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CHAPTER 11

CRYPTOMYS HOTTENTOTUS (LESSON) 1826

This bathyergid, known as the common mole-rat or Hottentot mole-rat was first described by Lesson in 1826 as Bathyergus hottentotus from the vicinity of Paarl, Cape Province. The locality was recorded as follows: "Vingt lieues de la ville du Cap, près le village de la Pearl, non loin montagnes de Drackenstein" (Ellerman et.al., 1953, 231). Lesson acted as apothecary on board the French ship Coquille during its voyage around the world, and he thus had the opportunity to encounter this mole-rat during the vessel's sojourn at the Cape.

The following year, in 1827, the same animal was described as B. caecutiens by Brants (1827, 37). The type locality was given vaguely as the eastern part of the colony of the Cape of Good Hope. This was followed in 1829 by yet another description of the identical animal by A. Smith (1829, 439) (vide Sclater, 1901, 78) who named it B. ludwigii and described it as inhabiting ".... various parts of South Africa". In the case of B. caecutiens, Roberts (1951, 397) nominated Knysna as the type locality, while the same author proposed Cape Town as the type locality for B. ludwigii (p. 391).

In 1779 Pallas described the 'blesmol' (i.e. Georychus capensis) from the Cape of Good Hope as Mus capensis (for date of publication see Sherborn, 1891a, 236). As was indicated earlier on in this work, the dune mole-rat Bathyergus was described sub-

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sequently in 1782 by Schreber as Mus suillus. In 1811, Illiger proposed the erection of the genus Georychus for Mus capensis and Bathyergus for Mus suillus for it was evident that these bathyergids differed radically from mice. It is therefore understandable that many subsequent descriptions of mole-rats used the generic ranks of Georychus and Bathyergus irrespective of the fact whether the different authors were describing Bathyergus, Georychus or Cryptomys as we understand the definition of the different genera today. This explains the fact that the early descriptions of C.hottentotus referred to this animal as Bathyergus hottentotus, B. caecutiens and B. ludwigii.

In later years, specimens of Cryptomys were referred to the genus Georychus, and this procedure was followed until the early years of the 20th century. This seems strange, for already in 1864 Gray proposed the name Cryptomys as a subgenus of Georychus, genotype Georychus holosericeus Wagner. It was only during the present century that the subgenus Cryptomys was gradually interpreted as a valid genus. Therefore, many of the species described for Cryptomys were first referred to as Georychus.

As here understood, Cryptomys hottentotus is a geographically variable monotypic species. It ranges from Namaqualand and the south-western Cape eastwards to the Eastern Province, northwards over large stretches of the eastern Karoo and into the southern Orange Free State. Furthermore, it also occurs in the north-eastern Transvaal low country extending westwards in the lower lying country along the Limpopo river, to the vicinity of Pilansberg in

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the central western Transvaal. It thus exhibits an extensive distribution pattern in the Republic of South Africa.

Cryptomys hottentotus (Lesson)

Bathyergus hottentotus Lesson, Voyage autour du monde sur la Coquille, Zool. 1: 166, 1826. Type locality: Vicinity of Paarl, Cape Province.

B. caecutiens Brants, Het Geslacht der Muizen, p. 37, 1827. Type locality: Cape of Good Hope. (Knysna, vide Roberts, 1951, 397).

B. ludwigii A. Smith, Zool. J. 4: 439, 1829. Type locality: Cape Town, vide Roberts, 1951, 391). (Sic ludovigii Sclater, 1899, 229).

Georychus exenticus Trouessart, Cat. Mamm. Viv. Foss. 1899. Error for caecutiens.

G. jorisseni Jameson, Ann. Mag. nat. Hist. 4: 466, 1909. Type locality: Waynek, Waterberg District, Transvaal.

G. albus Roberts, Ann. Transv. Mus., 4: 100, 1913. Type locality: Unknown.

G. vandami Roberts, Ann. Transv. Mus., 5: 273, 1917. Type locality: Griffin Mine, Leydsdorp District, Transvaal.

Cryptomys cradockensis Roberts, Ann. Transv. Mus., 10: 73, 1924. Type locality: Cradock, Cape Province.

C. transvaalensis Roberts, Ann. Transv. Mus., 10: 73, 1924. Type locality: Boekenhoutfontein, on border of bushveld, Pretoria district, Transvaal.

C.hottentottus/...

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C. hottentottus (sic) talpoides Thomas & Schwann, Proc. zool. Soc. Lond., p. 166, 1906. Type locality: Knysna, Cape Province.

Type specimen: ?

Type locality: Vicinity of Paarl, Cape Province.

Distribution: (Fig. 11.1)

Occurs in the south-western Cape (as far north as Ezelfontein, near Leliefontein, Namaqualand) and ranges eastwards along the coast to the vicinity of Port Alfred. From the Eastern Province it extends over the eastern half of the Karoo to the area south of Bloemfontein. In the Transvaal, it occurs in the drier western and north-western parts along the Marico and Limpopo rivers extending eastwards to the north-eastern Transvaal lowveld (e.g. Leydsdorp).

Diagnostic characters:

A small to medium sized species, H.B. M = 120 mm., C.B. M = 32.0 mm. (♂♂). Overall colour more or less 'cinnamon-buff' to 'clay colour' dorsally, with a slightly lighter hue on the ventral aspect. White occipital patch usually absent. Mammae: 2 pairs pectoral, 1 inguinal pair = 6.

