# DESCRIPTIONS OF SOME NEW SUBSPECIES OF MAMMALS

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### **Cercopithecus mitis stevensoni** n.subsp.

DESCRIPTION. Above broadly washed with yellowish over the back on the general speckled coloration, much as in *C. m. schwarzi* Roberts (*Ann. Transv. Mus.* 1931, XIV, 222, pls. 3–5, figs. 14*a*, *b* and *c*; Mariepskop, Lydenburg district, Transvaal); but below with a considerable amount of grey banding to the otherwise whitish hairs, giving a greyer appearance, though not so grey below, nor so dark above, as in *C. m. nyasae* Schwarz (*Ann. Mag. Nat. Hist.* 1928, (10), I, 656; Fort Lister, Mlange district, Nyasaland); the skull averages larger than in *schwarzi* and comes nearer to *nyasae*. The ischial hairs are dark rufous, but this reddish colour does not extend over the base of the tail and is more pronounced in two adult females than in an adult male; an immature male is whiter below than the adults.

An adult female in the Transvaal Museum collection (by kind donation of Mr C. W. Benson) from Chinteche, north of the type locality of *nyasae*, agrees with the description of that subspecies, except for the presence of rufous ear fringes; but as Schwarz has rejected the name of *stairsi* on the grounds that the red colour is due to erythrism, these red ear-fringes may be due to the same abnormality, a matter that requires further inquiry. There is also an adult female of *erythrarcus* in this collection from Vumba, to the north of Mt. Selinda, which not only has the red of the ischial hairs extending conspicuously over the base of the tail, but is cranially rather smaller than *schwarzi* and *stevensoni*, thus intervening geographically between the ranges of *stevensoni* and *nyasae*. Comparison of the table of measurements indicates that *nyasae* and *stevensoni* average larger than *schwarzi* and *erythrarcus* and the recorded measurements of a skull of a reputed *stairsi* as given by Elliott (*Review of the Primates*, 1913, II, 372). Measurements of a specimen of *erythrarcus* given by Elliott are of the type of *beirensis* Pocock, which Schwarz correctly placed as a synonym of *erythrarcus* Peters. The types of both *erythrarcus* Peters from Inhambane and of *stairsi* Sclater are known to be immature; but this makes no difference to their colour characters. The distribution of the former from Inhambane to Beira and Vumba is the same as in some other animals, and is therefore not an anomaly as one might think, though it remains to be explained why the Mt. Selinda *stevensoni* seems to be cut off from the larger Nyasaland *nyasae*.

TYPE. T.M. no. 6977, adult ♀, Mt. Selinda, Melsetter district, S. Rhodesia. Also another adult ♀, an adult and an immature male collected at the same place, by a Transvaal Museum and Rhodesia Museum expedition.

### **Genetta tigrina methi** n.subsp.

In colour and colour markings, including the pale tail rings and marks on the underside (seven in all) similar to *G. t. tigrina* (Schreber) of the Cape of Good Hope and southern districts of that province; but larger in general size and skull, especially in the back teeth, which are larger than in the even larger *G. rubiginosa zuluensis* Roberts of Natal, Zululand and Swaziland, which has nine or ten pale rings and marks on the underside of the tail. In both the type (male) and cotype (female) the inner cusp of $p^3$ is well developed. The male lacks, but the female has, a rusty shade in the dark spots on the upper parts of body.

