo; Vlaknek 392KQ; Vogelstruisfontein 765LR; Wagendrift 64LT; Waterpoort; Weihoek 540KQ; Weipe 47MS; Wodin 148MS; Worcester 5LP; York 188KT; Zondagsfontein 300MR; Zoutpan 459MS; Zwartkloof 60HU; Olifants R, 10 km NE of Strydom Tunnel.



MAP 21.

Hemidactylus mabouia mabouia. Recorded distribution in the Transvaal, and in southern Africa.

Literature Records

Brak R., N. Tvl.; Griffin Mine; Pont Drift; Limpopo R.; Machabezane (FitzSimons 1943) Dwarsrivier, (NMZB). Punda Maria camp; Malelane; Skukuza; Tshokwane; Kingfisherspruit Nwambiya pan; Balule camp; Shingomene; Peru beacon; Mthlamhala spruit; Olifants camp; Pretoriuskop camp; Pretoriuskop camp; W.N.L.A. quarters, Pafuri; Nahpe road, 6,4 km from Skukuza; lower reaches of Mashikiri spruit; Malopene north windmill; upper reaches of Shinobyeni spruit; Letaba camp; Nwanedzi camp; Sandstone reef near confluence of Hlanganine and Maswidzudzu spruits; Eastern tributary of the Bangu spruit; North bank of Sabie river, 4,8 km east of Skukuza; Shipudze ridge; between Mathlakuza and Shimuhene pans; Pafuri new tarred road north of Luvuvhu 12-17 km; Shingwedzi; Shangoni; Satara; Crocodile Bridge; Lower Sabie; Pumbe sandveld; Nhlarulumi drift; Tseri; Boesmanklip dam; Mbandswe spruit; Mshatu kop; Gwalali; Mutale gorge; near Shabaku; Pafuri ranger's post (Pienaar et al 1983).

Habitat and Ecology

A very adaptable species occupying most available habitats. Primarily arboreal living on baobabs (*Adansonia digitata*) and any other large tree with holes and loose bark under which it can hide. Also rupicolous and frequently collected in crevices between rocks, it occurs at altitudes ranging between 200-1500 m above sea level. Is also commonly observed on the walls of houses where it roosts during the day under the eaves emerging at dusk to forage lower down as well as at any light where large numbers of insects are attracted. Will inhabit piles of rubble if nothing else available. This gecko appears to be very active moving 20 m to other

suitable buildings. It seems to be spreading as its presence close to Pretoria (ca 32 km north) indicates. The geckos are oviparous laying two soft shelled eggs which harden on contact with air. A series of six eggs collected on 16.12.78 under a large rock on a boulder hatched in sequence, 2 after 20 days, 2 more after 31 days incubation and the final two after 46 days. Hatchlings measure 20,0 - 23,0 mm SVL n=11 with a slightly shorter tail. Mass = 0,2 g. Breeding appears only to take place during the summer months.

Conservation Status.

Protected. Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. A widespread gecko north of Pretoria and extending south east into Natal as far as Durban, it occurs in most nature reserves in the bushveld and lowveld as well as the Kruger National Park. Its ability to adapt and make the most of its environment will ensure its continued expansion and survival.

Remarks

A highly variable species, the Transvaal populations indicate variations in characters differing, or more limiting than those recorded by Broadley (1977c). Instances include upper labials 7-11 (8-12), lower labials 6-9 (7-12); subdigital lamellae under 4th toe 6-7 (6-11) and preano-femoral pores ranging from 26-36 (22-40). This has led in the past to great taxonomic confusion and numerous nomenclatural changes (Loveridge, 1947). Broadley (1977c) reviewed the status of three forms from south-eastern Africa. It is perhaps time to review the South African forms to ascertain the degree of variation and affinity to those of Botswana, Zimbabwe and Mozambique.

Genus *Lygodactylus* Gray, 1864

Lygodactylus Gray, 1864, Proc. Zool. Soc. Loud. p. 59
Type: *Lygodactylus strigatus* = *L. capensis* (Smith).

A group of small geckos, the body covered with small juxtaposed granules and smooth overlapping scales ventrally. Pupil round, with distinct eyelid round the eye. The digits are slender, unequal in length; 1st digit very much reduced almost vestigial with an indistinct sheathed retractile claw. Remainder of digits expanded at the tip and ending in a strong partially retractile recurved claw. Preanal pores present in males.

Pasteur (1964) most recently, extensively revised the genus subdividing the species in regional groups or phyla. Two of these, namely Phylum Austro-Oriental and Phylum Panafricain have species occurring in the Transvaal. The former is subdivided into species groups incorporating the "Bonsi" group, containing *L. ocellatus* Roux, and the "Rex" group containing *L. methueni*. FitzSimons. Phylum Panafrican contains the "Capensis" group with *L. c. capensis* (A. Smith) and *L. stevensoni* Hewitt. There appears to be considerable variation within the Bonsi and Rex groups in the Transvaal which need urgent attention. Broadley (1966) follows Pasteur (1964) in his approach to the "Capensis" complex.

Key to the Transvaal species.

1. Mental with a pair of lateral clefts 2
   Mental without a pair of lateral clefts ... 3

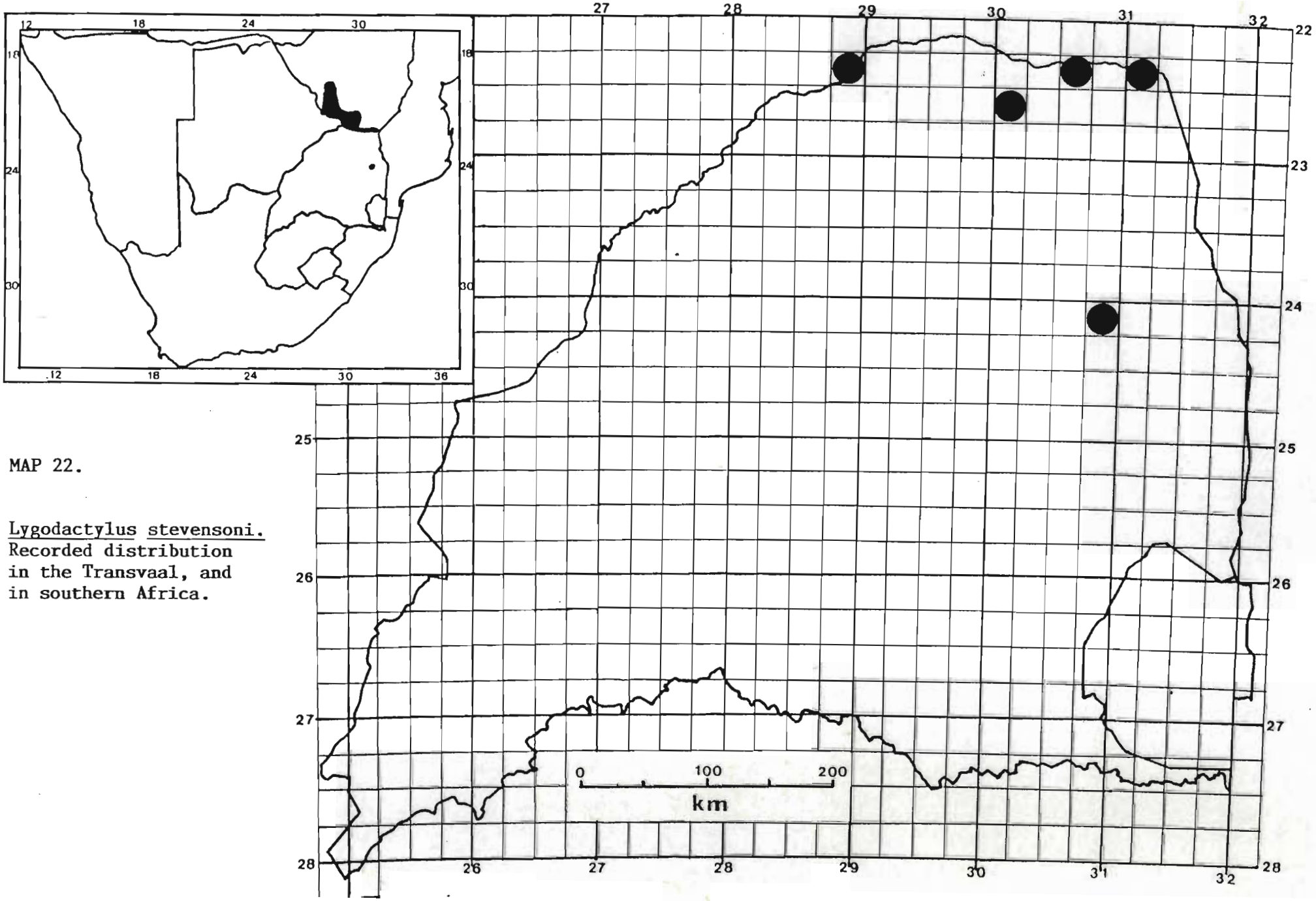
2. Preanal pores in males 3-6 (mostly 4, occasionally 5 or 6); Colour greyish brown with dark and pale dorso lateral and lateral stripes; throat unmarked or with irregular grey stippling ..... L. c. capensis
Preanal pores in males 7 or 8; Colour grey with irregular large black spots on the neck and sides, throat with forward directed chevrons ..... L. stevensoni

3. 4 prs of enlarged lamellae under the 4th toe ..... L. ocellatus
5 prs of enlarged lamellae under the 4th toe ..... L. methueni

Lygodactylus stevensoni Hewitt, 1926.

Lygodactylus stevensoni Hewitt 1926, Ann. Natal Mus. v. p. 445, pl. XXV, Fig. 3 & 4. Type locality: Khami Ruins, Zimbabwe. Pasteur 1964, p. 63. Pienaar et al 1983, p. 37, pl. 6; Branch 1988a, p. 198, pl. 91, 1988b, p. 6
Lygodactylus capensis stevensoni Hewitt. FitzSimons 1943, p. 53.
Lygodactylus angolensis Bocage (part). Loveridge 1947, p. 207, Welch 1982, p. 28.

Description 13 specimens examined.
Colour: Blue-grey to grey with large black spots distributed laterally. Below white; throat with dark, forward directed chevron markings.
Lepidosis: Snout more pointed than that of L. capensis and nostril between rostral, first upper labial and two nasals (rarely 1 nasal and 1 granule); internasals 2 rarely 1 or 3; UL 6-8, mostly 7 (72,7%); LL 6-7; mental large with deep lateral clefts; postmentals 3;



MAP 22.

Lygodactylus stevensoni.
Recorded distribution in the Transvaal, and in southern Africa.

digits with expanded tips ending in a recurved claw, 4-5 lamellae under 3rd, 4th and 5th digits and 6-8 laterally enlarged subdigital scales; preanal pores in males (n=6) 7-8 (6-9 in Zimbabwe, Broadley 1966); Tail long and tapering with 6-7 dorsal scale rows per verticil; tail autotomy evident with 5/6 (83,33%) regenerated.
Size: Largest male SVL = 36,0 mm (TM 58845 - Bievack 14 MR) and a mass of 1,3 g. Largest female SVL = 31,0 mm with a mass of 0,75 g (TM 58890 - Mabyeni hill). Mean male SVL = 31,67 mm ± 5,86 (1SD) n = 3; Mean female SVL = 29,0 mm ± 2,64 (1SD) n = 3. This is smaller than these recorded by Broadley (1966) in Zimbabwe and is no doubt due to the number of immature individuals collected during this survey.

Distribution

Restricted to the Khami Ruins and the Matopos in Zimbabwe, southwards to the north-western, northern and north-eastern Transvaal.

Distribution in Transvaal (Map 22).

Bievack 14MR, Dambale Hills, Doreen 108MT, Lillie 148KT; Mabyeni Hill.

Literature Records

Western boundary N. of Mutale mouth; sandveld plateau N. of Lanner gorge, (Pienaar et al, 1983).

Habitat and Ecology

Broadley (1966) records this gecko as commonly inhabiting large fig trees (Ficus glumosa) which grow among the rocks at Khami Ruins. Most specimens in the Transvaal

were collected on boulders with one or two on the boles of trees. Also observed on dead wood lying amongst the boulders. They appear therefore to be both arboreal and rupicolous. A diurnal gecko it appears in habits to be similar to L. capensis although it is a larger species. It occurs at altitudes between 300-700 m a.s.l. on sandstone and decomposing granite.

Conservation Status.

Protected. Schedule 2. Transvaal Nature Conservation Ordinance 12 of 1983. An uncommon, locally restricted species occurring in a disjunct band from the north-western Transvaal along the Limpopo river to the western Kruger National Park and then southwards to the Lillie nature reserve. It is rupicolous or at least restricted to rocky outcrops and can be considered secure.

Remarks

The status of L. stevensoni has been subject to considerable change since its description by Hewitt (1926). It has been linked with L. capensis by FitzSimons (1943) and with L. angolensis Bocage by Loveridge (1944). Pasteur (1964) reinstated L. stevensoni Hewitt as a full species, a move which was adopted by Broadley (1966). Broadley, 1966 made the observation that L. capensis and L. stevensoni do not occupy the same area. The taxa were found sympatric on Mabyeni hill although at different levels. This tends to reinforce their current taxonomic status. The relict population on the Lillie nature reserve is far south of the nearest other locality on Mabyeni hill.

Lygodactylus capensis capensis (A. Smith, 1849)

Hemidactylus capensis A. Smith 1849, Illus. Zool. S. Afr. Rept. pl. LXXV, fig. 3. Type locality: Kaffirland and the districts to the north of the Cape Colony.
Lygodactylus capensis capensis (A. Smith). FitzSimons 1943, p. 50, Loveridge 1947, p. 208. Pasteur 1964, p. 56, Branch 1987; p. ; Pienaar et al. 1983, p. 37, pl 6A. Pienaar 1978, p. 28, pl. 3; De Waal 1978, p. 20; Auerbach 1987, p. 87, pl. 8 fig. 6; Pienaar 1966, p. 35, pl. 3; Branch 1988a, p. 197, pl. 91, 1988b, p. 6.
Lygodactylus capensis (A. Smith). Jacobsen 1977, p. 17; Simbotwe 1983, p. 35, Welch 1982, p. 29.

Description. 512 specimens examined.
Colour: Grey to greyish brown with a dark streak extending from snout through eye to the shoulder occasionally extending along the flank. A pale dorso lateral streak extends from nostril through the eye and over anterior part of back extending to sacral area but frequently fading out along the back. A series of light coloured ocellar spots may be found laterally along the body and onto the base of the tail. Throat may or may not be heavily speckled with blackish grey. Ventrally off-white to yellowish, and in breeding males the throat may be yellow and underside of tail orange-brown. In young specimens the tail is reddish brown.
Lepidosis: Rostral broader than deep. Nostril between rostral, first upper labial and two to three nasals, some of which may be reduced to granules; Supranasals separated from one another by one to three granules; UL 6-9, mostly 7-8; LL 4-8, mostly 6-7; mental large, subtriangular with two clefts (one on either side) converging anteriorly from posterior margin; postmentals 3; scales on snout larger than those on head, and flattened; dorsals granular; ventral scales large, flattened and imbricate; Digits unequal, the first is

rudimentary; with the exception of the first, digits end in an expanded tip which is clawed; 4-5 pairs (mostly 4) of lamellae on 4th toe, 4 pairs on 3rd toe; inferomedian scale rows slightly enlarged; tail round and tapered and slightly prehensile; original tail with a series of 4-8 pairs of subcaudal lamellae distally; an angular row of 3-6 (mostly 4-5) preanal pores present in males and occasionally undeveloped in females.

Size: Largest male SVL = 39,0 mm (TM 58658 - above Motswedi), mass = 1,6 g (TM 58632 - Entabeni). Largest female SVL = 43,0 mm (TM 58814 - Bristol 760MS) mass = 1,45 g (TM58660 - Witkop 287LQ). Mean male SVL = 30,96 mm ± 2,49 (1SD) n=40, mass = 0,79 g ± 0,19 (1SD) n=38; Mean female SVL = 30,99 mm ± 2,71 (1SD) n=40, mass = 0,82 g ± 0,25 (1SD) n=40.

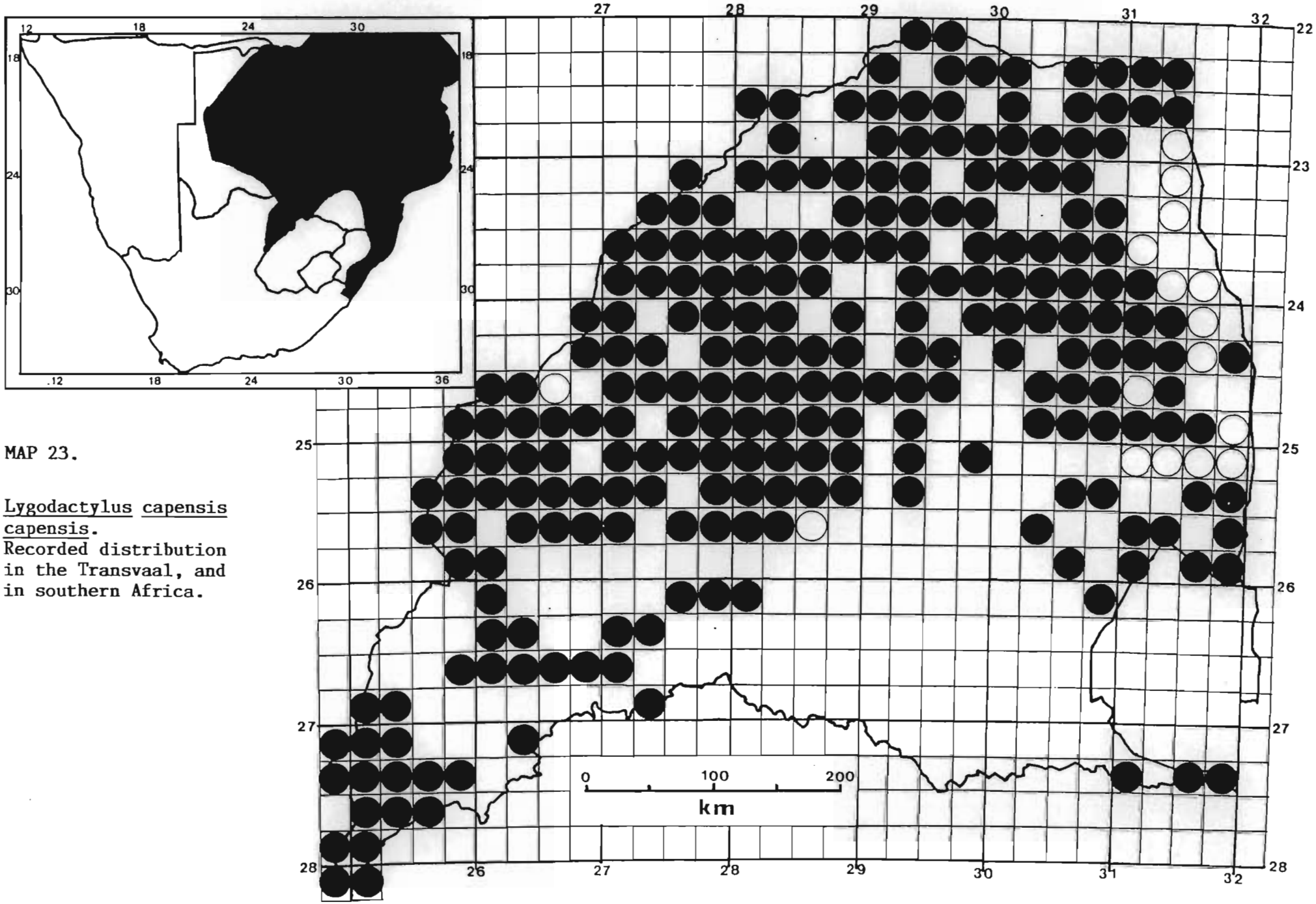
Distribution

Kenya South to the Cape Province, westwards to Botswana, South West Africa, Angola and Kinshasa.

Distribution in Transvaal (Map 23).

Btwn Saselondonga spruit and Pafuri; Btwn Hebron and Jericho; 5 km W. of Mount Sheba; 8 km E. of Pund Milia; 48 km S. of Sibasa; 4 km N. of Tshamavhudzi Peak; 5 km N. of Tshamavhudzi Peak; 5 km W. of Lukale Hill; Alldays; Alten 222LT; Ameland 11LS; Amsterdam 116LS; Argyle 46KU; Arthursrust 219KT; Arundel 788LT; Barberton Townlands 369JU; Belvedere 184MS; Blinkwater 680LR; Blouberg; Bochem 145LS; Bokfontein 396JP; Boompan 237LQ; Bordeaux 555MS; Boschkom 272JT; Bottellang 115MR; Brakpan 251IP; Breslau 2MS; Bridgewater 307KQ; Bristol 760MS; Bronkhorstfontein 42LR; Brosdoornhoek 433KQ; Buffelshoek 446KQ; Buffelskraal 486LR; Buffelspoort 421KR; Buisdorp 37LS;

Bulskop 225IP; Carnethy 113MS; Christiana 325HO; "Clearwaters" Haenertsburg; Cloudend 279LS; Cyferfontein 434KR; Dansfontein 40LR; Dardanellen 203MR; De Bad 396KT; De Kroon; De Loskop 205LS; De Putten 56JO; Diepkloof 44JS; Dirleton 276MS; Doorndraai 282KR; Doornfontein 345IP; Doornhoek 284KR; Doornplaat 106JO; Doornpoort 262IP; Doreen 108MT; Driefontein 387KR; Dzumeri; Elandsdoorns 144JP; Elandsfontein 335KQ; Elandsfontein 440JQ; Elandslaagte 30JQ; Entabeni Forest Reserve 251MT; Eureka City; Flamingopan 40KQ; Flynn 217KS; Fouriescloof 557LQ; Galakwyns Stroom 745LR; Geelhoutkloof 195KR; Gestoptefontein 349IO; Gewenscht 562KS; Glen Alpine 304LR; Goedehoop 31KS; Goedehoop 749KS; Gravelotte; Greenfield 333MS; Griffin Mine, Leydsdorp; Groeneboom 236KP; Groot Denteren 533LR; Grootfontein 352KQ; Grootfontein 47LT; Groothoek 106KS; Grootplaats 29HN; Grootpoort 123KP; Guernsey 81KU; Gulliver 237MS; Gunfontein 71KR; Gwaai 62MR; Ha Madzhiga; Haakdoornlaagte 167JQ; Hans Merensky Nature Reserve; Harmony 140KT; Harriet's Wish 393LR; Hartbeespoort 482JQ; Hartebeestpoortje 451IQ; Hartshoogte 17HN; Hectorspruit; Helena 400JU; Hermanusdoorns 204KQ; Honesty 43HN; Houtbosdorp; Houthaaldoorns 2IP; Houwater 54JQ; Ireagh 263KU; Italie 123HO; Jerome 287MT; Johannesburg, Mountain View; Kafferskraal 618JT; Kalkfontein 100LS; Kalkfontein 589KR; Kalkfontein 615LS; Kalkgat 554LS; Kalkpan 683KR; Kameelpoort 202JR; Kameelspruit 29KQ; Kareeboomput 286HO; Kareefontein 340HO; Kareelaagte 45JO; Kasteel 766LT; Keulen 669LT; Khavagari Mountain; Killaloe 235MS; Klein Engeland 9KP; Klein Tshipise; Klipfontein 9JO; Klipkuil 352JP; Klipplaat 108JO; Koeberg 52MR; Koedoespoort 402LS; Komatipoort; Krabbefontein; Krugersdorp; Kwa Lobatlong; Lake Funduzi; Laaste Poort van Marico 86KP; Ledzee 559LT; Leeuwfontein 61JP;



MAP 23.

Lygodactylus capensis capensis.
Recorded distribution in the Transvaal, and in southern Africa.

Leeuwfontein 67IP; Leeuwpoort 373KR; Letaba; Liamule Hill; Lillie 148KT; Lisbon 19LQ; London 112HO; London 29KP; Loretto 264MS; Loskopdam Nature Reserve; Lot 43 250IO; Lotteringskop 115KP; Louws Creek; Ludlow 227KU; Mabyeni Hill; Macouwkuil 45KR; Madimbo; Magaliesburg; Magazynskraal 3JQ; Mahobieskraal 211JP; Malamala 359KU; Malavuke; Malmaniersrivier 236KQ; Malongwa Flats; Mananga; Mangombe; Manyaningwe; Marico Bosvelddam; Mariepskop; Marokane 1HN; Matlapitsi R; Matiwa Lookout, Entabeni 251MT; Meanderthal 188LS; Mecklenburg 112KT; Melinda 164LR; Messina; Modjadjes Location 424LT; Moilwas Location; Mooimeisiesfontein 254KQ; Moonlight 111LR; Morgenrood 354LT; Motsotsotsela; Motswedi; Mpefu Location 202MT; Naauwpoort 363LQ; Napoleon 197KP; Nazungongo 152LQ; Nelspruit; New Belgium 608KR; NGwaribango; Nooitgedacht 17JP; Northumberland 31KU; Nwanedzi R; Nyandu Bush; Onrust 332HO; Paardeplaats 177IQ; Paarl 102LQ; Pafuri; Palmaryville; Panfontein 270HO; Parkfield 725MS; Pieterman 445LR; Pietersburg; Pijlkop 593MS; Pilgrim's Rest; Pipe Klip Berg 21HU; Pongola Nature Reserve; Pretoria, Pretoria North; Pretoria, Sunnyside; Praktiseer 275KT; Punda Milia; Rainpan 60KQ; Ratomba; Rhenosterpoort 283KQ; Rhenosterpoort 402KR; Rietfontein 179JP; Rietfontein 214JR; Rietgat 224JQ; Rietvallei 130IQ; Riverhead 755LT; Roode Kopjes Put 32JP; Roodeplaatdam Nature Reserve; Roodepoort 314KR; Roodewal 251JT; Rooiberg; Rooijantjiesfontein 89IP; Rooykrans 538KQ; Ross 55KU; Rust der Winter Nature Reserve; Rustvoorby 383JP; S.A. Bantu Trust; S.A. Lombard Nature Reserve; Sandilands 708MS; Satara Camp KNP; Schoonheid 2HN; Schoonkloof 273KP; Schweizer Reinecke Dorp 62HO; Sekororo Mountain; Shaholle; Shelton Hall 182MS; Shingwedzi, Crocidile pool nr; Shingwidzi Agricultural Stn.; Shylock 256JQ; Silonque 23LU; Skukuza; Springfield 337LQ; Stateland;

Steilpoort 615KR; Sterkspruit 412KT; Steynsdrift 145JS; Strydfontein 320IP; Sudwala Caves; Sunnyside 532LQ; Syferfontein 767JP; Syfergat 204HO; Tambotiekloof 607LQ; Tambootie Pan 175JR; Tambootierand 366KR; The Grange 47LS; The Oaks 198KT; Thornhill Farm 171JU; Tonga 475JU; Tshidzi Hill; Turfsloot 81KP; Tzaneen; Uitkomst 769LS; Uitspan 65LQ; Urk 10LS; Vaalbank 163JR; Vaalboschfontein 188HO; Vaalkop 192JQ; Venice 40KU; Vergulde Helm 316LQ; Vivo area; Vlakfontein 522KR; Vlakplaats 113KQ; Vlakplaats 535KS; Vogelstruiskraal 397KQ; Vredeburg 25610; Vulcanus 584LS; Vygeboom 619JT; Vygeboompoort 456KR; Waaikraal 396JQ; Waaikraal 396JQ; Wagendrift 64LT; Waterval 273KU; Waterval 561KQ; Waterval Onder; Weergevonden 173JT; Weipe 47MS; Welbekend 117JQ; Welgedacht 130JR; Welgegund 375IQ; Welgevonden 36LT; Weltevreden 596LQ; William Porter 90MS; Witklip 100KR; Witkop 287LQ; Wolmunster 108LQ; Wonderboom 98KP; Wonderboomhoek 550LQ; Wonderfontein 103IQ; Woodbush; York 108LS; York 188KT; Zaagkuildrift 46JR; Zandrivierspoort 851LS; Zeekoegat 673LR; Zeekoegat 12KU; Zoetfontein 137LT; Zoetfontein 154MR; Zoutpan 104JR; Zoutpan 459MS; Zwartkloof 60HU; Zwartkopfontein 7KO;

Literature Records

Acornhoek; Glentig 196KR; Hammanskraal; Heuningfontein; Junction of Marico and Crocodile rivers; Leeuwdoorns; Linokana = Dinokana; Louis Trichardt; Newington; Pienaars River; Potchefstroom; Premier Mine, (FitzSimons 1943). Punda Maria; Skukuza; Kingfisherspruit; Tshokwane; Pretoriuskop; Malelane; Crocodile Bridge; Tseri; Batavia; Pafuri; Shingwedzi; Letaba camp; Satara; Gorge; Olifants camp; Nwanedzi; Malopene; Shangoni; Mahlangene; Mabohlelene; Tsende; Nwanedzi experimental plots; Kambane and Numbi

experimental plots; Mthlamhala spruit; Msimbit forest on the eastern boundary between Nkulumbene and Mahewane; Hartebeesfontein; Pumbe picket; Maseya spring; Makangela spring; Eastern boundary 4 miles south of Pafuri; lower reaches of Masanje and Mashikiri spruits; Matukwane, Dinbo and Gumbandevu ridges, Punda Maria; North bank of Sabie river 4,8 km and 9,6 km east of Skukuza; experimental plots; Shalungwa spring; between Mathlakuza and Shimuhene pans; Anthrax camp, Pafuri; Eendrag windmill; Malonga; Lower Sabie; Mshatu kop; Gwalali; Mutale gorge (Pienaar et al, 1983). Wolkberg wilderness area (Snyders 1987). Pienaars River; Selati (NMZB).

Habitat and Ecology

A very versatile diurnal species, mainly arboreal and therefore frequenting trees, shrubs and aloes as well as descending onto rocks and also human dwellings. Usually found on dead wood but just as often observed clinging head down near the base of trees searching for prey in its 'sit & wait' strategy. A sociable species, living in what appear to be family groups of up to 13 individuals. Territoriality appears to be limited to the immediate environs of the resting male especailly while waiting for prey. They may wander from time to time appearing 50 m or more away. Reproduction appears to be throughout the year with a peak possibly in the winter months (Jacobsen 1982). Two eggs are laid at a time, soft shelled which adhere to each other as they harden. Rarely are the eggs observed separate. They measure 7-8 mm x 5-6 mm. The eggs are deposited in crevices and under loose bark as well as under stones. These geckos are frequently infested with red mites (*Geckobia australis*) under the scales of the digits, in the axils of the fore and hind limbs and on the belly.

Conservation Status

Protected. Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. An abundant species well able to adapt to the human urban environment although depleted in some areas by cats. This widespread gecko occurs in most nature reserves and national parks in the Transvaal with the exception of the southern and south-eastern highveld. It is therefore considered abundant and under no threat.

Remarks

A relatively consistent species showing little variation over its distribution range. Some forms such as those from the Penge area exhibit very marked colour contrasts with black and white stripes but as only a few specimens from this vicinity have been seen, little can be ascertained.

Lygodactylus ocellatus Roux, 1907

Lygodactylus ocellatus Roux 1907, Zool. Jahrb. Syst. 25, p. 406, pl. XIV, figs. 1-3. Type locality: Pretoria dist., Transvaal. FitzSimons 1943, p. 56, Loveridge 1947, p. 217. Pasteur 1964, p. 41; Welch 1982, p. 30; 1988a, p. 198, pl. 91, 1988b, p. 6.

Description: 107 specimens examined.
Colour: Grey to greyish brown dorsally, the back irregularly marked with numerous ocelli consisting of dark rings with a paler centre. The head is also extensively variegated above. The ocelli extend onto the limbs. The tail tends to be grey to orange-brown with black speckling. Ventrally whitish although the tail may be orange-brown to grey distally.
Lepidosis: Rostral large from 1 3/4-2 as broad as high; nostril between rostral, first upper labial and 2-4

(mostly 3) nasal scales; internasals 1-3, mostly 1-2; UL 5-9, mostly 6-8; LL 5-7, mostly 5-6; mental large, subtriangular, without lateral clefts, and bordered posteriorly by 2-3, mostly 2 postmentals; Dorsum covered in granules, largest on snout; ventrally scales smooth, imbricate and hexagonal; digits unequal, innermost rudimentary and fourth toe longest; dilated portion of digits with three pairs of well developed lamellae and a fourth pair, rudimentary, distally, the digit terminating in a recurved claw; Tail slightly dorsoventrally depressed and in the original slightly longer than the SVL but appears most often shorter; tail autotomy frequent, 26/36 having regenerated tails; Preanal pores 6-9 (mostly 6 or 8) in a slightly curved series although one aberrant male only has 3.