Colour:

The overall colouration exhibited by this species is uniform whether the colour is 'cinnamon-buff', or 'clay colour' or even varying from 'reddish grey' to 'bluish grey' as the colour has been described for some specimens. The colouration tends to be lighter on the ventral surface than the dorsal surface. The individual hairs have dark-slaty grey bases while the tips show a fawn colouration.

The feet portray a pinkish colour in fresh specimens, darkening to light brown in museum specimens,

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while the tail shows the same dorsal and ventral colouration as the rest of the body.

The colour of the juvenile pelage is decidedly darker than that found in adult specimens.

In the available study specimens, there is no indication of any difference between summer and winter pelages, as far as colour is concerned.

The colouration in specimens representing C. hottentotus which I have seen, shows it to be geographically variable. Those from the south-western Cape tend to possess a richer buff colour, while those from Knysna and surrounding areas are decidedly darker, nearly matching Ridgeway's slate colour, or even darker. Specimens from Port Alfred again compare favourably with those from the western Cape. At the other end of the scale one finds the pale grey colour of specimens from the north-eastern and north-western Transvaal. This variation in colour may be correlated with climatic conditions, especially as far as the moisture content of the soil is concerned.

White patches on the heads are usually absent in this species, and although they do occur infrequently, these are exceptions to the rule.

Size: Adult ♂♂:

H.B. 105-150 mm., M = 120 mm.

T. 17-27 mm., M = 22 mm., (18.2% of H.B.)

H.F. 18-25 mm., M = 21 mm., (17.4% of H.B.)

C.B. 29.0-38.6 mm., M = 31.9 mm.

B.C. 13.0-15.7 mm., M = 13.9 mm., (43.4% of C.B.)

I.W. 6.2-7.7 mm., M = 6.7 mm., (20.9% of C.B.)

Z.W. 19.1-28.0 mm., M = 22.8 mm., (71.2% of C.B.)

M.W. 4.8-7.6 mm., M = 6.3 mm., (19.6% of C.B.)

U.T.R. 4.5-6.1 mm., M = 5.1 mm., (15.9% of C.B.)

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L.J. 17.2-25.3 mm., M = 20.6 mm., (64.3% of C.B.)

L.T.R. 4.2-6.1 mm., M = 5.2 mm., (16.2% of C.B.)

Adult ♂♀:

H.B. 100-160 mm., M = 119 mm.

T. 17-26 mm., M = 21 mm., (17.6% of H.B.)

H.F. 17-25 mm., M = 20.8 mm., (17.4% of H.B.)

C.B. 27.2-36.4 mm., M = 31.2 mm.

B.C. 12.3-15.3 mm., M = 13.8 mm., (44.2% of C.B.)

I.W. 6.0-7.5 mm., M = 6.6 mm., (21.1% of C.B.)

Z.W. 18.4-25.3 mm., M = 22.0 mm., (70.5% of C.B.)

M.W. 4.9-6.9 mm., M = 5.9 mm., (18.9% of C.B.)

U.T.R. 4.6-5.9 mm., M = 5.1 mm., (16.3% of C.B.)

L.J. 16.9-24.1 mm., M = 20.2 mm., (64.7% of C.B.)

L.T.R. 4.3-6.0 mm., M = 5.1 mm., (16.3% of C.B.)

As can be seen from the tables above, the ♂♂ are slightly larger than the ♀♀, but these differences are statistically insignificant. Consequently, there seems to be no evident sexual dimorphism.

Some geographic variation in size occurs in C. hottentotus. Specimens tend to be smaller in the south-western Cape region while those occurring in the Eastern Province and north-eastern Transvaal tend to be larger.

Skull and dentition

The skull can be described as medium sized, and in mature ♂♂ the sagittal and lambdoid crests are but faintly developed. Braincase reasonably broad, interorbital constriction narrow. Nasals and muzzle region of skull slender. Infraorbital foramen more or less elliptical, variable in shape, without a thickened outer wall. Incisors strong, with molars well developed, decreasing in size from front to back.

Discussion/...

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Discussion:

According to Ellerman et.al.(1953, 230) the Cryptomys hottentotus group has been much oversplit by Roberts in Southern Africa. It is stated by these authors, that the possibility exists that there may be only one very variable species in the Republic of South Africa. In order to appreciate these remarks it is necessary to review briefly the scheme followed by Ellerman et.al.

Ellerman et.al. define C. hottentotus as a smaller species (on the average), if compared with C. mechowi (an extra-limital species as far as the present work is concerned). In the latter (i.e. the "bigger" species) the H.B. dimensions attain 175 mm. and more, with skull-and-incisor length in adults varying between 45-66 mm. The "smaller" species has a H.B. length of less than 175 mm., while the greatest length of skull-and-incisors rarely reaches 45 mm.

This smaller species is again subdivided on the basis of size: in one group, the greatest length of the ♂ skull (including the incisors) rarely reaches 40 mm., (with certain exceptions), while ♀ skulls rarely reach 38 mm. for this measurement. A second group, is on the average a larger species (though not exceeding 175 mm. in H.B. length) while the greatest length of the ♂ skull is usually above 40 mm., and ♀♀ are rarely below 38 mm. This latter larger form, Ellerman et.al. treat as Cryptomys holosericeus while the former smaller form is referred to as C. hottentotus. It is this latter species which has been ".... much oversplit by Roberts in South Africa" (Ellerman et.al. 1953, 230), and I am inclined to agree with this statement.

