Notes on the Giant Golden Mole Chrysospalax trevelyani Günther, 1875 (Mammalia: Insectivora) and its survival chances

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Abstract

Studied biological items of the nearly unknown Giant Golden Mole *Chrysospalax trevelyani* and its survival chances.

Since the hitherto only vaguely suspected range of *Chrysospalax trevelyani* never was tried to be precised, a voyage to its classical habitat, Pirie Forest, Natal, and a survey on available museum specimens should bring more knowledge.

Many mole hills were located, investigated, and dug up, as also some of the tunnels. Their temperature was taken and with 13 °C only was found to be surprisingly low. Neither signs of predation by jackals (*Canis mesomelas*) or caracals (*Felis caracal*), nor any surface traces of *Chrysospalax trevelyani*, as reported vaguely in earlier reports, could be found.

56 museum specimens were studied and the data of 44 more were collected by letters: Their localities of collection were used to draw the first map of the range of *Chrysospalax trevelyani*.

Fur colours were found to be remarkable different form indications in some earlier reports.

Considering the distribution map and the political and, as a result, economical changes in the very last years and in the near future in the bigger part of *Chrysospalax trevelani*'s range, its survival chances seem to be very poor, all the more since the said range is split up in several separated areas already.

Introduction

While I was collecting material for a survey of the literature now available on Insectivore Communication (Poduschka 1977) in order to support the more and more established zoological discipline "Comparative Insectivorology", it soon became abvious that the family Chrysochloridae seems to be the least known of the whole zoological order Insectivora. To be able to contribute to the knowledge of these subterranean mammals, I visited in October 1978 Pirie Forest (Cape Province, Republic of South Africa), where not only the first but also later a fair number of *Chrysospalax trevelyani* had been collected.

The literature on most of the Chrysochloridae is very diffuse and hardly deals with anything more than a few taxonomic and anatomical topics. This applies most of all to our knowledge of the Giant Golden Mole, even though its existence has been known for more than 100 years. Up to now, not even an exact distribution map was ever accomplished. Stuart (1978) indicated only roughly the areas round King William's Town and East London. According to Meester (pers. comm.), *Chrysospalax* was created as a subgenus by Gill in 1883, with *Chrysochloris trevelyani* as type species.

This paper is not intended to deal with taxonomy. I do maintain, however, that the biology, sensory physiology or ethology of any animal is closely linked to its anatomical or morphological facts or pecularities, which provide the technical bases for any behaviour pattern and allow us to understand connections or causes. This is especially true of Insectivores, which in many respects – probably on account of their great phylogenetic age – bear no comparison with most of the higher mammals.

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By way of a start to this uncultivated field of research, a few facts about the biology of *Chrysospalax trevelyani* are presented in this paper. Since literature on this animal is so scarce, however, an approach to the problems connected can only be facilitated by also considering papers on the other members of the family. Therefore, a few of them have to be quoted:

The first group (Doran 1878; Broom 1915, 1916; Leche 1904, 1907; Stephan and Bauchot 1960; Bugge 1972, 1974; Puttick and Jarvis 1977) deals only with the anatomy or morphology of other genera of the Chrysochloridae. The second group (Holm 1968; Meester 1964, 1972; Jarvis 1974; Withers 1978) deals with the biology of other Golden Moles. Meester provided us with the only available description of attempts at keeping Golden Moles in captivity, although he does refer to *Eremitalpa* Roberts and *Amblysomus julianae*, which was newly discovered by him.

Taxonomically, *Chrysospalax trevelyani* has been mentioned and more or less dealt with by Günther (1875), Huet (1885), Broom (1907, 1909), Roberts (1913, 1923–24), Allen (1939), Forcart (1952), Meester (1968) and Simonetta (1968). Anatomical, morphological or biological aspects were treated by Dobson (1882), Broom (1907, 1950), Parsons (1901), Kaudern (1907), Leche (1907), Cooper (1928), Roberts (1951), Ellerman (1956), Meester (1968) and Walker (1975). Unfortunately these papers differ considerably in minuteness of detail and originality. I beg forgiveness for these words of criticism, but I hope they will serve to arouse more interest in this animal and initiate a more dedicated study than has been the case so far. There are three important facts which demand urgent attention in this context:

Firstly, as far as its biology is concerned, we remain virtually without any reliable data. The information we have is either very imprecise, or appears to have been copied only too faithfully from other sources. Secondly, there does not even seem to exist a photograph of a living *Chrysospalax trevelyani*. Only Meester (in lit.) kept these insectivores alive for several months, but the photographs he made unfortunately have been lost. Thirdly, since *Chrysospalax trevelyani* is to be found only within a restricted area in a peculiar habitat type, this species seems to be in grave danger from the immanent political, agricultural and technical development of the area it was found during the last decades. Therefore, extensive research on this animal has to be undertaken before it is too late. Unfortunately there seems to be more talk on Nature Conservation or Species Conservation nowadays than there is action to support it. It is, by this, even more important that a scientific survey be undertaken as a first, logical step towards intervention in the otherwise gloomy fate of one of the most basic recent mammalian species, which – according to our present knowledge – is to be found together with its fellow Insectivores at the very root of our own, the Primates' evolutionary tree.