Table 1. *Measurements of* Cercopithecus mitis *subspecies (mm.)*

| | Males | | | | | Females | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *stevensoni*, Mt. Selinda | *nyasae* (Elliott), Fort Lister | *stairsi* (Elliott), Zambezi delta | *schwarzi*, type and 3 adults, E. Transvaal | *erythrarcus* (*beirensis*, Elliott), Beira | *stevensoni*, type and another, Mt. Selinda | *nyasae*?, Chinteche, Nyasaland | *stairsi*, none | *schwarzi*, Mariepskop and Woodbush | *erythrarcus*, Vumba, S. Rhodesia |
| Head and body | — | 670 | — | 530 | 561 | — | 500 | — | 450, 520 | — |
| Tail | — | 830 | — | 711 | 601 | — | 850 | — | 551, 650 | — |
| Hind-foot | — | 150 | — | 146 | 172 (?) | — | 136 | — | 130, 132 | — |
| Skull, greatest length | 121·5 | 126 | 114·5 | (4 skulls) 113·5–118·2 | 117·6 | 110·5, 106 | — | — | 98, 98·5 | 95 |
| Zygomatic width | 78·5 | 80·8 | 77·5 | 75·5–78·5 | 75·7 | 69, 69 | 67·5 | — | 65, 66 | 64·5 |
| Intertemporal constriction | 45 | 44·7 | 43·2 | 43–45·5 | 44 | 42·7, 44 | 42 | — | 42·2, 43 | 41·5 |
| Upper molar series | 29·2 | 29·5 | 26 | 25·5–27 | 26·6 | 27, 26·5 | 25·5 | — | 25·5, 25·3 | 25·8 |
| Mandible length | 85 | 87 | 85 | 82–84 | 79·8 | 74·7, 70·7 | 71·5 | — | ?, 67 | 65 |
| Lower molar series | 37 | 37·8 | 33·5 | 32·3–34 | 31·7 | 31, 30·5 | 30 | — | 28·2, 30 | 28·5 |

TYPE. T.M. no. 9989, adult ♂; cotype, T.M. no. 9990, adult ♀. A pair apparently as they were captured at the same time and place, on 1 August 1946, in the bush at the mouth of the Umsigaba River, Pondoland, on the cottage area owned by my son-in-law, Bertie Meth, whose kindness to me while recuperating from double pneumonia and assistance in procuring specimens is here fittingly commemorated.

The table of measurements will illustrate the difference in size between the three forms mentioned above (Table 2).

The three males of *Genetta tigrina tigrina* were captured by me at L'Ormarins, Franschhoek valley, Seven Weeks Poort (near Ladismith, C.P.) and Jonkersberg (George district), and the female at La Motte, Franschhoek. Six specimens in the Transvaal Museum from Knysna are not labelled as to sex nor measured, but the skulls are within the figures given for this typical subspecies. An adult procured by me near Committees Drift, Albany district, is intermediate in size, but has the smaller teeth of more westerly specimens.

### **Petromyscus collinus namibensis** n.subsp.

A very light-coloured form of a nearly uniform light buffy colour, with hardly any black-tipped hairs intermingled above and the face of the same colour as the back; the hands and feet buffy white, the tail buffy with only the tip slightly brownish, and the ears light brown and hardly contrasting with the head and body in colour. The skull is rather narrower than in *P. c. collinus* from Karibib, especially in the muzzle, and the palatal foramina are long and narrow, not widened out in the middle as in that form.

TYPE. T.M. no. 9526, adult ♀, Okombahe, on the border of the Namib desert, Omaruru district, south-west Africa, 29 September 1941.

Measurements: head and body 70, tail 96, hind-foot (s.u.) 15, ear 15 mm. Skull, greatest length 24·2, basilar length 18·8, zygomatic width 11·8, width of brain case 11, interorbital constriction 3·9, length of nasals 9·7, height at bullae 8, length of upper molar series 3·6, diastema 6·7, palatal foramina 5·1, greatest diameter of bullae 4·7 mm.

### **Leo leo vernayi** n.subsp.

A yellow-maned form of lion that occurs in the Kalahari desert, in which the general colour is paler, the mane yellow, seldom with black hairs interspersed and usually less profuse than in the black-maned *krugeri* of the southern part of the Kruger National Park; cranially shorter, but nearly as broad at the mastoid and quite as broad across the maxilla when measured from the outside of $p^4$; in three typical males from the Kalahari, and a female from Nkate, the upper tooth-row ($c$–$p^4$) is shorter than in *krugeri*, though to what extent this is of diagnostic value is not clear. Measurements are given hereafter in comparison of the subspecies.