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Consequently, Ellerman et.al. have tentatively defined holosericeus as above, and referred other named forms (all of which in the British Museum material have skull lengths less than 40 mm.) to the earliest named hottentotus as races. This includes specimens referred to as C. damarensis, C. darlingi, C. nimrodi, etc. They (i.e. Ellerman et.al.) state that they take no responsibility for the validity of races of Roberts which they have not placed in synonymy. Where Roberts had several forms occurring close together they have assumed that he was dealing with one individually variable form, and they have consequently placed certain names in synonymy.

This implies, that whereas Roberts may have oversplit the group, Ellerman et.al. may have overlumped. I can see no reason for a well marked species (e.g. C. damarensis, C. darlingi, etc.) to be demoted to subspecific rank (i.e. C. hottentotus damarensis, C.h.darlingi, etc.) and have retained C.damarensis and C. darlingi as clearly recognisable species in the present work. In such cases, I have thus followed Roberts, always bearing in mind that the lumping proposed by Ellerman et.al. was just and called for in some instances.

As was indicated in the list of synonyms of C. hottentotus in the present work, C. hottentotus and C. caecutiens are regarded as conspecific. Roberts (1951, 397) has retained caecutiens as a separate species while Ellerman et.al. (1953, 231) have interpreted caecutiens as a subspecies of hottentotus. As far back as 1895, Thomas remarked on the fact that he could not distinguish between 'Georychus caecutiens' and 'Georychus hottentotus'. I am inclined to agree

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with this statement, implying that there are no grounds for specific or subspecific separation. It has been mentioned above that size seems to be geographically variable in C. hottentotus and that specimens from the vicinity of Knysna are somewhat larger than those from other localities. Comparing material (♂♂) from the south-western Cape with that of Knysna, it was found that the average C.B. length for the former was 31.9 mm. and 33.7 mm. for the latter group. At a glance this difference in size may seem to be statistically significant. However, a C.D. value of 0.537 is attained which corresponds to a J.N.O. of less than 75%, i.e. below the level of subspecific distinctness. (A value of 1.28 corresponds to a 90% J.N.O. which is the accepted value for subspecific separation). Separation of C.caecutiens from Knysna from C. hottentotus (either as a species or subspecies), based on the C.B. length, does therefore not seem to be justified (See fig. 11.2).

Comparison of C.D. values of specimens from Port Elizabeth and Grahamstown with the C.D. value of Knysna specimens also gave numerical results which fall far below the level of subspecific distinctness.

The possibility exists that the overall darker grey colouration of the Knysna specimens could indicate grounds for subspecific separation. However, it is felt that this aspect is only an adaptation of these animals to the moister ecological conditions which prevail at Knysna and vicinity. It is a well known fact that animals occurring in the moister eastern districts of Southern Africa are darker than

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those occurring in drier western areas where animals usually show a pallid colouration.

Brants (1827, 38) described the Knysna forms as ".... eenvormig donkergraauw, de onderzijde iets lichter, alleen de borstelrige haaren der staart en de voeten morsig wit". The type specimen was described as 4 inches, 4 lines (i.e. 110 mm.) for the H.B. length, T. length 4 lines (= 8.4 mm.), with the H.F. 6¾ lines (=14.2 mm.). These figures are misquoted in Roberts (1951, 397): the head-body length is given as 4 ft. 4 inches (instead of 4 inches, 4 lines), tail as 4 inches (cf. 4 lines) and the hindfoot as 6¾ inches instead of 6¾ lines. As is evident from the figures given in the present work, the specimen(s) on which Brants based his description falls well within the range of observed variation of C. hottentotus, the exceptions being the tail and hind-foot which fall outside the minimum range.

Further comparison of values given for caecutiens by Roberts (1951, 603), based on three young adult to old ♂ specimens (i.e. Z.W., M = 21.2 mm., B.C., M = 13.4 mm., I.W., M = 6.7 mm., M.W., M = 6.0 mm., U.T.R., M = 5.5 mm., and L.T.R., M = 5.4 mm.), all fall within the range of variation given in the present work, implying no justification for taxonomic separation between C.hottentotus and C.caecutiens.

Some confusion exists about the person who named the species from Knysna. It is accepted, however, that Brants (1827, 37) gave the first official description of the animal and was thus known as Georychus caecutiens Brants. On the other hand, Brants (loc.cit.) credits the name to Lichtenstein and other 19th century papers relating to this species

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(e.g. Gray, 1864, 125) refer to it as Georychus caecutiens Lichtenstein.

Trouessart (1899, 588) apparently considered the description of coecutiens (sic) to have been published prior to that of hottentotus by Lesson and he thus listed hottentotus as a synonym of 'coecutiens'. This mistake was noted however, and rectified in the appendix (p. 1338) and he then referred to this species as exenticus.

The inclusion of the species Cryptomys vandami under C. hottentotus in the present work, requires some explanation. This species was based on a series of six skins and five skulls collected by van Dam and Bryer at Griffin Mine in the Leydsdorp district and was described by Roberts (1917, 273). The specimens were described as grey, "... paler than any other South African species...", with the nasals somewhat widened at the tip and the alisphenoid canal having the posterior opening exposed.

The reasons for synonymizing vandami with hottentotus are to be found in aspects relating to the mammae, colour, size and skull, and will briefly be discussed below.