I would, however, strongly recommend a ban on any survey of such rare and endangered animals that employs the old-fashioned museum-collector's method of killing as many specimens as possible using spring-traps. The use of traps should be confined to those that trap the animal live, like these developed and used by Dippenaar (Meester 1970) or Hickman (1979), which have proved very effective. I maintain that the time of unscrupulous killing of fauna that is already in a dangerously decimated state – even under the protective but hypocritical guise of science – should now be long past for true and responsible scientists. The "live" method must be considered especially for research on those rare or endangered species that live within a restricted area, and which on account of our ignorance of their needs will die only too soon anyway, but which should yield as many items of their utterly unknown behaviour, sensory physiology or the like when still alive, to drive knowledge on. All of this applies to the case of *Chrysospalax trevelyani*.

I very much regret that my own results on these animals, obtained in Pirie Forest, Cape Province, in October 1978, are so imcomplete. Unfortunately I lacked time, funds, proper tools and equipment. Nevertheless, the investigations resulted in a few new thoughts and

findings, which I offer herewith for proof, in the hope of inspiring more research by those South African colleagues, who are in a far happier position than I was, as far as time, monetary aid and equipment are concerned.

Results

Already before entering Pirie Forest itself, close to the shores of Maden Lake, I saw fresh mole hills, not all of which were beneath the shade of trees. They had a diameter of about 40–60 cm and an average height of about 25 cm. A plug of earth, more compact than the other mass of crumbled earth, locked the mouth of the tunnel and was easy to detect (fig. 1).

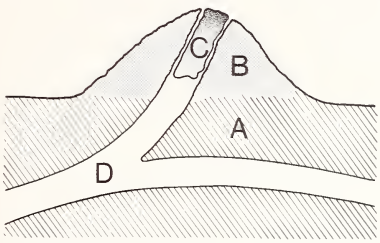

Fig. 1. Section through *Chrysospalax trevelyani* mole hill. A: Soil; B: Mole hill, consisting of crumbled earth; C: Plug, more compact than rest of mole hill; D: Tunnels

There were also groups of these mounds only 2 or 3 m distant from the water's edge, their position showing quite clearly the direction of the tunnels beneath the earth. These groups were always situated amidst small piles of earthworms' excrement. Each little pile was the size of a child's fist and looked like earthen sausages twisted and melted together, having a diameter of about 12–15 mm. Roberts (1951) called these earthworms *Microchaetus*. It was plainly visible that the colour of the earth dug up by *Chrysospalax trevelyani* as well as its chemical composition was completely different from that of the earthworm excrement. This indicates that the earth originates from different strata. The fineness of the composition and the comparatively greater density of the excrement seem to be caused only partially by the digestion process, since the two kinds of earth were of absolutely different quality. In unfortunately never published field notes, taken between 1950 and 1970, C. J. Skead (Du Plessis, in lit.) determined the depth of the burrows of the large *Microchaetus* species as being from 300 mm to about 700 mm. It is not yet known, up to which depth *Chrysospalax trevelyani* is able to drive its tunnels, but considering other Chrysochloridae, it seems that *Microchaetus* is burrowing in a considerable greater depth. Therefore, it seems to be preyed upon by *Chrysospalax trevelyani* especially when coming up near the surface, which would explain the striking coincidence of fresh mole hills and fresh earthworms' excrements.

Equally, the mounds within the forest itself, not only were also to be found very often very close to these clusters of earthworm excrement on the surface, but the earth brought up by *Chrysospalax trevelyani* and piled into mounds was always of a different quality and colour compared with the uppermost layer (about 20–40 cm) of forest soil or surface mould.