TYPE. A.M.N.H. no. 83616, Matapa Pan, central Kalahari, a fully adult male, collected on the Vernay-Lang Kalahari Expedition in 1930. (For comparative measurements see Tables 3 and 4.)

In the moister area north of the Kalahari desert occur lions that often have blackish manes, and some with skulls in males that are as long as or even slightly longer than in *krugeri*, but with the mastoid, zygomatic and maxilla breadths less, though interorbitally broader; in females the skulls are shorter than in *krugeri*, but almost as broad. And in the same area occur smaller lions and lionesses that show some affinity to the very short-skulled *bleyenberghi* of the Katanga area, but which has been recorded by Hill & Carter (*Bull. Amer. Mus. Nat. Hist.* 1941, LXXVIII, 136, 204) from Angola, though I question whether they are precisely of

Table 2. *Measurements of* Genetta *for comparison*

| | *G. tigrina tigrina* | | | | *G. t. methi* | | *G. rubigosa zuluensis* | |
|---|---|---|---|---|---|---|---|---|
| | S. Cape Province | | Knysna, six | Albany district, | Umsigaba River | | | |
| | 3 ♂♂ | 1 ♀ | not sexed | ad. ♂ | Type ♂ | Cotype ♀ | 6 ♂♂ | 4 ♀♀ |
| Head and body | 430–475 | 410 | — | 450 | 500 | 483 | 465–490 | 465–490 |
| Tail | 430–450 | 425 | — | 410 | 450 | 430 | 440–490 | 435–470 |
| Hind-foot (s.u.) | 85–90 | 80 | — | 94 | 84 | 78 | 90–95 | 86–90 |
| Ear | 44–47 | 45 | — | 48 | 44 | 44 | 47–50 | 45–50 |
| Skull: Greatest length | 87–89·7 | 86·6 | 85–89 | 90 | 92·8 | 90 | 96–101 | 92–95 |
| Basilar length | 77·2–80·7 | 77·5 | 75·6–80 | 83·5 | 84·5 | 82·5 | 87–90 | 84·5–85·5 |
| Zygomatic width | 42·2–47 | 44 | 42·2–47·7 | 47 | 50 | 45 | 47·7–51·3 | 44–49·5 |
| Width of brain case | 31·8–32·7 | 31·5 | 31–32·7 | 32 | 31·5 | 29·5 | 31–32 | 30·5–31·3 |
| Width across bullae | 28–28·5 | 27·8 | 26·2–27·6 | 29 | 29·2 | 28 | 31–31·2 | 29·2–29·5 |
| Length of bullae | 17–17·8 | 17 | 16·8–17·5 | 17·5 | 18 | 17·8 | 18·8–19·5 | 17·5–18·8 |
| c–$m^3$ series length | 32·6–34 | 33 | 31–32·5 | 34 | 34 | 34·3 | 35–37 | 33–35 |
| $p^4$ length | 8·3–8·7 | 8·7 | 7·2–8·5 | 8 | 9·4 | 9·2 | 8·4–8·7 | 8·5–8·8 |
| Greatest diameter of $p^4$ | 9–9·8 | 9·8 | 8·2–10 | 8·8 | 11·5 | 11·5 | 9·7–10·2 | 8·9–10 |
| Greatest diameter of $m^1$ | 7·7–8 | 7·5 | 7–8 | 7·3 | 8·7 | 9·2 | 7·9–8·6 | 7·2–8·6 |
| Mandible length | 61–63·7 | 60 | 59·8–61·8 | 65 | 67·5 | 65·8 | 68·2–70 | 63–66·8 |
| c–$m_3$ series length | 36·5–37·2 | 36·4 | 35·5–37·6 | 38 | 39 | 39 | 40–41·2 | 36·7–39·8 |
| $p_4$ length | 6·3–7 | 6·7 | 6–7 | 6·3 | 7·1 | 6·8 | 7–7·5 | 6·8–7·4 |
| $m_1$ length | 7·5–7·5 | 7·4 | 7–7·8 | 7·5 | 8·2 | 8·3 | 7·8–8·1 | 7–7·8 |
| Interorbital constriction | 12·5–13·8 | 13 | 11·8–13 | 13·8 | 14·8 | 13·5 | 13–14·8 | 13–15 |
| Intertemporal constriction | 14·7–14·9 | 14·2 | 13–14·5 | 14·4 | 12·5 | 13·2 | 9·5–11·3 | 10–12·7 |