As far as the mammae are concerned, the vandami specimens show the same arrangement as hottentotus, i.e. two pairs pectoral and one pair inguinal. This probably prompted Roberts (1951, 393) to state that this species (occurring in the north-eastern Transvaal low country, extending westwards to the Magalakwin river in north-western Transvaal) is a "... member of the C. hottentotus group,...." thus distinguishing it from C.komatiensis and C. natalensis which both occur to the south of the present/...

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present known distribution of vandami. In both komatiensis and natalensis the inguinal mammae are absent. Although six mammae are also found in C. holosericeus, the vandami specimens differ considerably from holosericeus in overall size and colour.

As indicated above, the type and associated series of specimens of vandami was described as a pale grey. This is decidedly so, when a number of specimens are seen simultaneously. On the other hand, if specimens are compared individually and placed among hottentotus material, it is barely possible to identify the specimen under consideration. This light grey hue may again be an adaptation of the animal to the drier conditions existing in the north-eastern and north-western Transvaal which usually results in a decrease of colour intensity. Similarly, one finds an increase in colour intensity in wetter and more humid areas (e.g. the darker forms of C. hottentotus found at Knysna). It can furthermore be demonstrated that the identical colouration found in vandami is also present in specimens representing hottentotus. Similarly, the usual absence of the white patch on the head of hottentotus is also reflected in the absence of this character in vandami. These factors all point to the probability of vandami being conspecific to hottentotus.

Although Roberts (1951, 393) has stated that vandami is larger in size, this aspect is not demonstrated statistically convincingly in the material available for study to the present author. Table 11.1 will serve to illustrate this point.

Table/...

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Table 11.1. Overall resemblance in size of various skull measurements in C. hottentotus and C. vandami.

	C.B.	B.C.	I.W.	Z.W.	M.W.	U.T.R.	L.J.	L.T.R.
C.hottentotus:								
various localities, M =	32.0 mm.	13.9 mm.	6.7 mm.	22.8 mm.	6.3 mm.	5.1 mm.	20.6 mm.	5.2 mm.
C.vandami:								
Njelele river, M =	31.9 mm.	14.1 mm.	6.7 mm.	22.5 mm.	6.1 mm.	5.1 mm.	21.6 mm.	5.3 mm.
Zwarthoek, M =	32.5 mm.	14.1 mm.	7.0 mm.	23.5 mm.	6.2 mm.	5.4 mm.	22.6 mm.	5.3 mm.
Montrose, M =	32.4 mm.	13.6 mm.	7.2 mm.	23.5 mm.	6.6 mm.	5.4 mm.	22.3 mm.	5.3 mm.

Furthermore, Roberts (1917, 273) has indicated that the lengths of the H.B., T. and H.F. of the type specimen of vandami (an old ♂) is equal to 133 mm., 17 mm. and 23 mm. respectively. It is evident, that these values fall within the range of variation found in C. hottentotus. (Compare values given for C. hottentotus under diagnostic characters above).

Finally, aspects of the cranial morphology of vandami may briefly be considered. Roberts (1917, 273) has stated that the posterior opening of the alisphenoid canal is exposed, as is the case in specimens which have been collected at Knysna and vicinity (i.e. hottentotus). Roberts points out that in this respect the skull of vandami is markedly different from C. natalensis and C. aberrans in which the posterior opening is hidden. On the other hand, he immediately continues to say that this character is variable in some other species as well and cannot therefore be relied upon. This implies that this

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character is not of diagnostic value for vandami and can be ignored. This strengthens the argument that vandami should be interpreted as a synonym of C.hottentotus.

In the same paper, describing C. vandami as a new species, Roberts (1917, 278) also commented on specimens collected by van Dam at Manetsi river, near Malala, Zoutpansberg district. The material consisted of two young adult ♂♂, as well as a young adult ♀ and a juvenile ♀. They were described as a more uniform grey than vandami, and according to Roberts, decidedly larger. However, they seemed to show nasal and other cranial characters of natalensis differing therefrom in being greyer and smaller, although not so small as komatiensis. This form Roberts named Georychus natalensis pallidus subsp. nov., characterized as above.

Allen (1939, 429) proposed a new name for this subspecies i.e. Cryptomys natalensis nemo in view of the fact that pallidus was preoccupied. (This does not refer to Georychus pallidus Gray, 1864, which in actual fact is a Heliophobius).

Eventually, Roberts (1951, 393) synonymized this subspecies with Cryptomys vandami. This fact again supports my contention that very little diagnostic features can be found in Cryptomys skulls due to the great amount of morphological variation encountered in the skulls. Although Roberts first placed the Malala specimens under Cryptomys natalensis, based on cranial characteristics, he evidently concluded at a later date (1951) that cranial differences between vandami and natalensis

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were not so clear cut. If, furtheremore, they were accepted as members of the natalensis species, they would not fit geographically speaking in the known range of distribution of natalensis.

It must further be noted that Ellerman et.al. (1953, 233) placed vandami as a possible synonym under Cryptomys hottentotus komatiensis, as well as C. natalensis pallidus and C.n.nemo. This procedure does not seem to be correct for the known komatiensis forms do not possess any inguinal mammae (i.e. only two pairs of pectoral mammae are present), whereas vandami and synonyms do possess the inguinal mammae, thereby emphasizing the fact that they should rather be treated as members of the hottentotus species, which also has the inguinal mammae present.

In 1924 a new species was described by Roberts and named Cryptomys cradockensis. It was stated that this was a member of the C.hottentotus group but differing from hottentotus in being greyer in colour and larger in size. According to Roberts (1924, 73) the buffy colouring of the hair is present as in the typical C.hottentotus, but paler ".... and not so heavily laid on". The shape of the nasals and the skull was described as being generally the same as in hottentotus but on a larger scale.