Jarvis (1974), when describing the burrow types of another species of the Chrysochloridae, gives evidence of burrow systems in swampy areas, in which large mounds of *Sphagnum* and *Alchemilla* are to be found. It is quite different with *Chrysospalax trevelyani*: on the very wet shores of Maden Lake, even on swampy places, it is able to live and forage for food very close to the water's edge and probably does so most of the time below the water level, but I never saw large mounds of earth like these described by Jarvis. This leads us to the conclusion, that *Chrysospalax trevelyani* avoids the danger of flooding in the tunnel sys-

tem merely by digging just above water level, or selecting a type of soil that allows to dig below water level due to its firm and waterproof consistency. Therefore, its nests – if any nests exist! – should be sought at a safe distance from the lake, where the danger of flooding normally does not exist. However, there may be some exceptions: STARCK, in a personal communication (August 1979) told me about drowned *Chrysospalax trevelyani* in Maden Lake (personal information of Mr. BIRCH, Pirie Forest trout hatchery, to STARCK). They possibly tried to escape from flooded tunnels and drowned in the lake, which – possibly – evoked the existing, but obviously never proven rumour that *Chrysospalax trevelyani* forage outside their tunnels. In any case the finding of drowned *Chrysospalax trevelyani* makes WALKER's (1975) words dubious, which claim that the species is such a good swimmer that it had been observed to swim across a stream, since Maden Lake is not big. I regret that also WALKER's next and surely false statement that "these animals obviously do not throw up mounds", does not support his reliability concerning *Chrysospalax trevelyani*.

I opened up some fresh-looking mounds as well as parts of the tunnels leading to them, but lacking proper tools and hampered by the abundance of tree roots under the trees of the forest, I did not succeed in finding the deepest level to which the tunnels extended. These have a diameter of about 9–11 cm and this enabled me to penetrate with my whole arm up to the shoulder. On the inside it was remarkably cool and wet: At a depth of about 30 cm I measured a temperature of 13 °C. To prevent raising the tunnels' air temperature by leaving them open too long, I always deposited the thermometer inside and closed the opening firmly, before taking it out again 20 minutes later.

This unexpectedly low temperature in the tunnels made by *Chrysospalax trevelyani* is understandable if we take in account the known low body temperature (20–24 °C) of another member of the Chrysochloridae family, reported by WHITHERS (1978) for *Chrysochloris asiatica*. Furthermore, my findings on low tunnel temperature in Pirie Forest have a parallel in the tunnels made by another subterranean insectivore, the European Mole (*Talpa europaea*), which also maintain a temperature of between 10 and 17 °C even on the hottest of summer days. *Talpa europaea* can survive in captivity only when kept in a microhabitat of less than 20 °C. Although the tunnel temperature mentioned by KLEIN (1972) refers to European summertime, I think it can be used as a parallel for the microclimate in tunnels made by *Chrysospalax trevelyani*, since the dense and comparatively cool Pirie Forest, even in summer, has an air temperature of probably never more than 30 °C. MCNAB (1966), however, recorded higher temperatures (22–26 °C) in the burrows of fossorial rodents. This remarkable difference possibly could serve as a distinctive mark between the tunnels of fossorial insectivores and those of fossorial rodents.

In Pirie Forest I was not able to find any mound that had been dug up by other mammals, although I did see plenty of jackal (*Canis mesomelas*) and caracal (*Felis caracal*) tracks. One can assume therefore that *Chrysospalax trevelyani* at least is not hunted by these predators, but possibly by otters (*Aonyx capensis*) which occur in Maden Lake (STARCK, pers. comm.). In the middle of a sunny clearing, however, I did happen to find an adult Boomslang (*Dispholidus typus*) right in the middle of a group of mole hills. To be able to investigate them I had to drive away the reptile and then I discovered one mound with an opening on top. It was much smaller (about 4 cm) than the diameter of the tunnel opening itself, which could easily be seen (fig. 2). Of course I am unable to state whether this small opening was only the result of the normal plug having fallen inside only partially, or whether it was caused by some foraging serpent.

As far as the vertical direction of the tunnels near and below the mounds is concerned, I noted that the mounting tunnel leads in a slight curve through the solid earth at an angle of about 60°. Similar statements were made by JARVIS and SALE (1971) when doing field work on other subterranean animals. At a depth of about 20 cm (measured from ground level and not from the top of the mound), the entrance tunnel forks off vertically from another tunnel, which leads on, sloping downwards slightly (see fig. 1).

Fig. 2. Mole hill with artifical (?) hole in the locking earth plug

Discussion of some previous statements on Chrysospalax trevelyani biology

The only known description of *Chrysospalax trevelyani* behaviour is given by ROBERTS (1951), who writes that "it seems to be adapted to living upon the giant worms (*Microchaetus*), which occurs in the Eastern Cape Province, but requires the shelter of the forests for its protection, as it is in the habit of searching for its prey upon the surface. Like *Bematiscus* it appears to live in old mounds, where there are chambers and passages to allow of its escape in the event of intrusion by enemies; such a mound I have seen at Pirie and cut across the mound". We note that after the sentence dealing with the "searching upon the surface" ROBERTS brings in *Bematiscus* (= *Chrysospalax villosus*) into the discussion, whose activity above ground ("turning up the surface soil like miniature pigs in the immediate vicinity of the holes from which they emerged") he claims to have seen himself. It is obvious, however, that ROBERTS lays no claim to having seen *Chrysospalax trevelyani* above ground, nor does he mention anyone who has ever done so. In an earlier paper (ROBERTS 1913) he claims that *Chrysospalax pratensis* spec. nov. "at night after rains . . . roots about on the surface of the ground after the fashion of pigs". Here we find the same words for the first time, be they merely assumptions, quoted reports or his own observations.