Table 3. *Measurements of adult lion skulls*

| | *L. l. krugeri* Kruger National Park | | | N. Transvaal | *L. l. vernayi* Kalahari | | | *Leo leo vernay?* + *L. l. bleyenberghi?* | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Ngamiland | | | | | Ovamboland | | Angola | | | | Katanga | Chikwawa, Nyasaland | Mashonaland | Boror, Mozamb. | *L. l. massaicus* 9♂♂ | | | *L. l. nyansae* 4♂♂ | | | *L. l. azandicus* 7♂♂ | | |
| | Type | | | | Matapa Pan | Gomodimo Pan | | | | | | | | | | | | | | | | | | | | | | | | |
| | T.M. | T.M. | Col. | T.M. | Type | Field | Near | T.M. | V.-L. K.E. | V.-L. K.E. | V.-L. K.E. | V.-L. K.E. | T.M. | T.M. | Ehanda T.M. | Cassinga Berlin | Loanda Berlin | Capelonga Amer. | Type Congo | T.M. | T.M. | T.M. | Min. | Max. | Aver. | Min. | Max. | Aver. | Min. | Max. | Aver. |
| | 4405 | 4401 | Celliers | 869 | Mus. | y. ad. | T.M. | 973 | 253 | 244 | 241 | 192 | 1024 | 1023 | 1022 | Mus. | Mus. | Mus. | Mus. | 978 | (skel.) | 927 | | | | | | | | | |
| Greatest length | 393 | 387·5 | 395 | 360 | 369 | 362 | — | 390 | 382 | 401 | 362 | 353 | 358 | 352 | 381 | 366 | 362 | 340 | 334 | 345 | 342 | 357 | 337 | 373 | 358 | 356 | 371 | 363 | 355 | 380 | 367 |
| Condylobasal length | 342·5 | 337 | 348 | 325 | 321 | 322 | — | 342 | 344 | 345 | 316 | 317 | — | 313 | — | — | — | — | — | 311 | 309 | 311 | 316 | 335 | 318 | 318 | 329 | 324 | 323 | 335 | 330 |
| Mandible length | 258 | 253 | 257 | 242 | 245 | 235·5 | 242 | 260 | 256 | 258 | 236 | 235 | 243 | 236 | 258 | — | — | — | — | 232 | 231 | 241 | 238 | 257 | 244 | 242 | 255 | 249 | 237 | 253 | 244 |
| Zygomatic width | 256 | 256 | 251 | 234 | 248 | 232·5 | 247·5 | 242 | 250 | 247 | 236·5 | 236·5 | 235 | 225 | 250 | 230 | 252 | 215 | 239 | 231 | 220 | 220 | 233 | 248 | 240 | 235 | 251 | 241 | 240 | 255 | 248 |
| Mastoid width | 150 | 148 | — | 136 | 145 | 141·5 | — | 138·5 | 144 | 141·5 | 133·5 | 133 | 133 | 130 | 142·5 | 139·3 | 143·5 | 131·4 | 132 | 134 | 128 | 131·5 | 132 | 137 | 135 | 132 | 144 | 136 | 133 | 143 | 139 |
| Interorbital width | 77·5 | 74 | 71·5 | 65·5 | 68·5 | 69·8 | — | 76·5 | 75·5 | 80·5 | 69 | 67·4 | 76 | 60·2 | 82 | 73·5 | 79·1 | 68·7 | 74 | 70 | 63 | 62·2 | 6·8 | 75 | 71 | 66 | 74 | 70 | 66·5 | 79·5 | 74·5 |
| Across $p^4$–$p^4$ width | 134 | 139·5 | — | 125 | 140 | 129 | 138·5 | 128 | 133 | 128 | 132 | — | 135 | 123? | 134·5 | — | — | — | 130·5 | 133 | 127 | 125 | — | — | — | — | — | — | 124·5 | 133·5 | 129 |
| c–$p^4$ length | 118 | 117 | — | 115 | 109 | 109 | 107·5 | 116 | 118 | 119·5 | 111 | 114 | 115 | 108 | 120 | 117·5 | 117·9 | 108 | 103 | 110 | 107 | 107·5 | 103·5 | 116 | 109·5 | 106 | 114 | 109·6 | 109·6 | 118·8 | 114·3 |
| c–$m_1$ length | 137 | 133 | — | 134 | — | — | — | 136 | 135 | 138 | 127 | 129 | 136 | 129 | 136·5 | — | — | — | — | 125 | 127 | 127 | 121·2 | 133 | 125·9 | 118 | 132 | 125·6 | 128 | 138·3 | 132·5 |
| $p^4$ length | 40 | 38·5 | 40 | 39 | 40 | 39·5 | 40 | 36·5 | 39 | 37 | 38·5 | 41 | 39 | 38? | 36·5 | — | — | — | 36·5 | 40·8 | 33·8 | 36·5 | 35·4 | 40 | 36·1 | 35·3 | 40·5 | 38·2 | 36·1 | 40·8 | 37·9 |
| $m_1$ length | 30·7 | 29·5 | — | 30 | 29·8 | 27·5 | 29·8 | 29 | 30 | 27·2 | 27 | 29·5 | 30 | 27 | 27·5 | — | — | — | — | 28·5 | 25·5 | 28 | 25·6 | 28·8 | 26·2 | 24·9 | 30·6 | 28·6 | 26·2 | 30·4 | 28·4 |