The type specimen (an adult female, TM 2389) was trapped by van Dam at Cradock in the Karoo, on October 5th 1918. Roberts stated that this form also seems to occur at Grahamstown and he named it as a species as it is possible that it occurs in the same ground as the typical C.hottentotus and ".... it cer-

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tainly intervenes between the ranges of hottentotus and rufulus which are not so readily recognised, and the differences between the species are not always defined clearly enough to enable one to judge of their exact status" (Roberts, 1924, 73). Furthermore, Roberts stated that cradockensis is perhaps the starting point of a divergence from C. hottentotus towards C.vandami of the north-eastern Transvaal, which again overlaps the range of C.rufulus (see later), the latter representing C.hottentotus on the foothills of the Drakensberg.

Figures enabling a comparison between specimens of C.hottentotus and C.cradockensis are given by Roberts (1924, 74). On closer inspection, one can see no reason why the cradockensis specimens are to be separated from hottentotus. Unfortunately, the material from Cradock is sparsely represented in the available study material and therefore a statistical comparison has not been possible. I am convinced of the fact, that if more specimens were available, the range of variation to be expected in cradockensis would become more clearly defined which would diminish the descrepancy in size between hottentotus and cradockensis which Roberts saw in the specimens from Cradock.

Returning for a moment to the figures supplied by Roberts (1924, 74) the following comparisons may be quoted and are presented in Table 11.2.

Table/...

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Table 11.2. Measurements given by Roberts (1924, 74) to illustrate differences in size between C. hottentotus and C. cradockensis.

	5 specimens, C.hottentotus	2 specimens, C.cradockensis
H.B.	115-125 mm.	115-124 mm.
Z.W.	22.5-23.5 mm.	23.0-24.3 mm.
I.W.	6.4-7.0 mm.	6.5-7.2 mm.
U.T.R.	5.0-6.0 mm.	5.3-5.8 mm.
L.T.R.	4.3-5.3 mm.	5.2-5.5 mm.

These are but a few examples of measurements given by Roberts, illustrating the fact that there is very little difference between hottentotus and cradockensis. Further comparison of figures pertaining to C.hottentotus given in the present work show that the cradockensis specimens fall well within the observed minimum-maximum ranges.

Furthermore, it is not clear why a new species (i.e. cradockensis) should be present in an area surrounded by hottentotus, especially if climatological and vegetational conditions surrounding Cradock (and prevailing at Cradock) is the habitat in which C. hottentotus is encountered.

In 1951 Roberts (1951, 391) demoted this species as a subspecies of hottentotus, for apart from the fact that they are slightly greyer and larger compared to the typical hottentotus, they do not otherwise offer any marked differences. In Roberts' work, the distribution of the species was given as the eastern districts of the Cape Province, about Cradock to Grahamstown ".... and also occurring at Plettenberg Bay and Knysna, and perhaps in the intervening districts." If subspecific rank for cradockensis, hottentotus and

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caecutiens is accepted, it would imply that C.h.cradockensis and C.h.caecutiens occur sympatrically at Knysna, presenting a most confusing picture and a taxonomical absurdity.

Finally, Ellerman et.al. (1953, 231) have tentatively placed C.cradockensis as a synonym under C.h.caecutiens. By accepting that C.hottentotus, C.caecutiens and C.cradockensis are conspecific (as has been done in the present work), a more acceptable picture of the distribution of C.hottentotus in the Cape Province emerges.

Similarly, Cryptomys transvaalensis has been described by Roberts (1924, 73) as a new species. According to Roberts, it is hardly different in size from C.hottentotus but it can be distinguished from hottentotus by the shape of the nasals, the broader interorbital constriction and the greater length of the skull from the front of the molars to the condyles. Furthermore, Roberts has stated that in colour it is hardly separable from hottentotus, but the hair is shorter (not longer than six mm., as against seven mm., or more in hottentotus), while the hair on the ventral surface is very scanty, not serving to hide the skin.

Roberts (1924, 74) furthermore remarked, that all specimens trapped by him showed a peculiar expansion between the orbits of the skull, which ultimately, in the oldest ♂, forms a shell-like hood, projecting outwards.

In addition to the overall hottentotus-like affinities, Roberts furthermore pointed out that transvaalensis seems to be allied to C.vandami taking the latter's place in the western Transvaal bushveld districts. The possible differences between vandami

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and transvaalensis also refers to size and cranial morphology. The latter species is smaller, but with the interorbital constriction broader while the nasals are broad for the posterior two-thirds, the anterior third narrower, not posteriorly pointed, usually squared off to some extent with the apex of the nasals not markedly expanding.

On closer examination of these facts, it appears that these differences are not of vital importance. The type skull (an adult female, TM. 2463, trapped in gravelly soil on the farm Boekenhoutsfontein, on the border of the bushveld, Pretoria district, on December 19th, 1919) was compared with a skull of C.hottentotus from Lormarin, Paarl, and the exact replica of the nasal shape described for transvaalensis could be seen on skull No. TM 2205 from the south-western Cape. As far as the width of the interorbital constriction is concerned, I found that it is broader in juvenile Cryptomys specimens while it decreases in width as the animal grows older. It was found furthermore, that the skull of transvaalensis is in fact shorter than skulls from Paarl (i.e. hottentotus) in a similar age group.