I maintain, therefore, that it has not yet been proven that *Chrysospalax trevelyani* seeks its prey on the ground surface – all the more so since I was not able to find any signs or traces of this peculiar behaviour pattern while I was studying a large number of mounds in Pirie Forest as well as in the dense and wet lowland vegetation near Maden Lake. As utated before, these mounds were very often situated very close to *Microchaetus* excrements, but never was there the slightest trace of the soil having been turned up in the way pigs do.

This confused speculation on the similar actions of different species is not made any

clearer by the fact that ELLERMAN et al. (1953), MEESTER (1968) and SIMONETTA (1968) agree that *Chrysospalax villosus* is merely a synonym for *Bematiscus*, as also WALKER (1975) accepted.

Until better proof is found, I regret to say that I rather assume that ROBERTS extended the behaviour patterns of *Bematiscus* and possibly also those of *Chrysospalax pratensis*, spec. nov., which were possibly well known to him, and applied them erraneously to *Chrysospalax trevelyani*.

WALKER (1975) merely repeats what ROBERTS (1951) probably only suspected, but adds the very interesting statements that *Chrysospalax trevelyani* not only in all probability hibernates in winter, but is also able to swim across a stream to escape from danger. I was not able to find any trustworthy source for these statements.

Range of Chrysospalax trevelyani according to the available museum specimens

In all I collected data of 100 specimens, of which I myself saw 56: In the Kaffrarian Museum, King William's Town, I was fortunate to find the impressive number of 41 skins. In addition I also found there a skin of *Amblysomus hottentottus*, which is also native to the King William's Town (KWT) district. This proves that this much smaller mammal is sympatric with *Chrysospalax trevelyani*, as also was stated by ROBERTS (1951).

I also was allowed to study the collection of *Chrysospalax trevelyani* skins in the Transvaal Museum, Pretoria, as well as in the private collection of Prof. Dr. Dr. h. c. STARCK in Frankfurt/German Federal Republic. Furthermore, I was honoured to receive the cooperation of the South African Museum, Cape Town, where I had the opportunity to study the list and some interesting items of the collection. The Museum für Naturkunde, Humboldt Universität Berlin German Democratic Republic, gave me the details of their specimens, as also the British Museum (Natural History), London, The University Museum of Zoology, Cambridge, England, The American Museum of Natural History, New York, and the Museum of Comparative Zoology, Harvard University, Cambridge, Mass./USA.

In addition, in literature there are mentioned 29 more specimens (GÜNTHER 1875; BROOM 1907; ROBERTS 1913). Since these authors did not indicate register numbers, probably some of these specimens are now included in the cited collections. Regarding some parallels in locality items, most of these specimens dealt with by BROOM (1907) seem to be now in the South African Museum's collection. However, BROOM mentioned 6 specimens more than today present in the said museum, among which 3 are from Port St. Johns and 3 from Entafufu (= Ntafufu), near Port St. Johns.

The holotypus was brought to GÜNTHER (1875) from Pirie Forest. BROOM (1907) indicates the provenance of the specimens he knew about in his days as follows: 15 specimens from Port St. Johns, Pondoland; 3 specimens from Entafufu; 1 from Bashei (= Bashee) River, Transkei; 1 from Ladysmith, Natal.

This last mentioned specimen, however, already presented to the South African Museum in 1889, seems to be dubious: If it really was found in Natal, it would mean that the range of *Chrysospalax trevelyani* was far greater in the last century at least than it has been within the last few decades. According to MEESTER (pers. comm.), *Chrysospalax trevelyani* could have been and probably was more widespread, but it is dubious whether Ladysmith ever was forest or whether the species ever occured there. It easily could have been a misidentification for *Chrysospalax villosus*, which is more widespread, although scarce, and does occur in grassland.