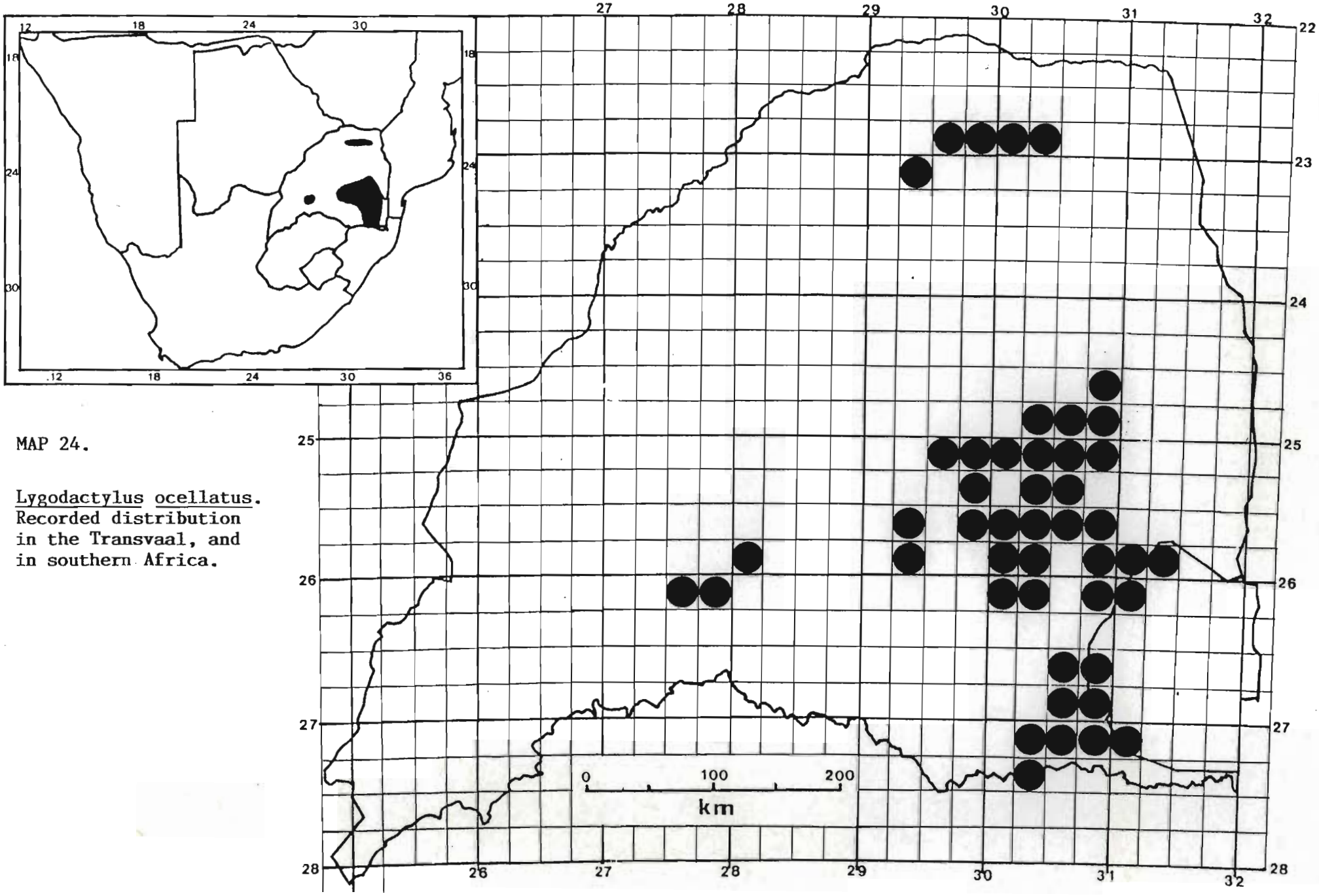
Size: Largest male SVL = 330,0 mm (TM 58919 - Paardeplaats 101HT), mass = 0,95 g (TM 58936 - Goedgevorden 134HT); Largest female SVL = 37,0 mm (TM 58864 - Mooifontein 285JS), mass = 1,1 g (TM 58860 - Houdkop 475 IT); Mean male SVL = 28,77 mm ± 1,88 (1SD) n=32, mass = 0,70 g ± 0,17 (ISD) n=23; Mean female mass = 30,22 mm ± 2,46 (1SD) n=43, mass = 0,73 g ± 0,22 (1SD) n=34.

Distribution

Restricted to Transvaal and Swaziland.

Distribution in Transvaal (Map 24).

5 km E. of Machadodorp; 3 km W. of Mount Sheba; Athole 392IT; Boschhoek 36JT; Carolina; Confidence 17HU; Desire 563KT; Dientje 453KT; Diepgezet 388JU; Doornkop 356JS; Driekop 387JT; Duurstede 361JU; Dycedale 368JU; Elandsfontein 36HT; Elandsfontein 471JT; Farrefontein 349JT; Flynn 217KS; God's Window; Goedehoop 152JS;



MAP 24.

Lygodactylus ocellatus. Recorded distribution in the Transvaal, and in southern Africa.

Goedgevonden 134HT; Groothoek 171HT; Heerenveen 27IT; Houdkop 475IT; Inhlovudwalile 421IT; Ishlelo 441IT; Kaapsche Hoop 483JT; Knapdaar 92JT; Konigstein 625JT; Kranskloof 554KT; Leeuwklip 363JS; Lisbon State Forest; Lochiel 192IT; Long Tom Pass; Loopfontein 298JT; Makapansgat 39KS; Maloney's Eye 169IQ; Mapochsgronde 500JS; Mariepskop; Merriekloof 420IT; Mooifontein 285JS; Mooiplaats 242JS; Morgenzon State Forest; Nooitgedahct 392KT; Normandie 178HT; Ohrigstaddam Nature Reserve; Olifantsgeraamte 198JT; Oshoek; Ostend 104KT; Paardeplaats 101HT; Paardeplaats 154JT; Paardeplaats 177IQ; Paardeplaats 91JT; Pilgrims Pass; Pretoria, Groenkloof; Redcliff 426IT; Rietfontein 365JT; Rietvlei 375JT; Schoongesigt 347JT; Stanley Bush Kop; Sterkspruit Nature Reserve; Suikerboschfontein 422JT; Wanhoop 78JT; Waterval Boven; Soutpansberg. Bluegumspoort 779MS; Bristol 760MS; Buisdorp 37LS; Entabeni Forest Reserve 251MT; Newgate 802MS; Outlook 789MS; Thonondo Peak;

Habitat and Ecology

An exclusively rupicolous gecko of the highveld regions of the Transvaal and Swaziland between 1500 - 2300 m above sea level. Often overlooked because of its dappled colouring which blends with the rocks on which it lives. Its habit of moving from sunlit areas into the shadows if disturbed enhances this crypticity. They normally live in pairs or small family groups but this depends on the size of the outcrop. They take refuge in crevices between and under boulders if chased and their dorsoventrally depressed body assists in this. They forage in typical Lygodactylus "wait and see" fashion clinging to the boulders watching their surroundings for movement.

The geckos are oviparous with two eggs laid at a time. Communal nesting takes place-up to 20 eggs have been recorded and a gecko will lay repeatedly at the same site. The eggs are laid at the base of boulders, frequently between the base of a grass tussock and the rock as well as under rocks on soil. The eggs are laid throughout the summer months, gravid females and eggs having been recorded from September to April. The eggs measure on average 7,1 mm x 5,3-5,8 mm with a mass of 0,15 g. FitzSimons (1943) records the eggs measuring 7,5 x 6,2 mm. The hatchlings measure between 12,5-14,5 mm SVL (X = 13,67 mm n=9); Tail 10,5-14,0 mm (X = 12,89 mm n=9).

Conservation Status.

Protected. Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. A rupicolous lizard, its habitat is relatively secure. It occurs in the Wanhoop nature reserve. It is common throughout its distribution and therefore its status is secure. Afforestation is the only threat at this stage.

Remarks

Lygodactylus ocellatus Roux *sensu stricto* is typified by the squat depressed appearance and the scattered dorsal ocelli. FitzSimons (1943) and Pasteur (1964) incorporated a number of forms in this complex, the only common feature being the entire mental. Pasteur (1964) referred to two groups which he termed the "bonsi" and "rex" complexes. The former incorporating *L. bonsi* Pasteur, *L. bernardi* FitzSimons and *L. ocellatus* and the latter *L. rex* Broadley and *L. methueni* FitzSimons. Based on an examination of specimens collected and those in the

Transvaal Museum it appears that there are a number of taxa currently incorporated in L. ocellatus, which can be placed in the two basic groups proposed by Pasteur (1964).

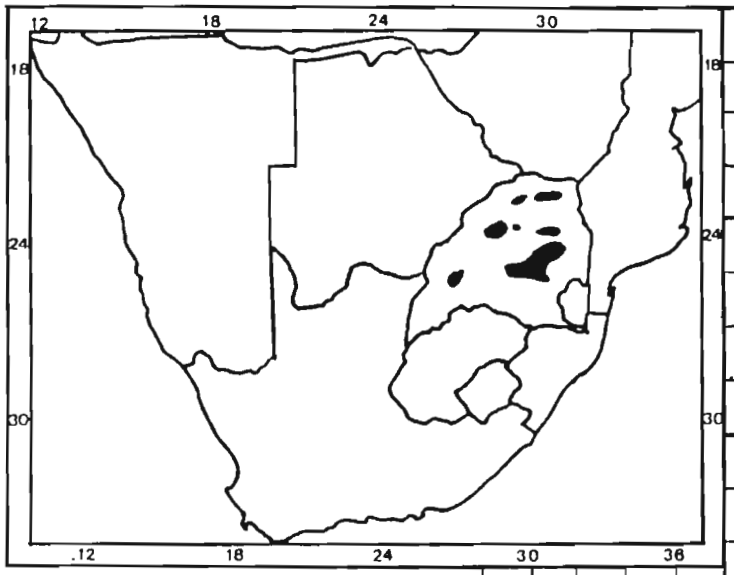
Bonsi Complex

Some specimens from the Soutpansberg show affinities to L. ocellatus. These are restricted to the Soutpansberg and are disjunct from the nominate form. They occur at altitudes between 850-1500 m a.s.l. and are also strictly rupicolous. The ocelli are still present but many specimens have extensive black spotting on the back. The lizard is also less depressed than the nominate form. It can be distinguished from L. ocellatus by having mostly three (93,75%) posterior mentals as opposed to the usual two (78,22%) of the nominate form.

Rex Complex

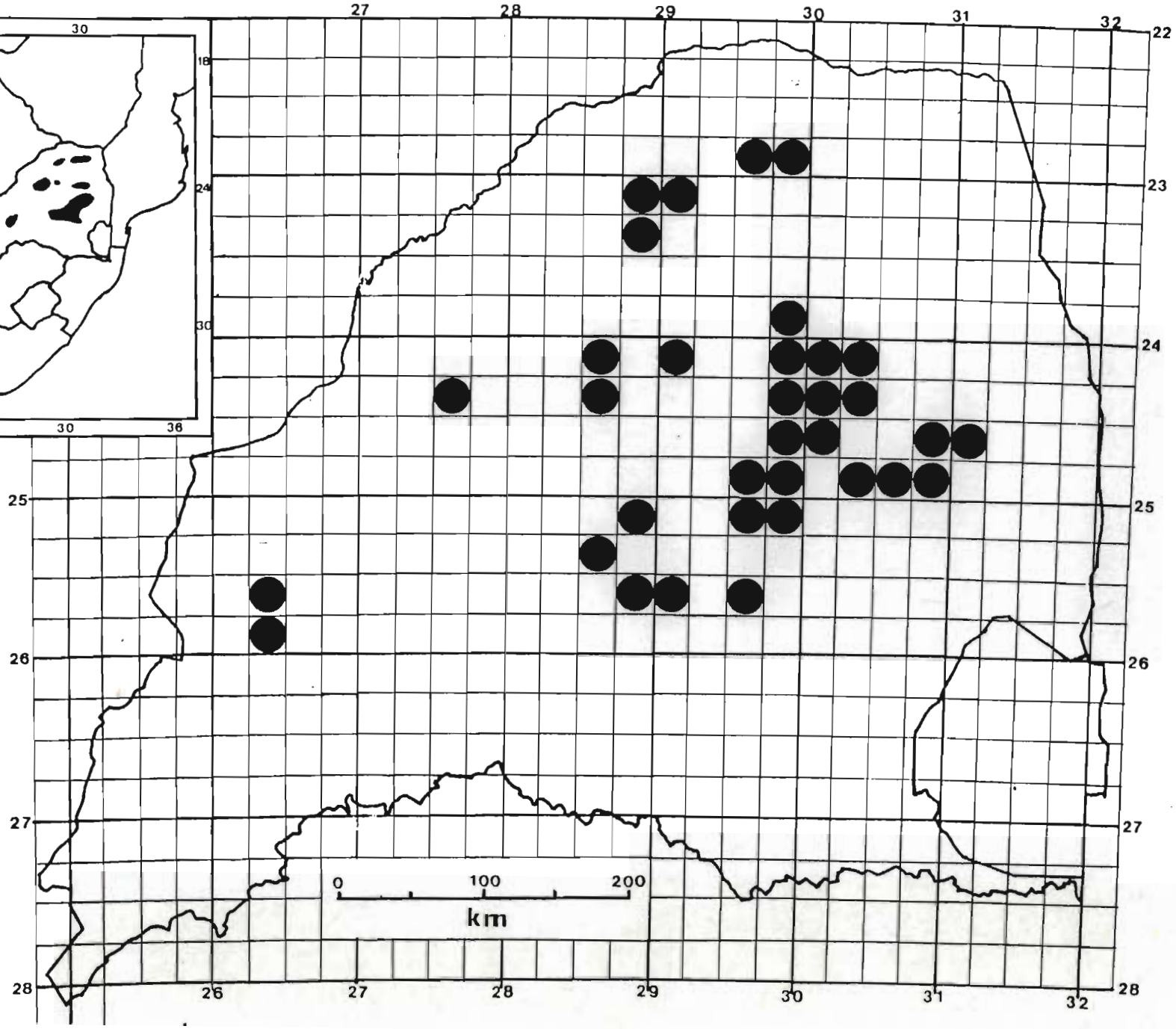
Pasteur (1964) incorporated L. methueni and L. rex in this group, on the basis of their large size, sexual dimorphism, tail on average 1,2 times SVL and having preanal pores numbering 9-11.

In the Transvaal there is a group of forms which are allied to this complex although some do not reach 40,0 mm SVL. Owing to the diversity of forms and geographical distributions it is difficult to determine the exact number of different phena. Preliminary analysis of morphological characters, size and colour indicate five phena. Subdigital lamellae vary between 4 or 5 on the third toe and numbers of preanal pores range from 7-11. These findings indicate different taxa along all mountain ranges of the Transvaal, some of which are found in sympatry with L. ocellatus but at different altitudinal levels such as on the farm Dientje 453KT, where ocellatus occurs on the crest with L. sp. half way op the slope. Similarly in the Soutpansberg both species occur in close proximity. A list of localities follows below according



MAP 24A.

Lygodactylus ocellatus Complex. Recorded distribution in the Transvaal, and in southern Africa.



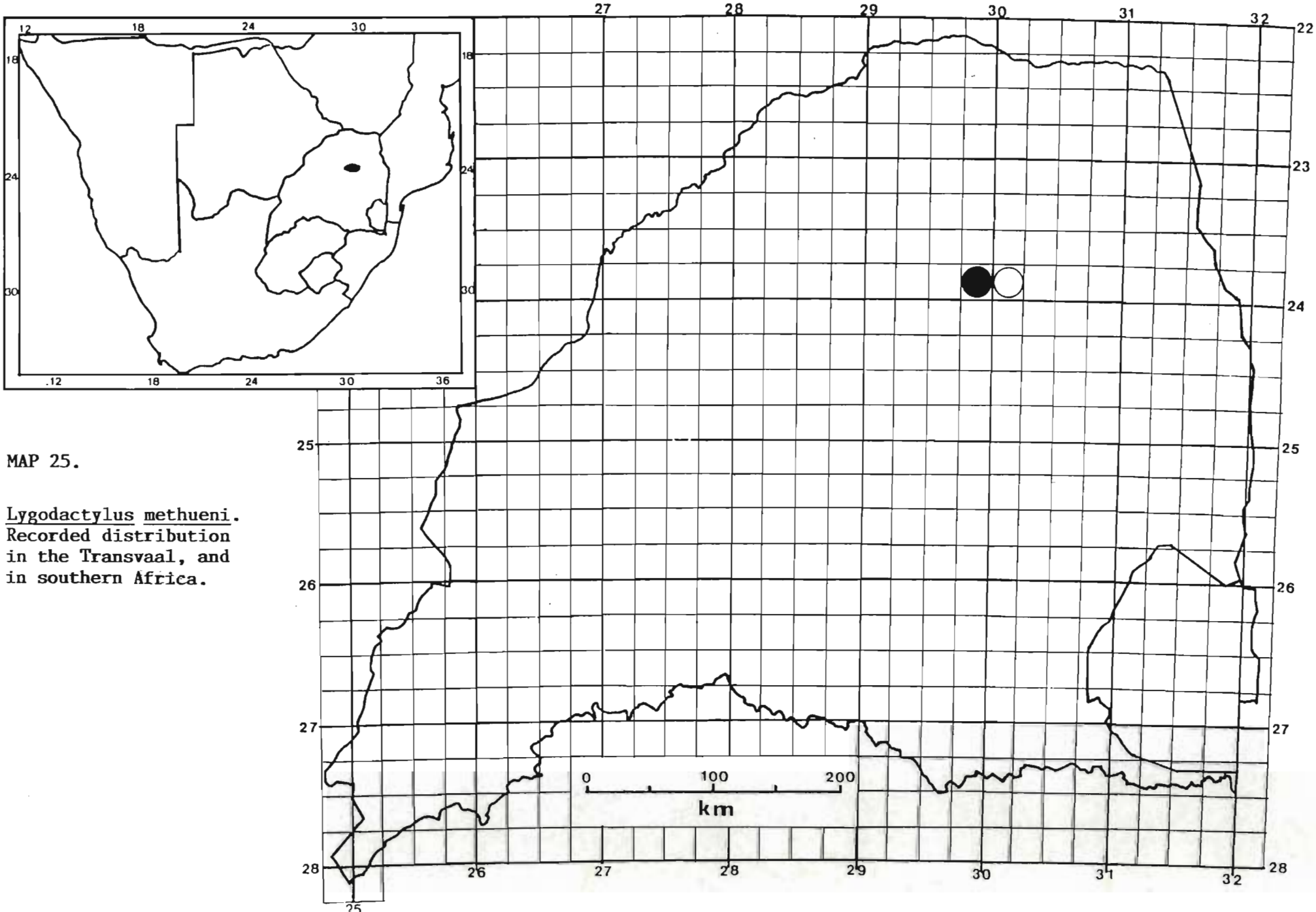
to the various forms observed (Map 24A). However these serve only to indicate the complexity of the problem and some will no doubt be merged with others. This is considered currently to be beyond the scope of this work and should be given urgent attention in the future.

(Waterberg) Buffelshoek 277KR; Groothoek 278KQ; Sterkriviernedersetting 253KR; (Percy Fyfe) Percy Fyfe Nature Reserve; (Blouberg) Beauley 260LR; Ketting 368LR; Leipzig 264LR; Urk 10LS; (Soutpansberg) 6 km West of Punchbowl Hotel; Above Louis Trichardt; Bluegumspoort 779MS; Highfield 797MS; Newgate 802MS; Outlook 789MS; Peover 772MS; (Wolkberg) Acre 2KT; Flynn 217KS; Iron Crown; Morgendal 216KS; Schelem 32KT; Serala 5KT; Wolkberg; (Black spot) 5 km W. of Mount Sheba; Dientje 453KT; Diepkloof 44JS; Garatouw 282KT; Holfontein 126KT; Klipfontein 256JS; Klipfontein 498JR; Kuilfontein 324JP; Leeuwfontein 188JR; Lolamontes 682KS; Maandagshoek 254KT; Makapansgat 39KS; Mapochsgronde 500JS; Masleroems Dude Stad 840KS; Mount Sheba Nature Reserve; Nooitgedacht 345JS; Nooitgedacht 392KT; Ntsweletau; Pilgrim's Rest; Rietfontein 214JR; Rolle 235KU; Tivoli 98KT; Zyferfontein 293JP; (Blyde) Blyde River Nature Reserve.

Lygodactylus methueni FitzSimons, 1937

Lygodactylus methueni FitzSimons 1937, Ann. Tvl. Mus. 17, p. 276, figs. 1 & 2. Type locality: Woodbush, N. Transvaal. FitzSimons 1943, p. 57, Loveridge 1947, p. 218; Pasteur 1964, p. 41; Welch 1982, p. 30; Branch 1988a, p. 198, pl. 91, 1988b, p. 6.

Description. 5 Specimens examined.
Colour: Olive brown with four longitudinal rows of well defined brown to dark brown angular spots, blotches or stripes dorsolaterally and laterally. Each spot has a



MAP 25.

Lygodactylus methueni. Recorded distribution in the Transvaal, and in southern Africa.

smaller pale area posteriorly or a pale stripe extends from the eye to the base of the tail; limbs spotted and a few indistinct dark markings on the head; tail marked similar to the back. Ventrally olive yellow extending under tail. Grey vermiculations on throat and lower labials. Juveniles are more brightly coloured, being yellow below and having an orange tail.

Lepidosis: Rostral large, subpentagonal, wider than high; nostril between rostral, first upper labial and three nasal scales; 1-2 internasals; UL 6-8; LL 5-7; mental large, entire, about twice as broad as long; two postmentals. Scales on snout large and more or less flattened; Dorsals granular; ventrally scales are smooth, flat and imbricate. Digits subequal, first rudimentary; digits expanded at the tip, with five pairs lamellae, four well developed, fifth rudimentary. Tail longer than snout/vent; indistinctly segmented with 6 scale rows per verticil dorsally and 3-4 below. Preanal pores 9-11 (usually 10), (FitzSimons 1943).

Size: A large *Lygodactylus* species. Largest male SVL = 41,4 mm (TM 1961 - Woodbush); largest female SVL = 43,5 mm (TM 58852) Diepgelegen 945LS), mass = 1,9 g (TM 58852).

Distribution

Endemic to the Transvaal.

Distribution in Transvaal (Map 25).

Houtbosdorp; Woodbush.

Habitat and Ecology

This species is only known from the Woodbush area at an altitude of 1700 mm a. s.l. Rupicolous and diurnal this

species may also ascend trees. The geckos are found mostly basking on rocks or in crevices between and under rocks even at the edge of the pine forest. FitzSimons (1943) records it living on the boles of large trees in the forest. This has not been observed. An oviparous species two eggs are laid during the summer months and measure 8-9,0 mm x 6,6-7,1 mm with a mass of 0,22 g. Hatchlings measure on average 16,7 mm SVL (n=5); Tail 17,63 mm (n=4); Mass = 0,14 (n=5) ranging in SVL from 16,0-18,0 mm; Tail 16,5-19,0 mm; mass 0,13-0,15 g.

Conservation Status (RDB 1988, Vulnerable)

Protected. Schedule 2, Transvaal Nature Conservation, Ordinance 12 of 1983. A vulnerable species only known from the type locality and vicinity. Much of the area has been planted to pines and there is little doubt that this has negatively affected these lizards. They have been found on small rock piles at the edge of roadsides as well as on rocky outcrops but are few and far between. The area is constantly subjected to disturbances and it has become imperative to establish how common this species actually is. It has been found living on the wall of a house and appears to be able to inhabit most areas provided it is not disturbed. Recommendations can be made once the true status has been established.

Remarks

A well defined species which is part of a complex of phena spread throughout the Transvaal (see L. ocellatus).

Genus *Pachydactylus* Wiegmann, 1834

Pachydactylus Wiegmann, 1834, *Herp. Mexicana*, p. 19. Type: *P. bergii inunguis* Guerin, not Cuvier = *P. geitje* Sparrman.

The thick-toed geckos are characterised by having the body covered with small uniform granules and or enlarged frequently keeled to trihedral tubercles either scattered or even contiguous. Ventrally the scales are smooth and imbricate rarely granular; Pupil is vertical; a distinct eyelid frequently pale in colour above; Digits are free with or without minute claws and more or less dilated, terminating in a single flattened nail - like scale. Ventrally the digits have a series of curved or angular, transverse adhesive lamellae distally (distal most lamella usually divided); Proximally digits have subdigital scales similar to those dorsally or with the median series enlarged. Preanal and femoral pores are absent. The genus is represented in the Transvaal by seven species. Many species have a wide distribution with resultant geographical variation. This is especially so of *P. punctatus* Peters, *P. bibronii* (A. Smith) and the *P. capensis* complex.

Key to the Transvaal species.

1. Dorsum covered with subuniform to uniform granules 2
   Dorsum covered with granules intermixed with enlarged tubercles .. 3

2. Original tail cylindrical, body colour brown with variable darker variegations. Dorsum with or without

numerous white spots ..... *P. punctatus*
Original tail and body depressed,
Body dark purple-black with narrow
white, black edged crossbands. Crown
of head uniform brown ..... *P. tigrinus*

3. Transverse adhesive lamellae under
4th toe 4-5 4
Transverse adhesive lamellae under
4th toe 9-12 (mostly 10 or 11) .... *P. bibronii*

4. Scales on back conical but not
keeled ..... *P. maculatus*
Enlarged tubercles on back conical
and keeled 5

5. Enlarged tubercles regularly di-
stributed, prominent, conical
and keeled, in roughly 9-16 (mostly
10-12) rows. Tubercles separated
by small regular granules. Original
tail prominently verticilled with
enlarged keeled tubercles terminating
each vertial ..... *P. capensis*
Enlarged tubercles regularly to
irregularly distributed. Tubercles
separated by large irregular granules,
or in contact. Pronounced white,
black bordered bands, regular to
irregularly placed down back or
narrow white continuous to inter-
rupted white bands extend down the back.
Back may also be heavily spotted or
mottled with black 6

6. Dorsum brown to greybrown with narrow white black edged stripes extending down back frequently with a thin white vertebral stripe forming irregular blocks. Interstices between stripes blotched with darker brown. an irregular pattern is found on the crown of the head ..... P. vansonii

Dorsum brown with numerous black spots and variegations. Narrow white crossbars extend down the back or are interrupted and may be incomplete down the back. A dark stripe extends from the nostrils through the eye to above the earhole. Crown of head variously spotted black and occasionally white but not forming a distinct pattern ..... P. affinis

Pachydactylus punctatus punctatus Peters, 1854

Pachydactylus punctatus punctatus Peters 1854, Monatsb. Akad. Wiss. Berlin p. 615. Type locality: Sena & Tete, Mozambique. FitzSimons 1943, p. 71, Loveridge 1947, p. 352; Pienaar 1966, p. 38, pl. 4, 1978, p. 31, pl. 4, Auerbach 1987, p. 84, pl. 8, fig. 4; Welch 1982, p. 35, Broadley 1966c, p. 117; Branch 1988b, p. 6.
Pachydactylus punctatus Peters. Pienaar et al 1983, p. 50. pl. 13; Branch 1988a, p. 205, pl. 81.

Description: 185 Specimens examined.
Colour: Variable markings; ground colour, yellow to greyish-brown to dark brown with darker vermiculations

on the back. Small scattered white spots restricted to single scales are widespread on the dorsum. A dark streak is usually present extending from the nostrils through the eyes to the back of the head. Labials pale and dark spotted. Ventrally white to creamy white. Eyelid edged white to yellow above and anteriorly. Tail with pale ocelli.

Lepidosis: Rostral much broader than deep, nostril in contact with first upper labial and three nasals occasionally two nasals and a granule; anterior nasals in contact; UL 6-9, mostly 7; mental 1,5 times as deep as wide; LL 3-7, mostly 5-6; scales on snout larger than on crown of head; scales on back overlapping and flattened as are the ventrals. Digits slightly dilated with 4 lamellae on the fourth toe, an inferomedian row of enlarged subdigital scales present. The body and tail is cylindrical. Tail autotomy is much in evidence, 55/108 having regenerated tails.

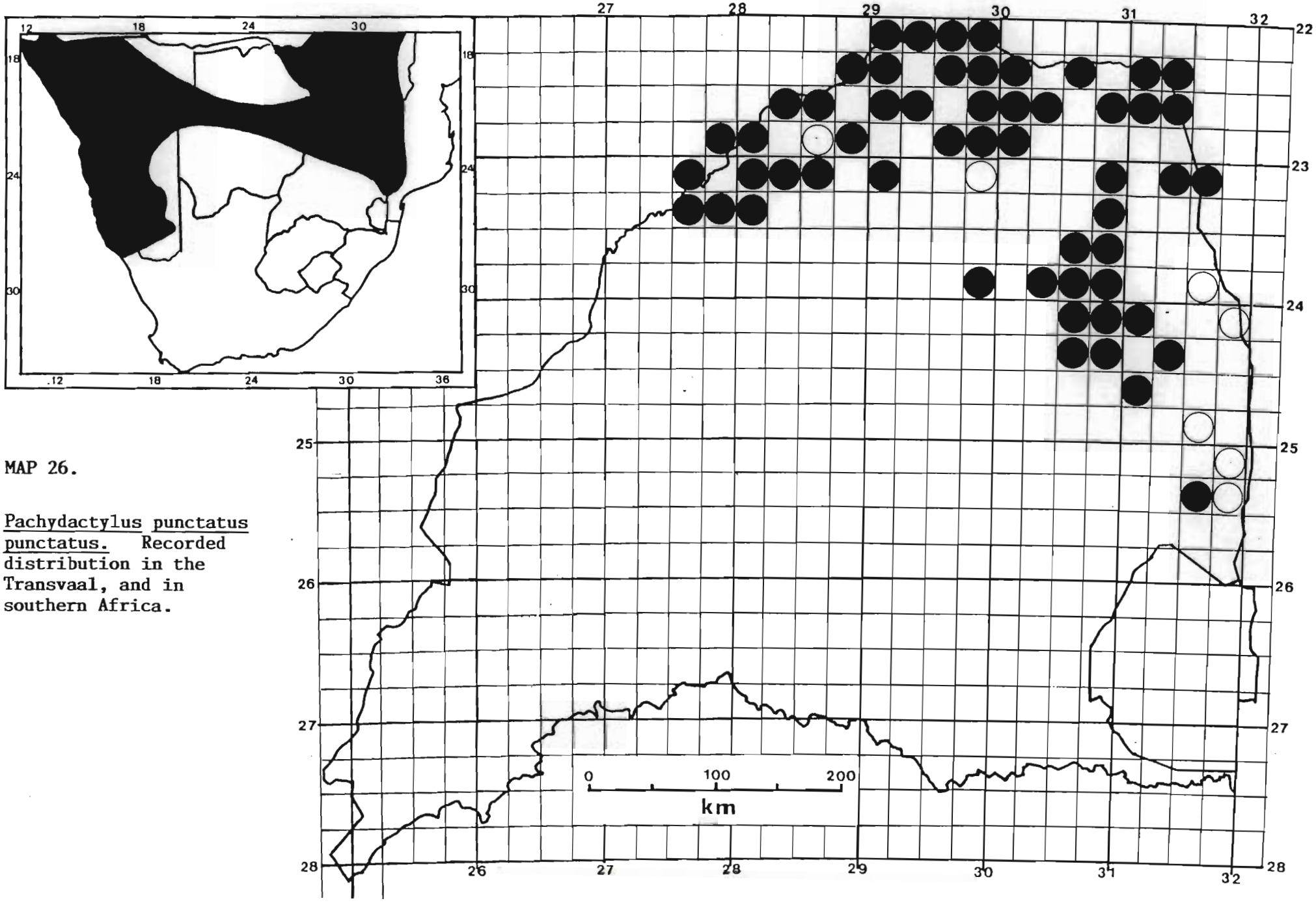
Size: Largest male SVL = 39,5 mm (N 848 - Bismarck 116MS); mass 1,35 g (J6119 - The Oaks 198KT); Largest female SVL = 40,0 mm (J 1779 - KaKheyi); mass 1,95 g (J 1779; Mean male SVL = 33,46 mm ± 2,79 (1SD) n=31, mass = 0,95 g ± 0,21 (1SD) n=31; Mean female SVL = 34,84 mm ± 3,73 (1SD) n=32, mass = 1,07 g ± 0,35 (1SD) n=32.

Distribution

Widespread in Southern Africa from Katanga and Malawi in the north through Mozambique, Zimbabwe, Botswana, South West Africa and Angola, south to the Transvaal, possibly Swaziland and the northern Cape Province.

Distribution in Transvaal (Map 26).

4 km Messina to Tshipise. Bismarck 116MS; Bloukop 514MS; Border 136MS; Breslau 2MS; Bridgewater;



MAP 26.

Pachydactylus punctatus punctatus. Recorded distribution in the Transvaal, and in southern Africa.

"Clearwaters", Haenertsburg; Cookham 186MR; Copenhagen 58KU; Crocodile Pool, nr Shingwedzi; Dambale Hills; Dansfontein 40LR; Doreen 108MT; Dover 44MT; Eendracht 95LQ; Evelyn 159MS; Glen Alpine 304LR; Graaf Reinet 71MR; Griffin Mine; Gulliver 237MS; Hacthorne 30MS; Hilda 23MS; Inkom 305MR; Ka Khayi; Ka Mininginisi; Kasteel 766LT; Keulen 669LT; Khavagari Mountain; Killaloe 235MS; Klaserie; Koeberg 52MR; Konigsmark 117MS; Langalanga 141KT; Letsitele Siding; Lillie 148KT; Lilliput Station; Little Muck 26MS; Loretto 264MS; Mabyeni Hill; Maiepo; Mangombe; Melinda 164LR; Messina Golf Course; Messina Experimental Farm; Middlesex 205KT; Mpefu Location 202MT; N slopes of Tshamavhudzi Peak; Nwanedzi, W. of Letaba Rest Camp; Pafuri; Platjan 198MR; Prince's Hill 704MS; Punda Milia; Ratho 1MS; Rochdale 700MS; Ross 55KU; Ruhrord 324MS; Saselondongaspruit; Scrutton 23MT; Selati; Shaholle; Sheldrake 239MS; Silwana's Location 719LT; Sonskyn Spa; Tempelhof 150MS; The Oaks 198KT; Thornhill Farm 171JU; Tilburg 145LQ; Trevenna 119MT; Tshidzi Hill; Tshipise 105MT; Tshitangenzhe; Uitenpas 2MT; Uitspan 65LQ; Urk 10LS; Venice 40KU; Vrouwensbrom 80MT; Weipe 47MS; Wilhanshohe 78LS; Wolmunster 108LQ; Worcester 131MR; York 188KT; Zeekoegat 12KU.

Literature Records

Acornhoek; Brak R., N. Tvl; Gravelotte; Magalakwin R; Nwaredzi R, E. Tvl; Olifants R.; Zondagfontein 300MR (FitzSimons 1943). Outlook 789MS; 3,2 km S. of Beit Bridge; 50 km SSW of Messina; Komatipoort (NMZB). Gumbandevu ridge; near Kukumezane pan; Matukwane; Olifants camp; Lebombos near headwaters of Mabakana spruit; Makangela spring; 'Papkuilfontein' ridges along Luvuvhu river west of Shipale; Madziringwe poort;

Godleni picket; Eastern boundary at Saselandonga gorge; Malonga spring; Hlanganine sandstone reef near Letaba; Maseya spring area; Lebombos between beacon A and B and at Sabie-poort; Mutale; Hutwinikop, Pafuri; new tarred road north of Luvuvhu river 10 km; along Sand river; Kingfisherspruit; Gwalali; Mabyeni hill; Mutale gorge; near Shabaku (Pienaar et al 1983).

Habitat and Ecology

A nocturnal, essentially terrestrial species found also on rocky outcrops in crevices, under stones and logs. Usually solitary occasionally pairs found together. Can be locally common. Slow moving but when disturbed run off in short brief bursts of speed. The eggs are laid during summer under stones or logs and are white and oval. The eggs are 8,2-9,8 mm x 6,7-6,9 mm and weigh 0,2 g. Hatchlings measure 17-19,0 mm SVL with a mass of 0,1 to 0,2 g. Hatchlings are found in late summer and even into winter (July).

Conservation Status.

Protected. Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. A common species in the northern and eastern Transvaal it occurs in many nature reserves such as Langjan, Hans Merensky, Lillie, Blyde and also the Kruger National Park. Its status is secure.