It thus appears, that craniologically speaking there seem to be no real valid reasons for separation of transvaalensis from hottentotus. Furthermore, both these species possess inguinal mammae which again points to a similar genotype. It has already been stressed in the present work that vandami and hottentotus should be treated as synonyms and the mere fact that Roberts (1924, 73)

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has hinted that transvaalensis appears to be allied to vandami also points to the possible equivalence of transvaalensis with hottentotus.

Roberts (1924, 74) has pointed out that within the genus Cryptomys there seems to be a considerable amount of variation perceptable in series from various localities and that he was not at all sure that all specimens he placed tentatively with species would necessarily be correctly identified.

The distribution of transvaalensis, apart from the type locality, includes Jericho and other places to the west (e.g. Pilansberg and Buffelsdraai (near the junction of the Marico and Crocodile rivers)) whence it ranges in the north-western Transvaal bushveld regions, (along the Limpopo river), eventually being replaced by 'vandami' near the Magalakwin river.

Roberts (1951, 391) consequently demoted the transvaalensis specimens from specific to subspecific rank, which then already seemed to be a truer representation of the facts. In the present work however, I feel that even a subspecific rank is not justified for these animals and that C.transvaalensis should also consequently be treated as a synonym of C.hottentotus, as was the case in C. vandami.

It may also be pointed out, that Ellerman et.al. (1953, 233) have placed C. transvaalensis tentatively as a synonym of Cryptomys hottentotus jorriseni (see below).

As was indicated above, the distribution of C. transvaalensis (here treated as C.hottentotus), includes its type locality, i.e. Boekenhoutsfontein as well as Jericho, Pilansberg and Buffelsdraai, i.e.

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more or less in the drier central western Transvaal. In 1909, H. Lyster Jameson described another new species of Cryptomys, from Waynek, in the Waterberg district of the Transvaal, to the west of Warmbad. This species was named Georychus jorisseni (1909, 466) and was described as being much smaller than C. hottentotus, with a rather warmer colouring. Compared to C. hottentotus, the skull was smaller and lighter, the zygomatic arches being depressed, giving the orbits a narrower outline when seen from above.

Unfortunately, I have not been able to study the type specimen personally (housed in the British Museum, ♀ , No. 402, B.M. No. 9.7.2.23). In the Transvaal Museum however, there is a very small sample of study skins collected at Waynek which was available for closer inspection.

In the paper describing the type specimen and associated series of skins, the geographical distribution is given as probably extending right across the bushveld in the northern Transvaal, as ".... a form which I can not, from available material, distinguish from it occurs in the Zoutpansberg, alongside of C. hottentotus....." (Jameson, 1909, 466). Roberts (1951, 397) describes the possible distribution of jorisseni as the western bushveld areas of the Transvaal in the Waterberg and Rustenburg areas, while Ellerman et.al. (1953, 233) state that the range includes the Rustenburg district, western Transvaal.

On comparing the available study skins from the type locality, with C. hottentotus specimens from the western Cape, it becomes evident that the overall resemblance is striking. When the skulls of

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jorisseni are compared to those of hottentotus, the differences described for the type specimen skull of jorisseni can not be demonstrated to be present in the skulls available in the Transvaal Museum.

In the original description of the type specimen, no indication is given concerning the number of mammae present in jorisseni. Roberts (1951, 397) has retained jorisseni as a valid species, and states that the inguinal mammae are lacking, and that jorisseni overlaps the distribution of transvaalensis, which has the inguinal mammae.

In contrast to Roberts, Ellerman et.al. (1953, 233) have interpreted jorisseni as a subspecies of C.hottentotus, and have tentatively placed transvaalensis as a synonym of C.h.jorisseni.

The fact that Roberts states that the inguinal mammae are absent, should to my mind, be accepted with some reservation. The study sample available in South Africa, is very small indeed and it is possible, that if a larger series becomes available, it may show that the females have in fact six mammae instead of four.

In the present work, the species jorisseni is thus tentatively interpreted as a synonym of C. hottentotus. This interpretation is partially based on the fact that the phenotypic resemblance to hottentotus and transvaalensis is pronounced and that I fail to see valid differences in the cranial morphology of jorisseni compared to hottentotus or transvaalensis. Furthermore, the species transvaalensis (i.e. C.hottentotus as here understood) occurs in close geographical proximity to the range of

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jorisseni - in fact Roberts has stated that these two species overlap. If thus interpreted, the specimens from Waynek fall naturally in the geographical distribution pattern of C. hottentotus in the Transvaal.

It may be pointed out that Roberts spells the species as jorriseni, compared to the original spelling of jorisseni, also followed by Ellerman et.al.

Finally, the subspecies Cryptomys hottentottus (sic) talpoides has been described by Thomas and Schwann (1906, 166), from Knysna. They state that the material in the British Museum portrays similarities in essential characters to the true hottentottus (sic) but that the overall colour is much darker. The general colour of the upper surface has been described as a dark slaty grey (including the sides), while the hairs themselves are slaty grey, tipped with brown, nearly matching Ridgeway's 'slate colour'. The crown and a large area on the centre of the back are even darker still, the tips of the hairs being quite black. This dark area extends to the root of the tail. The belly has a dull slaty colour, the tips of the hairs being dull buffy. Furthermore, they state that this subspecies may be the Knysna representative of C.hottentotus, being darker than its allies elsewhere, as is usually the case with animals from forest regions.