Table 1 shows the localities of those specimens I was able to see myself or which I was able to locate by letters. The skins and/or skulls are not listed according to their museum register numbers, but according to their date of capture or delivery to the musea. By that, their relative abundance in certain years is indicated, but I want to emphasize that this can be caused

Table 1

Particulars of museum or collection specimens

Register number	Sex, if known	Locality of collection	Collector, or donor, if known	Collecting date or arrival in the collection
		A. Kaffrarian Museum, King William's Town		
810	♂	Port St. Johns	–	24.11.1902
794	♂♂	Pirie Forest	–	? ? 1921
812	♂♂	Port St. Johns	–	28.08.1922
811	♂	Port St. Johns	–	19.09.1922
793	–	Pirie	–	12.12.1931
807	–	East London	–	11.05.1933
802	♂	Blaney, C.P.	–	5.10.1933
804	♂♀	Kei Road	–	26.10.1933
792	♂♀	Pirie	–	27.10.1933
805	♀	Kei Road	–	11.10.1934
808	–	E.L. (= East London)	–	6.01.1938
798	–	Pirie	–	13.01.1940
803	♀	Gray's Halt (Amabele)	–	17.04.1940
809	–	E. L.	–	1.05.1940
1555	♀	Frankfurt	–	20.01.1944
8971	♀♀	Macleantown	–	28.01.1945
12713	♀♀	Frankfurt	–	20.10.1947
18232	♀♀	Pirie	–	30.12.1954
476	♂♀	Cintzo East, E.L.[1]	–	31.01.1957
549	♂♀	Nahoon, E. L.	–	1.03.1957
584	♂♀	Gonubie Park	–	18.11.1957
585	♂♀	Pirie	–	21.11.1957
18479	♂♀	King William's Town	–	5.12.1957
19481	♂♀	Pirie	–	20.12.1957
806	♂	Kei Road	–	13.01.1958
19158	–	Pirie Trout Hatchery[2]	–	? 9.1958
639	♂	East London	–	26.01.1959
18539	♂♀	Pirie	–	29.01.1959
18548	♂♀	Pirie	–	13.02.1959
714	♂	Haga Haga, Komqha District	–	19.01.1962
18956	♂	„Emtalemi", Kei Road	–	1.04.1964
658	♀	Greenfields, E. L.	–	4.11.1969
188	–	Selbourne Lawn, E. L.	–	?
835	–	Gonubie, East London	–	?
126	♀	?	–	?
KM 20617	–	?	–	?
18531	♀	between King William's Town and Peelton	–	?
797	–	Pirie	–	?
796	–	Pirie	–	?
714	–	The Hogsback	–	?
		B. Transvaal Museum, Pretoria		
–	–	Port St. Johns, 3129 Da[3]	–	1897
–	–	Pirie Forest, 3727 Cd[4]	–	1898
–	–	Pondoland, 3129 Da[3]	–	1907
–	–	Port St. Johns, 3129 Da[3]	–	1908
–	–	Port St. Johns, 3129 Da[3]	–	1910
–	–	Kei Road, 3727 Cd[4]	–	1928
–	–	Pirca Bush, KWT, 3727 Cd[4]	–	?
–	–	Port St. Johns, 3129 Da[3]	–	?

Tabelle 1 (continued)