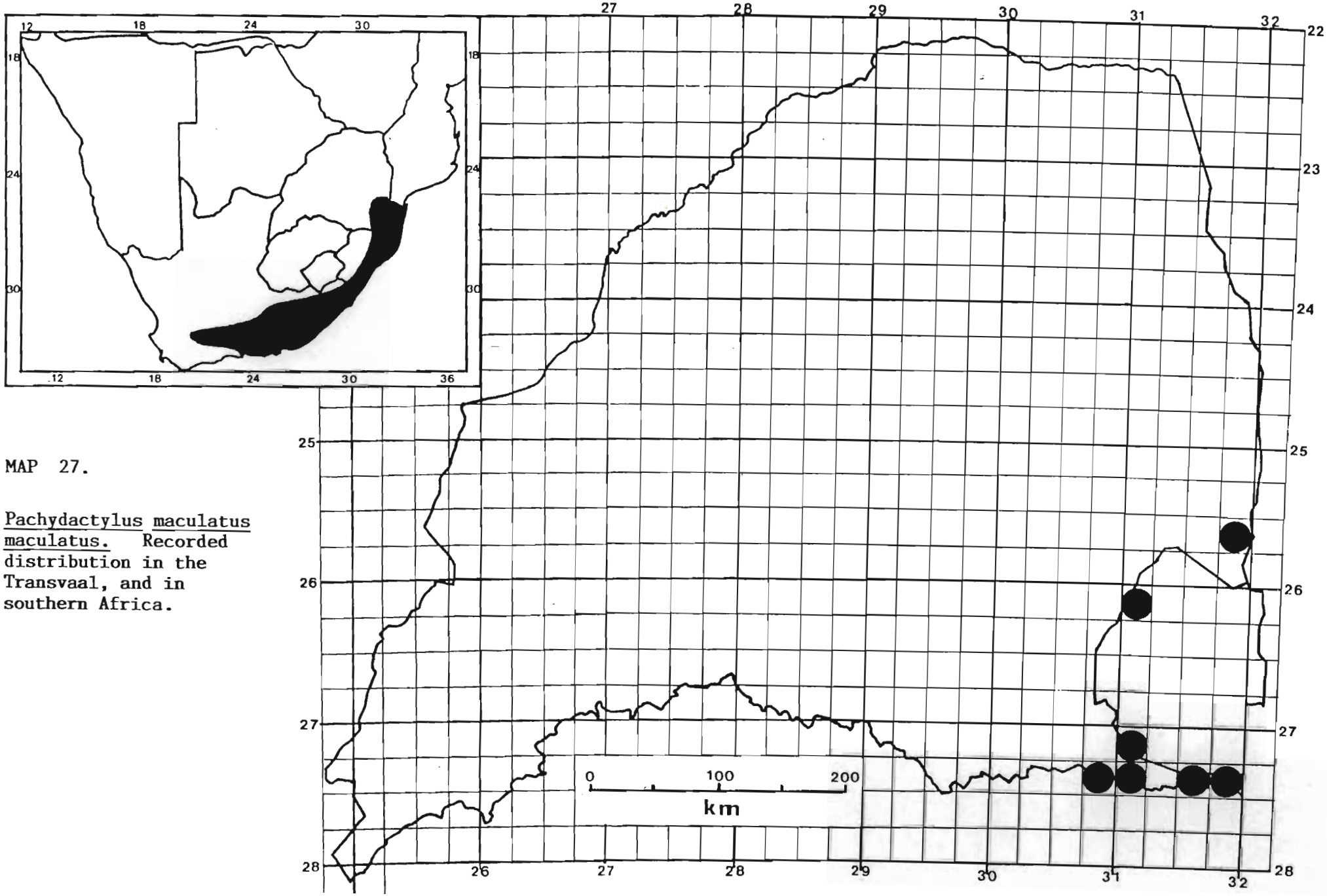
Remarks

The variability of the species has led to the formation of a subspecies <u>amoenoides</u> in the west. This is currently under investigation by Haacke (pers comm.).

Pachydactylus maculatus maculatus Gray, 1845

Pachydactylus maculatus maculatus Gray 1845, Cat. Liz. p. 167. Type locality: South Africa. FitzSimons 1943, p. 80, pl. XV, fig. 1. Branch 1981, p. 145; Branch 1988b, p. 6.
Pachydactylus maculatus Gray. Loveridge 1947, p. 364; Welch 1982, p. 34; Branch 1988a, p. 203, pl. 81.

Description: 25 Specimens examined.
Colour. Pale brown to greyish brown with four rows of dark brown blotches, two paravertebral and two dorsolateral extending from the neck to the base of the tail. The paravertebral rows extending dorsally along the tail finally merging to form bars near the tail tip in original specimens. A dark brown band extends from the nostrils, through the eye to almost meet at the occiput. Ventrally white with some brown speckling ventrolaterally. Regenerating tails variegated, short and fat.
Lepidosis: Rostral wider than high, somewhat pentagonal; nostrils almost in contact with the first labial and surrounded by one large nasal and several small scales or granules; internasals 0-3, mostly 2-3; UL 6-9, mostly 7-8; Mental narrow, 1,5-2 times as long as wide; LL 6-9, mostly 8-9; Scales on snout conical and small; dorsal scales conical but larger than those on head; scales on tail overlapping; digits slightly expanded with 4-5 lamellae under the fourth toe; a series of 3-4 enlarged pointed subconical scales on either side of the base of the tail. Tail autotomy common with 12/19 tails having been regenerated.
Size: Largest male SVL = 43,0 mm (N7229-Pongola nature reserve), mass 1,7 g; (N7229); Largest female SVL = 48,0 mm (N7719 - Diepgezet 288 IU), mass = 5,1 g (N7382 - Pongola nature reserve); Mean male SVL = 34,43 mm ± 6,80



MAP 27.

Pachydactylus maculatus maculatus. Recorded distribution in the Transvaal, and in southern Africa.

(1SD) n=7, mass = 1,01 g ± 0,37 (1SD) n=8; Mean female SVL = 39,78 mm ± 8,98 (1SD) n=10, mass = 2,16 g ± 1,70 (1SD) n=9.

Distribution

From the southern Cape Province eastwards and northwards to Zululand, Swaziland and the south-eastern Transvaal.

Distribution in Transvaal (Map 27).

Bergplaats 25HU; Confidence 17HU; Diepgezet 388JU; Merribeek 424JU; Pipe Klip Berg 21HU; Pongola Nature Reserve; Umkoonyan 42HU; Warmbad 18HU; Zwartkloof 60HU.

Habitat and Ecology

A nocturnal terrestrial species, roosting by day under stones and probably logs usually single but occasionally in pairs. In other parts of its range it is found inhabiting Achatina sp. shells as well as among brushwood and dead leaves. Occurs in the Transvaal at altitudes ranging from 150-1200 m. These geckos are oviparous laying normally two eggs at a time under rocks which hatch in late summer. The eggs average 10x7,5 mm (FitzSimons 1943).

Conservation Status.

Protected. Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. Its occurrence in Transvaal is only peripheral and therefore less emphasis is placed on its status as the greater proportion of its distribution falls within Natal and the Cape Province. It does occur in the Pongola nature reserve where its survival should

be assured. It tends to inhabit rocky hillsides which are unlikely to be seriously altered with the exception of those areas which may be afforested. It is likely that afforestation poses the greatest threat to its existance in Transvaal. A low priority species.

Remarks

A fairly uniform species changing little morphologically over its distribution range. P. m. albomarginatus Hewitt from the north central Cape Province is an arid environment form, the result of adaptation and isolation.

Pachydactylus capensis capensis A. Smith, 1846.

Pachydactylus capensis A. Smith 1846, Illus. Zool. S. Afr. Rept., pl. L, fig 2. Type locality: Interior of Southern Africa.
Pachydactylus capensis capensis A. Smith. FitzSimons 1943, p. 93, figs 27, Loveridge 1947, p. 375; Broadley 1977, p. 1. pls 1 & 2, fig. 2. Branch 1981, p. 146; Jacobsen 1977, p. 17, De Waal 1978, p. 24; Auerbach 1987, p. 83, pl. 8 fig. 2 & 3; Welch 1982, p. 33; Branch 1988a, p. 201, pl. 83, 1988b, p. 6.

Description: 439 specimens examined.
Colour: Variable but mostly varying shades of brown in ground colour, spotted and variegated with white and dark brown; sometimes with vague dark crossbands; a dark streak extends from the nostril through the eye to the rear of the head. Ventrally white.
Lepidosis: (Figure 5). Rostral slightly broader than high and pentagonal; nostril bordered by 3 (rarely 4) nasals, the anterior in contact behind the rostral; UL 6-9, mostly 6-7; LL 5-8, mostly 6-7; crown of head covered with small granules interspersed between larger conical tubercles which are much smaller than the

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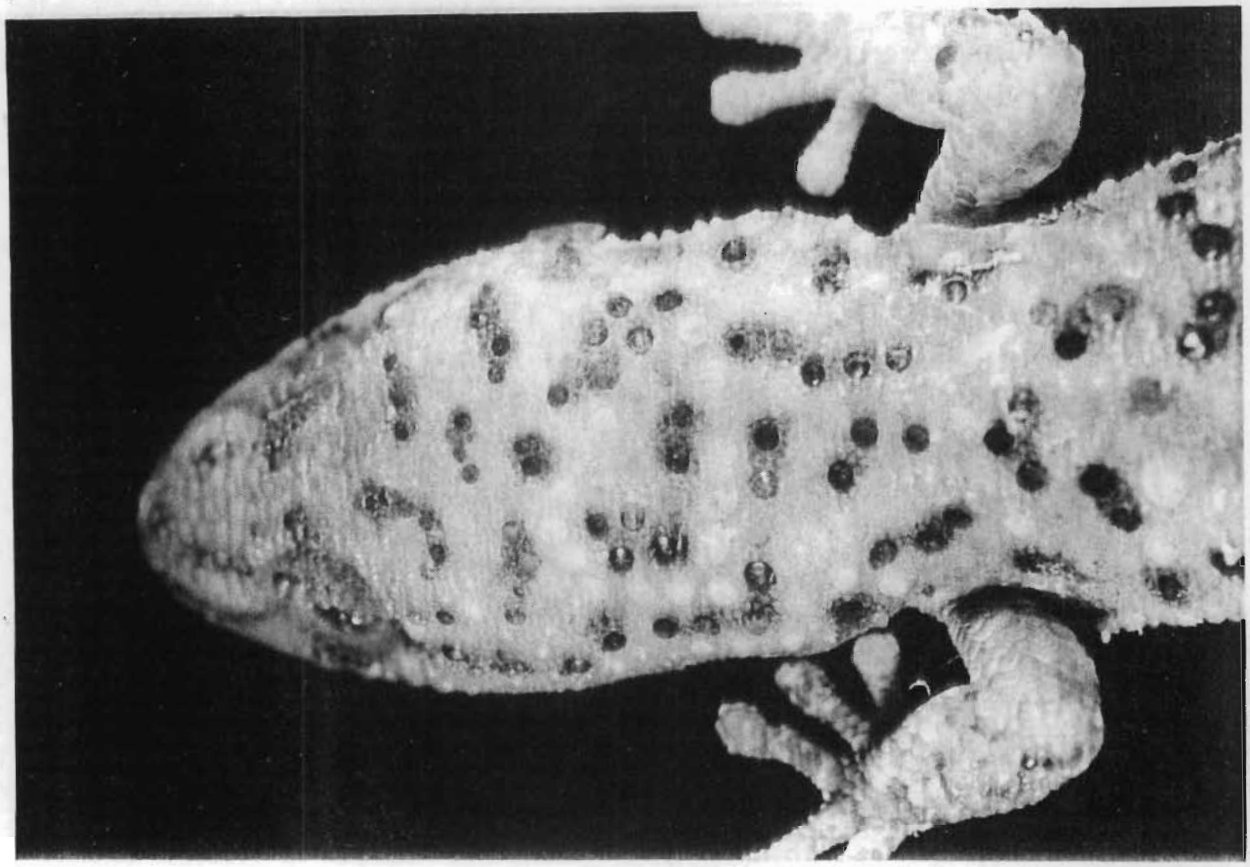

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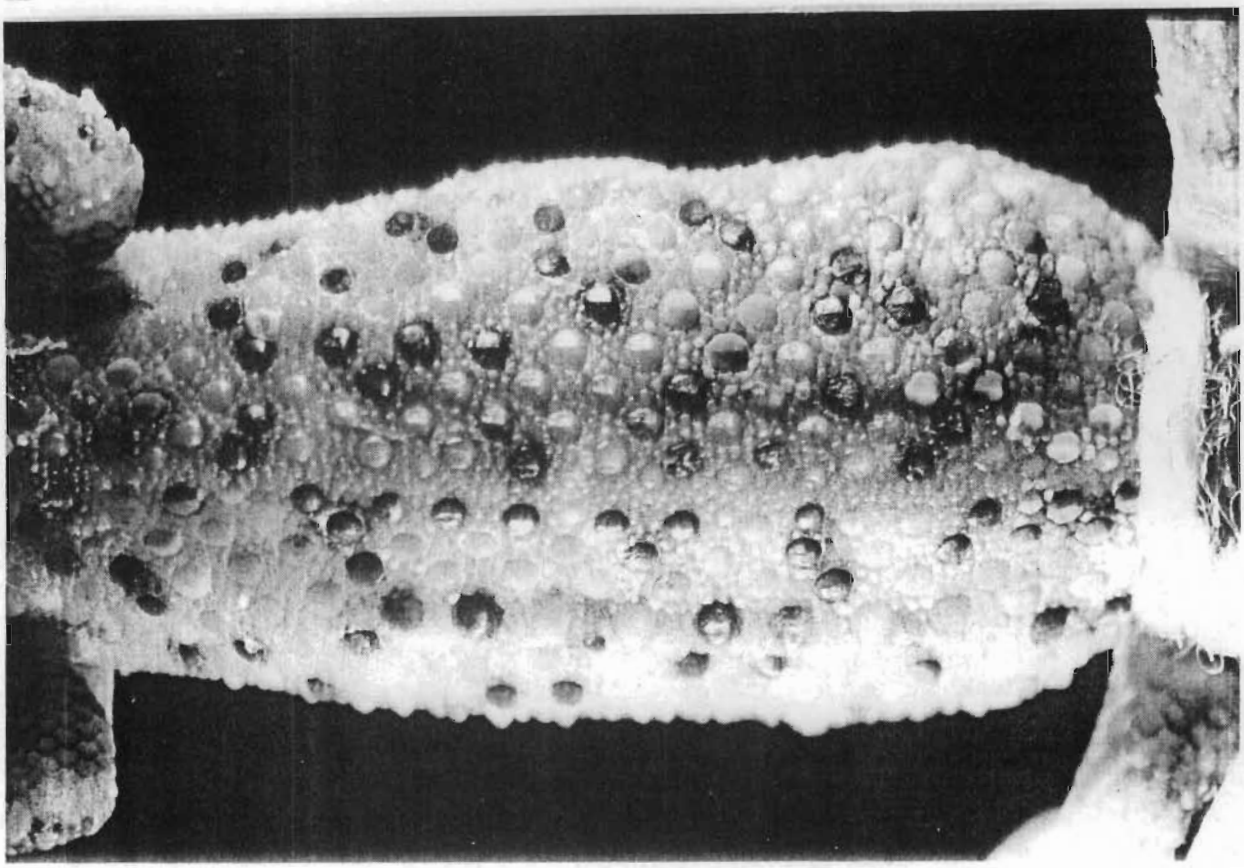


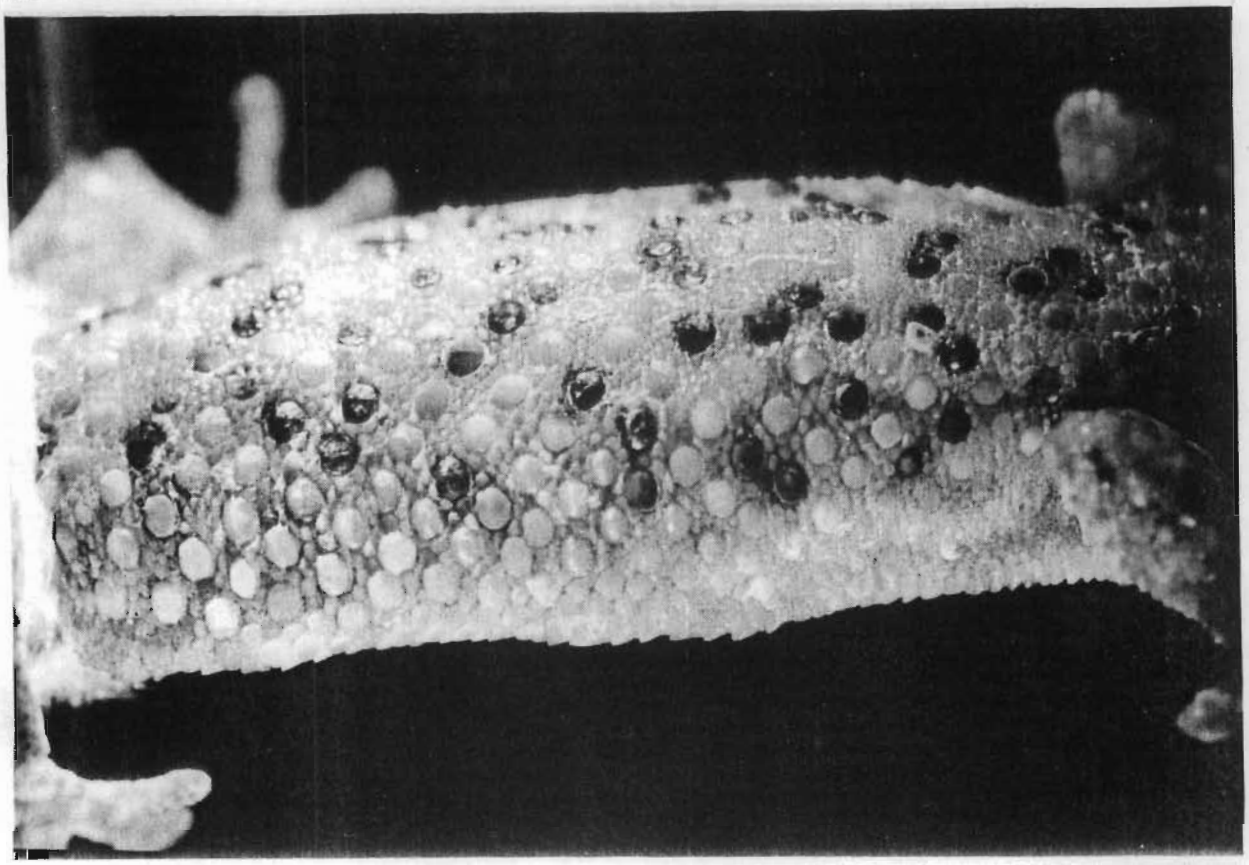


Figure 5 : Dorsal and lateral view of Pachydactylus c. capensis, showing tubercle arrangement.

tubercles on the back; Dorsum covered with granular scales interspersed with rows of large conical tubercles; number of rows varies between 8-16 rows but is mostly 9-11; laterally the tubercles vary from being regularly spaced to more crowded and difficult to count. The limbs are covered with overlapping scales proximally which become tuberculate distally; Digits short and moderately slender, slightly expanded distally, covered below by lamellae, numbering 5 (rarely 4 or 6) under the 4th toe; Tail slightly depressed dorso-ventrally and verticillate, each verticil terminating in a row of enlarged scales or a row of small tubercles, 3-5 (mostly 3-4) scale rows per verticil dorsally; original tail tapers gradually to an acute tip, regenerating tails tend to be very broad proximally tapering to an acute tip. Caudal autotomy is very prevalent 50/66 having regenerated tails.

Size Largest male SVL = 60,5 mm (J1533 - Harriets Wish 393LR), mass = 6,7 g (J1533); Largest female SVL = 67,0 mm (N11601 - Fontainebleau 537MS), mass = 8,8 g (N11601); Mean male SVL = 41,06 mm ± 6,31 (1SD) n=50, mass = 1,98 g ± 1,28 (1SD) n=50; Mean female SVL = 40,85 mm ± 8,14 (1SD) n=50, mass = 2,06 ± 1,60 (1SD) n=50.

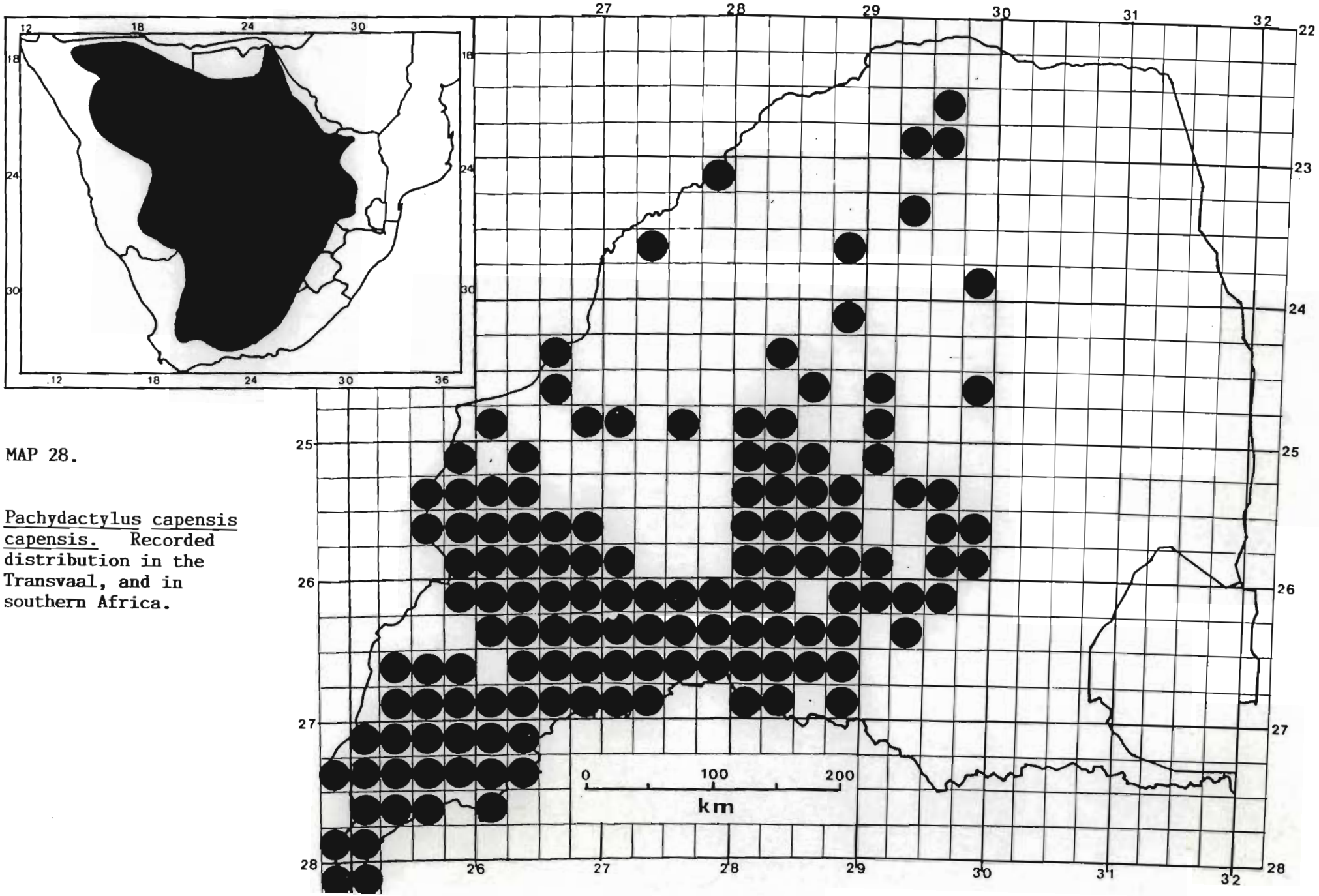
Distribution

Southern Angola south to the central Cape Province, and Botswana to the Transvaal.

Distribution in Transvaal (Map 28).

4km West of Dinokana; Abe Bailey Nature Reserve; Above Motswedi; Acornhoek; Amsterdam 116LS; Barberspan Nature Reserve; Benoni; Bezuidenhoutskraal 64HP; Bloemfontein 63JP; Bloemhofdam Nature Reserve; Bordeaux 555MS; Boschkop 482IR; Boschrand 158HO; Buffelsfontein 443IP; Buffelspruit 443KR; Buisfontein 367IP; Bulskop

225IP; Bultfontein 92JO; "Clearwaters", Haenertsburg; Christiana 325HO; Creslow; Delarey Station; De Putten 56JO; Donkerhoek 365JR; Donkerkloof 162KR; Doornhoek 577IR; Doornplaat 177IP; Elandsfontein 115IQ; Fontainbleau 537MS; Geduld 270IP; Geluk 42HN; Geluks Location; Generaalsdraai 423JS; Gestoptefontein 349IO; Gewenscht 562KS; Gillooly's Farm; Goede Hoop 490JP; Goedvertrouwd 499JR; Golela Bos; Graspan 230HO; Greylingsrus 101HP; Groeneboom 236KP; Groenfontein 526JR; Grootplaats 29HN; Haasfontein 28IS; Halfgewonnen 190IS; Harriet's Wish 393LR; Hartbeesfontein 297IP; Hartebeestfontein 437IQ; Hartebeestpoortje 451IQ; Hartshoogte 17HN; Heidelbergkloof; Hennops R. nr Pleasure Resort; Hoedspruit 346JS; Holland 237KP; Honingkrans 131HP; Houthaaldoorns 2IP; Irene; Italie 123HO; Jackalskraal 45KP; Jagersfontein 55JO; Johannesburg; Johannesburg, Honeydew; Johannesburg, Buccleugh; Johannesburg, Rietfontein; Jukskei R., btwn Johannesburg and Pretoria; Kameelpoort 202JR; Kareeboomput 286HO; Kareefontein 340HO; Kareekuil 356IO; Klavervalley 671KS; Kleinfontein 203JS; Klerksraal 65IQ; Klipfontein 498JR; Klipfontein Organic Farm; Klipnek 199JS; Klipplaat 108JO; Klipplaatdrift 193JR; Klipplaatdrift 43JR; Klipspruit 89HP; Koestersfontein 45IQ; Kolkenbek; Koppieskraal 157IR; Korannafontein 350IO; Koster; Kosterfontein 460JP; Kraalkop 147IQ; Krabbefontein; Kromdraai 263IR; Kromdraai 486JS; Krugersdorp; Kuilfontein 324JP; Langzeekoegat 325IR; Leeuwfontein 185HO; Leeuwfontein 61JP; Leeuwklip 363JS; Leeuwpoort 283JS; Lily 47LQ; Lindleyspoort 220JP; London 112HO; Loskop Dam Nature Reserve; Lot 43250IO; Mabalanes Location; Magaliesberg above Sinoville; Marokane 1HN; Mezeg 77JP; Mogomane Hill; Moilwas Location; Mollepoos Oog 332JP; NE slopes of Tshamavhudzi Peak; Naboomspruit; Napoleon 197KP; Nooitgedacht 17JP;



MAP 28.

Pachydactylus capensis capensis. Recorded distribution in the Transvaal, and in southern Africa.

Nooitgedacht 333JR; Nooitgedacht 508IQ; Nylsvley Nature Reserve; Onrust 332HO; Orkney Townlands 437IP; Potchefstroom Townlands; Pretoria; Pretoria West; Pretoria North; Pretoria, East Lynne Quarry; Pretoria, Mayville; Pretoria, Lynnwood Glen; Pretoria, Pyramids; Pretoria, Arcadia; Pretoria, Garsfontein; Pretoria, Zoo Hill; Pretoria, Wonderboom; Pretoria, Meyers Park; Pretoria, Fountains; Pretoria, Groenkloof; Pretoria, Silverton; Pretoria, Brooklyn; Pretoria, Logalies Location; Pretoria, Skinner's Court; Pretoria, Roberts Heights; Pretoria, Rietfontein; Pretoria, Sjambokstad; Pretoria, Koedoespoort; Prospect 315HO; Randfontein; Ratzegaaiskraal 204IP; Rhenosterspruit 326IP; Rietfontein 115IP; Rietfontein 214JR; Rietfontein 255JT; Rietfontein 313IR; Rietfontein 487JP; Rietgat 105JR; Rietkuil 491JS; Rietspruit 91KQ; Roodekraal 454IQ; Roodeplaat 293JR; Roodewal 322JQ; Roodewal 364IO; Rooidraai 85IQ; Rooijantjesfontein 89IP; Rooipoortje 453IQ; Rooykrans 538KQ; Rust der Winter Nature Reserve; Rustenburg; Rustkraal 129HP; Rustvoorby 383JP; S.A. Lombard Nature Reserve; Schoongezicht 124IP; Schweizer Renecke; Silverband 611IR; Skurweberg; Springbokpan 611IO; Steenbokpan 295LQ; Strydkraal 477IT; Suikerbosrand Nature Reserve; Syferfontein 13HP; Syferfontein 293IQ; Syferfontein 303IP; Tambootie Pan 175JR; Vaalbank 110IP; Vaalboschfontein 188HO; Valhalla, Pretoria; Ventersdorp Dorpsgebied; Vereeniging; Vierfontein 61IS; Vlakfontein 457JR; Vlakfontein 558IR; Vlakplaats 354JR; Vogelfontein 400JP; Vogelstruiskraal 397KQ; Vyeboom; Vygeboompoort 456KR; Warmbaths; Waterpan 292IQ; Waterpoort; Welgedacht 130JR; Welgevonden 312IO; Weltevreden 176HO; Witpan 20IP; Witpoort Dorpsgebied; Witrand 103IS; Witrand 457JP; Wonderboom 98KP; Zandspruit 287KR; Zeekoefontein 573IQ; Zeerust Townlands; Zonkolol 473JR; Zoutpan 459MS; Zwartkrans

172IQ; Zyferfontein 293JP; near Gopane Mine.

Literature Records

Arbeidsgenot, Waterberg (NMZB).

Habitat and Ecology

A stout cylindrical bodied gecko, mostly terrestrial. May roost in crevices between rocks although more commonly found under rocks on soil, in moribund termitaria and under rotting logs and bark as well as in the holes of other animals including those of dung beetles. Nocturnal and solitary it forages at night during the summer months eating slow moving prey. Appears to have a wide habitat tolerance from the grasslands of the highveld at an altitude of 1800 m to the Limpopo river basin at 600 m a.s.l. It is most abundant in the calcrete SW-NW Transvaal. The eggs are laid separately under a rock, two at time measuring approximately 10-11 x 7-8 mm (FitzSimons, 1943).

Conservation Status

Protected. Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. Although the gecko is widespread in Transvaal (Map 28), it is sparse throughout its range. More common along the western parts of the Transvaal it is under considerable development pressure in the south western Transvaal. The habit of demolishing live termitaria by farmers and of moribund termitaria by amateur herpetologists poses a great threat to the continued survival of P. capensis on the highveld. These moribund termitaria are very important overwintering refuges for a host of reptiles, mammals and invertebrates, without which many species would not

survive. Although the current status of the species is secure, large scale habitat destruction and amateur herpetologists pose a serious threat.

Remarks

Considerable confusion hinges around P. capensis and its allies. Various interpretations of their relationships have been proposed and in this study there is another attempt at compartmentalising the various taxa. FitzSimons (1943), Loveridge (1947), Broadley (1977b) and McLachlan (unpublished MS) have retained three subspecies in the Transvaal, namely P. c. capensis, P. c. vansoni FitzSimons and P. c. affinis Boulenger, based on the number and arrangement of the enlarged tubercles on the dorsum, absence or presence of occipital tubercles and the arrangements of the subcaudal scales.

The arrangement of the enlarged tubercles on the back are a diagnostic aid in the establishment of specific status and is therefore a useful character when referred to P. c. capensis serving to separate it from the other forms. It is also usable in distinguishing a certain form of P. c. vansoni separating it from others as well as P. c. affinis.

The absence of or presence of tubercles on the head appears to be very variable according to geographical location and is therefore of little value. While the arrangement of the subcaudals may have taxonomic relevance, the fact that at least half of all species examined have tails broken off on capture or else regenerated leaves a number of specimens which cannot be classified with any degree of certainty.

It was decided that colour patterns and arrangement was an aid in the sorting of the specimens coupled with habits and habitat requirements. The latter features have frequently been overlooked and are very important

when assessing the status of an animal so bound to its substrate as geckos are. Pachydactylus c. capensis may aestivate in a crevice between the rocks but it is not normally associated with a rocky habitat whereas P. c. affinis is exclusive to a rocky habitat as is also a form of P. c. vansoni, while others are again terrestrial indicating another subspecies perhaps, as will be discussed presently.

Some of there forms are sympatric and both P. c. capensis P. c. affinis have been collected within 10 m of each other. Similar sympatry occurs in the eastern Transvaal Drakensberg where P. c. affinis and P. c. vansoni occur together. Both Broadley (1977b) and Mclachlan (unpublished MS) have suggested hybridization to account for forms observed in the NW Transvaal which did not conform to the morphological units created, rather than look at the whole and accept the polymorphism shown by some taxa.

My approach is therefore unusual, but, relying on morphology, colour and habitat requirements, I have attempted to provide a meaningful separation and distribution pattern of the various taxa.

A unique feature of P. c. capensis is the fact that there are occasional specimens scattered from NW to SW which are very much larger than their more common compatriots. These specimens are very tubercular and robust, a feature which may bear looking into, as it is of sufficient frequency to be more than incidental.

Pachydactylus vansoni FitzSimons 1933

Pachydactylus capensis vansoni FitzSimons 1933, Ann. Tvl. Mus. 15, p. 274. Type locality: Between Entabeni and Lake Fundusi, Soutpansberg, N. Tvl. FitzSimons 1943, p. 96, Loveridge 1947, p. 382, Broadley 1977b, p. 1, pl. 1 &

2, Fig. 2; Pienaar et al, 1983, p. 46, pl. 11; Pienaar 1978, p. 32, pl. 5, 1966, p. 40, pl. 5; Welch 1982, p. 34; Branch 1988a, p. 201, pl. 83, 1988b, p. 6.