Table 4. *Measurements of adult lioness skulls*

| | *L. l. krugeri* Kruger National Park | | | | *L. l. vernayi?* + *bleyenberghi?* | | | | | | | | | | | *L. l. bleyenberghi?* | *L. l. massaicus* (J. A. Allen) 13♀♀ | | | *L. l. nyansae* (J. A. Allen) 10♀♀ | | | *L. l. azandicus* (J. A. Allen) 5♀♀ | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | N. Transvaal | | | Nkate | Ngamiland | | | | | | | | | | | | | | | | | |
| | T.M. | T.M. | T.M. 1026 | On | T.M. | T.M. | T.M. | V.-L. K.E. | V.-L. K.E. | V.-L. K.E. | V.-L. K.E. | V.-L. K.E. V. 190 | V.-L. K.E. | V.-L. K.E. | | Mashonaland | | | | | | | | | |
| | 4402 | 4403 | y. ad. | loan | 868 | 965 | 926 | 334 | 0241 | 0245 | V. 191 | y. ad. | 245 | 246 | T.M. 9 | | Min. | Max. | Aver. | Min. | Max. | Aver. | Min. | Max. | Aver. |
| Greatest length | 333 | 331 | 316·5 | 330 | 303·5 | 301·5 | — | 308 | 315 | 302·5 | 297 | 300 | 293 | 292 | | | 282 | 307 | 299 | 277 | 313 | 296 | 280 | 305 | 297 |
| Condylobasal length | 291 | 287 | ? | 285 | 270 | 268 | — | 274 | 280 | 275·5 | 267·5 | 264 | 264 | 266 | 263 | | 254 | 273 | 264 | 254 | 281 | 267 | 260 | 270 | 265 |
| Mandible length | 212 | 210 | 211 | 212 | 202 | 202 | 207 | 202 | 205 | 202·5 | 200 | 190 | 197·5 | 196 | 198 | | 196 | 212 | 204 | 196 | 212 | 206 | 196 | 204 | 201 |
| Zygomatic width | 203 | 212 | 200 | 207·5 | 205 | 205·5 | 201·5 | 205 | 205 | 201 | 205 | 191 | 193·5 | 188·5 | 205 | | 184 | 204 | 194 | 180 | 206 | 196 | 184 | 210 | 201 |
| Mastoid width | 119 | 126 | 120 | 131 | 118 | 117 | 119 | 118·5 | 117 | 116·5 | 118·5 | 114 | 111·5 | 108·5 | 111 | | 112 | 120 | 114 | 105 | 123 | 115 | 112 | 126·8 | 117 |
| Interorbital width | 64 | 60·7 | 62·5 | 65·3 | 65·5 | 63·2 | 60 | 61·5 | 60 | 61 | 60·5 | 56 | 58 | 60 | 57·8 | | 54 | 67 | 60 | 54 | 66 | 60 | 56 | 67·1 | 61·7 |