Register number	Sex, if known	Locality of collection	Collector, or donor, if known	Collecting date or arrival in the collection
		C. South African Museum, Cape Town		
34157	–	Bashee River, Transkei	J. H. Bowker	prob. late 19th century
34156	–	Ladysmith, Natal	W. Wiltshire	24.01.1889
5187	♀	Port St. Johns, Transkei	G. C. Shortridge	17.11.1901
5188	♀	Port St. Johns, Transkei	G. C. Shortridge	26.11.1901
5186	♀	Port St. Johns, Transkei	G. C. Shortridge	2.12.1901
5651	♂	Port St. Johns, Transkei	G. C. Shortridge	23.01.1902
5652	♂	Port St. Johns, Transkei	G. C. Shortridge	1.02.1902
5654	♀	Port St. Johns, Transkei	G. C. Shortridge	16.06.1902
6069	♀	Port St. Johns, Transkei	G. C. Shortridge	24.08.1902
6070	♀	Port St. Johns, Transkei	G. C. Shortridge	4.10.1902
7018	♂	Port St. Johns, Transkei	G. C. Shortridge	2.11.1902
7015	♂	Port St. Johns, Transkei	G. C. Shortridge	17.11.1902
7020	♂	Port St. Johns, Transkei	G. C. Shortridge	17.11.1902
7021	♂	Port St. Johns, Transkei	G. C. Shortridge	17.11.1902
7022	–	Port St. Johns, Transkei	G. C. Shortridge	21.11.1902
		D. British Museum (Natural History), London		
76.3.14.2	–	King William's Town	H. Trevelyan	?
26.3.24.3	–	King William's Town	–	?
77.3.6.2	–	King William's Town	H. Trevelyan	?
77.10.12.3	–	King William's Town	H. Trevelyan	?
77.10.12.4	–	King William's Town	H. Trevelyan	?
98.10.8.1	♀	King William's Town	A. N. Stenning[5]	?
98.10.8.2	♀	King William's Town	A. N. Stenning	?
3.6.2.7	♂	Port St. Johns, Pondoland	–	?
3.6.2.8	♀	Port St. Johns, Pondoland	–	?
3.6.2.9	♂	Port St. Johns, Pondoland	–	?
4.6.6.2	♂	W. Pondoland	H. H. Swinney	?
25.7.9.21	–	Pirie Forest, King William's Town	G. C. Shortridge	?
1939.1504	♂	St. Johns, Pondoland	Rothschild bequest	?
71.1743	–	St. Johns, Pondoland	Rothschild bequest	?
		E. University Museum of Zoology, Cambridge, England		
E.5470.A	–	Pirie Bush	de Winton	1915
E.5470.C	–	Pirie	–	–
E.5470.D	–	–	R. Godfrey	1913
		F. Museum of Comparative Zoology, Harvard University, Cambridge/Mass.		
21693	–	King William's Town	G. C. Shortridge	?
21701	–	Pirie	R. Godfrey	?
		G. American Museum of Natural History, New York		
34647	♀	Pirie Forest	A. N. Stemming[5]	10.11.1900
34648	♀	Pirie Forest	A. N. Stemming	10.11.1900
89040	♀	Pirie Forest	H. M. Haynes	31.03.1922
54365	–	Port St. Johns	H. H. Swinney	8.07.1923
		H. Museum für Naturkunde Berlin, Bereich Zoologisches Museum		
5426	♀	Südafrika	G. Clayton Sclater	?
6415	–	Slopefield	Bachmann	?
8979	♂	Entafufu, Port St. Johns River, Pondoland	Bachmann	?

Tabelle 1 (continued)

Register number	Sex, if known	Locality of collection	Collector, or donor, if known	Collecting date or arrival in the collection
8981	♂	Entafufu, Port St. Johns River, Pondoland	BACHMANN	?
15286	–	Pondoland (N'12) (B 563 LH)	–	?
without number	–	–	–	?
		J. Collection D. STARCK, Frankfurt		
–	–	Pirie Forest	–	?
–	–	Kei Road, near King William's Town	–	?
–	–	King William's Town	–	?
–	–	King William's Town	–	?

[1]I am not able to confirm the exactness of the indications on the labels. Especially so, since I cannot decide, whether f.i. an animal labelled with "East London" comes from the city or from the surrounding district. Similar items must be expected for King William's Town and environs. – [2]"Pirie Trout Hatchery" may be included in "Pirie" (Forest). – [3]The specimens from "Pondoland" and "Port St. Johns have exactly the same geographic indications! – [4]The same holds for these from "Pirie Forest" and "Pirca Bush, KWT". – [5]I cannot decide, whether the spelling "Stemming" or "Stenning" is correct. Obviously, as indicated by the identical initials, both spellings refer to one person.

Table 2

Localities and numbers of specimens collected there

Locality	number of specimens	Locality	number of specimen	Total
Port St. Johns	26	King William's Town	11	
Pirie Forest	21	Haga Haga, Komqha District	1	
Pirie Trout Hatchery	1	"Emtalemi", Kei Road	1	
East London	5	Qacu, Stutterheim	1	
Cintzo East, E. L.	1	between KWT and Peelton	1	
Nahoon, E. L.	1	The Hogsback	1	
Greenfields, E. L.	1	Pondoland	2	
Selbourne Lawn, E. L.	1	Pirca Bush, KWT	1	
Gonubie, E. L.	1	Bashee River	1	
Blaney, C. P.	1	Ladysmith	1	
Kei Road	5	W. Pondoland	1	
Frankfurt	2	Slopefield	1	
Gray's Halt (Amabele)	2	Entafufu	2	
Macleantown	1	locality unknown	5	
Gonubie Park	1			
Total	70		30	100

by temporal collecting efforts. The sex ratio of the listed specimens is 25 males, 32 females, and 43 of unknown sex.

The relative density (of the collecting localities and not necessarily of the occurrence!) is shown in table 2. Always taking in consideration the possible zeal of collectors working in certain areas only, it seems that Port St. Johns and environs was the one stronghold of *Chrysospalax trevelyani*, whilst the other was or is the area from around East London going

northwest with the center King William's Town and including the best known habitat, Pirie Forest.