Description: 156 specimens examined.
Colour: Grey-brown to red-brown with irregular dark brown dorsal blotches; Dorsum mostly with a distinct complete or incomplete pale vertebral stripe and from 6-8 white, dark edged crossbars which in some specimens are staggered on either side of the vertebral line; A dark stripe extends from the nostril through the eye to the rear of the head bordered below by the pale supralabials which continue as a whitish line behind the head in the nuchal region; This line is bisected by the vertebral stripe and variable patterns are formed on the crown of the head; Limbs brown with dark brown blotches; Vertrally white; Tail (original) verticillate and striped with black and white crossbars.
A second colour phase (Highveld form), is similar in apparance except that the ground colour is grey to greyish brown without the large dark brown blotches of the typical form.
Lepidosis: (Figures 6, 7 & 8) Rostral broader than high; nostril surrounded by three (rarely 4) nasals, anterior largest and mostly in contact behind the rostral; UL 6-8, mostly 7 or 8; Mental narrower than infralabials and tapered posteriorly; LL 5-7, mostly 6 or 7; Gulars granular; dorsally snout covered in convex keeled granules larger than conical granules on crown; Dorsum covered in granules interspersed between large trihedral tubercles which form 10-17, mostly 13-15 rows (Highveld form) and may be irregular to regular in the typical form; Limbs have overlapping scales proximally and tubercles distally; Digits short and moderately slender with the distal end slightly distended (nominate form) to markedly distended (Highveld form), with lamellae under

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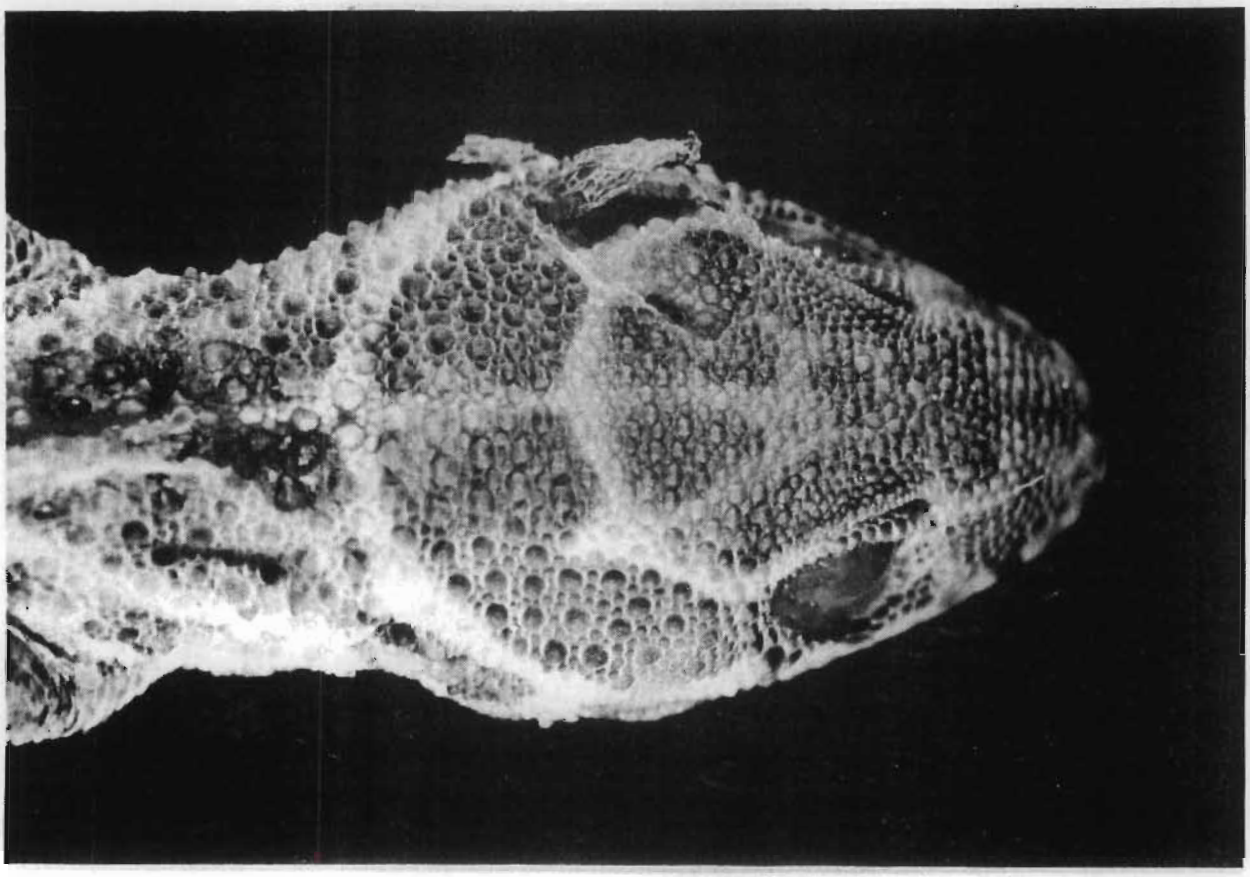

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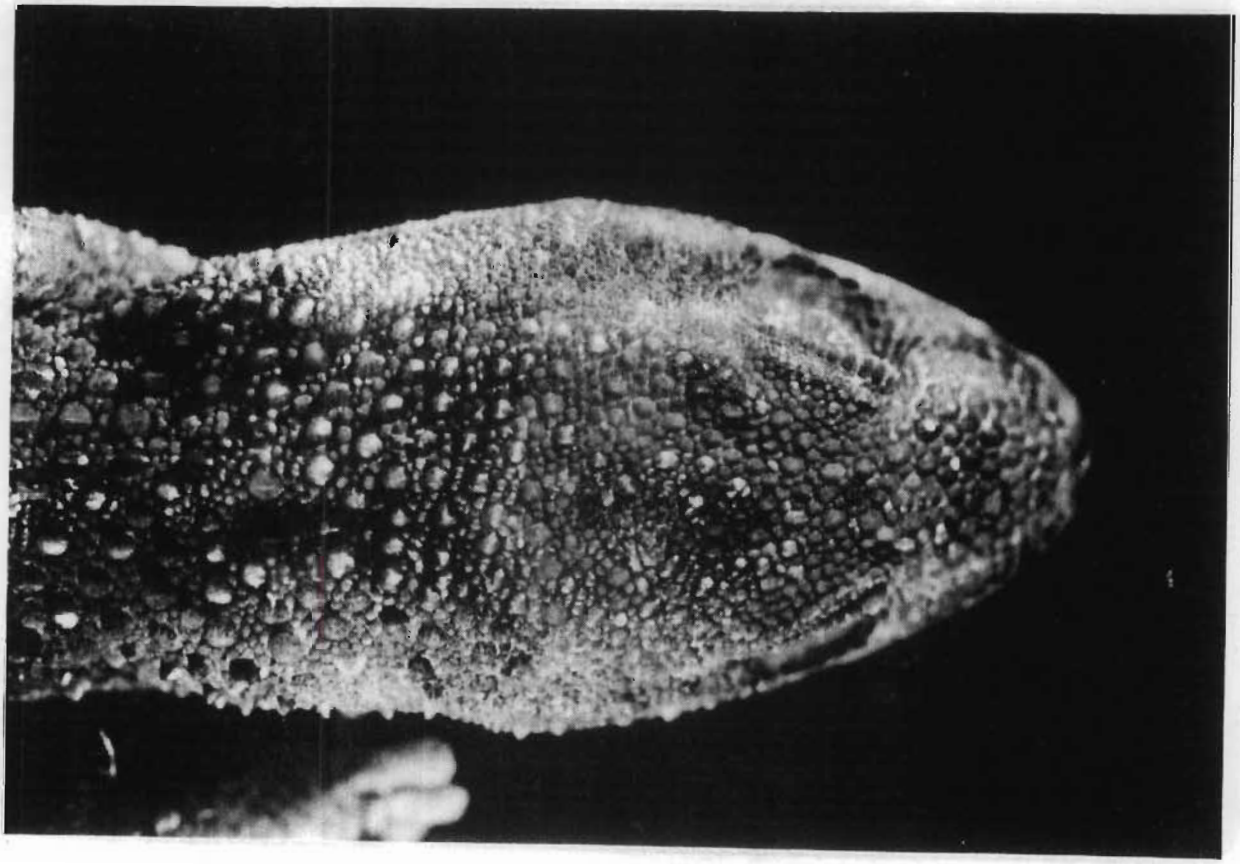

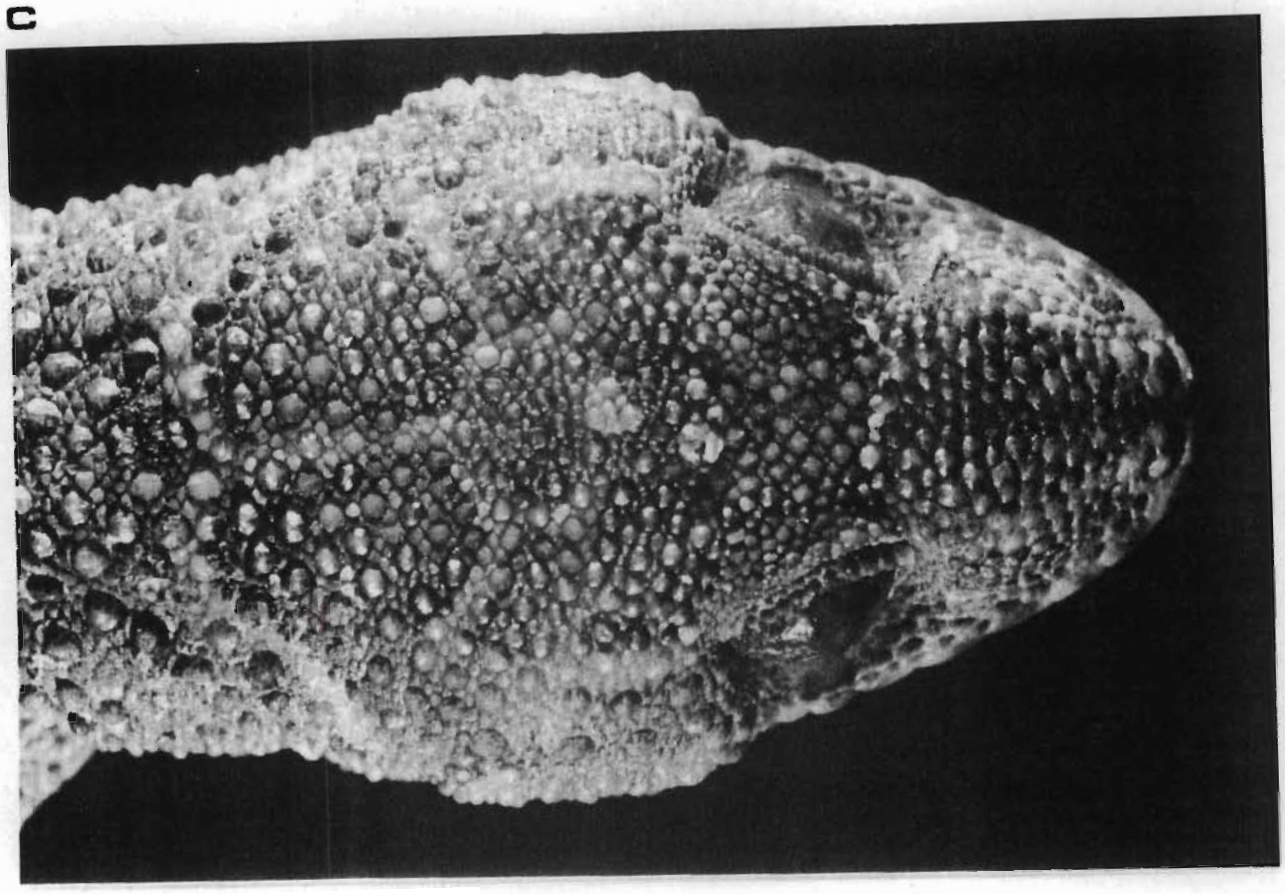

Figure 6 : Dorsum of head of Pachydactylus vansoni from three different localities, A. Thononda Peak 2230 CC - J1110 (near type locality), B. Pongola Nature Reserve 2731BD - N7223, C. Loopfontein 298JT 2530DA - N7904. showing tubercle arrangement.

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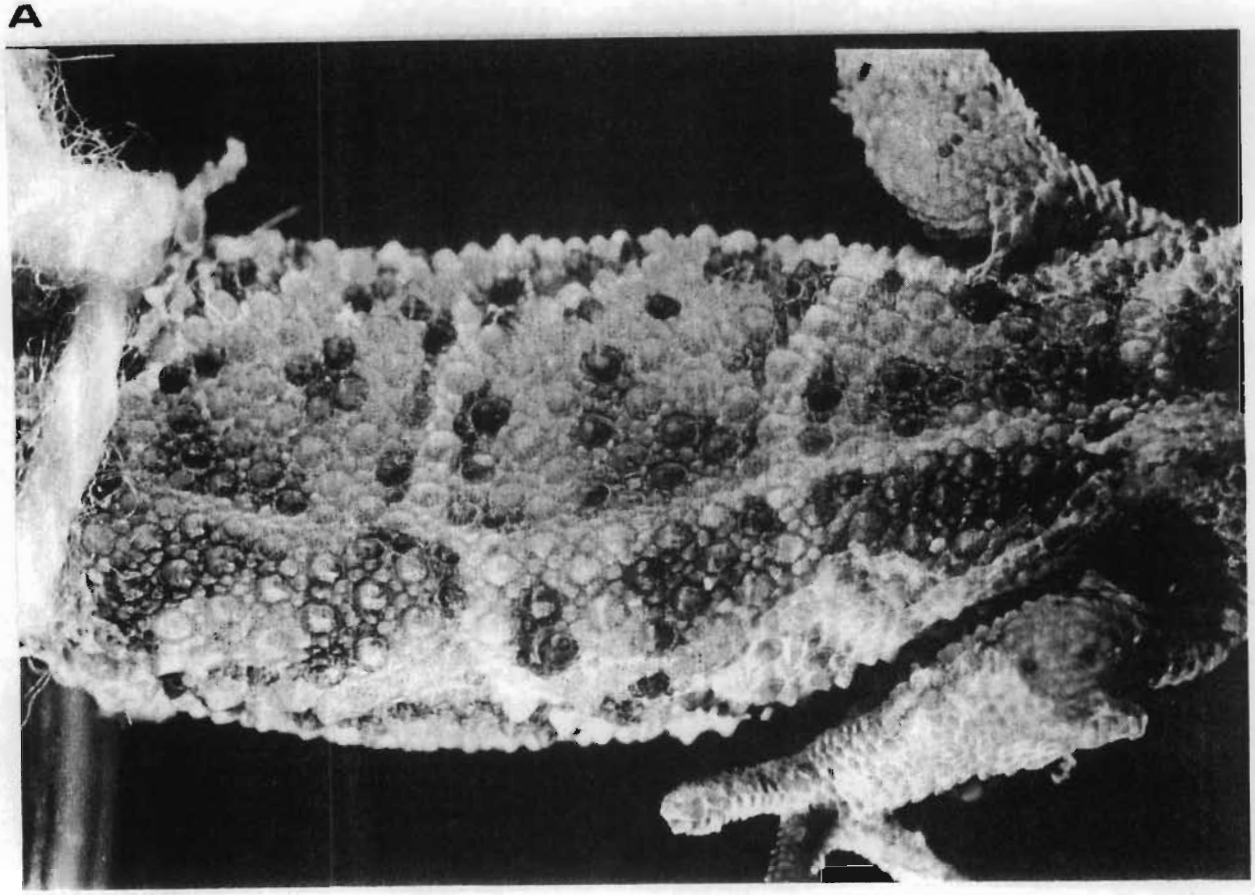

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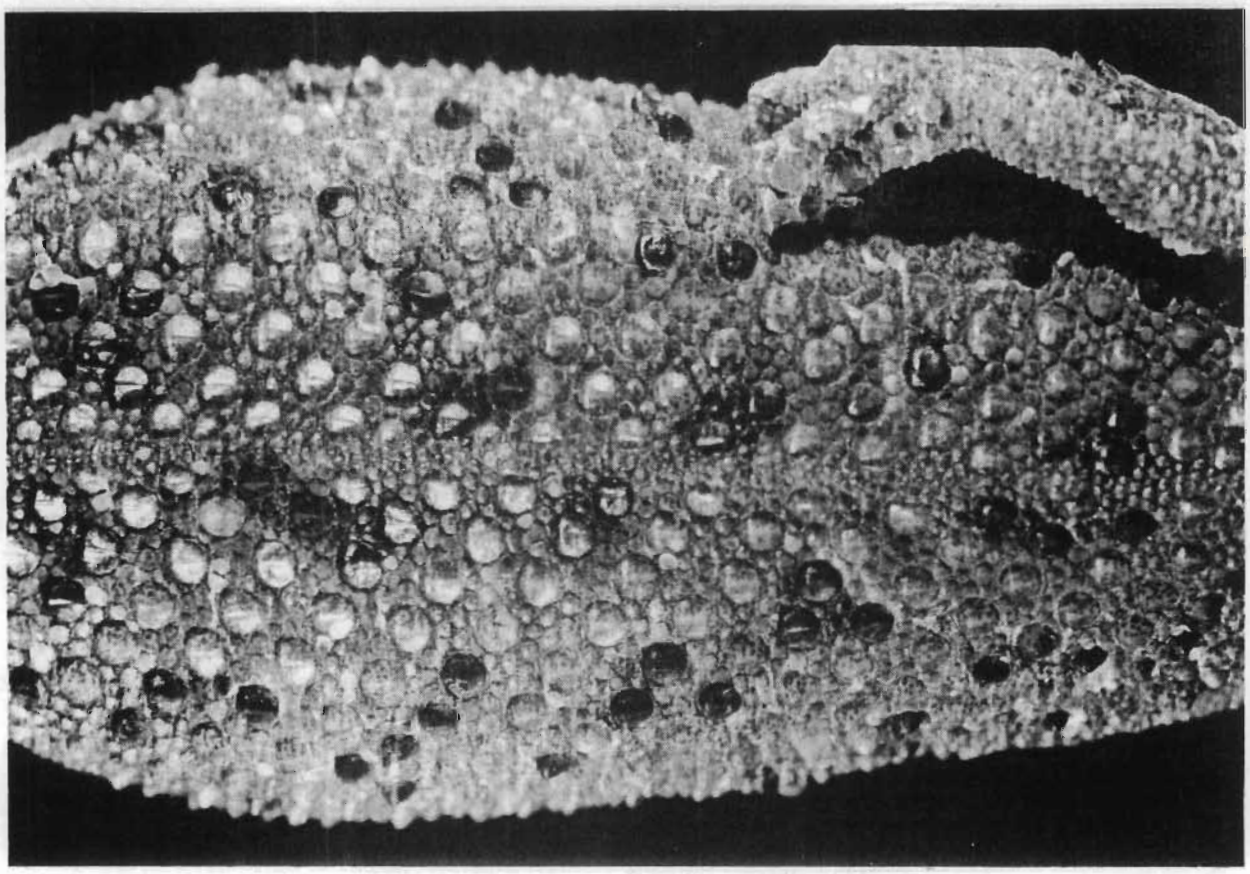

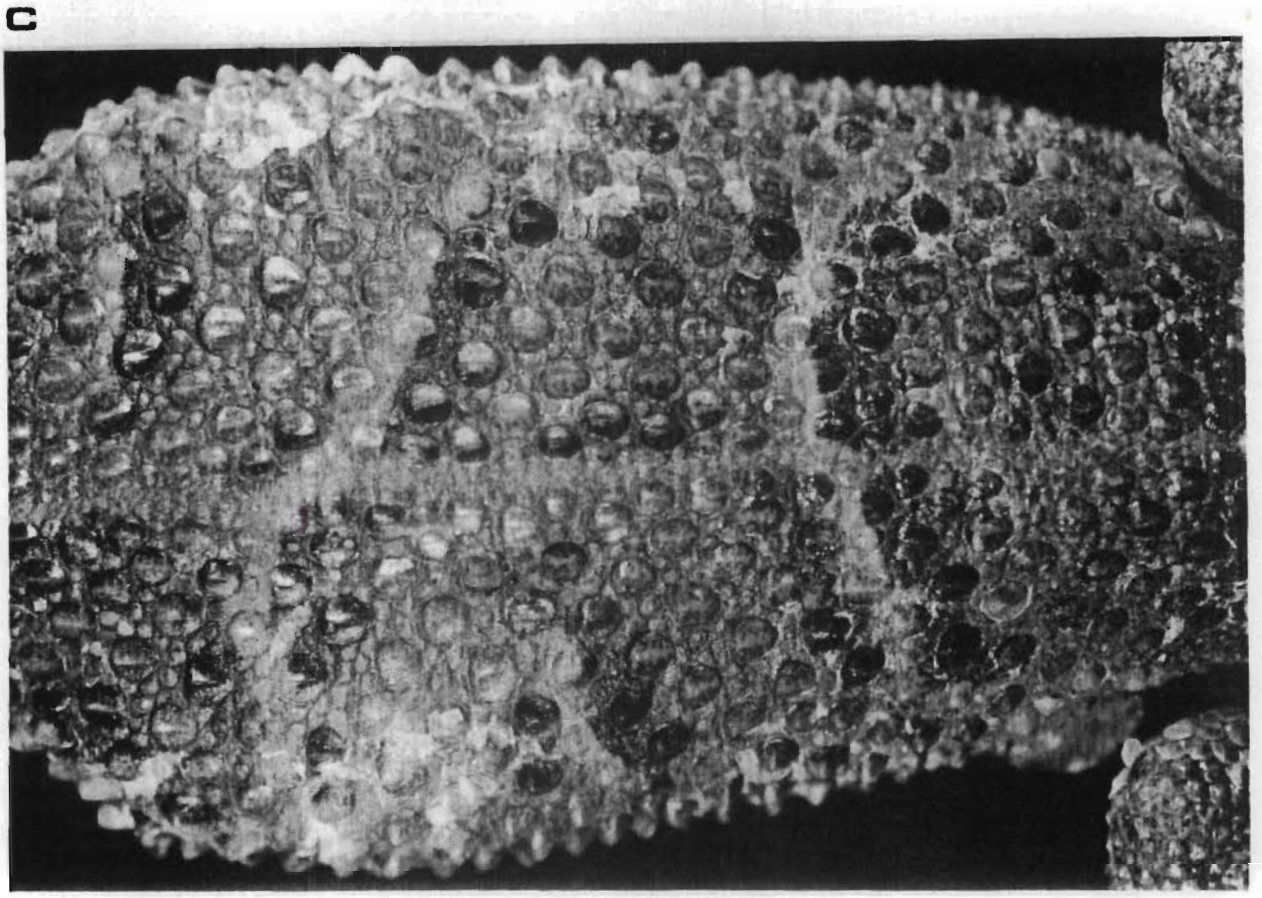

Figure 7 : Dorsum of back of Pachydactylus vansoni from three localities (as for Figure 6).

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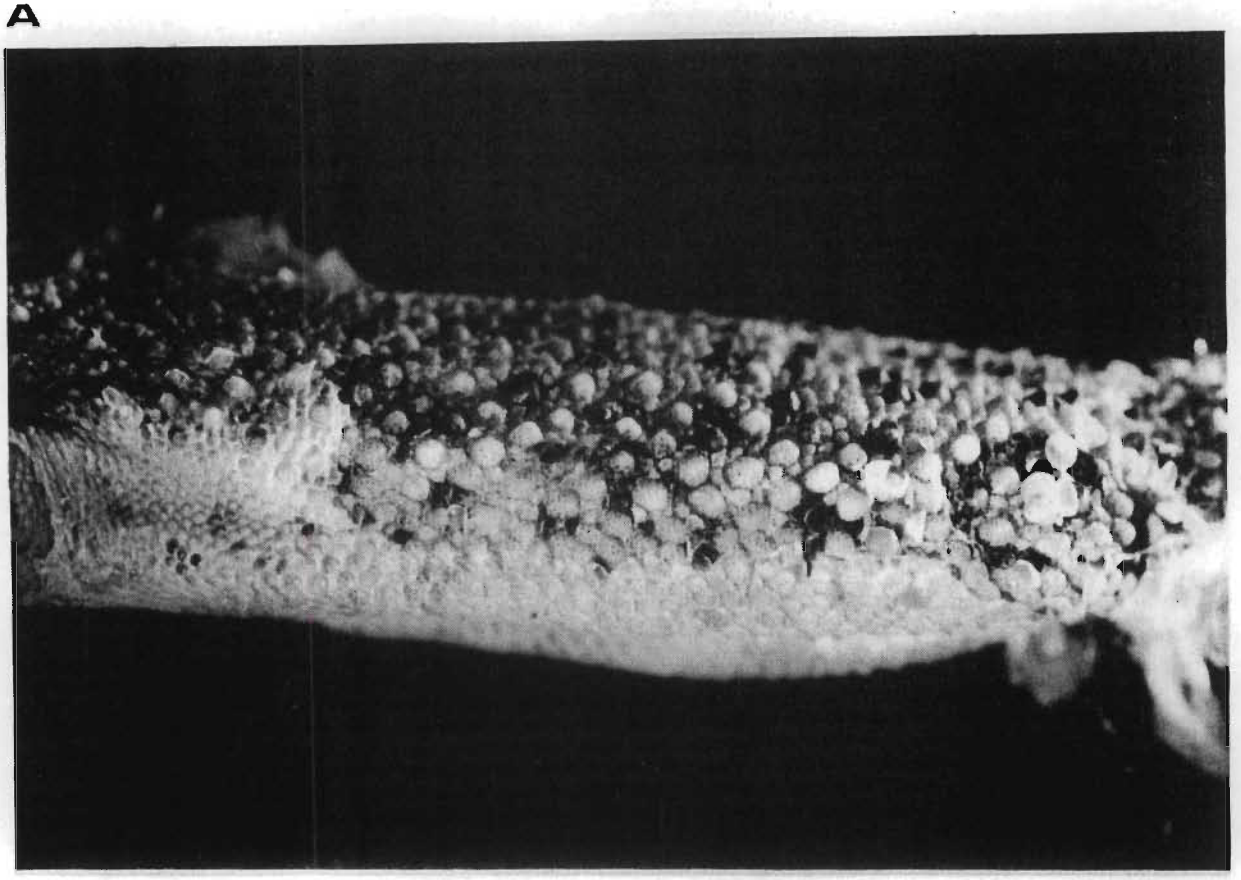

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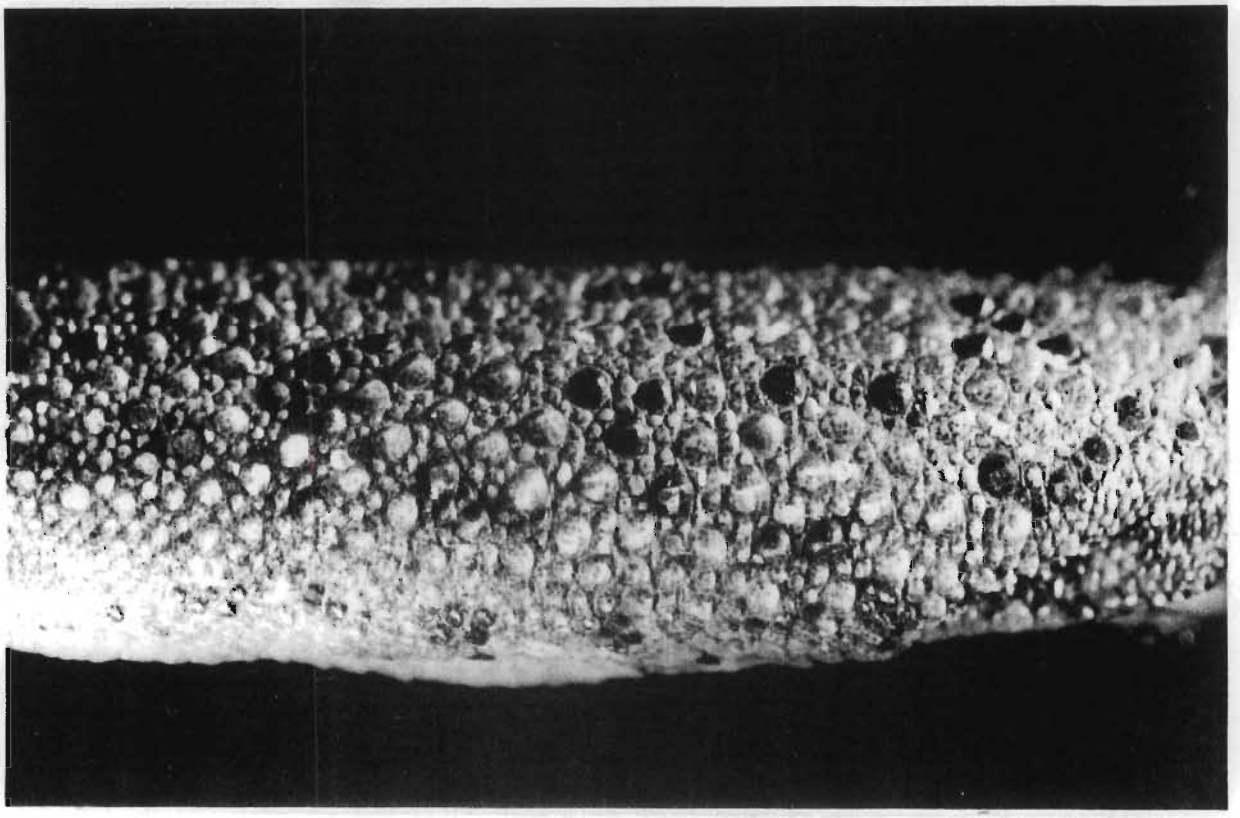


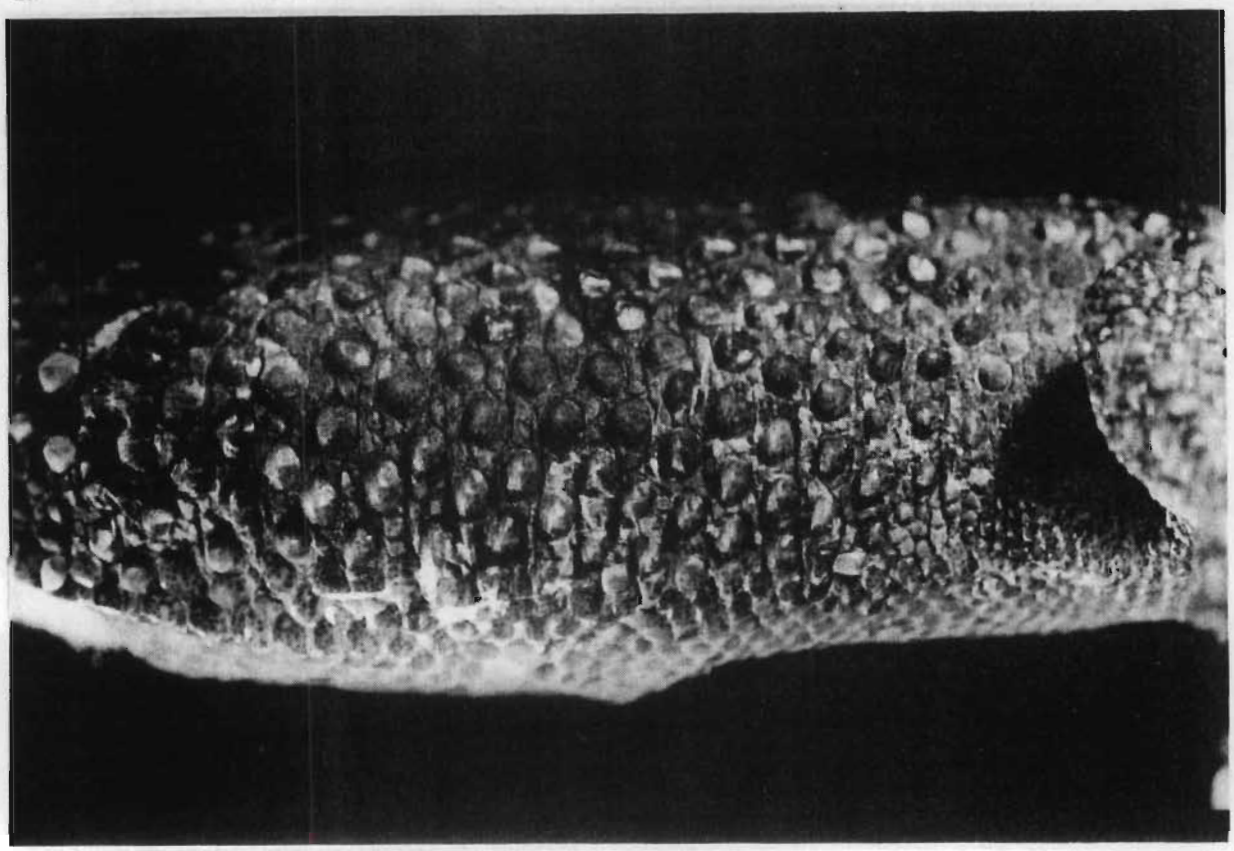


Figure 8 : Lateral view of Pachydactylus vansoni from three localities (as for Figure 6).

the distended portions, 4-6, usually 5 under the 4th toe; inferomedian subdigital scales not or slightly larger than surrounding scales; Tail verticillate in its original form with 3-5, mostly 3-4 scale rows per verticil; a row of enlarged tubercles is found in the middle of each verticil.

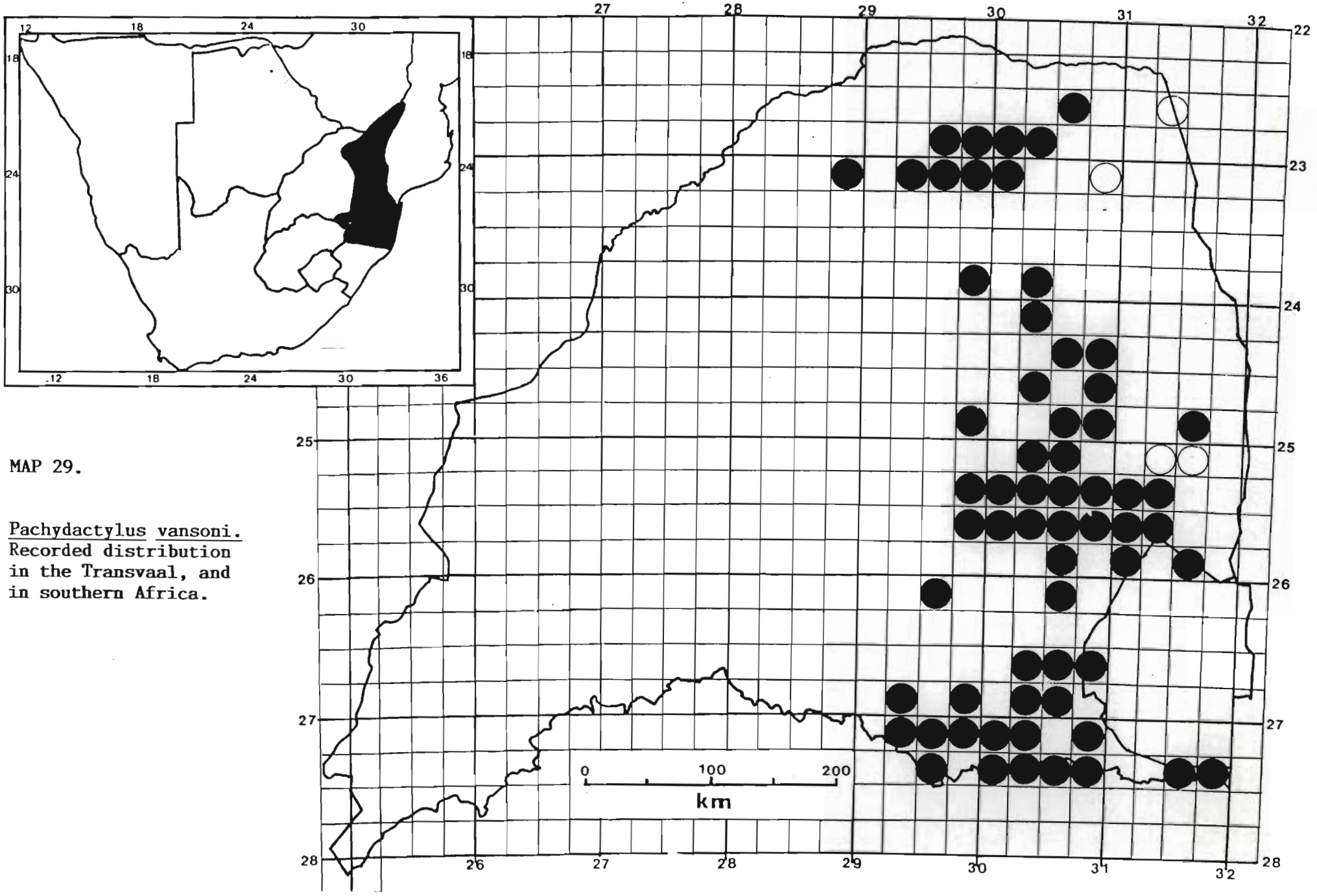
Size: Largest male SVL (nominate form) = 47,0 mm (J1007-Matiwa Lookout, Entabeni Forest Reserve); mass = 2,8 g (J1007); Largest female SVL (nominate form) = 54,5 mm (JN512 - Carpe Diem), mass = 3,9 g (J1126 - Fundusi); Mean male SVL (nominate form) = 42,31 mm ± 4,18 (1SD) n=8; mass = 1,97 g ± 0,59 (1SD) n=8; Mean female SVL (nominate form) = 46,32 mm ± 4,83 (1SD) n=17, mass = 2,48 g ± 0,76 (1SD) n=17; Largest male SVL (Highveld) = 55,0 mm (N7066 - Long Tom Pass), mass = 5,5 g (N7066); Largest female SVL (Highveld) = 59,0 mm (N7107 - De Kuilen 205JT), mass = 6,0 g (N7107); Mean male SVL (Highveld) = 45,17 mm ± 6,61 (1SD) n=15, mass = 2,70 g ± 1,32 (1SD) n=15; Mean female SVL (Highveld) = 46,49 mm ± 6,15 (1SD) n=38, mass = 2,81 g ± 1,18 (1SD) n=38.