| Across $p^4$–$p^4$ width | 121 | 124 | 121 | 124 | 122·5 | 120 | 117·5 | 116 | 121 | 121 | 117·5 | 114 | 115 | 111 | 118 | | — | — | — | — | — | — | 100·5 | 121·8 | 115 |
| c–$p^4$ length | 104 | 104 | 104 | — | 100·0 | 99 | 103·5 | 95 | 102·2 | 102·5 | 99·5 | 98 | 95 | 92·5 | 96 | | 91 | 99 | 94·5 | 94 | 102 | 96·8 | 92·5 | 99·2 | 95·5 |
| c–$m_1$ length | 119 | 117·5 | 119·5 | — | 115 | 113 | 117·5 | 111 | 117 | 119 | 115 | 112 | 111·5 | 106·5 | 112·5 | | 104 | 115 | 109 | 106 | 115 | 110·7 | 109·2 | 117·7 | 113·2 |
| $p^4$ length | 36 | 37 | 38·5 | 38·5 | 36 | 36 | 37 | 35 | 36 | 35·5 | 37 | 35·5 | 37 | 35 | 33·8 | | 32·5 | 35·4 | 33·9 | 32·8 | 36·2 | 34·4 | 33·8 | 35·5 | 34·6 |
| $m_1$ length | 27·2 | 26 | 28 | 30 | 27 | 27 | 27 | 25·5 | 26·5 | 28 | 28 | 25·5 | 28 | 25 | 26·7 | | 22·7 | 25·7 | 24·8 | 22·7 | 25·7 | 24·8 | 24 | 27·8 | 25·6 |

that form, judged by the measurements of skulls recorded. More recently Hill has placed all the lions collected on the Vernay-Lang Kalahari Expedition (*Bull. Amer. Mus. Nat. Hist.* 1942, LXXIX, art. V, pp. 373, 384) under *bleyenberghi*, although I placed the larger ones tentatively under *krugeri* and left the smaller ones in abeyance until the material, that had been sent to America, could be studied (cf. *Ann. Transv. Mus.* 1935, XVIII, 229). The specimens recorded by Hill seem to have got mixed, as two are recorded from Nkate, when only one was procured there and neither of the two seem to be the one actually from there. I was able to measure roughly the skulls taken on the expedition and noted the field numbers attached, which are recorded in the table of measurements given hereafter, so that they can be checked up by those to whom they may be available. I saw only two of the males, namely from Matapa Pan (near Kuke Pan) and Gomodimo Pan, and both were yellow-maned; but I was informed that some of the Ngamiland males were partly black-maned, though which they were in relation to the skulls I am unable to say.