Although it is obvious that the range of *Chrysospalax trevelyani* is not as limited as was previously assumed, its situation is nevertheless precarious and its chances of survival very poor, since the whole range is split up in several isolated localities. Therefore, BROOM's opinion (1916) that *Chrysospalax trevelyani* is only known to occur "in a very limited forest near King William's Town" is happily enough out of date.[1] ROBERTS (1951) already knew of additional findings at Port St. Johns, but never seems to have bothered about determining the actual (proven by collecting) range of the animal. I do agree, however, with his opinion, that *Chrysospalax trevelyani* could be found anywhere in the vicinity of Pirie Forest and Port St. Johns, provided there remain forests large enough to give suitable shelter. Should these forests be cut down, burned, or replaced by *Eucalyptus* plantations that use up far more water than any other types of woods, then *Chrysospalax trevelyani*'s chances of survival are simply nil.

It is a pity that the indications "Pondoland" or even "W. (= West) Pondoland" are so vague, since Pondoland covers the whole northeastern part of the modern Transkei. Therefore, these specimens could extend the animal's range – and our knowledge – very much, but equally just come from Port St. Johns too.

Fur colour of the examined museum specimens

When studying the colour of the museum specimens, I was astonished to find that nearly all of them were of quite different colours from those mentioned by BROOM (1909), who called the typical colour of Pondoland specimens "very dark grey" and some of them "nearly black". Almost all of the 56 skins I saw are of a rather saturated, mostly reddish brown. The colour "grey" only holds true due to lack of overhairs and guardhairs, which results in the underhairs being visible, which is, according to BRUNNER and COMAN (1974) generally of little diagnostic value. The underhair is indeed slate grey in colour, but only in several and by no means in all cases. In some cases the undercoat is yellowish-buff. Some specimens have a general cocoa colour which seems to be the result of the slate grey undercoat forming a kind of shimmer effect. One specimen even showed a mixed colouration, having some overhairs of a greyish colour which contrasted sharply with the rest of the reddish-brown fur.

On the other hand, I cannot accept ROBERTS' statement (1951) that *Chrysospalax trevelyani* is dark yellowish-brown with a base of greyish-yellow uppermost and an undercoat of (only!) yellow, because the greater number of skins I saw most definitely had a grey undercoat.

GÜNTHER (1875) describes the holotypus as having a "deep chocolate-brown colour, with showing a dense whitish underfur . . . in the posterior parts of the abdomen". If we accept all these variations therefore, we seemingly have to refrain from making generalizations with regard to the colour of the undercoat.

BROOM, after obtaining more specimens from different localities, thinks it probable that certain local varieties could have been established. Any attempt of associating colour variations with localised habitat, however, would seem to offer scant reward, if we consider the relative paucity of skin samples available for scrutiny. It is known, moreover, that among the better known insectivores at least, litter mates are very often coloured in quite different shades (PODUSCHKA 1974). Attributing differently coloured specimens to distinct local

[1] In this connection I do not understand the same author's remarks in his earlier papers (1907, 1909), when he mentioned himself f. i. "16 specimens from Port St. Johns, Pondoland" – which is more than 200 km away from Pirie Forest! I am afraid that this must be a mistake, when cited otherwise in the paper of 1916.

groups or local sub-races seems, therefore, to be a more than dubious affair. It is also worth considering, that subterranean mammals may show quite unexpected colours caused by an apparent correlation between the heavy metal content of the soil and the colour shade of melanin (Poduschka and Nopp 1978).

There is also an additional problem that occurs when we try comparing the fur colour of *Chrysospalax trevelyani* with the locality in which it is found: This has to do with the imprecise nature of the names of the localities. In table 1 for instance, the locality indicated as "East London", possibly includes the nearby "Nahoon" and "Gonubia" and we are unable to draw any dividing line between them as both, additionally, have the label "E. L." (= East London). Very probably we are meant to take this as the name of the whole district, in which case the name "East London", which stands alone next to 10 other specimens, can only be regarded with scepticism: It seems improbable that all 10 specimens were caught right in the city of East London itself. We have, therefore, to consider the possibility at least, that some to them are only from the surrounding district.

The survival chances of Chrysospalax trevelyani

This is a tricky theme, which I by no means intend as an attempt at political polemics. As a professional zoologist working in the field as also in preservation of endangered species, I am only interested in scientific research and animal protection. I would be overjoyed, however, if this modest paper could influence the government of those countries where *Chrysospalax trevelyani* still has a chance of survival, into providing aid of a practical nature to South African Mammalogists or Nature Conservationists and thereby ensure protection for this gravely endangered animal.