Distribution

Restricted to south-eastern Zimbabwe, north-eastern and eastern Transvaal descending to sea level in southern Mozambique.

Distribution in Transvaal, (Map 29).

(Highveld) 10 km N. of Amsterdam; Barberton Townlands 369JU; Bendor 211HT; Blyde River Nature Reserve; Boschhoek 36JT; De Kuilen 205JT; Edinburgh 439IT; Eureka City; Excelsior 211JU; Farrefontein 349JT; Goedgevonden 134HT; Jericho Dam 304IT; Kafferskraal 47HS; Kaffir Creek; Langkloof 356JT; Leiden 340IT; Lisbon State Forest; Long Tom Pass; Loopfontein 298JT;



MAP 29.

Pachydactylus vansoni. Recorded distribution in the Transvaal, and in southern Africa.

Merriekloof 420IT; "Misty Mountain"; Mooimeisiesfontein 77HS; Mount Sheba Nature Reserve; Nkungwini; Normandie 178HT; Paardeplaats 101HT; Pilgrim's Pass; Pittville 197IT; Potgieters Hoop 151HT; Rietvlei 375JT; Rolfontein 536IS; Roodewal 102HS; Schoonaard 326KT; Spitskop 276IS; Stanley Bush Kop; Sterkspruit 508IS; Van der Waltspoort 81HT; Verkyk 88HS; Vryheid 97HT; Wakkerstroom Townlands 121HT; Wanhoop 78JT; Waterval 128HS; Welbedacht 382IS; Welgelegen 107IT; 30 km SE of Nelspruit. (Lowveld); Barberton Townlands 369JU; Bellevue C 518JT; Blijdsschap Nature Reserve; Buffelskroon; Buisdorp 37LS; Carpediem 76KT; De Villiersdale 313LR; Ehlatine 618LT; Elandsfontein 471JT; Entabeni State Forest; Grootfontein 47LT; Harnham 793MS; Hoedspruit; Houtbosdorp; Jeppes Rust 469JU; Khandizwe; Lake Fundudzi; Louws Creek; Luphisi; Malamala 359KU; Mapochsgronde 500JS; Matiwa Lookout, Entabeni 251MT; Newgate 802MS; Perkeo 223KT; Perth 242LS; Pongola Nature Reserve; Praktiseer 275KT; Rhenosterkop 195JU; Rietfontein 255JT; Robertson 748MS; Schoonoord 326KT; Schoonoord 380JU; Sudwalaas Kraal 271JT; The Willows 197KT; Thonondo Peak; Vygeboom 619JT; White River 64JU; Zwartkloof 60HU.

Literature Records

Near Mahlambandlovu pan; Malelane camp area; Nahpe road 6,4 km from Skukuza; Skukuza; Nwambiya pan, (Pienaar et al, 1983). Outlook 789MS; 24 km E. of Lydenburg; Komatipoort; Nelspruit; The Downs 34KT, (NMZB).

Habitat and Ecology

The nominate form is a terrestrial species occurring from the top of the Soutpansberg at an altitude of 1 500 m to the lowveld at 250-300 m a.s.l. and in Mozambique to sea

level. The Highveld form only occurs between 1500 to 2 300 m a.s.l. and is exclusively rupicolous being totally restricted to rocky outcrops in the grasslands. The nominate form inhabits rocky outcrops but is more frequently found under rock on soil as opposed to mostly crevices between or under rock on rock in the Highveld form. This feature is also reflected in the degree of dilation of the digits. Both forms are nocturnal and solitary although the Highveld form is frequently found in pairs. They are oviparous and lay two eggs at a time under rock slightly buried in the soil during the summer months. A female may lay more than one clutch under the same stone. The eggs measure 10,0-11,3 mm x 7,8-9,5 mm with a mass of 0,3-0,45 g. The hatchlings emerge in late summer and measure 19,0-21,0 mm SVL, T.18,0-20,5 mm with a mass of 0,15-0,30 g.

Conservation Status.

Protected. Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. Both forms occur within nature reserves such as Jericho, Wanhoop, Hans Merensky, Lillie, Blyde and Happy Rest as well as the Kruger National Park. Their continued existance is assured. Apart from afforestation which could seriously affect the status of both forms, there are few threats. Current status is considered secure.

Remarks

It is clear that there are two forms under consideration although they are similar. The differences in choice of habitats, and of their attendent modifications such as the more depressed body and tail and expanded digits of the Highveld form, as opposed to more cylindrical appearance and less developed lamellae of the nominate

form, are real. Some overlap in colour pattern between those from Entabeni and those from the Highveld form are apparent but the lowveld patterns digress considerably from those of the highveld. In my analysis of P. capensis complex two species were sympatric at the The Downs 34KT 2430AA and no doubt elsewhere which leads me to conclude that P. c. vansoni is a valid species in its own right and is herewith referred to as P. vansoni FitzSimons with obvious affinity to P. c. capensis.

Pachydactylus affinis Boulenger, 1896

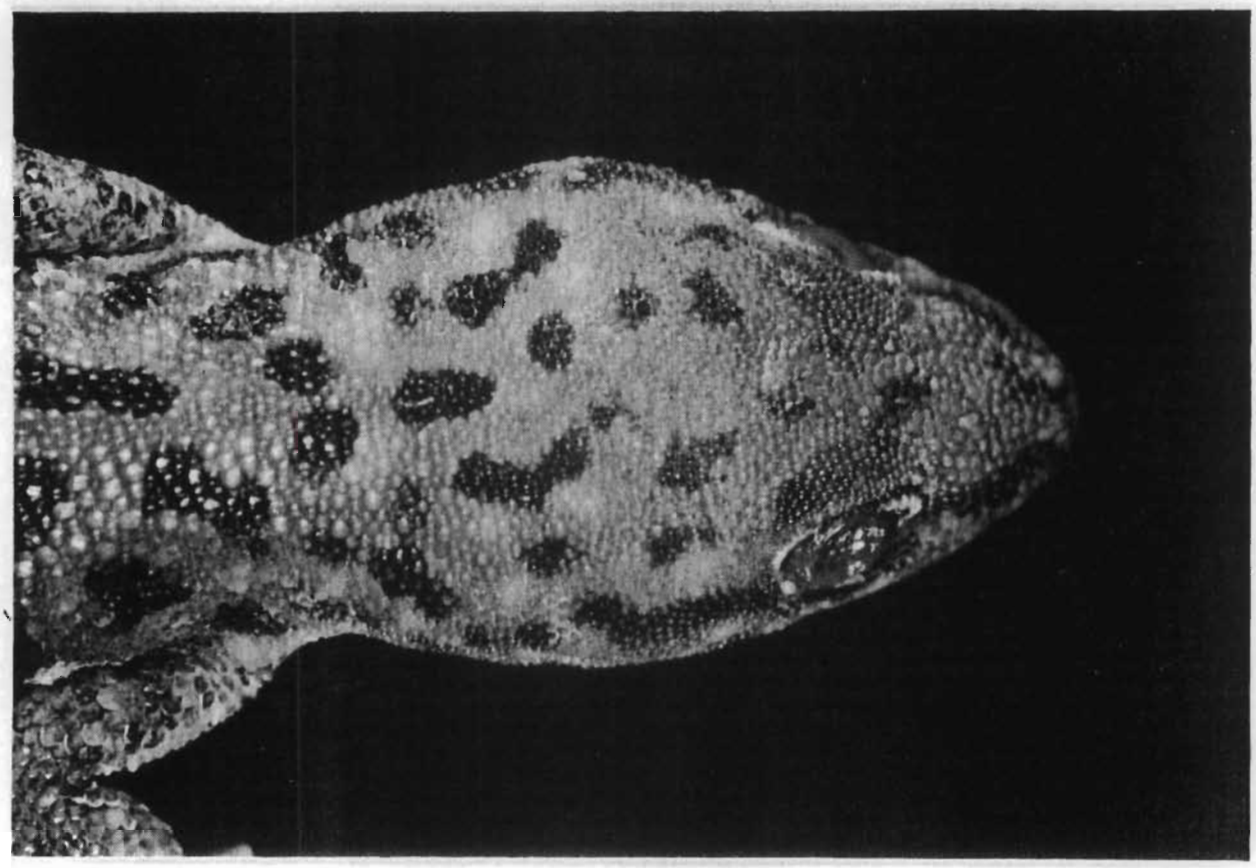
Pachydactylus affinis Boulenger, 1896, Amer. Mus. Nat. Hist. (6) 17, p. 21. Type locality: Rustenburg dist. Transvaal.
Pachydactylus capensis affinis Boulenger. FitzSimons 1943, p. 102-103. Loveridge 1947, p. 381-382; Broadley 1977b, p. 1; Pienaar 1978, p. 32, pl. 5A, Welch 1982, p. 33; Branch 1988a, p. 201, pl. 82, 1988b, p. 6.
Pachydactylus affinis affinis Boulenger. Jacobsen 1977, p. 18.

Description. 284 specimens examined.
Colour: Pale brown to brown in ground colour with numerous dark brown blotches, spots or vermiculations on the head, back and extending into the tail. Scattered white spots occur in some specimens on the back and coalesce to form white cross bars which in some specimens may be bordered by black. The markings and crossbars are particularly bold in the eastern Transvaal, Soutpansberg and Blouberg specimens. A dark stripe extends from the nostril through the eye to above the ear in western forms and to the shoulder in eastern Transvaal specimens. Upper labials white, this extending back to the shoulder. Ventrally white.

Lepidosis: (Figures 9, 10 & 11) Rostral slightly wider to wider than high; nostrils between three (rarely 4) nasals; anterior nasals in narrow to broad contact behind rostral or may be separated by a granule particularly in the Magaliesberg specimens. UL 6-10, mostly 9; Mental narrower than adjacent infralabials and tapered posteriorly, longer than broad; LL 4-8, mostly 6 or 7; gulars granular; Scales on snout rounded to conical and larger than granular scales on crown of head; Crown of head granular with occasional, flattened slightly enlarged tubercles in specimens from the Waterberg, with raised, rounded to conical widespaced tubercles in those from the Magaliesberg to numerous tubercles in those specimens from the Transvaal Drakensberg, and the Soutpansberg and Blouberg; scales on the back granular with large keeled tubercles spaced regularly on the back becoming much denser dorsolaterally in those from the Waterberg, to widespaced and regular in those from the Magaliesberg to heavily tuberculate with fewer granules in those from the eastern and northern Transvaal. Limbs covered with overlapping scales proximally, the forelimbs becoming slightly tuberculate distally, hindlimbs heavily tuberculate distally; digits slightly expanded at the tip and five rows of lamellae present; Tail (original) moderately long and tapering to a point, regenerated tails, fat proximally rapidly tapering to an acute tip. Original tails not or only faintly verticillate with 4 rows of scales perverticil; Tail covered with overlapping scales.

Size: Largest male SVL (Waterberg) 41,5 mm (J4064 - Sterkfontein 282KQ), mass = 1,8 g (N3370 - Donkerkloof 162KR); Largest female SVL (Waterberg) 46,5 mm (N2641-Galakwyns Stroom 745LR), mass = 3,1 g (N2641); Largest male SVL (Magaliesberg) 43,5 mm (N8361 - Waaikraal 396 JQ), mass = 2,2 g (P10842 - Witklipbank

A



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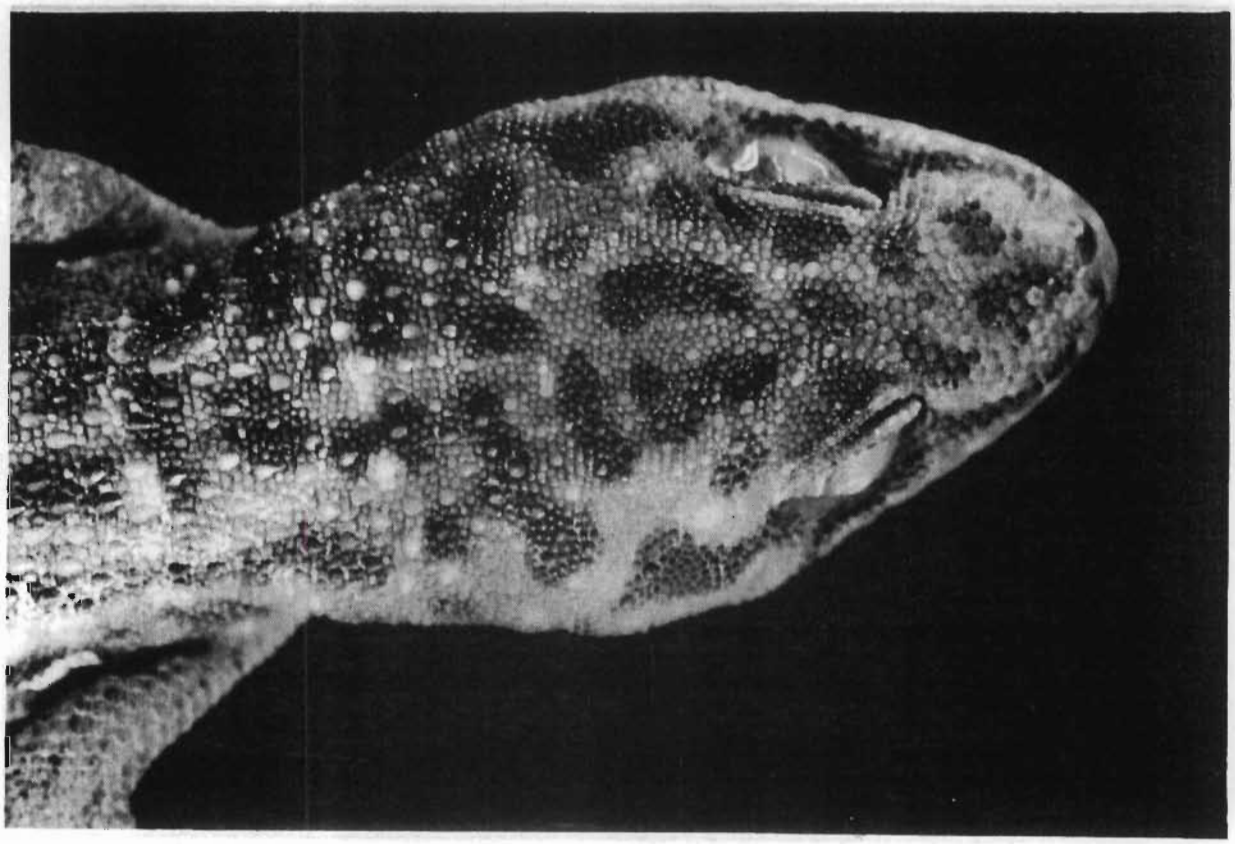


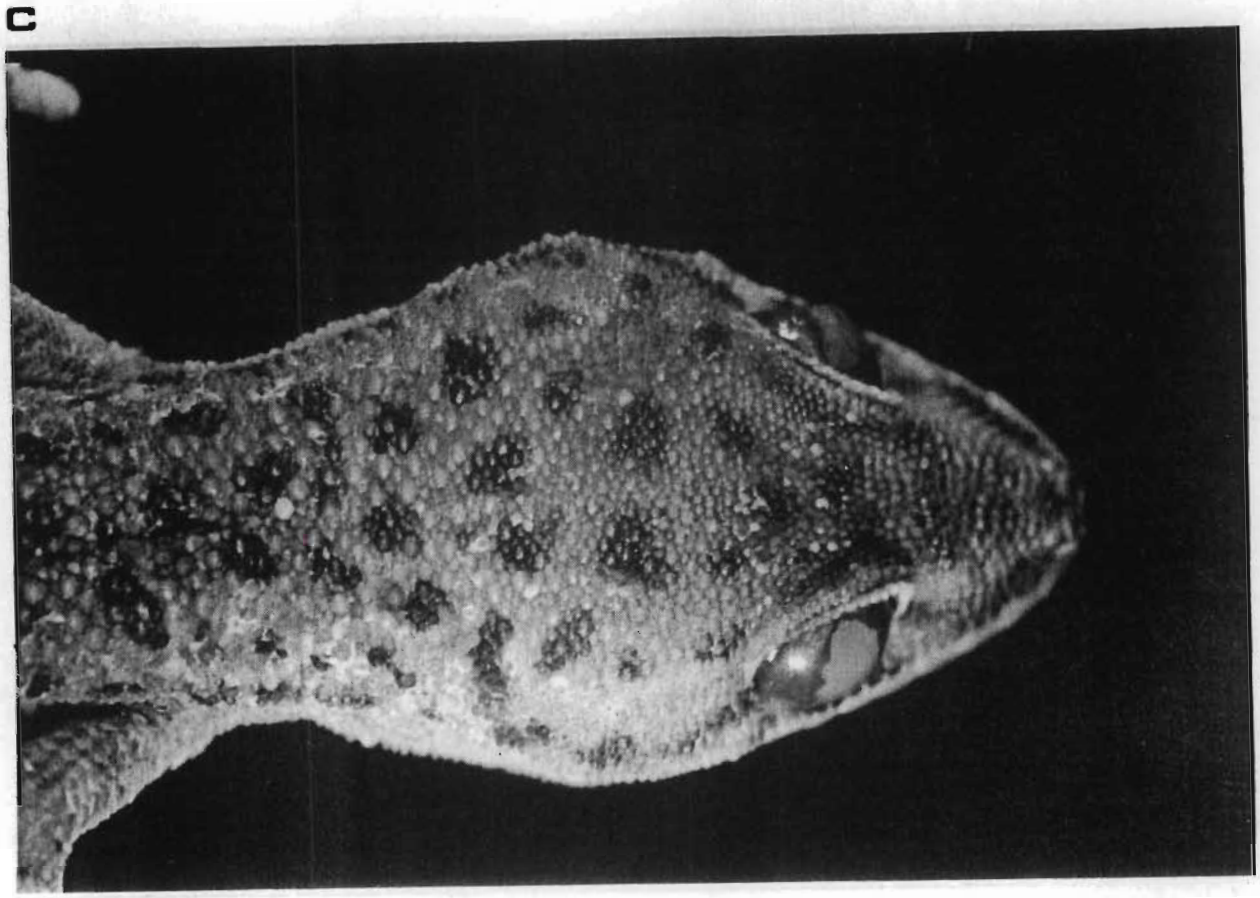


Figure 9 : Pachydactylus affinis - dorsal view of head,

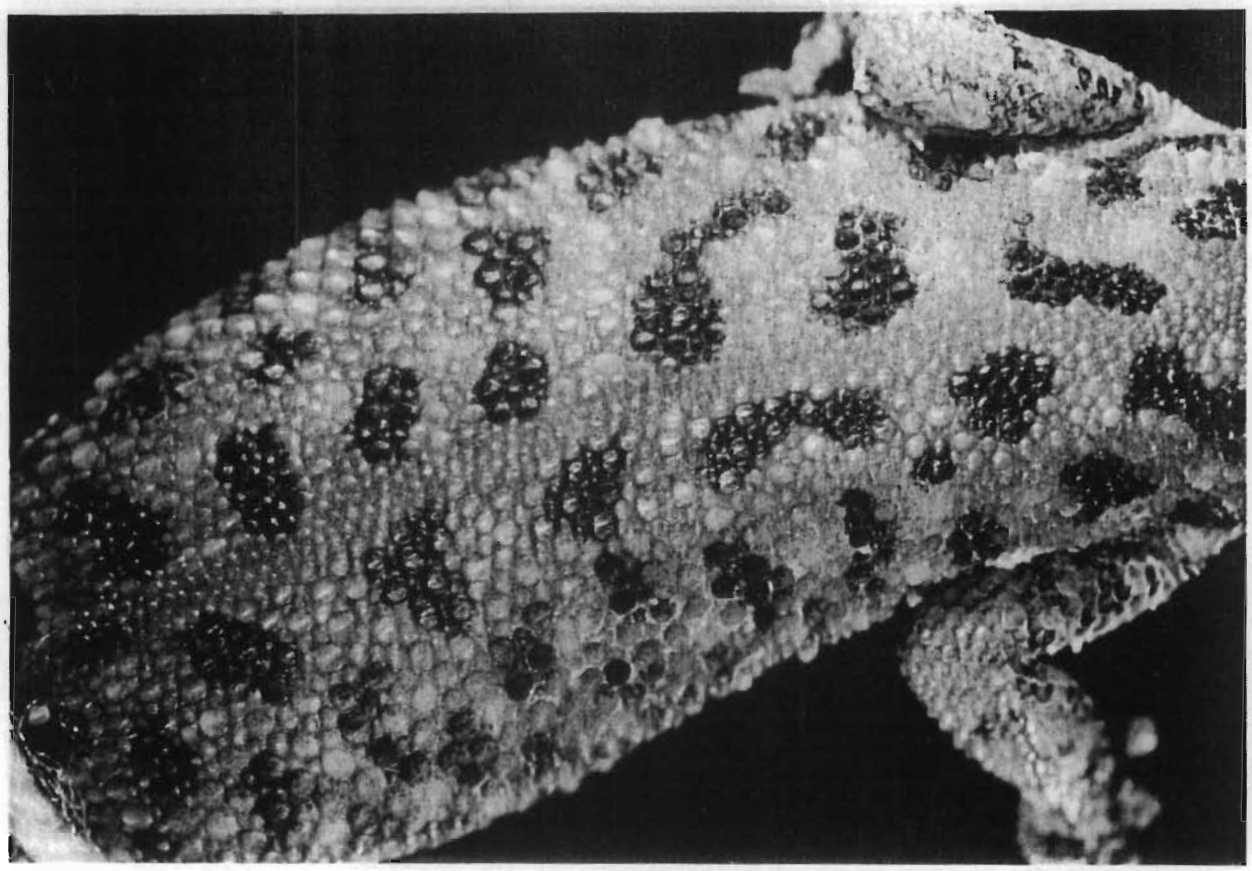
A. Zandspruit 287KR 2428BB - N3513,

B. Waaikraal 396JQ 2527DA - N8361,

C. Morgendal 216KS 2429BB - JN 2876,

showing tubercle arrangement.

A



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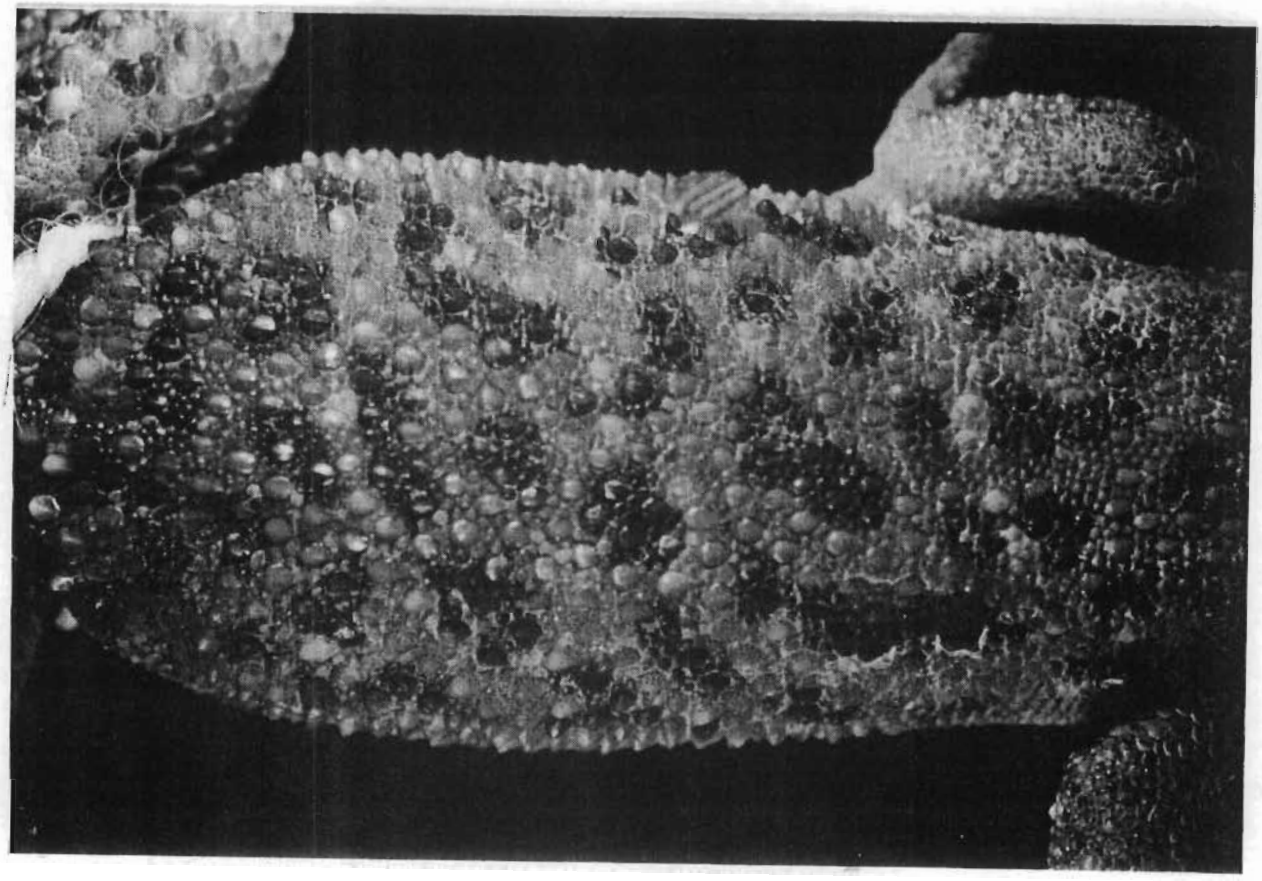


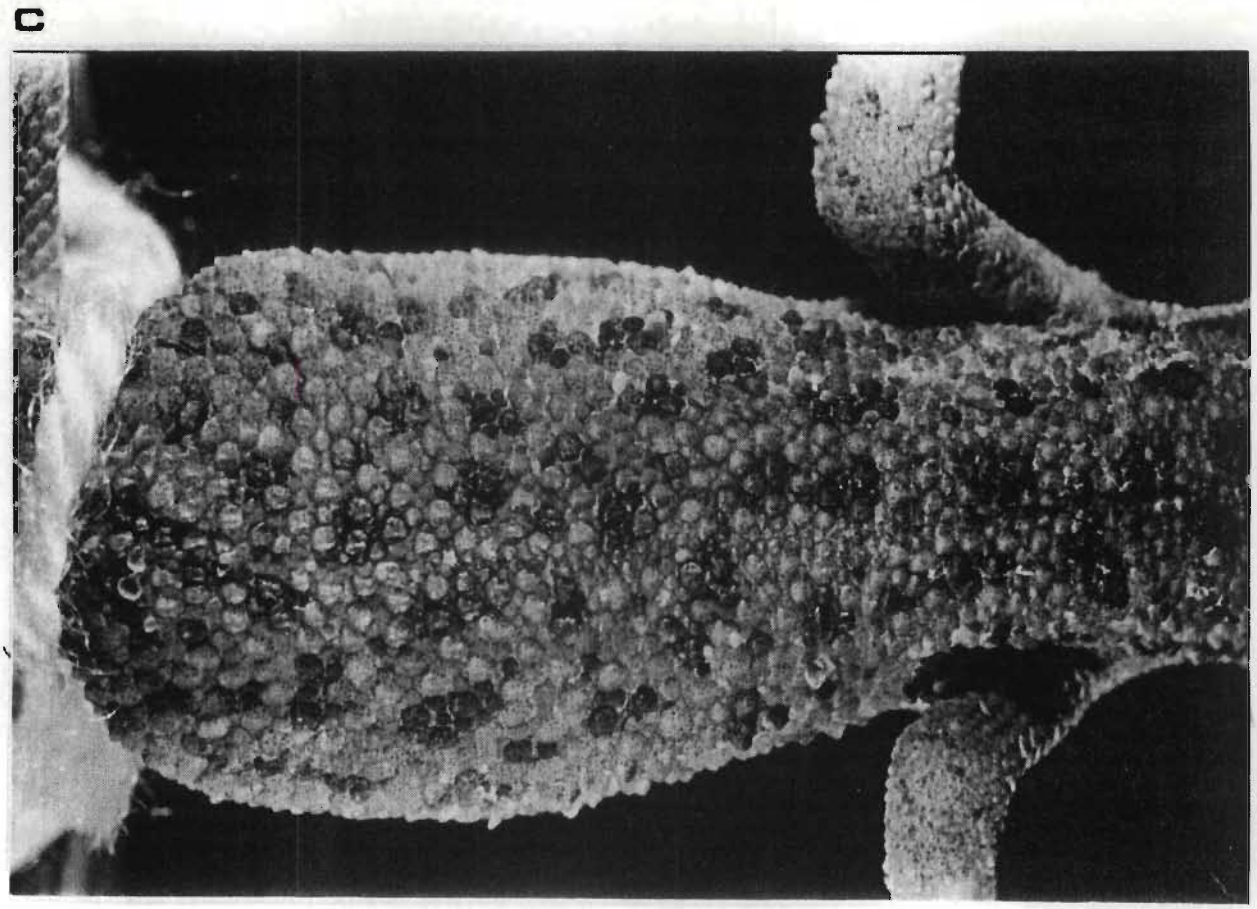
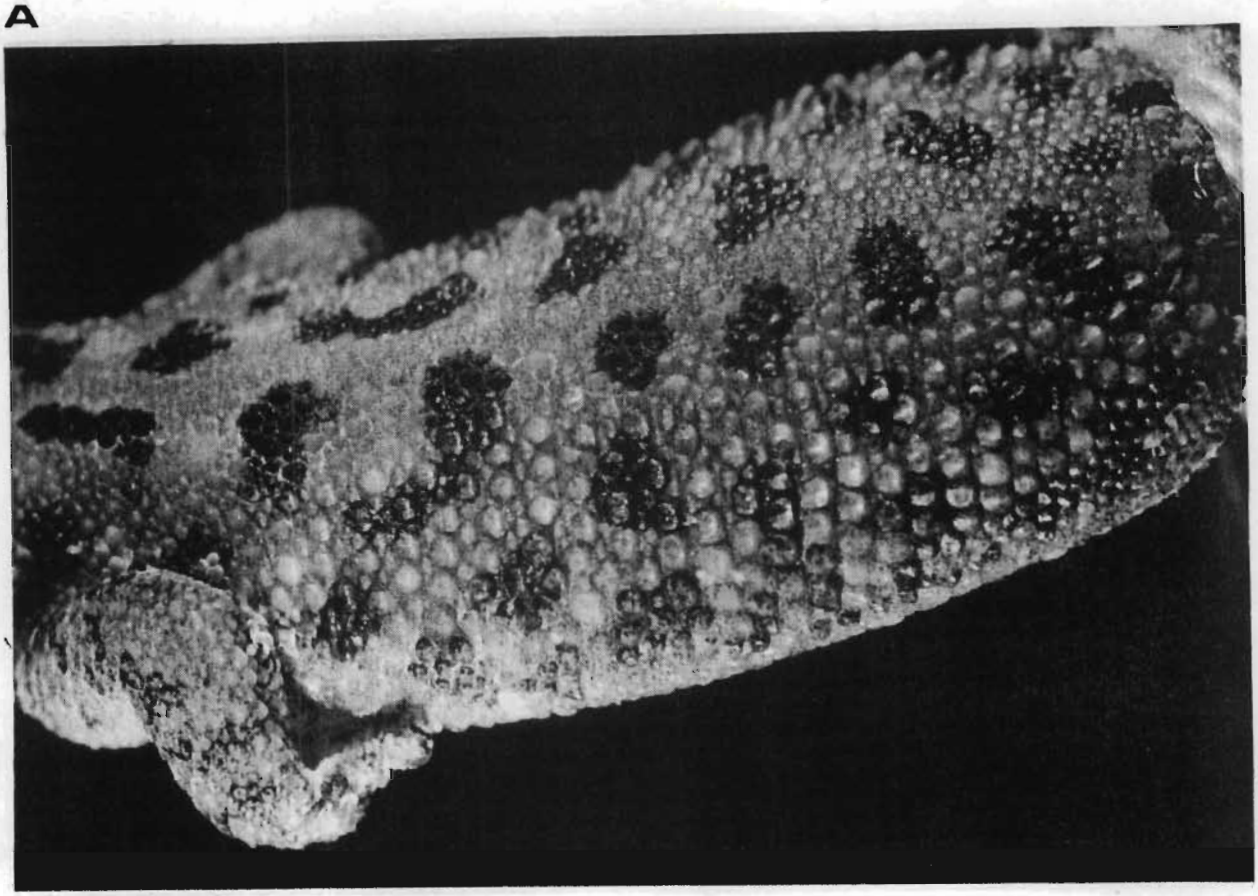


Figure 10 : Pachydactylus affinis - dorsal view of back.