Other privately owned skins of lions I saw in the Kalahari were all yellow-maned, and I was informed that black-maned lions only occurred in the swamp areas to the north. In an interesting letter from Major C. H. Hahn, for 30 years Native Commissioner for northern S.W. Africa, dated 12 March 1945, the prevalence of only yellow-maned lions in the Etoscha Pan and Kaokoveld areas is confirmed, black-maned lions having been seen by him only in the well-watered areas north of the Kalahari. Major Hahn stated that he has examined scores of lions shot by himself or trapped by natives in the Kaokoveld and they have all been smaller with short or only tufty manes, and are reputed to be fiercer than elsewhere. So far, I have seen no specimens from there; but Major Hahn has sent two lion skulls from Ovamboland, of which measurements are hereafter recorded. Of other skulls recorded, that from Ehanda district was kindly given me by Dr da Silva of Onjeva, which had been shot by Mrs R. S. Cope and himself, the spoils being divided by Mrs Cope retaining the skin and Dr da Silva the skull. Upon inquiry from Mr R. S. Cope, I was informed that the lion was yellow-maned; and Mr Cope also stated that the smaller of the two lions from Ovamboland, the skulls of which were donated, was '50% black-maned'[1] and the larger was yellow-maned with only a sprinkling of black hairs. This may or may not be significant, as the small Katanga lion type was also blackish maned. The skull recorded from Boror, in Mozambique, north of the mouth of the Zambezi River, is one I shot in 1908, was fully adult, a man-eater, measuring in total length 8 ft. 10 in., and yellow-maned; but a second one I shot in Boror (afterwards sold to a member of the Imperial Audit Department) was slightly black-maned and larger, total length 9 ft. 1 in. Amongst the skulls recorded is one from Chikwawa, Nyasaland, also a man-eater, donated by Mr B. L. Mitchell, the colour of the mane is not recorded.

I am fully aware that black-maned and yellow-maned, and shaggy-maned and short-maned lions have been recorded from the same districts; but when the majority, if not all, of one or the other type occupy a large area—such as this pale yellow-maned lion of the Kalahari—especially when such characters are common to other animals in the same area, such differences should be recognized for subspecies. And with regard to skulls, the three male and four female skulls from the southern Kruger National Park are so consistently large that there can be little doubt *krugeri* is well grounded; but in the northern part of that sanctuary where there are elements of other fauna not found in the southern part, there is an intrusion of Kalahari-like lions. On the Letaba River, when accompanying a party of Netherlands scientists, we saw a magnificent lion at a distance of 10 or 12 ft. which had a beautiful pure yellow mane, representing this western intrusion,

[1] It was killed after it had attacked a chief's motor car and smashed a door.

and doubtless there is the usual mixture of both types. Again, in the three typical Kalahari lions examined not only was the mane yellow but the proportions of the skulls were the same. But when we enter the Ngamiland area, where the small northern and large southern types meet and interbreed, we find a wide range of variation. While the Kalahari lions are accustomed to the absence of water and must needs find liquid—like other animals—in the Tsama melons, and must be driven from their haunts to the borders at times of protracted drought, those of the better watered areas are less likely to stray far from water, with the result that the desert type tends to greater isolation than the other. Faunistically there is another area in the tropical country south and north of the lower Zambezi River which cannot be ignored. My experience here in 1908 was that the antelopes were smaller than in the more temperate highlands or south, and correlated with this the lions seem also to be smaller than elsewhere. The skull of that from Boror has not the same proportions as a small lion and lioness skulls from Mashonaland, nor that from Nyasaland; but with such isolated material, in which the range of variation in each area is not known, it is naturally not clear whether each contains a distinctive race, and all we are able to say is that they all belong to a smaller race than that of the southern Kruger National Park. Small ones from Ngamiland are not dissimilar, which is not unexpected, having regard to faunal distribution westwards. Since the difference between the lions is not specific, interbreeding has probably taken place, with the result that there is a considerable range of variation.