As can be seen in fig 3, a large part of *Chrysospalax trevelyani*'s range is covered by the sovereign state of Transkei, which was only founded on 26th October 1966. I admit that I am not aware of the state of vegetation in this country before independence, but when I crossed

Fig. 3. Range of *Chrysospalax trevelyani*, as indicated by collecting localities. Dotted area: range of successful collecting up to now (Scale 1 : 730.000)

the Transkei by car exactly two years later I was shocked by the only too obvious scarcity of trees and bushes in most of the countryside I saw. It seemed to have been alarmingly overgrazed – an understandable enough fact when one considers that the Xhosa people are a nation fond of their herds. However, the masses of grazing and browsing animals – especially the goats – make revegetation almost impossible, which deprives *Chrysospalax trevelyani* of any chances of suitable habitat.

I tried hard to obtain maps in the hope of learning from them whether the Transkei still contains any undisturbed woodland areas that might allow *Chrysospalax trevelyani* some chances of survival. Unfortunately, these maps did not arrive, but I was told about some forests which still exist on the coast of the Indian Ocean and are under control of officials of the South African Government. I hope very much that the mentioned woods are not *Eucalyptus* plantations. However, the situation as a whole is such that the remaining patches of forests are so far isolated from one another that in the long run they are practically useless at providing a chance of survival on a far more widespread and extensive habitat to be able to survive. The fact that I did not get exact maps, forces me to fear the worst with regard to the suitable habitat for *Chrysospalax trevelyani* which I had hoped for.

An additional threatening factor are the numerous stray dogs since they are obviously not fed regularely and depend for food upon any prey they can find, thereby minimizing the chances of life for any small animals.

Hitherto, I have only considered that part of *Chrysospalax trevelyani*'s range which is covered by the Transkei. Now, plans also exist to convert another part of the known range of this animal into the new state Ciskei. By so doing, areas will have to be claimed that partly include or are very close to *Chrysospalax trevelyani*'s best known habitat. Should this happen, only a small and narrow corridor will remain for this rare animal, which will not be subjected to general and radical change in the name of economic development. In the long term, however, *Chrysospalax trevelyani* will very probably not be able to survive even in this remaining limited area: Soberminded, we will have to accept that, as everywhere else, also still existing suitable habitat for *Chrysospalax trevelyani* in little bits constantly will be sacrified to new agricultural and settlement plans. It is obvious, therefore, that the Giant Golden Mole will not be able to find a locality where he has a chance for the future, since there is no possibility of shifting the necessary habitat on account of the mentioned limiting the corridor by the bordering states with their different economy.

If nothing is done, if there is no display of public and scientific interest in protection of one of South Africa's rarest and – for the purpose of science – most important animals, then the days of *Chrysospalax trevelyani* are surely numbered. This postulated interest together with the sincere wish for the protection of this animal must come from the present and any future government in order to prevent yet another black spot in the long history of mankind ruthlessly destroying nature and the animals that still exist.

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Zusammenfassung

Bemerkungen über den Riesengoldmull Chrysospalax trevelyani Günther, 1875 (Mammalia: Insectivora) und seine Überlebenschancen

Im Oktober 1978 fuhr ich in den Pirie Forest, Kapprovinz. Beabsichtigt war das Sammeln biologischer Daten, das Studium des für dieses gefährdete Tier typischen Habitats, sowie die Prüfung der Überlebenschancen auf längere Sicht, da die Ergebnisse einschneidender politischer Veränderungen zu befürchten waren.

Zahlreiche Erdauswurfhügel – auch nahe des Seeufers bei Maden Dam – wurden untersucht und aufgegraben. Sie befinden sich häufig dort, wo es Ansammlungen von frischen Exkrementen großer Regenwürmer (*Microchaetus*) gibt. Die Temperatur in den Gängen liegt überraschenderweise bei nur 13°C. Die Gänge scheinen von den dort häufigen Schakalen (*Canis mesomelas*) und Karakalen (*Felis caracal*) nicht aufgegraben zu werden.

Frühere Literatur wurde kritisch durchgesehen und mußte teilweise als ungenau oder unbewiesen angesehen werden. So konnte z.B. keine Spur von angeblicher Beutesuche „in der Art kleiner Schweine" auf der Erdoberfläche gefunden werden.

Eigene Untersuchungen an Museumsbälgen (56) und Angaben über weitere 44 Exemplare ergaben die erstmalige Feststellung des bisher bekannten Verbreitungsgebietes aufgrund der Fundorte.

Die Fellfarbe wurde bei 56 Exemplaren untersucht und in merkwürdigem Gegensatz zu früheren Berichten befunden.

Aufgrund der Verbreitungskarte und der in den letzten 3 Jahren bereits eingetretenen und auch für die nächste Zeit zu erwartenden politischen Veränderungen werden die Überlebenschancen dieses Tieres als äußert trist bezeichnet, umso mehr als das Verbreitungsgebiet bereits in mehrere, weit von einander liegende Areale zerrissen ist.

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