(Legend as for Figure 9).

A



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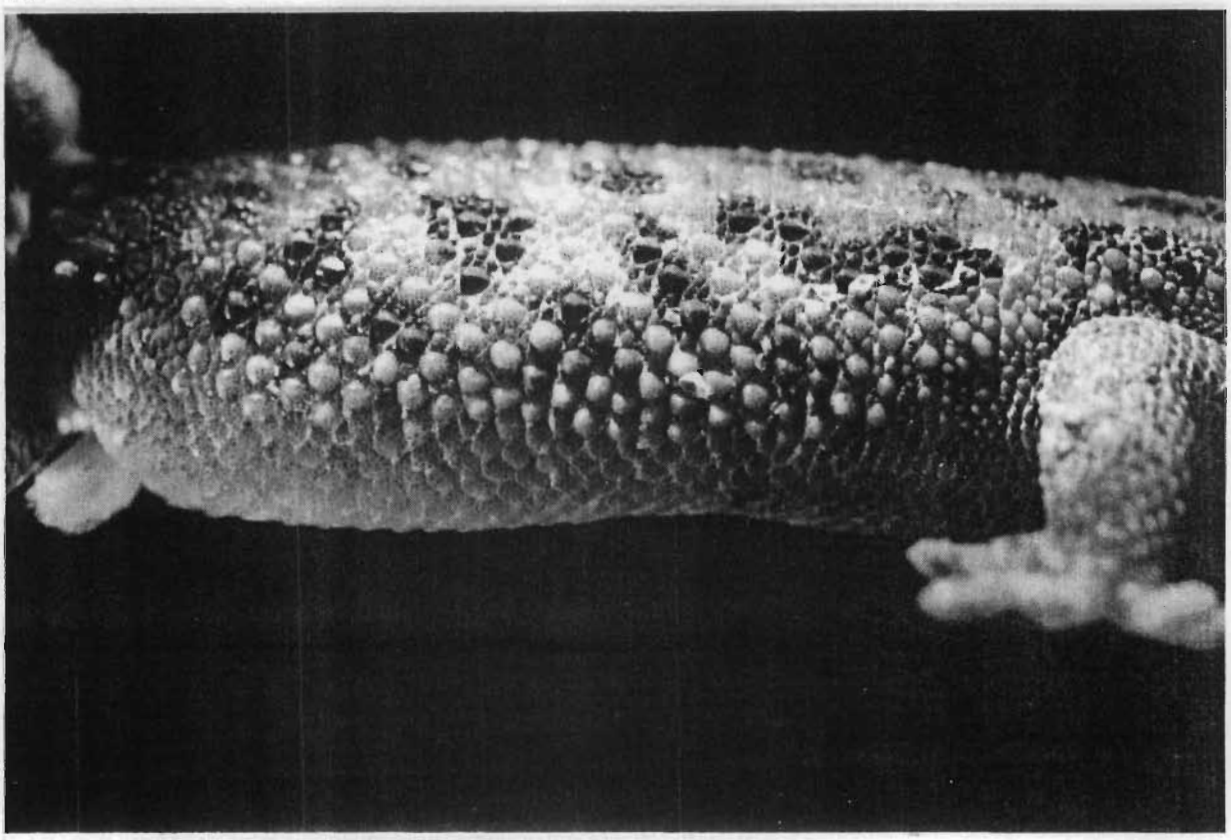


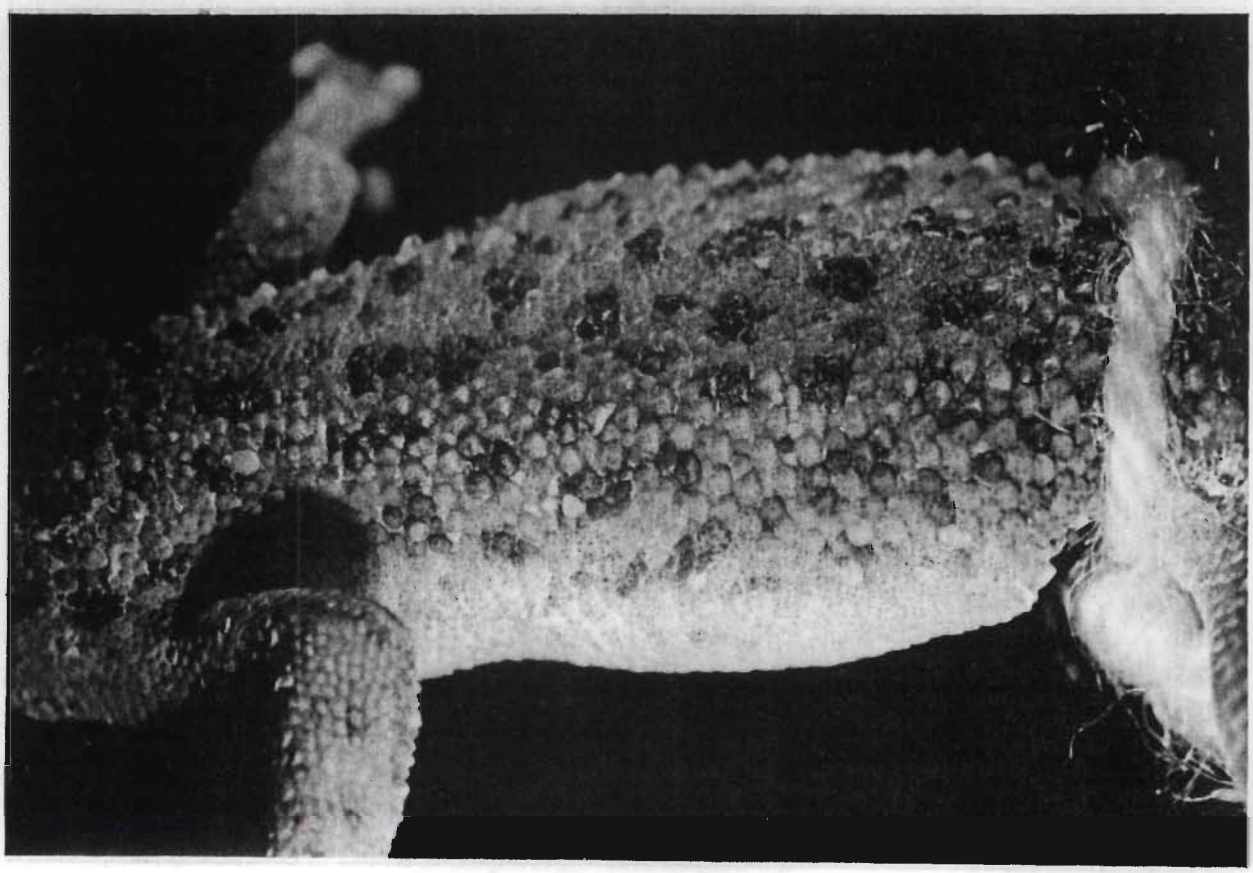


Figure 11 : Pachydactylus affinis - lateral view of body.

(Legend as for Figure 9).

202JR); Largest female SVL (Magaliesberg) 49,0 mm (N8373 - Nooitgedacht 471JQ), mass = 2,95 (N8373); Largest male SVL (E & N. Transvaal) 44,5 mm (J6890 - Mapochsgronde 500JS) mass = 2,2 g (N7416 - Gumela); Largest female SVL (E & N. Transvaal) 51,0 mm (J6162 - California 228KT), mass = 3,7 g (N7471 - Lavhalisa). Mean male SVL (Waterberg) = 36,93 mm ± 3,74 (1SD) n=23, mass = 1,25 g ± 0,39 (1SD) n=23; Mean female SVL (Waterberg) = 39,55 mm ± 5,33 (1SD) n=22; mass = 1,63 g ± 0,69 (1SD) n=22; Mean male SVL (Magaliesberg) = 37,43 mm ± 3,81 (1SD) n=20, mass = 1,27 g ± 0,50 (1SD) n=19; Mean female SVL (Magaliesberg) = 39,28 mm ± 4,91 (1SD) n=18, mass = 1,61 g ± 0,68 (1SD) n=18; Mean male SVL (E. + N. Transvaal) = 37,67 mm ± 4,84 (1SD) n=21, mass = 1,44 g ± 0,56 (ISD) n=21; Mean female SVL (E. & N. Transvaal) = 41,54 mm ± 5,69 (1SD) n=28, mass = 2,02 g ± 0,83 (1SD) n=28.

Distribution

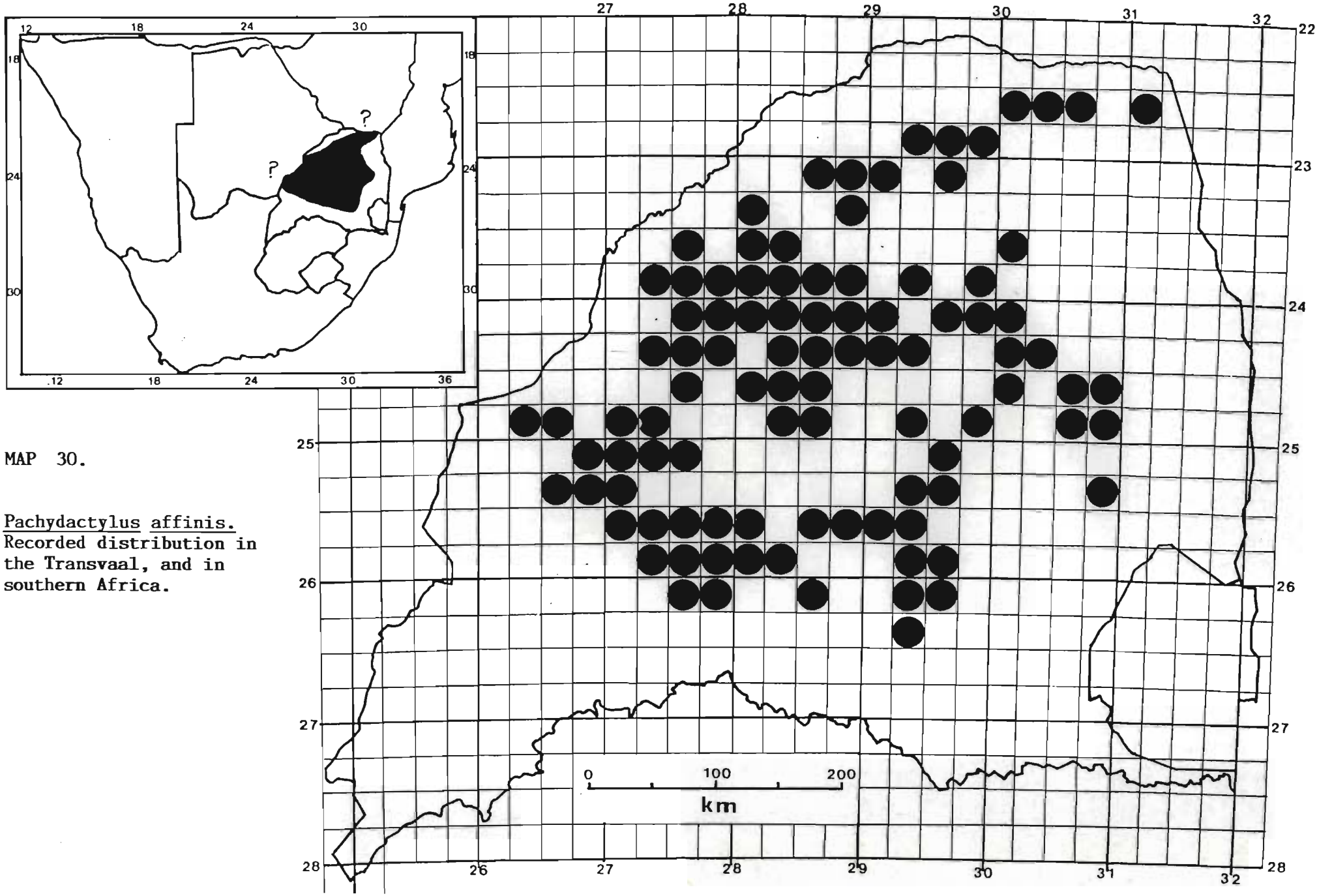
Appears to be endemic to Transvaal although I have not examined specimens of the P. capensis complex from elsewhere. Some of the forms pictured in Broadley (1977b) fig. 4 from Zimbabwe could be ascribed to this species as recorded by FitzSimons (1943). Until these have been examined little can be said.

Distribution in Transvaal (Map 30).

The three basic groupings will be kept separate at this stage but this may not represent the final picture once all facets have been examined.

(Waterberg) 30 km N. of Vaalwater; Buffelshoek 446KQ; Buisfontein 451KR; Diepkuil 135KQ; Donkerkloof 162KR; Doorndraaidam Nature Reserve; Elandsfontein 290KQ;

Fouriesskloof 557LQ; Galakwyns Stroom 745LR; Geelhoutkop; Goevernements Plaats 417KQ; Groothoek 278KQ; Hanover 181KQ; Hartbeestfontein 281KQ; Irene; Kafferskraal 43JQ; Kareehoek 274KQ; Klein Denteren 495LE; Knoppieskraal 484KQ; Lotteringskop 115KP; Malmaniesrivier 236KQ; Moorddrift 289KR; Naauwpoort 363LQ; New Belgium 608LR; Nylsvley Nature Reserve; Paardedrift 303KR; Potgietersrust; Pretoria, Rosslyn; Rhenosterpoort 402KR; Rietspruit 412KR; Ruighoek 169JP; Schoonkloof 273KP; Sterkfontein 282KQ; Tafelkop 46KR; Trehowel 133KR; Vaalkop 192JQ; Varkenskuil 605KR; Varkfontein 141KQ; Victoria 532LR; Vogelstruiskraal 397KQ; Vygeboomspoort 456KR; Waterval 297KR; Weltevreden 596LQ; Wemmersvlei 195LR; Wildeboschdrift 599LR; Wonderboomhoek 550LQ; Zandspruit 287KR; (Magaliesberg); Bleskop Siding; Brits; Brosdoornhoek 433KQ; De Kroon; Diepkloof 186JS; Dwarsvlei 503JQ; Elandsfontein 440JQ; Goedehoop 152JS; Gunfontein 71KR; Haasfontein 28IS; Halfgewonnen 190IS; Houwater 54JQ; Irene; Klipdraai 3KT; Klipfontein 256JS; Kromdraai 486JS; Kromdraai 520JQ; Kromrivier 347JQ; Leeuwfontein 750KS; Loskopdam Nature Reserve; Mooifontein 285JS; Mooiplaats 242JS; Nooitgedacht 471JQ; Ostend 104KT; Palmietfontein 110IS; Pretoria, Mountain View; Pretoria, Hartebeesthoek; Pretoria, Skinners Court; Pretoria, Rosslyn; Pretoria, Florauna; Pretoria, Bon Accord; Pylkop 26JQ; Rietfontein 179JP;
Ruighoek 169JP; Shylock 256JQ; Sterkfontein Caves; Syferfontein 178JP; The Downs 34KT; Tweefontein 523JQ; Vlakfontein 457JR; Vlakfontein 494JQ; Vlakplaats 354JR; Waaikraal 396JQ; Welbekend 117JQ; Witklipbank 202IR; Zonkolol 473IR; Zusterstroom 447JR; Zwartkrans 172IQ; Zwavelpoort 373JR; (E. & N. Transvaal) 4km N. of Tshamavhudzi Peak; Beauley 260LR; Blouberg; California 228KT; Calitzdorp 221LS; Dientje 453KT; Glen Alpine 304LR; Gumela; Ketting 368LR; Krabbefontein;



MAP 30.

Pachydactylus affinis.
Recorded distribution in the Transvaal, and in southern Africa.

Langbaken 342KS; Lavhalisa; Maandagshoek 254KT; Makapansgat 39KS: Mapochsgronde 500JS; Masleroems Oude Stad 840KS; Mokeetsi; Morgendal 216KS; Ohrigstaddam Nature Reserve; Oostenryk 92KS; Parkfield 725MS; Pietersburg; Potgietersrust; Punda Milia; Rietfontein 255JT; Robertson 748MS; Rooiboklaagte 112KS; Schilderkrans 1041LS; Schoonoord 326KT; Smithfield 456MS; Streatham 100KT; Strydfontein 442KT; The Downs 34KT; Tivoli 98KT; Urk 10LS; Waterpoort 695MS; Wolkberg; Wylliespoort.

Literature Records

Klipfontein 53KR, (NMZB).

Habitat and Ecology

A dorsoventrally depressed gecko which is an adaptation to its almost exclusively rupicolous existance. It does however move across open ground and may cross open stretches to reach cover. Usually found inhabiting both vertical and horizontal crevices in or between boulders. Also often found under rock on rock or less commonly rock on soil. Where moribund termitaria occur along rocky hillsides may also occupy these. Also commonly found in houses when these are close to outcrops. Nocturnal, it moves in short barsts of speed when crossing open spaces, with a considerable degree of tail lashing, particularly when on the point of moving. Feeds on a variety of invertebrates and is often seen on the walls of houses near lights which attract insects. They are vocal and on occasions utter a creaking squeak. Its association with rocky outcrops or hillsides ranges from 500-2 200 m a.s.l. It is therefore a very versatile species. Oviparous, the eggs are laid during early summer under rocks on soil. Normally two are laid at a time but a

female may lay more than once under the same rock. The eggs measure from 8,3-11,2 x 6,0-8,5 mm (the largest measurements referring to two ova measured *in situ* in a gravid female and may therefore not be representative) Ova mass is 0,2-0,4 g. The neonates hatch during middle to late summer and even in autumn. Neonates measure 18,0-19,0 mm SVL; Tail 15,0-17,0 with a mass of 0,2 g.

Conservation Status.

Protected. Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. This species is secure over most of its range as it is normally found only on rocky hillsides and outcrops which are subjected to little disturbance by man. Grazing and fire are the main threats although unlikely to seriously reduce populations. The species occurs in five provincial nature reserves and can therefore be regarded as secure.

Remarks

Mention has already been made of the different interpretations of the *P. capensis* complex by various authors including FitzSimons (1943), Loveridge (1947), Broadley (1977b) and McLachlan (*in litt.*). These interpretations were based on a conventionised distribution pattern in the Transvaal. An examination of the body shape of the specimens coupled with colour tend to lump a large proportion of those previously considered as *P. c. vansoni*, with those of *P. c. affinis*. The great variability of head and body scalation exhibited by the geographical forms indicates the unreliability of any one to circumscribe the population as a whole. Additional points of clarification were the facts that *P. c. affinis* was found to be sympatric with both *P. c. capensis* and *P. c. vansoni*, which indicated that these species should best be referred to on the specific level.

I therefore propose that P. affinis be retained as a full species, and on morphological grounds, it may be advisable to give subspecific status to the eastern and northern Transvaal form. Overlaps in morphology between the various forms discussed under the diagnosis do exist. It remains only to establish how much.

Pachydactulys tigrinus Van Dam, 1921

Pachydactylus capensis tigrinus Van Dam 1921, Ann. Tvl. Mus. 7, p. 244, pl. V. Type locality: Blinkwater on the Brak river, Zoutpansberg district, N. Transvaal. FitzSimons 1943, p. 103, Loveridge 1947, p. 383; Pienaar 1966, p. 41, pl. 6.
Pachydactylus tigrinus Van Dam. Broadley 1977, p. 16, pl. 1 & 2, fig. 4; Pienaar 1978, p. 34, pl. 6; Auerbach 1987, p. 84; Pienaar et al 1983, p. 48, pl. 12; Welch 1982, p. 36; Branch 1988a, p. 208, pl. 82, 1988b, p. 6.

Description: 30 specimens examined.
Colour: A uniform brown to purple brown above with the exception of the top of the head which is yellow brown to pale brown. On either side of the head extending from the nostrils through the eye to the shoulder is a black streak bordered below by the white upper labials and intermittent white spots which fade out anterior to the shoulder. Dorsally there are 5-6 white crossbars from behind the head to above the anal region. In very mature individuals the posterior crossbars tend to break up into a series of white spots. In juvenile specimens the white bars are fringed on either side by a black line which in mature specimens tends to fade particularly posteriorly. The original tail is plumbeus and slightly verticillate with scattered white spots. Regenerated tails are dark grey-brown variegated with irregular black markings. The limbs may be greyish with white spots. Ventrally white, speckled with grey.

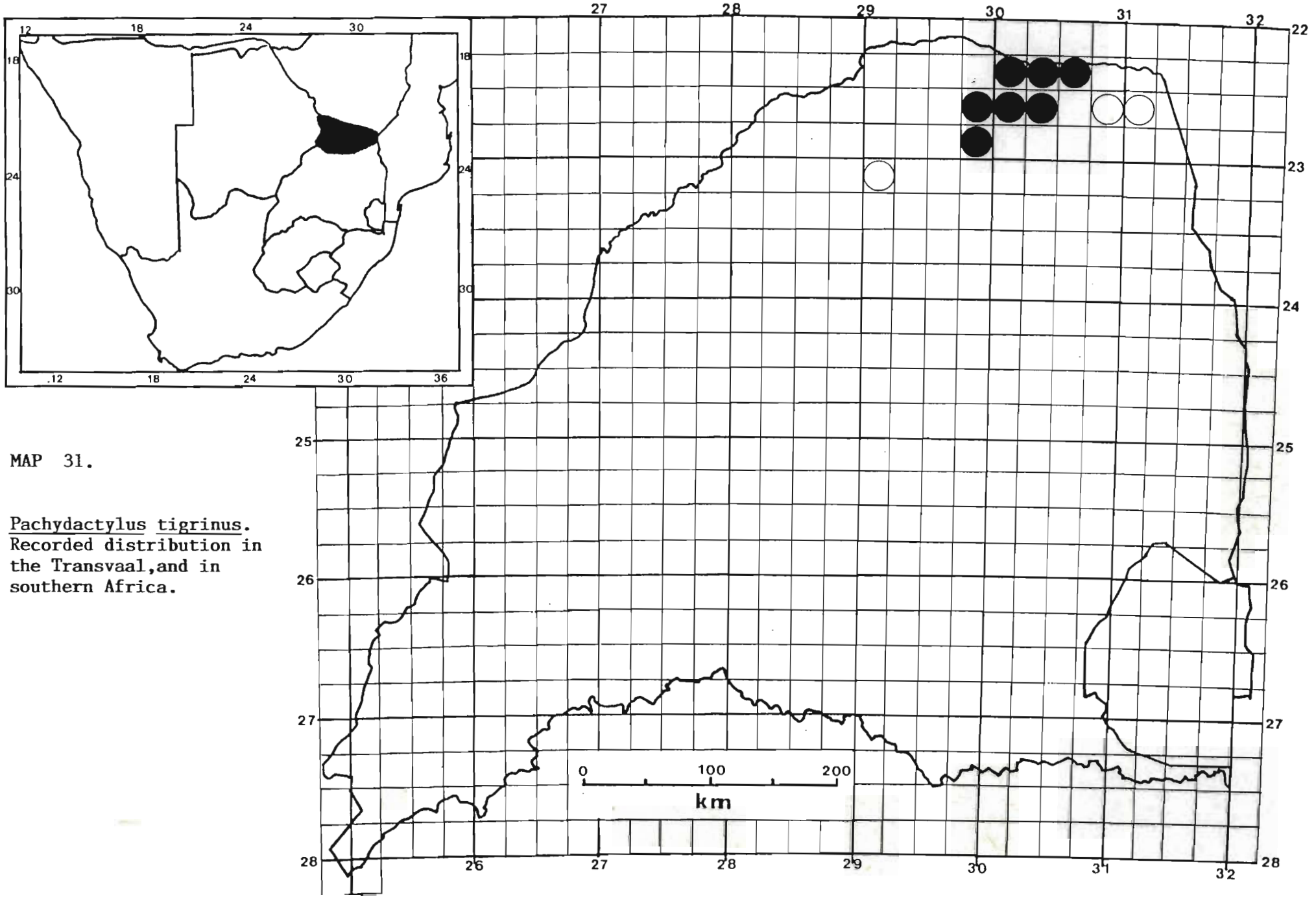
Lepidosis: Rostral small, slightly broader than high; nostril surrounded by three (rarely 4) nasal scales, anterior nasals much larger than the others and in contact behind rostral; UL 7-10, mostly 8-9; LL 7-8; snout covered in rounded, larger scales than crown of head which has conical tubercles; the back is covered by small granules interspersed with larger keeled tubercles which increase in size and number laterally; Digits are short and moderately slender with slightly expanded tips; 4-5 rows of lamellae are found distally on 4th toe and the infromedian scales rows are enlarged; Tail broadens abruptly near the anus and tapers of to a point; regenerated tails are very broad proximally but taper off to a point; scales on tail imbricate.
Size: Largest male SVL = 52,0 mm (JN 220 - Vrouwensbrom 80MT), mass = 4,55 g (JN 220); Largest female SVL = 45,0 mm (JN 2196 - Overwinning 713 MS), mass 2,7 g (JN2196); Mean male SVL = 46,5 mm ± 5,77 (1SD) n=3, mass = 2,92 g ± 1,50 (1SD), n=3; Mean female SVL = 38,67 mm ± 5,54 (ISD), n=6, mass = 1,84 g ± 0,81 (1SD) n=4.

Distribution

Northern Transvaal, Zimbabwe, eastern Botswana and western Mozambique.

Distribution in Transvaal (Map 31).

35 km SW of Tshipise; Blaauwkop 514MS; Gumela; Lavhalisa; Lilliput Station; Messina Golf Course; Overwinning 713MS; Sand R; Scrutton 23MT; Tshipise 105MT; Vrouwensbrom 80MT.



MAP 31.

Pachydactylus tigrinus. Recorded distribution in the Transvaal, and in southern Africa.

Literature Records

Blinkwater 100LS; Punda Milia; 50 km SSW of Messina, (Broadley 1977). Gumbandevu ridge; Matukwane; Shipudze ridge, (Pienaar et al, 1983). Njelele R., (NMZB).

Habitat and Ecology

A solitary nocturnal gecko, roosting by day in vertical or horizontal rock crevices in sandstone and granite often in the company of the large scorpion Hadogenes troglodytes. May also be found under rocks on soil.

Conservation Status.

Protected. Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. an uncommon gecko throughout its range hence the paucity of specimens, it occurs in the Messina nature reserve and the Kruger National Park. Its rupicolous habits tend to protect it. More detailed surveys are needed. Currently secure.

Remarks

This gecko is one of a group of morphologically similar lizards which have been the subject of many taxonomic proposals. A similar shape and lepidosis, characters on which most systematic studies are based, have been the reason for the various definitions. Although colour has largely been ignored in the past, similar patterns are important in a diagnosis of a species. In the Transvaal at least, and in parts of southern Zimbabwe, this species exhibits a constant colour pattern making it easily recognisable. Its affinities no doubt lie with the P. capensis complex but its sympatry with P. c. capensis A. Smith at Blinkwater is indicative of its specific status,

as mentioned by Broadley (1977b). It is likely that many specimens from Zimbabwe referred to this species have affinities with other members of the P. capensis complex (see discussion of P. affinis).

Pachydactylus bibronii A. Smith, 1846

Pachydactylus bibronii A. Smith, 1846, Illus. Zool. S. Afr. Rept., pl. 50, fig. 1. Type locality: Southern Africa. FitzSimons, 1943, p. 106, fig. 30., Loveridge 1947, p. 401, Branch 1981, p. 146; Pienaar et al p. 44, pl. 9 & 9A; Pienaar 1978, p. 36, pls. 7 & 7A; De Waal 1978, p. 26; Auerbach 1987, p. 86 pl. 8 fig. 5; Pienaar 1966, p. 42, pl. 7 & 7A; Patterson & Bannister 1987, p. 43, fig; Branch 1988a, p. 200, pl. 84, 1988b, p. 6.
Pachydactylus bibronii bibronii A. Smith. Welch 1982, p. 33.
Pachydactylus bibronii turneri (Gray). Jacobsen 1977, p. 18.

Description. 385 specimens examined.
Colour: Grey-brown, brown to dark brown above, with 4-5 more or less distinct, irregular wavy dark brown to black crossbands, extending down the back isolating rounded patches of ground colour between these bands; isolated tubercles white and frequently arranged to highlight the posterior margins of the darker bands; The crown of the head a paler brown than the rest and a dark line extends from behind the nostril through the eye to the rear of the head above the ear; another dark stripe is evident in some specimens extending from the nostrils through the supraocular region to the rear of the head. Limbs brown with darker and lighter markings. Tail barred with brown, darker brown and pale brown. Ventrally white to off-white.

Lepidosis: Rostral slightly wider than high; nostril between 3-4 (mostly 3) nasals; anterior nasals in narrow contact behind rostral; UL 8-12, mostly 9-11; Mental 1,5-2 times as long as broad and slightly wider, to as wide as the adjacent infralabiales; LL 7-10, mostly 8 or 9; gulars small and overlapping; Scales on snout and head conical and keeled but smaller than those on back; Dorsum covered with large oval, strongly keeled scales interspersed with small flat scales in the interstices; Upper limbs covered with feebly keeled to strongly keeled overlapping scales; lower limbs with robust strongly keeled scales. Digits short and robust, the tips expanded; 9-13, mostly 10 or 11 lamellae under 4th toe. Ventral scales overlapping and smooth; an oblique row of 3-4 enlarged scales on either side at the base of the tail. Tail long and tapered to an acute point, regenerated tails fat proximally and taper rapidly to an acute tip; tail verticillate with 4 rows of scales per verticil; a row of large keeled acutely pointed scales occur per verticil. Tail autotomy is evident, 39/113 having regenerated tails.

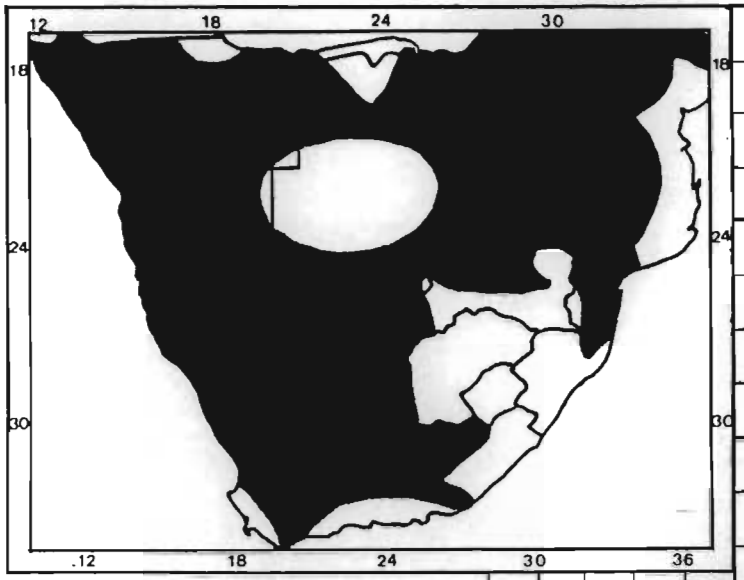
Size: Largest male SVL = 102,0 mm (N2137 - Tuli 56MR), mass = 33,0 g (N2137); Largest female SVL = 92,0 mm (J6286 - Hartzhoogte 171 HN), mass = 24,0 g (J6286); Mean male SVL = 77,41 mm ± 15,89 (1SD) n=57, mass = 16,53 g ± 8,74 (1SD) n=56; Mean female SVL = 70,83 mm ± 12,77 (1SD) n=45, mass = 12,13 g ± 6,01 (1SD) n=45.

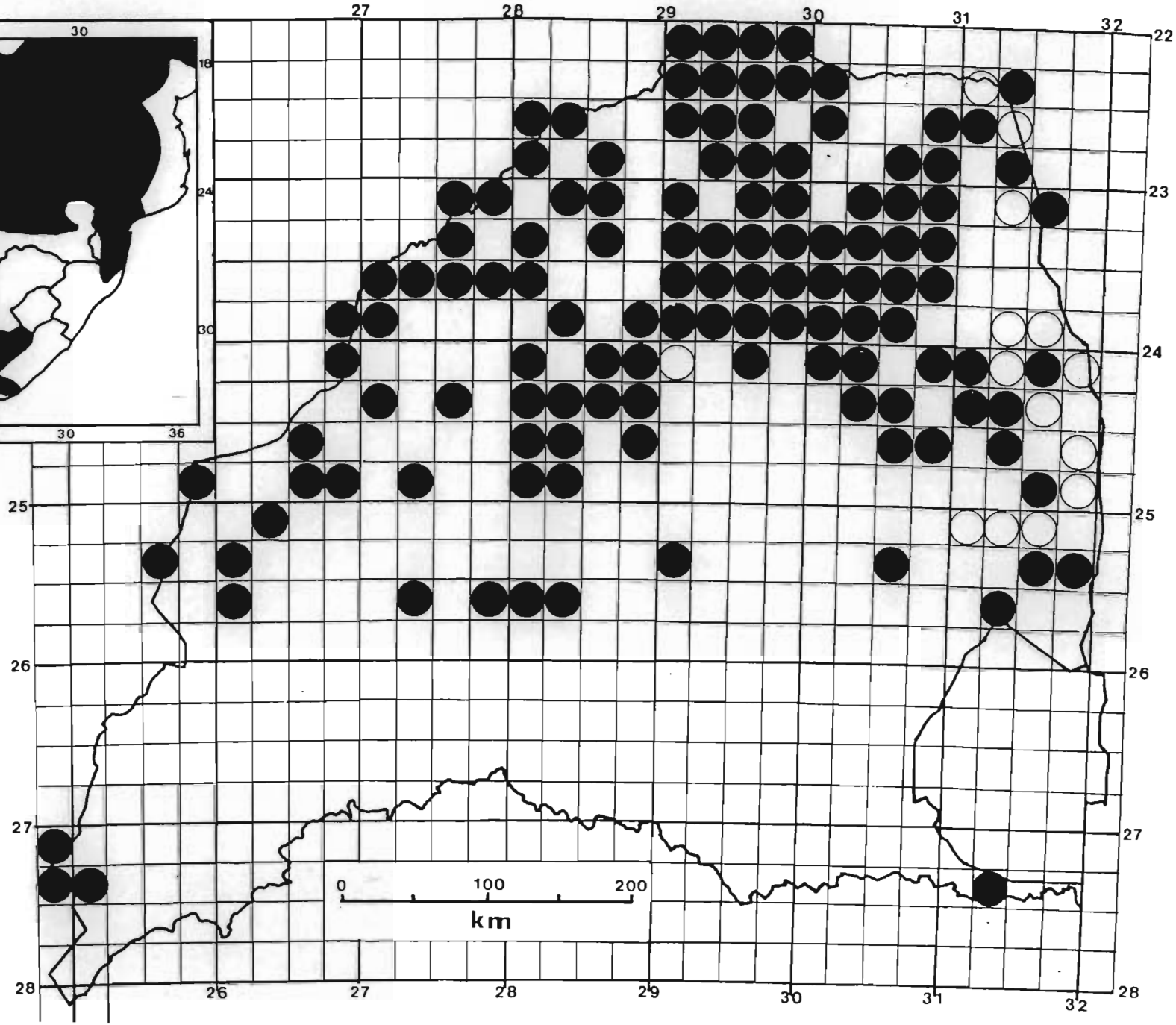
Distribution

From the central and northern Cape northwards to the Transvaal, Zimbabwe, Botswana, SWA, Angola to Tanzania excluding the eastern Cape Province, Natal and most of Zululand and the Orange Free State (FitzSimons 1943).