Roberts (1951, 397) referred to this subspecies as a synonym of Cryptomys caecutiens while Ellerman et.al. (1953, 231) have done the same under C.h.caecutiens. The latter authors state that at Knysna, C.h.caecutiens would appear to occur in two colour phases. In view of the fact that C.caecutiens is not accepted as a separate species or subspecies

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from C. hottentotus, it leads to the conclusion that it is also a synonym of C. hottentotus. If these facts were not interpreted as such, it is evident that a third subspecies (i.e. C.h. talpoides) would occur sympatrically at Knysna together with C.h.caecutiens and C.h. cradockensis - a totally untenable position.

Before leaving the discussion of taxonomic aspects of Cryptomys hottentotus, a few words must still be said on the species Cryptomys albus. This species was described by Roberts (1913, 100), as being pure white throughout with the skull smaller than in C.hottentotus (Roberts, 1951, 398). This species was described on the strength of two specimens without labels and another in spirits bearing a torn label with the words "--nberg, K.K., Jan., 1899". Roberts (1913, 100) states that it seems likely therefore that the three specimens all came from the same place, most likely Wynberg in the Cape Province. On the other hand, Roberts (1951, 398) later pointed out that the type locality for this species was not known, but that the material has been collected "... perhaps from Knysna, whence specimens are made up in the same way as the type and another specimen".

Apart from the pure white specimens, buffy-yellowish specimens are known from Tulbagh. According to Roberts (1951, 398) Thomas has stated this species to be an albino. The present author is inclined to agree fully with Thomas' verdict, that this socalled species is an example of albinism occurring in C.hottentotus, and that the buffy-yellowish species are examples of partial albinism, or a decrease in the intensity of the grey and dark pigments usually found in the pelage of C.hottentotus. Roberts has

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indicated that the distribution of albus is probably restricted to the southern Cape Province only, which is quite in the middle of the normal distribution range of C. hottentotus. To my mind, there is no doubt that C.albus should ever have been described as a species and it is therefore placed in synonomy with C. hottentotus. Ellerman et.al. (1953, 234) have placed C.albus incertae sedis under their C.hottentotus group. They also refer to the spirit specimen as an albino.

On comparison of the available measurements, it is evident that skull measurements fall well within the observed range of variation in C. hottentotus.

Biological

Aspects of the biology of the hottentot mole-rat has been discussed in Chapter 6 of the present work. However, a number of factors remain to be discussed briefly.

From the foregoing discussion, it may have become evident that this species has a wide geographical distribution in South Africa, and it therefore occurs in diverse ecological habitats. It is adapted to the drier and more arid north-western Cape Province and north-western Transvaal and also to conditions of high rainfall and humidity in the vicinity of Knysna. No correlation of its geographical distribution with rainfall is evident.

Similarly, they occur in Karoo and Karroid veldtypes, coastal rhenosterbosveld and macchia, coastal forest and thornveld, false Karoo veldtypes, Mopaniveld, tropical bush and savannah veldtypes, as well as in Knysna forest conditions. As is the case

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with rainfall, no correlation is evident between the geographical distribution of this species and the vegetation. Unfortunately, the distribution of bulbous plants (on which these animals mainly subsist) is known rather poorly and I am inclined to think that such information (when available) would possibly show a certain degree of correlation.

As far as topography is concerned, it is evident that they occur predominantly in sandy soils, which are devoid to a large extent of stones and rocks. On closer inspection of a topographical map, it becomes evident that they often disperse in sandy soils, usually found near rivers or streams. As an example, specimens from the south-western Cape may be quoted. Specimens have been taken at Paarl and vicinity (e.g. the Cape Flats and Stellenbosch) which are all below 1,000' above sea level. In contrast, specimens have been collected at De Doorns and Matjiesfontein (approximately 2,000' above sea level) and where it seems that they have spread via the Hex river and Groot river respectively.

According to Roberts (1951, 391) they also excavate chambers in which bulbs are stored (as is possible in the case of C.damarensis) from which tunnels are made to certain places where bulbs are to be found. Roberts has stated that this chamber is usually on slightly higher ground than the feeding areas, but that on flat plains of the upper Karoo, where the ground in certain instances becomes completely submerged by floods, large mounds are "..... thrown up in which the storage chambers are made above the flood-level".

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As is the case in other species of this genus, C.hottentotus feeds mainly on bulbs, tubers, fleshy rootstocks and, according to Shortridge (1934, 325), especially bulbous grassroots. They show preference for certain kinds of bulbs: in the vicinity of King William's Town, a small species of blue iris (Moraea sp.) occurs, which is poisonous to cattle, but seems to be preferred above almost anything else by C. hottentotus. Consequently, it is often difficult to propagate this iris and other indigenous bulbaceous plants in gardens. Shortridge states further that other garden plants are occasionally attacked including onions, agapanthus and dahlias. Roberts states (in Shortridge, 1934, 325) that potatoes and other tuberous crops are often ruined where these animals are plentiful.

Virtually nothing is known about the activity pattern of C. hottentotus. Normally, they do not occur above the ground, but they do come onto the surface at night as is evidenced by the fact that they occur in pellets of the barn own Tyto alba. They seem to burrow more vigorously after rainfall when many fresh mounds are thrown up during the night. Fitzsimons (1919-20, 157) has stated that they are active burrowers on moonlight nights but it is clear that activity of movement can be observed at all hours.