Comparison of measurements given by Hollister (*Bull. U.S. Nat. Mus.* 1918, XCIX, 155–69) and J. A. Allen (*Bull. Amer. Mus. Nat. Hist.* 1924, XLVII, art. III, pp. 220–47) for East African lions show a considerable range of variation; but, nevertheless, the differences are not as great as in the males from Ngamiland, e.g. in five males of the latter the greatest length is 353–401 = 48 mm., as compared with 337–373 = 36 mm. in the normally yellow-maned *massaicus*; condylobasal length 316–345 = 39 mm., as compared with 19 mm.; mandible length 235–260 = 25 mm., as compared with 19 mm.; mastoid width 133–144 = 11 mm., as compared with 7 mm. In six female skulls from Ngamiland there is not the same disparity as in males, namely, greatest length 293–315 = 22 mm., in *massaicus* 282–307 = 25 mm.; condylobasal length 264–280 = 16 mm., in *massaicus* 254–273 = 19 mm.; mandible length 190–205 = 15 mm., as compared with 196–212 = 16 mm.; mastoid width 108·5–117 = 8·5 mm., as compared with 112–120 = 8 mm.; interorbital width 56–61·5 = 5 mm., in *massaicus* 54–67 = 13 mm. If the maxima of Ngamiland specimens are taken and compared with the maxima of *massaicus* they are greater in respect of length, width and upper tooth-row, but less in respect of mastoid and interorbital width in females only. In *krugeri*, both males and females in the maximum measurements exceed those from Ngamiland and Ovamboland, except in the length in males, and naturally also the Kenya forms.

The type of *bleyenberghi* is partly black-maned, but unfortunately measurements of skulls other than those of the type have not been recorded from the Katanga area, so that the range of variation is not known. The general fauna of Nyasaland to the south-east and Angola to the west is not necessarily the same as that of Katanga, nor does it follow that the fauna of Loanda of northern Angola is the same as that of the southern Angola-Ovamboland-Ngamiland area. We should therefore have longer series from each of these areas before dogmatically lumping them all together. To some extent the skulls of lionesses confirm the general characters of skulls of lions of the same areas, but are more conservative, varying less between extremes than in the males.

A possible explanation of the presence of large lions in the Ngamiland area may be found in the evidence of the former distribution of the fauna along the course of the Angola River system when it found its way into the Indian Ocean

by way of the Limpopo River; when this river system became diverted into the present lower Zambezi valley, the Kalahari dryness extended northwards over the Makarikari area and upper Limpopo valley, thus cutting off the former continuous distribution from Angola to northern Transvaal. The Kruger Park lion is the largest surviving lion, while the southern Cape lion was certainly the largest in its day, judging by recorded measurements, differing also in having a more shaggy mane which covered the shoulder-blades and extended farther back on the back and belly, and more completely black in colour. This type seems therefore to have extended northwards and changed to a slightly smaller size, with a large mane, but not covering the shoulders nor extending so far back and with the fore part of the mane tawny as in the Kruger lion; still retaining its rather large size and blackish mane it extended from Transvaal north-westwards to Angola; but when the change of river course took place, it became cut off from Limpopo River to Ngamiland by displacement, by the Kalahari form which was better adapted to the dryness covering this area. Hence the presence of lions in northern Transvaal which resemble those of the Kalahari rather than those of the southern Kruger National Park. It is a well-known fact that the fauna of the northern is not always identical with that of the southern part of the Kruger National Park. That is not to say that the lions are likely to be all of the same type in a single area, as they are wandering animals, given to 'wander lust' at times, with consequent dilution of characters; but, nevertheless, the lions do tend, like many other large mammals, to develop certain characters in certain areas, especially when these are large areas like the Kalahari desert. Another effect of the change of the Angola River courses has been that formerly the present lower Zambezi River did not offer the barrier to distribution that it does to-day, with the result that the East African and eastern Northern Rhodesian and Nyasaland fauna often penetrated into Mashonaland and low country to the east and drier country to the west. In the case of the lions this is seen in the presence of a small lion in the Mashonaland area, of which measurements of skulls of a male and female are tabulated hereafter; but the male is interorbitally very narrow, as also the small male from Ovamboland, as compared with the type skull of *bleyenberghi*; the Boror skull is rather longer, but is otherwise very similar to that from Mashonaland. It is probable that the coastal lion of Mozambique is smaller than that of the interior highlands, extending as far north as Kenya Colony; but I am not aware of any comparison having been made between them, measurements recorded by Hollister being of skulls of lions from the interior only; judging by the distribution of other animals it ought to extend south of the Zambezi River as far as the lower Limpopo River.