Distribution in Transvaal (Map 32).

35 km S of Tshipise; 45 km N. of Pietersburg; 5 km W. of Lukale Hill; Abel Erasmus Pass; Alldays; Alten 222LT; Amsterdam 116LS; Arthursrust 219KT; Bekaf 650MS; Ben Lavin Nature Reserve; Bleskop Siding; Blyde River Nature Reserve; Boompan 237LQ; Border 136MS; Breslau 2MS; Bridgewater; Bristol 760MS; Brits; Buffelskraal 486LR; Buffelskroon; Buffelspruit 443KR; Buisfontein 451KR; Celine 547MS; "Clearwaters", Haenertsburg; Constantia 122LQ; Corea 96MS; Crocodile Pool, nr Shingwedzi; De Gladde Klipkop 763LS; De Hoop 136MR; De Kroon; De Loskop 205LS; Den Staat 27MS; Donkerkloof 162KR; Doorndraaidam Nature Reserve; Doreen 108MT; Dublin 218KT; Duivelskloof 436LT; Elandsfontein 401KR; Glen Alpine 304LR; Goevernements Plaats 417KQ; Graaf Reinet 71MR; Gravelotte; Greefswald 37MS; Griffin Mine; Groblersbrug; Groningen 779LR; Grootdraai 38KU; Groothoek 298KQ; Groote Zwart Bult 290LQ; Gunfontein 71KR; Ha Madzhiga; Harmony 140KT; Hartshoogte 17HN; Hartz 233MS; Hectorspruit; Houtbosdorp; Impala Estates; Italie 123HO; Jutland 536MS; Ka Kheyi; Ka Mininginisi; Kafferskraal 55LQ; Kalkfontein 84LR; Keulen 669LT; Killaloe 235MS; Klipbank 406LS; Krugerskraal 583KR; Kwa Kouletsi; Langjan Nature Reserve; Ledzee 559LT; Leeuwfontein 61JP; Leeuwpoort 373KR; Letsitele; Little Muck 26MS; Loretto 264MS; Louws Creek; Mabofuta Ridge; Machabezane; Maiepo; Malelane; Malta 65KT; Manamela; Mangombe; Manyeleti Game Reserve; Masogoro Hill; Matangari; Matlabas Location; Meanderthal 188LS; Melinda 164LR; Melkboomfontein 919LS; Middlesex 205KT; Modjadjes Location 424LT; Moilwas Location; Mokeetsi; Molepos Location 187KS; Moletsi Location; Moorddrift 289KR; Mpafuri's Location; N slopes of Tshamavhudzi Peak; Newgate 802MS; Nooitgedacht 17JP; Nwanedzi R.;





MAP 32.

Pachydactylus bibronii.
Recorded distribution in the Transvaal, and in southern Africa.

Nyandu Bush; Olifants Camp; Ostrolenka 107MS; Paardedrift 303KR; Paardekraal 135LT; Palmietfontein 24KS; Penge; Pentonville 216LQ; Petershof 131MS; Pietersburg; Pongola; Preezburg 400LR; Pretoria; Pretoria, Zoo Hill; Pretoria, Heatherly; Prince's Hill 704MS; Punda Milia; Ratho 1MS; Rietspruit 412KR; Roodeplaat 293JR; Ross 55KU; Ruhrord 324MS; Saltpan nr Blackhills; Schelem 32KT; Schoonheid 2HN; Schoonkloof 273KP; Schots 196KP; Schroda 46MS; 779LR; Scrutton 23MT; Sekororo; Shaholle; Shamiriri; Sheldrake 239MS; Shiluvane; Shimumene Pan; Shingwidzi Agricultural Stn.; Skukuza; Smithfield 456MS; Smitskraal 788LS; Sohobele; So-ja Mineral Baths; Sonskyn Spa; Springfield 337LQ; Steenbokpan 295LQ; Sterkriviernedersetting 253KR; Sterkspruit 412KT; Sunnyside 532LQ; Swartwater; Tambootierand 366KR; Thankerton 144KT; The Grange 471LS; Thor 147MS; Tshipise; Tuli 56MR; Turfloop 987LS; Uitspan 65LQ; Uitspanning 38JS; Umzinto 36MR; Vaalwater; Van Stadenshoek 12KP; Van Tondershoek 10KO; Venice 40KU; Vhurivhuri Plantation; Vlakplaats 113KQ; Vlakplaats 283KP; Vyeboom; Vygeboompoort 456KR; Waterval 269JT; Weipe 47MS; Welgevonden 444LQ; Wilhanshohe 78LS; Wildeboschdrift 599LR; Worcester 5LP; Zandrivierspoort 851LS; Zeekoegat 12KU; Zeerust Townlands; Zondagfontein 300MR; Zoutpan 459MS;

Literature Records

Kingfisherspruit; Satara; Tshokwane; Skukuza; Shingwedzi; Letaba; Hape Hill; Pafuri; Msimbit forest on the easter boundary between Nkulumbene and Mahewane; Pumbe pan area; cave at Shaben hill; Maseya spring area; Mbulwene sandstone reef; sandstone outcrops along Olifantsriver 3,2 km east of Munyekelani drift; Ramitipan area; Msimbit forest along upper reaches of Shinobyeni spruit; Hlanganine sandstone reef; Mbyamiti

experimental plot No. 7; near the Sabie and Sand River confluence; Mbyamiti dam area; between Mathlakuza and Shimuhenepans; Malonga spring; eastern boundary between Mathlakuza pan and Nwambiya; Lebombos between beacons A and B; Leonhardi sandveld, Pafuri; Tseri; Boesmanklip dam site; Mshatu kop; Mabyeni hill; near Shabaku, (Pienaar et al 1983). Potgietersrust, (FitzSimons 1943). Wolmaransstad; 16 km S. of Bandolierkop; 50 km SSW of Messina; Komatipoort; Dwarsrivier, (NMZB).

Habitat and Ecology

One of the largest and most robust geckos in South Africa, it lives mostly in rocky outcrops, at the edge of cliffs, in deserted termite mounds, under the loose bark of trees, under the eaves of houses, and in the thatch of huts. Although nocturnal it emerges from its refuge in the late afternoon and may bask in the rays of the sun becoming quite active leaping from rock to rock; at night it moves slowly but can put up a rapid burst of speed when occasion demands it. It is capable of moving upside down although usually only slowly in a waddling manner. According to FitzSimons (1943) and Broadley (1966c) these geckos feed on grasshoppers, ants including those of the genus Pheidole, termites, beetles, earwigs and spiders, while it is my experience that the species is very much opportunistic taking anything it can catch. If annoyed this species regularly bites which can have painful results, removing skin on occasions. When handled the species is highly vocal, uttering loud squeaky sounds. As it is mostly a gregarious species it no doubt communicates in this manner. P. bibronii is oviparous, laying from one to two ova under a stone partially buried in the soil. These are laid throughout summer and measure 14,5-16,1 mm x 11,8 - 14,9 mm. Although the eggs are usually laid separately on

occasions they may bejoined on one side; The eggs weigh from 1,2 - 1,55 g; Neonates measure from 30,5 -32,5 mm SVL, tail from 24,0 - 31,0 mm with a mass ranging from 0,5 - 0,95 g.

Conservation Status.

Protected. Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. Its wide distribution in the Transvaal, coupled with its rupicolous habit makes its status secure. Only large scale trade in the species is likely to affect it but as this is currently contained, its status is unlikely to change.

Remarks

A variable species, with FitzSimons (1943) recognizing the variety turneri Gray while Loveridge (1947) recognised three subspecies, namely pulitzerae Schmidt in northern South West Africa and Angola, turneri from the northern Cape, Transvaal and part of Angola and the nominate race from the Cape Province. Broadley (1966c) came to the conclusion that both turneri and pulitzerae were not significantly different from the typical form and synonymised them so that P. bibronii is treated as a monotypic form, an opinion which is here concurred with.

Genus Colopus Peters, 1869

Colopus Peters 1869, Monatsb. Akad. Wiss. Berlin, p. 57, pl., figs 1-1f. Type: C. wahlbergii Peters.

Body covered in small uniform granules dorsally with smooth overlapping scales ventrally. Pupil vertical and eyelid distinct only in front and above the eye and usually highlighted. Digits are free slightly dilated at the tip. Fingers clawless, toes minutely clawed; all digits with a median series of slightly enlarged, serrated imbricate scales above, terminating distally in an enlarged nail-like scale. Below, the digits have two transversely enlarged lamellae distally and are granular proximally. No preanal or femoral pores present.
A monotypic genus it has been extensively discussed by Haacke (1976). The possibility of the nominate form C. w. wahlbergii Peters occurring in the Transvaal cannot be excluded, considering the number of other Kalahari species occurring north of the Soutpansberg.

Colopus wahlbergii wahlbergii Peters, 1869

Colopus wahlbergii Peters 1869, Monatsb. Akad. Wiss. Berlin, p. 57, pl. fig. 1. Type locality: Damaraland. FitzSimons, 1943, p. 111, figs. 31-34., Loveridge 1947, p. 335; Welch 1982, p. 15.
Colopus wahlbergii wahlbergii Peters. Haacke 1976(a), p. 29, pl. 2; Haacke 1976(b) p. 71; Branch 1981, p. 143; Auerbach 1987, p. 90, pl. 9 fig. 1; Branch 1988a, p. 193, pl. 80, 1988b, p. 6.

Description. (After FitzSimons, 1943, Haacke 1976). No specimen, only a photograph taken by I. Temby near Mopane, N. Transvaal.

Colour: Pale olive to olive brown with large irregular spots or mottling of yellow usually edged with dark brown; these markings are often confluent into irregular crossbands on back and tail; a mesial yellow streak from rostral to crown of head and another on each side from angle of the jaw over the shoulder breaking up into a series of yellow spots on the flanks. Lips and undersurfaces pale cream yellow. Occasional specimens are uniformly pale olive brown above with no yellow markings except on tail; a yellow streak sometimes present from occiput to base of tail.

Lepidosis: Rostral broader then high; nostril between three nasals; anterior nasals separated by a single elongate scale; UL 8-9; mental narrower than long and narrower than adjoining labials; LL 7-8; gular scales small and subhexagonal; Scales on back smooth, slightly convex and subimbricate; Scales on limbs overlapping and round; Digits short with an enlarged row of median supradigital scales with serrated margins terminating in a larger nail-like scale; digits basally granular below and two enlarged transverse lamellae distally; Fingers slightly delated distally and without claws; toes slightly narrowed distally with minute claws (in females only) and smaller lamellae than those on the fingers; Tail cylindrical, non-verticillate tapering to an acute point; 4-5 (usually 4) enlarged scales on either side of the base of the tail.

Size: Largest male SVL = 52,0 mm (TM 42513 - Gangwe Pan); Largest female SVL = 61,2 mm (P17680 - 11 km S. of Tshabong); Mean Male SVL = 49,3 mm (based on 10 largest males); Mean female SVL = 57,9 mm (based on 10 largest females), (Haacke 1976b).

Distribution

The southern, central to north-western Kalahari, from the northern Cape Province through southern and central Botswana, north-eastern South West Africa into southern Angola.

Distribution in Transvaal.

An unconfirmed report illustrated by photos from near Mopane in the northern Transvaal.

Habitat and Ecology

A nocturnal terrestrial gecko restricted to areas of Kalahari Sand. Haacke (1976b) indicates that this gecko is probably unable to dig its own burrows but utilizes existing available shelters. The photos taken by I. Temby, then involved in collecting dung beetles for the Australian research program, were of an individual removed from the hole of a dung beetle (*Heliocopris* sp.).

Conservation Status

Until its presence is verified little can be said.

Remarks

A visit undertaken during this study to the vicinity of Mopane in an area of deep sands failed to obtain any specimens. Areas of relict patches of Kalahari sand are widely scattered over the northern Transvaal. The fact that other Kalahari species such as *Typhlosaurus lineatus*, *Monopeltis leonhardi* and *Ptenopus g. garrulus* have relict populations in this area is supportive of the occurrence of *C. w. wahlbergii* here. Further surveys will be necessary at the right time of the year.

Family AGAMIDAE

Genus *Agama* Daudin, 1802

Agama Daudin, 1802, *Hist. Nat. Rept.* 3, pp 333 & 356. Type: *A. colonorum* Daudin, 1830 = *Lacerta agama* Linnaeus, 1758.

South Africa has five *Agama* species, of which three occur in the Transvaal. One of which *A. aculeata* Merrem, has been the subject of considerable controversy. In addition, Branch (1988b) followed Moody (1980) in relegating *atricollis* to a separate genus, *Stellio*. However until this has been published and subjected to peer review, I retain *atricollis* in the genus *Agama* Daudin. The three species occupy different habitats, arboreal, rupicolous and terrestrial, although some overlap does occur. *Agama atricollis* A. Smith is the largest, followed by *A. a. atra* Daudin and *A. aculeata*. These lizards are characterised by the broad triangular head which is distinct from the neck, a sturdy cylindrical to slightly depressed body, strong well-developed limbs and feet armed with claws and a strong cylindrical tail.
Body covered with juxtaposed to imbricate scales or tubercles; dermal appendages such as crests, gular pouches etc. are often present in males or sometimes in both sexes. Eyes small with a round pupil and well developed eyelids. Dentition is acrodont, with enlarged canine-like teeth anteriorly. Femoral and preanal pores present or absent.

Key to the species

1. Occipital not enlarged, indistinguishable from adjoining scales on back of head; arboreal in habits ..... *A. atricollis*

Occipital more or less enlarged, larger than scales on back of head; rupicolous or terrestrial in habits 2

2. Scales on back largely uniform with scattered small clusters of enlarged spinose scales dorsolaterally and laterally, more pronounced in males than in females; habitat rupicolous ..... A. a. atra
Scales on back roughly homogeneous but enlarged spinose scales arranged in 6 longitudinal, interrupted rows; habitat terrestrial 3

3. Gular marked solely in a reticulate pattern - with a dark posterior patch in males. Range: north of the Soutpansberg ..... A. aculeata armata
Gular usually with eight or more longitudinal lines. Centrally the area between the lines may be speckled or spotted. Rarely a netlike pattern present and then only ventrolaterally. Males have a large blue black gular patch posteriorly. Range: Transvaal, south of the Soutpansberg ..... A. a. distanti

Agama atricollis A. Smith, 1849

Agama atricollis A. Smith 1849, Illus. Zool. S. Afr. Rept. App. p. 14. Type locality: Interior of Southern Africa and country near Port Natal. FitzSimons 1943, p. 127; Jacobsen 1977, p. 18. Mattison 1982, p. 38; Pienaar et al 1983, p. 52, pls. 14 & 14A; Pienaar 1966, p. 46, pl. 8 & 8A) 1978, p. 40, pl. 9 & 9A; Auerbach 1987, p. 95, pl. 9 fig. 4; Patterson & Bannister 1987, p. 45, fig; Branch 1988a, p. 179.
Agama atricollis atricollis A. Smith. Welch 1982, p. 46.
Stellio atricollis (A. Smith). Branch 1988b, p. 7.

Description. 180 specimens examined

Colour: Variable depending on mood, background and hormonal state. Usually greyish black to olive brown reticulated with black. Males are often brightly coloured with a bright blue triangular head, the blue fading posteriorly becoming greenish-yellow; there is a large black spot anterior to the shoulder; a broad pale bluish green to yellowish vertebral streak extends from behind the head to the base of the tail; throat bright blue fading onto the chest; belly brownish with blue patterning; tail blue green to olive brown and yellowish green. Females are duller, usually olive brown reticulated with black; there is also a large black patch just anterior to the shoulder; during the breeding season the back may have red brown reticulations; Ventrally off-white with a network of bluish colour on the throat and extending onto the belly.

Lepidosis: Rostral small, wider than high; nostril pierced in a single nasal on or just below the canthus rostralis; ear opening larger than eye and in females and immatures openly visible whereas in adult males the large masseter muscles at the angle of the jaw almost obscures the opening; UL small, 10-14; mental triangular and much larger than surrounding scales, LL 12-15; bordered posteriorly by elongated posteriorly directed scales. Scales on head are flattened and radiate out from the parietals in the region of the pineal eye; scales on snout raised and supraciliaries from a prominent eyebrow. Back covered with small irregular overlappping scales interspersed with large acuminate tubercles forming 4 irregular dorsolateral lines in males; Limbs covered with overlapping slightly keeled scales becoming spinose distally; digits end in strong claws, with 17-26 scales (mostly 20-23) under the 4th toe; Tail covered with large rugose scales for approx 40% of the length, followed by keeled slightly

spinose tails. Ventrally gulars overlap and acuminate, scales in belly flat, overlapping and acuminate. Females similar but more spinose. Precloacal pores in males arranged in 1-3 (mostly 2) rows, the number of pores ranging from 7 to 14, but is mostly 11-13.

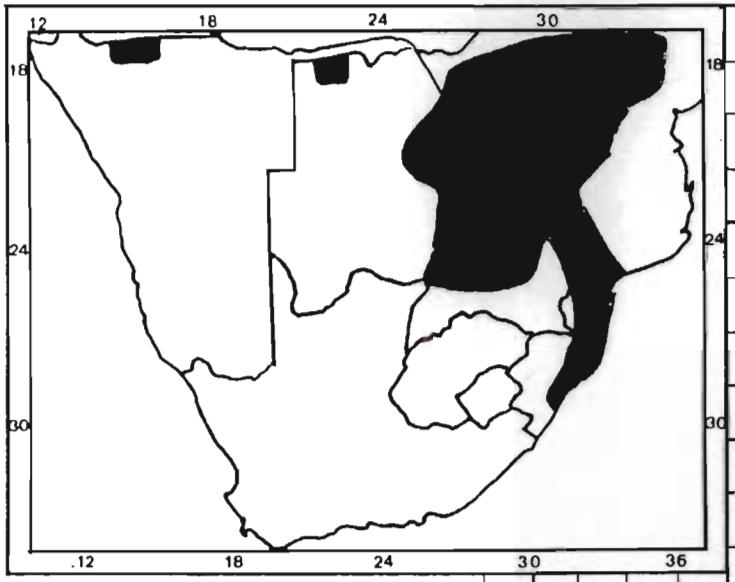
Size: Largest male SVL = 167,0 mm (TM19370 - Komatipoort), mass = 132,0 g (N3561 - Du Toit's Kraal 532 KR); Largest female SVL = 133,0 mm (N3510 - Doornhoek 284KR); mass = 97,5 g (N3972 - Goedehoop 31KS); Mean male SVL (100,0 mm) = 129,13 mm ± 16,89 (1SD) n=5, mass = 83,78 g ± 34,41 (1SD) n=5; Mean female SVL = (75,0 mm) = 115,17 mm ± 15,56 (1SD) n=15, mass = 59,71 g ± 24,90 (1SD) n=15.

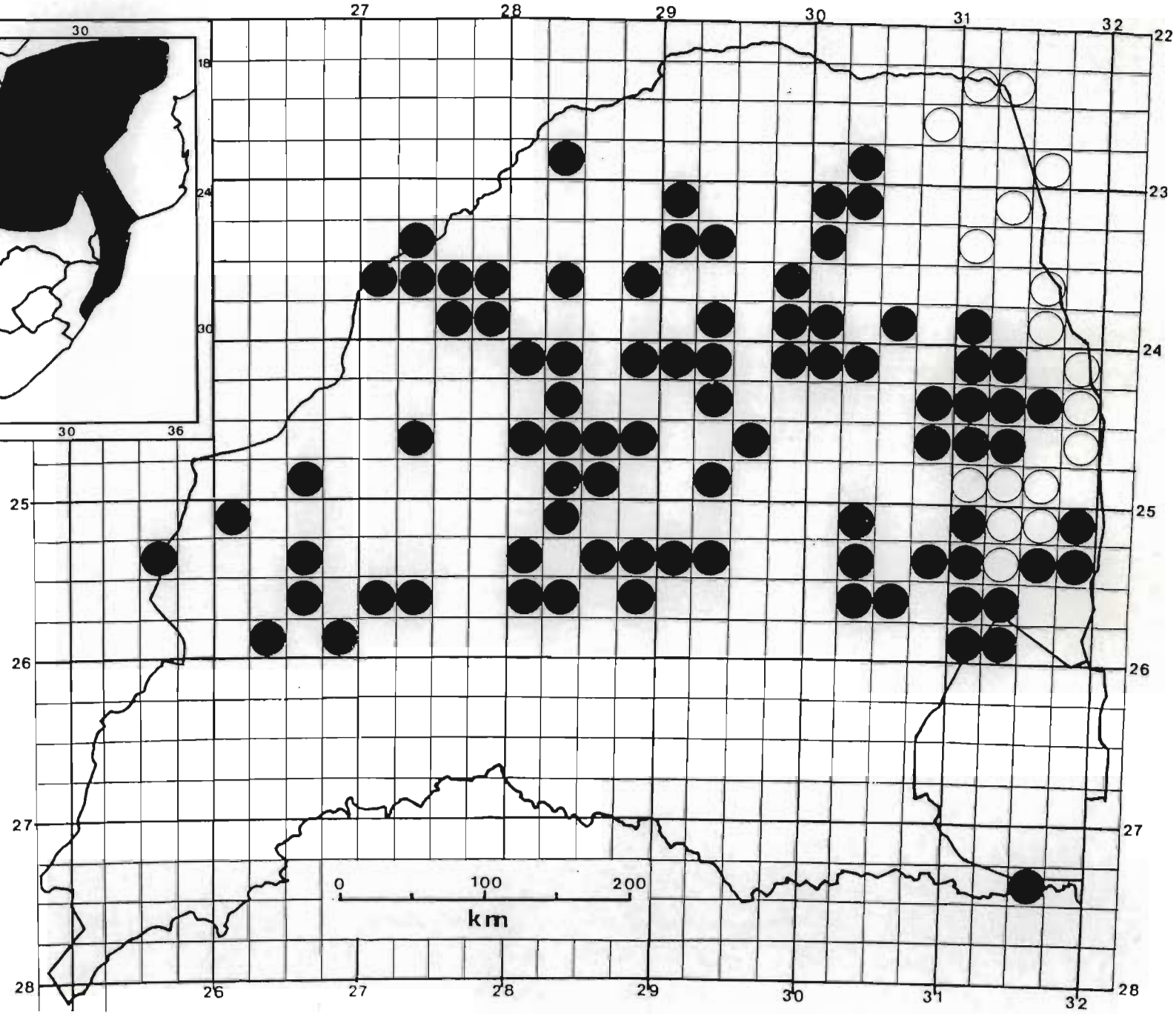
Distribution

From East Africa south to Zimbabwe, west to Angola, northern South West Africa to Botswana, central, northern and eastern Transvaal to Mozambique and Natal.

Distribution in Transvaal (Map 33).

5 km S. of Sibasa; 7 km E. of Satara; Argyle 46KU; Aronsfontein 722LS; Barberton Townlands 369JU; Bochem 145LS; Boekenhoutskloofdrift 286JR; Bottellang 115MR; Btwn Funduzi and Entabeni; Carpediem 76KT: Charloscar 43KU; Dendron; Doornhoek 284KR; Du Toit's Kraal 532KR; Dycedale 368JU; Elandsfontein 401KR; E.P. Helm (Trichardtsdal); Eureka City; Geelhoutkop; Gilead 729LR; Goedehoop 31KS; Gopane Mine; Griffin Mine; Groote Zwart Bult 290LQ; Groothoek 106KS; Gunfontein 71KR; Hans Hoheisen Research Station; Hartebeestfontein 516KR; Hazyview; Hectorspruit; Hoedspruit 82KU; Jachtdrift 190LT; Kaapmuiden 212JU; Kalkfontein 1JP; Kameelpoortnek 218JR; Komatipoort; Kosterfontein 460JP; Leeuwfontein 750KS; Lindleyspoort 220JP; Loskopdam





MAP 33.

Agama atricollis.
Recorded distribution in the Transvaal, and in southern Africa.

Nature Reserve; Louws Creek; Lower Sabie Camp; Lydenburg; Mahubatswane; Malelane; Manyeleti Game Reserve; Marble Hall Maribashoek 50KS; Mariepskop Matlepitsi R.; Meidingen 423LT; Mooifontein 597KR; Mooiplaats 147JT; Moorddrift 470LQ; Morgendal 216KS; Moscow 41KU; Munnik; Nelspruit; New York 490LQ; Nylstroom; Phalaborwa; Pienaars River; Pieterman 445LR; Pietersburg; Pongola; Pretoria; Pretoria, Wonderboom; Rhenosterkop 195JU; Rietfontein 214JR; Rietfontein 446JR; Rietfontein 338JQ; Rietspruit 412KR; Rietvly 271JQ; Rolle 235KU; Rondavelskraal 290JP; Roodeplaatdam Nature Reserve; Rooibok 707KS; Ratomba, near Louis Trichardt; Rust der Winter Nature Reserve; Sandringham 197KU; Sekororo; Shiyalongubo; Shiluvane; Smaldale 225KP; Stratford 309KQ; Tafelkop 46KR; Tambotiekloof 607LQ; The Curlews 103JU; Tshakuma; Uitspanning 38JS; Venice 40KU; Vier en Twintig Rivier 701LR; Virginia 6LQ; Vyeboom; Vygeboompoort 456KR; Waterval Onder; Wildebeesthoek 310JR; Wilhanshohe 78LS; Witkop 287LQ; Wonderboomhoek 550LQ; Woodbush; Zandput 202LS; Zeekoegat 12KU; Zeekoegat 196JR; Zoutpan 104JR;

Literature Records

Dientje 453KT; Glentig 196KR; Heuningfontein = Honingfontein; Klipfontein 53KR; Magoebaskloof; Newington; White River; Zwagershoekberg = Swaershoekberg, (FitzSimons, 1943). Malelane camp; Balule; Skukuza; Kingfisherspruit; Tshokwane; Satara; Dongadziba; Hape area; Pafuri; Letaba camp; Gomondwane; Lower Sabie camp; Shingwedzi; Shipalên; near Kumane dam; Nwamuriwa; north bank of Shingwedzi near confluence with Mahewane spruit, near Randspruit main road to Tshokwane just north of Mutlumbi drift; Mazite dam area; Timfenene; between Timfenene drift and Mlambane; Sikkeltowkloof; Doispane road near Mklari

turnoff; Phabene pumphouse; Pumbe picket; Pretoriuskop camp; Shaben hill; lower reaches of Makatlanyane spruit, Lebombos; Nwanedzi, Nyamundwa dam area, (Pienaar et al, 1983). Wolkberg wilderness area, (Snyders 1987). Arbeidsgenot, Waterberg, (NMZB).

Habitat and Ecology

Arboreal and found throughout the bushveld and Lowveld of the Transvaal, provided large trees are present. Surprisingly inconspicuous, its presence is usually only noted on observing the brightly coloured males. The more cryptic females are far more unobtrusive by remaining on tree trunks with which they blend. Similar to squirrels and other arboreal animals they scuttle crablike around the bole of the tree when alarmed and always attempt to keep the tree between themselves and their pursuers.

They are diurnal and usually forage near the base of the tree waiting for prey to move past. Largely myrmecophagous, they are also opportunistic, feeding on bees, wasps and other insects. Even much larger prey will be consumed, such as young chickens and even bats have been recorded. The male is typically seen hanging head down on the bole of a tree bobbing its head as a warning to other males in the vicinity as well as acting as a sexual attractant. When cornered, males gape widely showing off the bright yellow interior of the mouth. Four large canine-like teeth are found at the corners of the upper and lower jaw, which are put to use when fighting rival males or predators.

Oviparous, 5-14 ova are laid in a hole dug by the female during summer. The female straddles the hole with her hind feet and laying takes place. Once the eggs have been laid she fills the hole with sweeps of her head, tamping the soil hard with her snout. Additional soil

is raked back with her front feet and energetically tamped down with her snout, almost lifting herself off the ground in the effort. Eventually no trace of the hole can be seen and is covered in dry grass. The eggs measure from 19,0 - 23,0 mm x 12,0 - 14,5 mm and hatch during late summer. Neonates measure about 78,0 mm total length (FitzSimons 1943).

Conservation Status

Widespread and may be locally common in some parts of the bushveld. Are subjected to persecution from boys with pellet guns and catapults. Also from farmers in protection of livestock. Elsewhere feared to be poisonous. Are also roadkill victims when they descend to the ground. However its cryptic habits and wide distribution as well as the fact that this species is found in several provincial nature reserves as well as the Kruger National Park makes its current status secure. The greatest threat is habitat destruction as a result of agricultural practices.

Agama atra atra Daudin, 1802

Agama atra Daudin 1802, *Hist. Rept.* 2, p. 349.
Type locality: South Africa. FitzSimons 1943, p. 129-133; De Waal 1978, p. 28.
Agama atra atra Daudin. FitzSimons 1943, p. 129; Branch 1981, p. 151; Auerbach 1987, p. 96, pl. 1; Welch 1982, p. 46; Branch 1988a, p. 176, pl. 76, 1988b, p. 7.

Description: 234 specimens examined.
Colour: Grey to dark grey-brown to brown above with a pale vertebral stripe from the occiput to the base of the tail in males; less pronounced and often interrupted in females. Scattered greenish ocelli with dark margins

scattered over body and hind limbs. Head in males blue-green or brownish black with blue spots and scales; head in females dark brown with paler spotting and mottling. Tails irregularly banded with pale brown to off-white becoming indistinct in older males. Ventrally males have the gular blue with darker longitudinal lines, the blue extending onto the chest and fading gradually posteriorly. Ventro-laterally orange which extends onto tail. Females off-white ventrally with grey-brown reticulations or wavy lines under the gular.

Lepidosis: Rostral small, about as wide as high. Nostril pierced in the centre of a raised nasal scale, nostril opening directed rearwards and upwards. None or short carthus rostralis. Ear opening smaller than diameter of eye and conspicuous in both males and females. UL 12-16; Mental obtusely triangular, LL 13-18, mostly 13. 3 postmentals; Scales on head flattened, smooth or obtusely keeled, a cluster anterior to the eyes forming a hornlike raised lump which is accentuated in males. Parietal eye present. Scales on back overlapping, mucronate and keeled; 90-180 scales at midbody.

Dorsolaterally and laterally small scattered groups of larger spinose scales more pronounced in males than in females. Limbs laterally projecting, moderately stout and digits terminate in strong claws. Subdigital scales under 4th toe range 16-21, mostly 18-20. Tail robust, cylindrical and tapered. Tail autonomy is visible 57/211 (27,01%) being truncated or regenerating. Most (80,7%) are found in males which indicates greater predation pressure on males or a great degree of male to male combat. Precloacal pores are present in males ranging from 8-15, mostly 11-13.

Size: Largest male SVL = 122,0 mm (P10227 - Kromrivier 347JQ) mass = 62,09 (P10227); Largest female SVL = 99,0 mm (N3672 - Ruighoek 169JP), mass = 41,9 g (N3672). Mean

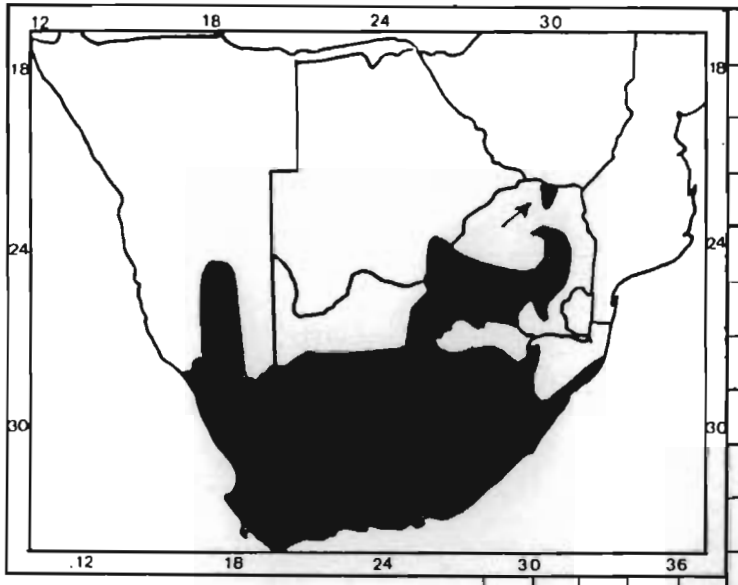
male SVL (75,0 m) = 99,36 mm ± 9,99 (1SD) n=42, mass = 38,04 g ± 11,32 (1SD) n=43; Mean female SVL (75,0 mm) = 83,83 g ± 6,44 (1SD) n=31, mass = 22,77 g ± 6,10 (1SD) n=31.

Distribution

Throughout the Cape Province northwards to southern South West Africa, Orange Free State, south-eastern Botswana, Transvaal, Natal and southern Zululand and Lesotho.