Apart from the barn owl Tyto alba referred to above, other known predators on C. hottentotus include snakes and herons. I have found the remains of a mole-rat in the stomach of the shield snake Aspidelaps scutatus collected in the vicinity of Shingwedzi in the Kruger National Park. The snake was

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caught in the mole-trap which points to the fact that it frequented the tunnels of Cryptomys in search of its prey. The mole snake Pseudaspis cana lives for the most part in abandoned animal holes or burrows and as its name implies lives almost exclusively on moles, rats, gerbilles and other small ground-living mammals. Their favourite item of diet are moles and mole-rats, in search of which they push their forepart of the body down through a mole-hill into the runway below and patiently wait in this position for their prey (Fitzsimons 1962, 165). Shortridge (1934, 323) has also commented on the fact that snakes are presumably among their chief enemies.

As far as the avian predators are concerned, there are well documented records of C. hottentotus being preyed upon by the barn owl (Davis, 1959, 147). It is also of interest to note that skulls of this species have been found in pellets of the grey heron (Sneyd Taylor, 1948, 209).

Mammals preying on C. hottentotus include the black-backed jackal Canis mesomelas and the silver jackal, Vulpes chama, for remains of C.hottentotus have been found during analysis of the stomach contents of these two canids (Bothma, personal communication).

Very little data is available concerning the breeding biology of the hottentot mole-rat. A ♀ specimen was taken at Stellenbosch in December containing five large embryos, while a specimen from Jericho in the western Transvaal was said to be gravid on March 21st. In ♂♂, the testes are usually abdominal.

Parasite./...

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Parasite records include the following (de Graaff, 1964, 123):

Plathyhelminthes: Inermicapsifer madagascariensis.

Arthropoda: Haemolaelaps capensis, H.natalensis, Haemolaelaps sp. Myonyssoides capensis, Ixodes alluaudi, Cryptopsylla ingrami, Xenopsylla pirei and Procaviopsylla creusae.

Phylogenetic:

The closest relative of C.hottentotus appears to be C. holosericeus, which it resembles in colour and the possession of inguinal mammae. Furthermore, both species do not normally possess white frontal patches. In view of its pronounced smaller size, it could well be that C. hottentotus is the more primitive of the two species. It occurs in a greater variety of habitats which may point to a greater degree of genotypic plasticity when compared to the larger and more geographically localized holosericeus. It would seem that due to the possible greater genetic adaptibility, C. hottentotus succeeded in establishing itself successfully in divergent ecological niches.

List of localities:

Bathurst, 1 (AM), Bellville, 6 (TM), Bredasdorp, 3 (TM), Buffelsdraai, 10 (TM), Burgersdorp, 1 (TM), Centlivres, Uitenhage, 1 (TM), Clanwilliam, 1 (AM), Coega river, 3 (TM), Coldspring, 1 (AM), Cossack Post, Rosmead, 1 (TM), Cradock, 4 (TM), De Aar, 1 (AM), De Brug, 2 (TM), De Doorns, 2 (SA), De Wetsdorp, 1 (AM), Dortrecht, 4 (AM), East London, 17 (EL, SA), Eendekuil, 2 (TM), Ezelfontein, 9 (PE, AM, EL), Fauresmith, 1 (TM), Fort Beaufort,

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2 (AM), Garcia forest, Riversdal, 5 (TM), Garies, 2 (TM), George, 2 (AM), Glennifer, Kei Road, 2 (AM), Gorge, 1 (KP), Graaff Reinet, 1 (AM), Grahamstown, 66 (AM, TM), Grootvadersbosch, 1 (TM), Hlati Road, 1 (KP), Howison's Poort, 1 (AM), Jericho, 3 (TM), Jonkersberg, 1 (TM), Kamiesberg, 3 (AM), Klaver, 8 (TM), King William's Town, 8 (PE, TM), Knysna, 17 (TM, AM, SA), Kompanjiesdrift, Lambert's Bay, 1 (NM), Letaba, 1 (KP), Lindanda, 2 (KP), Lormarin's, Paarl, 8 (TM), Mahewane, 1 (KP), Mahungumule, 1 (KP), Mashakadzi, 1 (KP), Matjiesfontein, 1 (TM), Middledrift, 1 (AM), Mlondozi, 5 (KP), Montrose, 6 (TM), Ngirivane, 1 (KP), Nieuwhoudtville, 1 (NM), Njelele river, 6 (TM), Nwanetzi-west, 1 (KP), Nwamayiwani, 1 (KP), Olifantsriver, van Rhynsdorp, 2 (TM), Queenstown, 1 (AM), Peddie, 1 (AM), Perseverance, 1 (PE), Phillipolis, 4 (TM), Philipstown, 4 (TM), Plettenberg Bay, 5 (TM), Port Alfred, 10 (AM), Port Elizabeth, 44 (PE, TM, AM), Pumbe, 4 (KP), Shibangwanene, 1 (KP), Shingomene, 1 (KP), Richmond, 1 (TM), Riebeeck Kasteel, 1 (SA), Satara, 1 (KP), Satara plots, 1 (KP), Seweweekspoort, 3 (TM), Shingwedzi, 2 (KP), Stellenbosch, 4 (TM), Sterkstroom, 1 (TM), Swellendam, 1 (AM), Tulbagh, 3 (TM), Wolseley, 6 (TM), Worcester, 6 (TM), Zoutpan, 3 (TM), Zoutpansberg, 12 (TM, SA), Zwarthoek, Zoutpansberg, 23 (TM).