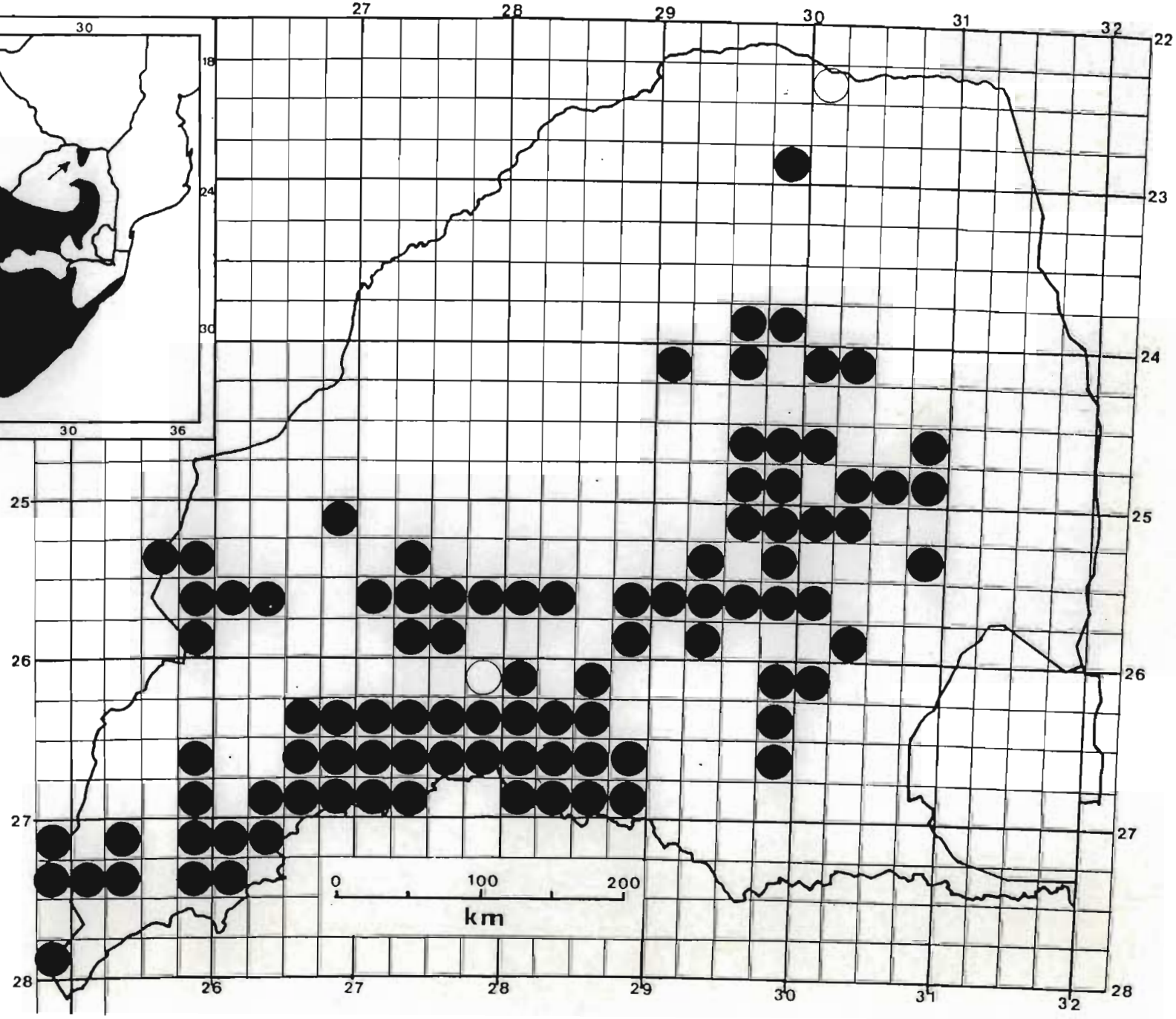
Distribution in Transvaal (Map 34).

32 km S of Heidelburg; 35 km SW of Tshipise; Balloon Forest; Beletlwa; Bezuidenhoutskraal 64HP; Bleskop Siding; Boschhoek 36JT; Boschkop 482IR; Btwn. Wolmaransstad and Witpoort; Bulskop 225IP; Burgersfort; "Clearwaters" Haenertsburg; Dal Josaphat 461KS; De Kroon; De Oude Stad van Sekwati 765KS; De Roodepoort 435IS; Dientje 453KT; Doornfontein 345IP; Doornkop 356JS; Doornplaat 106JO; Droogespruit 416IP; Elandsfontein 440JQ; Farrefontein 349JT; Frederickstad; Garatouw 282KT; Gatsrand; Gestoptefontein 349IO; Gillooly's Farm; Goedehoop 152JS; Greylingstad; Grootplaats 29HN; Hartebeestfontein 437IQ; Hartebeestpoort B. 410JQ; Hartebeestpoortje 451IQ; Hartshoogte 17HN; Heidelberg; Heidelbergkloof; Hexrivier 634IR; Humanskraal 346IO; Italie 123HO; Johannesburg; Johannesburg, Orange Grove; Johannesburg, Northcliff; Johannesburg, Melville Koppies; Kafferskraal 381IR; Klerksdorp Townlands; Klipfontein 498JR; Klipplaatdrift 343JS; Kliprivier 73JT; Kliprivierberg 106IR; Kolkenbek, De Deur; Kraalkop 147IQ; Kranspoort 248IS; Kromrivier 347JQ; Langbaken 342KS; Leeuwfontein 185HO; Leeuwfontein 228JS; Lisbon Falls; Loskop Dam Nature Reserve; Magaliesberg;



MAP 34.

Agama atra atra.
Recorded distribution in the Transvaal, and in southern Africa.



Makapansgat 39LS; Makwassie; Makwens; Mapochsgronde 500JS; Mariepskop; Melkboomfontein 919LS; Mogatles Location; Moilwas Location; Mooifontein 285JS; Mooiplaats 242JS; Nelspruit; Nooitgedacht 392KT; Nooitgedacht 471JQ; Ohrigstaddam Nature Reserve; Ottoshoop; Percy Fyfe Nature Reserve; Potchefstroom Townlands; Pretoria, Rosslyn; Pretoria, Bon Accord; Pretoria, Sjambokstad; Pretoria, The Willows; Pretoria Baviaanspoort; Ratzegaaiskraal 204IP; Rietpoort 193IR; Rietspruit 91KQ; Rietvallei 130IQ; Roodekraal 454IQ; Ruighoek 169JP; Rustenburg Nature Reserve; Schoonheid 2HN; Schoonoord 326KT; Schweizer Reinecke Dorp 62HO; Sekororo; Sendelings Pos; Silverbank 611IR; Spitskop 502JR; Strydfontein 320IP; Strydkraal 477IT; Suikerboschfontein 422JT; Suikerbosrand Nature Reserve; Syferfontein 293IQ; Syferfontein 303IP; Syfergat 204HO; Tevreden 56IT; The Downs 34KT; Turfloop 987LS; Valsfontein 183IR; Ventersdorp Dorpsgebied; Venterskroon; Vlakfontein 558IR; Vuurfontein 117HO; Waterpan 292IQ; Welbekend 117JQ; Welgemeend 206IS; Weltevreden 822KS; Witklipbank 202IR; Witpoort Dorpsgebied; Witwatersrand; Woodbush; Zeekoefontein 573IQ; Zusterstroom 447JR; Zwartkoppies 296JQ; Zyferfontein 293JP.

Literature Records

Dinokana; Krugersdorp; Lydenburg; Messina; Modderfontein; Potgietersrus (FitzSimons, 1943). Wolkberg wilderness area (Snyders 1987), Waterberg (NMZB).

Habitat and Ecology

An exclusively rupicolous species with marked sexual dimorphism, males becoming much larger than the females.

Males frequently observed perched on top of a boulder; basking and keeping one eye open for predators and other male conspecifics. Occurs from sea level to 2 300 m altitude although in the Transvaal, restricted to rocky outcrops and ridges in the south and west and along mountain ranges elsewhere in the Province. The males also bob their heads like the other agama species. When alarmed and at nightfall these lizards retreat into vertical crevices where they wedge themselves and resist eviction. Males may often be seen haring across boulders, leaping from one to another and bobbing the head. Males during the breeding season become blue anteriorly and show off on top of the boulders to attract females and chase off males. These lizards are gregarious living in family groups. They appear to feed largely on ants as well as many other arthropods such as beetles, grasshoppers, crickets, millipedes and spiders. Oviparous, the eggs 5-12 (FitzSimons, 1943) measuring 15-18 x 10-12 mm are laid in summer. Gravid females were found during November and December. The eggs are laid in a hole in the ground and after an incubation period of 2-3 months the young hatch. Neonates measure 59,0 - 68,0 mm total length with a mass of 0,4-1,2 g.

Conservation Status

Protected. Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. A widespread species which may be locally common. It occurs in some provincial nature reserves and coupled with its rupicolous habit can be considered secure. Only large scale quarrying of rocky outcrops pose a local threat.

Remarks

A relict population exists north of the Soutpansberg which is widely separated from the nearest other population at Haenertsburg and represents the most northerly distributed population. A subspecies A. a. knobelii Boulenger is described from South West Africa.

Agama aculeata distanti Boulenger, 1902

Agama distanti Boulenger, 1902, Ann. Mag. nat. Hist. (7)ix, p. 339, Type locality: Pretoria/Rustenburg.
Agama hispida distanti Boulenger. FitzSimons, 1943, p. 143; Welch 1982, p. 48.
Agama aculeata distanti Boulenger.

Description
Colour. Very variable from brown to greyish black. An interrupted to continuous pale vertebral stripe extends from the occiput to the tail becoming more patchy posteriorly. Dorsolaterally irregular pale or dark patches occur. Head with or without distinct greyish to buffy crossbars from just anterior to just posterior to the eyes. Pale patches and bands also occur laterally including the upper labials. Limbs covered with pale and dark bands. Ventrally white with varying degrees of greyblack spotting or striping under the chin and gular. A dark gular patch present in males, (Figure 12).
Lepidosis. Small to medium sized agamas with a triangular head distinct from the neck. Females become very broad and squat in body; in the limbs well developed and digits clawed. Tails in females tend to be shorter than SVL in the south but may be equal or even longer. In males the tail is longer than the SVL. Female tail length shorter to as long or longer than SVL,

ranging from 39,52-56,62% of total length. Male tail length longer than SVL and 52,83-57,26% total length. Rostral small, band like, twice or more as broad as high; nostril pierced in a single flat to bulbous nasal, with the opening pointing laterally to dorsolaterally, or slightly posteriorly; UL 8-12; Mental small; LL 9-12; Body covered with imbricate, strongly keeled and mucronate scales dorsally; Scattered large, strongly keeled, mucronate scales occur in 6 interrupted longitudinal rows; the lateral ones extend from where the elbow touches the body to just anterior to the inguinal region. Ventrals imbricate, keeled and mucronate; Scales at midbody 78-104. Limbs covered with keeled spinose scales; digits short with 12-17 spinose subdigital scales under the 4th toe; Femoral pores in males 10-17; Tail with enlarged spinose to recurved spinose scales at the base becoming less pronounced but still spinose posteriorly.

Size. Largest male SVL = 87,0 mm (N3361 - Donkerkloof 162KR), mass = 25,8 g (N3361); Largest female SVL = 91,5 mm (J3027 - Malmaniesrivier 236KQ), mass = 34,2 g (gravid) J1804 - Busizi Hills). Mean male SVL = 69,72 mm ± 11,35 (1SD) n=20, mass = 14,2 g ± 6,26 (1SD) n=19; Mean female SVL = 67,79 mm ± 16,63 (1SD) n=22; mass = 14,58 g ± 9,27 (1SD) n=22.

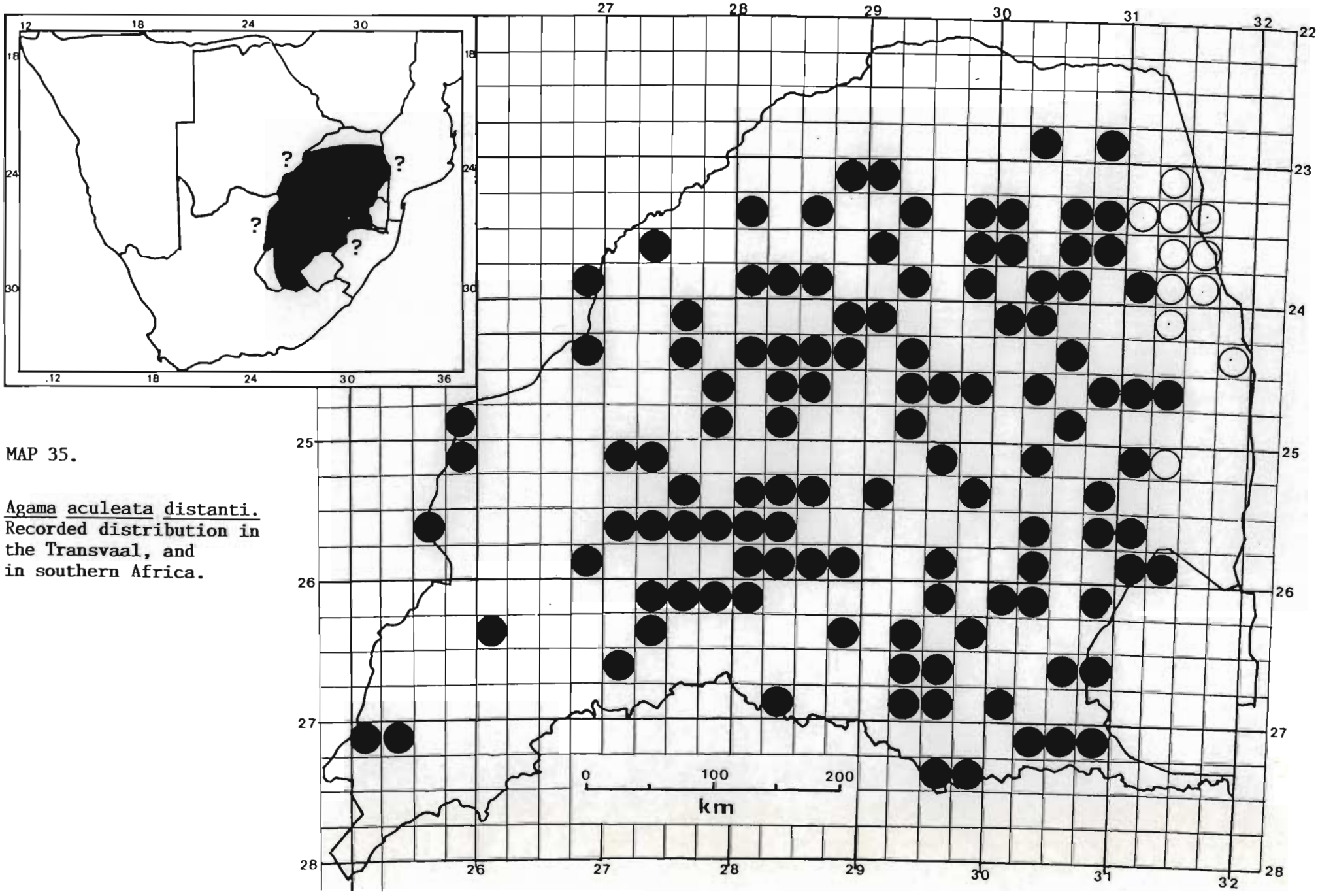
Distribution

Cape Province, Orange Free State, Botswana and most of the Transvaal.

Distribution in Transvaal (Map 35).

Altyd Mooi 379LT; Amsterdam 116LS; Bandolierkop; Barberton; Beerlaagte 494IR; Berlyn 670LT; Blaauwbank 515KQ; Bourkesluck 454KT; Bronkhorstspruit;

Buffelsdoorns 315KR; Buffelshoek 277KR; Bulhoek; Busizi Hills; Calais 563 KS; Clearwaters, Haenertsburg; Carolina; Deelkraal 412LT; DeHoop 136MR; Donkerhoek 172HT; Donderkloof 162KR; Doornbult 81IP; Doorndraai Dam Nature Reserve; Doornhoek 284KR; Doornkop 356JS; Duurstede 361JU; Dycedale 368JU; Eloffsdaal; Galakwynstroom 745LR; Geelhoutkop; Goedemoed 373IT; Goedgedacht 152JT; Griffin Mine; Groenfontein 458KQ; Groothoek 106KS; Groothoek 171HT; Groothoek 278KQ; Halfgewonnen 190IS; Hartbeesfontein 516KR; Hartbeeslaagte 66JQ; Heerenveen 27IT; Holfontein 49Iq; Indhlovudwalile 421IT; Irene; Jobertsvallei 337IS; Johannesburg, Melville; KaKhayi; Kaalplaats, Pretoria; Kaapsche Hoop 483JT; Kafferskraal 43JQ; Kafferskraal 168KR; Kareelaagte 45JO; Klipfontein 241IS; Klipfontein 498JR; Klipheuwel 573KS; Klipkop 411JQ; Kosterfontein 460JP; Koster; Kromdraai 486IS; Kroondal; Krugersdorp; Leeuwpoort 373KR; Letsitele; London 29KP; Ludlow 227KU; Lydenburg; Makapan Caves; Malietzies Kop; Malmaniesrivier 236KQ; Manamala; Maribashoek; Matlapitsi R.; Melinda 164LR; Moddernek, Nylstroom; Monte Christo 388LR; Mooiplaats 355JR; Morgenzon; New Belgium 608LR; Ngwaribango; Normandie 178HT; Ntsweletau; Nylstroom; Nylsvley Nature Reserve; Ohrigstad Dam Nature Reserve; Ongezien 717KS; Paardefontein 35HO; Paardeplaats 101HT; Palala R.; Palmietfontein 110IS; Palmietfontein 24KS; Papatso; Pentonville 216LQ; Percy Fyfe Nature Reserve; Phalaborwa; Pietersburg; Potchefstroom Townlands; Pretoria; Pretoria, Bon Accord; Pretoria, Garstfontein; Pretoria, Groenkloof; Pretoria, Hornsnek; Pretoria, Kilner Park; Pretoria, Koedoespoort; Pretoria, Magaliesberg; Pretoria, Meintjieskop; Pretoria, Muckleneuk; Pretoria, Pyramids; Pretoria, Silverton; Pretoria, Sjambokstad; Pretoria, Skinners Court; Pretoria, Sunnyside; Pretoria, Wonderboom; Pretoria,



MAP 35.

Agama aculeata distanti.
Recorded distribution in the Transvaal, and in southern Africa.

Wonderboom-Suid; Pretoria, Zoological Gardens; Potgietersrus; Praktiseer 275KT; Randfontein; Recliff 426IT; Rhenosterkop 195JU; Rietfontein 214JR; Rietfontein 255JT; Rietfontein 313IR; Rietspruit 412KR; Rolle 235KU; Roodekrans 457IS; Rooiberg; Rooibok 707KS; Rustenburg Nature Reserve; Schweizer Reneke; Sekale; Selati; Shamiriri; Shilowane; Sibasa; Sweethome 315LR; The Oaks 198KT; Theespruit 156IT; Turfloop 987LS; Uitkomst 769LS; Van Tondershoek 10KO; Vlakplaats 535KS; Vygeboom; Vygeboompoort 456KR; Waaikraal 396JQ; Waterval 128HS; Waterval Onder; Waterberg; Welbedacht 382IS; Welgegund 375IQ; Wilhanshohe 78LS; Wilkenshof 252JT; Wonderfontein 103IQ; Woodbush; Worcester 5LP; Zebediela; Zoetfontein 137LT; Zoutpan 104IR; Zwartkrans 172IQ; Manzini W. of Numbi Gate; nr. Dennilton; nr Dzumeri; nr. Letsitele Siding; nr Mokeetsi; 78 km NE of Vaalwater.

Habitat and Ecology

A squat terrestrial species usually found at the fringes of shrubs or foraging among the grass tussocks. Occasionally observed on rocks and termitaria, using these as vantage points and display sites. Takes refuge in rodent and other burrows as well as in the branches of shrubs, and in holes in moribund termitaria. Occasionally found under stones and other debris partially buried in the soil.
Found in veld types 8, 9, 10, 14, 16, 18, 19, 30, 48, 52, 54, 57, 61, 62, 63, 64 and 67,at altitudes ranging from 400-1800 m above sea level, these lizards feed largely on ants, but also consume many other arthropods.
Oviparous, the species lays from 7-18 eggs measuring 11,8 - 14,7 m x 9,2 - 10,7 m during midsummer in a hole in sandy soil.

Conservation Status

Protected. Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. The species is widespread in the Transvaal occurring in at least 16 provincial nature reserves. It is however sparsely distributed in most areas and details of populations on reserves are needed. The high level of habitat destruction in the south-western Transvaal is responsible for the few distribution records from that area. Currently secure population densities need to be determined on two or three prominent nature reserves.

Remarks

Various authors have in recent times discussed the variation between the various forms of the A. hispida and A. aculeata groups. FitzSimons (1943) recognised five subspecies of hispida based on variations in the size of ear opening, keeled and mucronate ventrals, size of head and midbody scales. Mertens (1955) pointed out that the classification of the hispida group needed revision. McLachlan (1981) established that in fact the hispida group consisted of two distinct species separable on the size of the earhole and its relationship to the diameter of the eye. These two were A. hispida and A. aculeata. A. aculeata included distantii and armata as these forms had a large earhole; the scales on the crown overlap anteriorly and the fifth toe reaches to the end of the first. McLachlan 1981 then elevated aculeata to specific rank incorporating distantii and armata as subspecies, restricting the former to "the small squat, almost toad-like agamas found on the highveld of southern Transvaal, the Orange Free State and the north-eastern Cape Province". The distinguishing character was that, the tails of females was shorter than SVL. Broadley

(pers. comm.) in McLachlan (1981) differentiated between A. aculeata and A armata on the basis of rugose head shields; ventrals more or less keeled and mucronate; usually 9-13 lamellae beneath the 4th finger and 11-17 beneath 4th toe; 3rd toe usually longer than 4th and maximum SVL 95 mm. McLachlan (1981) based a key separating the two subspecies distanti and armata on the tail being longer or shorter than SVL in females and that in the former the ventral scales are smooth or slightly keeled as opposed to keeled and mucronate in the latter.

During the course of this survey the above morphological characters were found to vary tremendously. It was evident that using "short tail" as a criterion, that distanti was widespread in the Transvaal and not limited to the highveld. The tails of many individuals were found to equal or very nearly equal the SVL. This made the character difficult to apply.
Secondly the variation in the keel and mucron or absence thereof proved difficult to apply and unreliable, although being the only method applicable to males which in both subspecies have longer tails than SVL.

According to these characters, extensive overlap occurred in the morphology of the two forms with the exception of the north-east and south west of the province. An examination of gular pattern used by McLachlan (1981), revealed that most Transvaal material, with the exception of those from the far northern Transvaal, had a similar or conspecific arrangement, (Figure 12). It was therefore decided that, with the exception of those mentioned previously, all Transvaal material would provisionally be placed under distanti. Those specimens from north of the Soutpansberg are tentatively placed under armata.

Agama aculeata armata Peters, 1854

Agama armata Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 616. Type locality: Sena and Tete, Mozambique.
Agama hispida armata Peters. FitzSimons, 1943, p. 149.

Description

Colour. Above yellowish-to greyish or reddish-brown, usually with 4-5 transverse series of paired pale to dark spots or blotches on the back; An interrupted series of pale blotches occur along the vertebral line, these often coalescing in males to form a continuous line from the occiput to the tail; Head in females with two to three pale bars across the head in the vicinity of the eyes; Head in males brown and mottled to blue, particularly laterally. Limbs barred dark brown and pale brown. Tail blotched with grey to buffy brown with regular dark brown to blackish crossbars. Ventrally white, chin and gular with a grey-blue reticulate pattern, (Figure 12). The pattern occasionally extends onto the chest and belly.
Lepidosis. A larger subspecies than distanti with the head more triangular and distinct from the neck. Females when adult become squat; Males large but do not become as obese as the females; Limbs well developed; Tails in females longer than SVL in adults; in males the tails are longer than SVL. Female tails range from 50,0 - 59,59% of total length. Male tails range from 55,26-62,92% of total length. Rostral a narrow band 2-4 times as wide as high; nostril pierced near posterior margin of bulbous nasal and directed upwards and/or rearwards; UL 9-11; Mental small triangular as broad as long; LL 10-11 rarely 9; Head scales heterogeneous, bluntly keeled to conical, largest on snout and interorbitally and very different from body scales; Body scales mucronate, imbricate and strongly keeled; 6 rows

of enlarged keeled, spinose scales occur longitudinally along the body; Along the vertebrae a series of 5-6 smaller scale rows extend from the occiput to the sacrum. Midbody scales 88-105; Ventrally scales smooth to bluntly keeled, imbricate and bluntly to sharply mucronate. Limbs covered with overlapping keeled and mucronate scales; digits short with 12-18 subdigital lamellae under the 4th toe. Precloacal pores in males only, 9-18; tail covered with imbricate, strongly keeled and spinose scales; spinose scales not distinctly differentiated from the others, but those at base more than those distally.

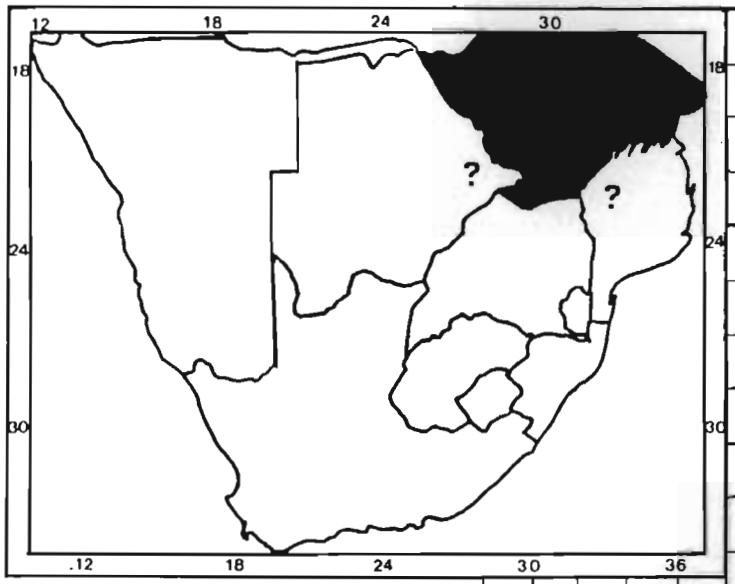
Size. Largest male SVL = 94,0 mm (N745 - Delet 499MS), mass = 28,0 g (N 745); Largest female SVL = 94,0 mm (N2031 - Canterbury 254MR), mass = 31,4 g (N2031). Mean male SVL = 72,47 mm ± 12,54 (1SD) n=18, mass = 14,97 g ± 6,80 (1SD) n=18; Mean female SVL = 79,04 mm ± 11,93 (1SD), n=12, mass = 18,98 g ± 7,52 (1SD), n=12.

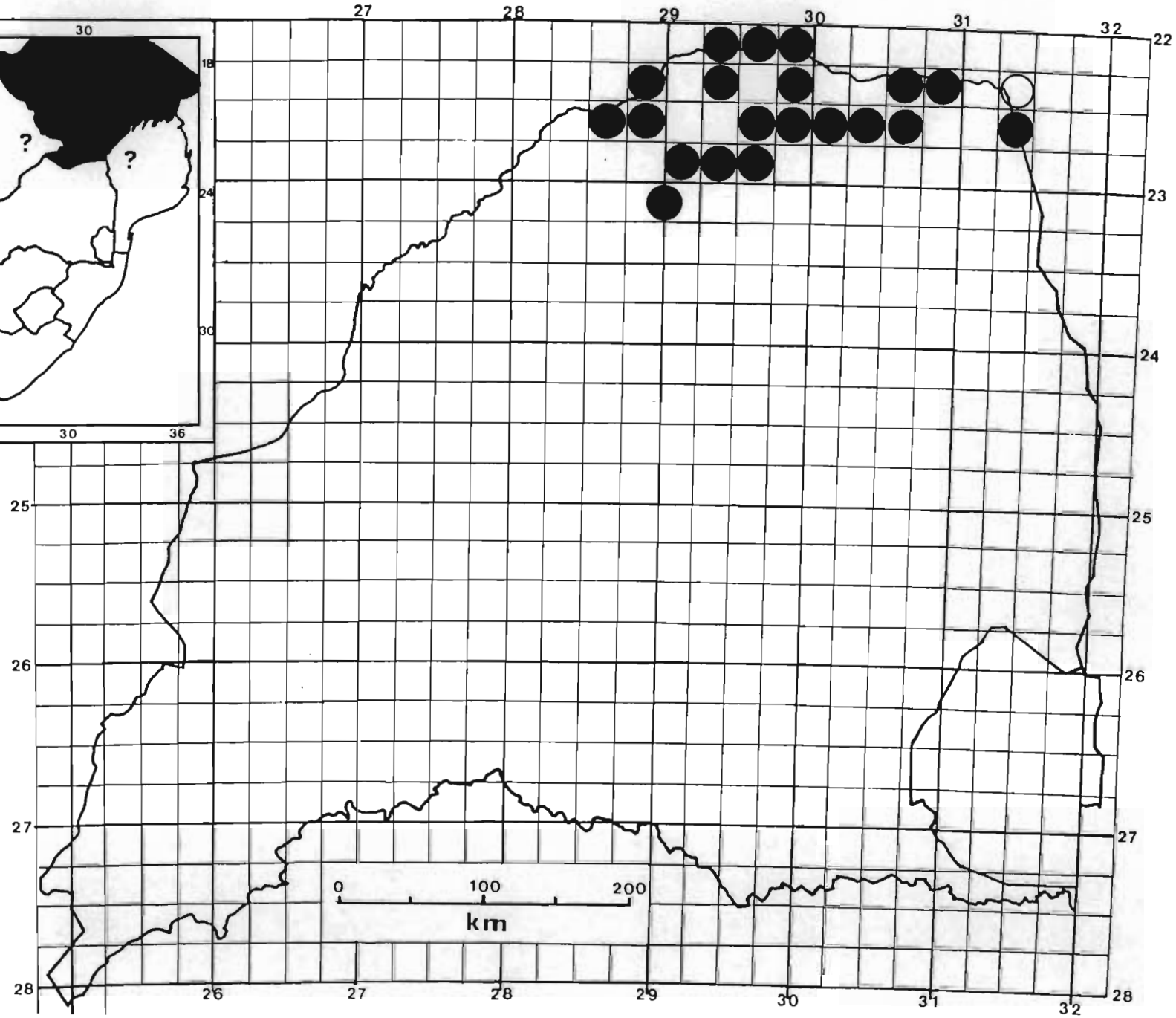
Distribution

Ranging from northern South West Africa to Zimbabwe, Transvaal and northern Mozambique.

Distribution in Transvaal (Map 36).

3 km W of Masisi; 5 km N of Tshamavhudzi Peak; 5 km W of Lukale Hill; Bismarck 116MS; Blouberg; Brak R.; Carnethy 113MS; Cookham 196MR; Evelyn 159MS; Gumela; Killaloe 235MS; Klein Tshipise; Ladismit 761MS; Langjan Nature Reserve 370MS; Malongwa Flats; Nwanedzi R.; Platjan 198MR; Ramsgate 543MS; River 141MS; Robertson 748MS; Sagan 217MS; Schroda 46MS; Sheldrake 239MS; Trevenna 119MT; Tshipise 105MT; Wellust 267MR; Zoutpan 459MS.





MAP 36.

Agama aculeata armata.
Recorded distribution in the Transvaal, and in southern Africa.

Habitat and Ecology

Terrestrial, the "reticulate" form occurring in deep sand areas and calcrete flats. Frequently take shelter under flat rocks lying half buried in the soil. The reticulate form is found in veld types 8, 14, 15, 18, 19 and 20 at altitudes between 400-800 m above sea level. Like distanti they also largely consume ants but will also eat other invertebrates.

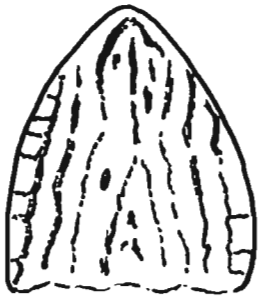
They are oviparous laying from 9-16 ova measuring 14,2-14,5 x 8,7 - 9,4 mm during midsummer. Neonates appear during March.

Conservation Status

Protected. Schedule 2, Transvaal Nature Conservation Ordinance 12 of 1983. Widespread in the Transvaal it occurs in several provincial nature reserves. As it is found mostly in ranching areas, its future is secure.

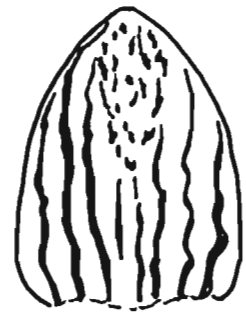
Remarks

A discussion of the complexities of this complex was incorporated under distanti. However on examining the specimens of armata it was noted that those from north of the Soutpansberg (Figure 12) had a reticulate gular pattern, quite different from any others in the remainder of the Transvaal (Figure 12), which mostly had a linear or speckled gular. The dark blue-black patch at the back of the gular is considerably smaller than those of distanti. It appears therefore that two phena are present in the Transvaal. McLachlan (1981) illustrates the difference (Fig. 1, p. 221) but although recognising makarikarica as a subspecies of hispida he ignores the similar disparity within the distanti/armata group. Those

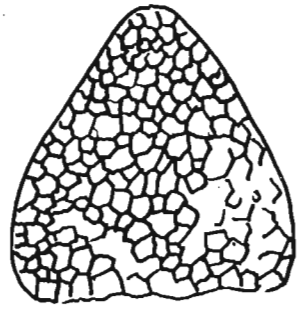


N8109 Vaalkop
490 IS ♀

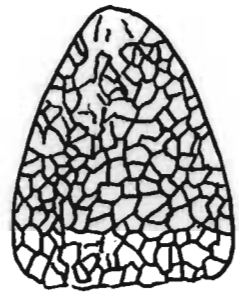
N5144 Sekale
♂



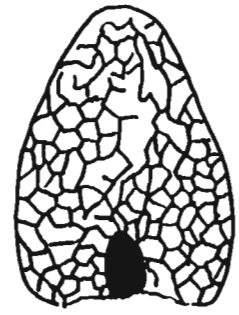
J1314 Donkerhoek
172 HT ♂



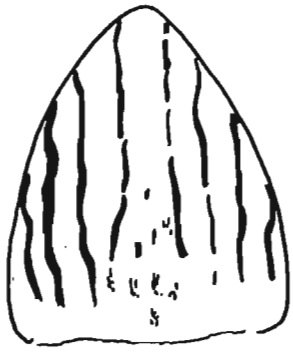
TN348 Klein Tshipise
♀



N7572 Robertson
748 MS ♂

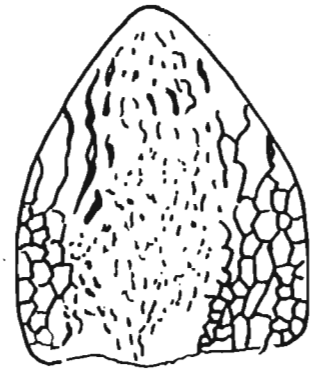


N7534 River 141 MS
♂



N2607 New Belguim
608 LR ♀

N5174 Vlakplaats
535 KS ♂



J6126 The Oaks 198
♀

FIGURE 12:

Variation in gular pattern in Transvaal Agama aculeata. (Note those in the middle from north of the Soutpansberg).

specimens with a reticulate gular have a restricted geographical range while those with a linear pattern are more widespread and overlap extensively with A. a. distanti (sensu McLachlan 1981). Peters (1854) described armata from specimens collected at Sena and Tete on the Zambesi river. His description of the gular pattern mentions that this was either yellow, spotted with black or with white speckles on a blue black background, a situation very similar to the reticulate pattern of those specimens from the far northern Transvaal. In addition, specimens cursorily examined from Zimbabwe and Mozambique also only exhibited this reticulate pattern. This tends to confirm that the epithet armata belongs to this form and is herewith incorporated as such.

Further research is needed to establish whether armata differs sufficiently from distanti to warrant specific status. However the partial net-like pattern found in some distanti specimens and a possible transition zone in the north-western Transvaal indicates retention of subspecific status, at least until more intensive studies have been undertaken. A specimen (TM2101) from Pietersburg with a reticulate gular pattern is difficult to place as it is so far out of the normal range of armata and many represent a very aberrant distanti or a translocation.