

other case no such warrens existed and advantage was taken of the loose soil of the old colonies in which to dig fresh burrows.

(7)

An attempt was made to estimate the number of meercats on the farms Beestekraal and Middagson.

One can assume that in the 65 colonies, that remained closed up to the 3rd March, and the 21 which were closed for a few days, the meercats in them at the time of gassing were killed. Only in 57 of these colonies were meercats seen to enter prior to gassing. The actual number of meercats seen to enter the colonies can thus be regarded as the minimum destroyed, i.e. Cynictis 97, Geosciurus 37, Suricata 7.

In addition to these the following meercats were either shot, trapped or captured in some way: Cynictis 53, Geosciurus 58, Suricata 10.

To the above totals may be added the number of meercats seen to enter the colonies that were reopened after the initial gassing and prior to the revisit.

The totals are therefore:

	Cynictis.	Geosciurus.	Suricata.
Assumed killed by gassing:	97	37	7
Trapped, shot etc.	53	58	10
Escaped Gassing:	16	11	12
Total:	166	106	29

These totals of course represent the absolute minimum of meercats that were on the two farms, as no consideration was taken of those that were killed in the colonies into which no meercats were seen to enter. If one

makes an allowance for these on a proportional basis, the following figures are obtained, viz: the 86 colonies that remained closed may have harboured 146 Cynictis, 55 Geosciurus and 9 Suricata.

Likewise on the same basis then 29 colonies which were reopened before being revisited, harboured something like 25 Cynictis, 27 Geosciurus and 29 Suricata. Some of these, however, were trapped, so that some allowance must be made therefor. It is estimated that seven Cynictis were trapped and already accounted for, so that the total for the Cynictis becomes 18. The grand total therefore becomes: Cynictis 184, Geosciurus 13, Suricata 58.

These totals may be regarded as a fair and still conservative estimate of the meercat population on the two farms, taking cognisance of the fact that more meercats were probably killed by gassing than were counted and seen to enter the colonies prior to gassing.

On the other hand again it may be that a certain percentage of those that escaped the gassing were probably trapped at some other colony.

If these totals are acceptable as a rough estimate, then the density on the two farms, 2,400 morgen in extent, works out at 1 Cynictis to 13 morgen, 1 Geosciurus to 17, 1 Suricate to 40 morgen.

C. Extermination of Meercats on Infected Farms, as a Practical Measure of Rabies Control.

As a consequence of the promising results obtained in the experimental destruction described above for Beestekraal and Philip, the Department was prevailed upon to undertake the extermination of meercats on infected farms as a practical control measure. This afforded thus

a further opportunity of improving the technique and making further observations under rigorous field conditions.

A Stock Inspector was appointed to undertake the work under the author's supervision. The labour and working equipment consists of eight natives, three Schoeman double action pumps, the necessary supplies of Cyanogas, two hundred 3" gin traps, six spades and a motor van. The party camps near the site of operations so that there is a minimum of time lost going to and coming back from work.

Procedure.

The localities in which outbreaks of rabies occur are treated in sequence. A preliminary inspection is carried out to establish the probable extent of the infection and therefore the area to be treated. This is based on the occurrence of colonies, whether there is a break in their continuity or not, the topographical features, etc. These points will be more fully illustrated when describing the infected areas.

As soon as this is completed a programme is drawn up and the whole area is divided into sections, which are to be treated in sequence.

Operations are then started and carried on according to the method already explained. The area is traversed in strips to locate the colonies, and gas them. This is followed by systematic inspection and trapping until no meercats are left.

A daily report is drawn up and submitted by the Stock Inspector. Certain essential data is extracted from this report and summarized in table-form so as to show in column (1) the number of the sections, corresponding to the number on the sketch map, of the area to be treated; column (2) the date; (3) the number of colonies

found and treated; (4) the total number of colonies opened by meercats the day following gassing; (5) the number of traps set and the number of meercats caught; (6) the number of colonies in which warrens are found open on the second day following gassing, and (7) the number of traps set and the result; (8) the number of colonies inspected and found open at the periodic inspections, giving the dates on which these were gassed; (9) the number of traps set and the result, and finally (10) the result of a final inspection over the whole area with the number of colonies opened, the number of traps set, and the number of meercats caught.

The daily reports also include the number of meercats seen, particulars as to age, pregnancy, species, stomach contents etc., of the meercats trapped.

(1) Marah - Waaikraal Area : Bloemfontein District.

11.2.39. - 27.3.39.

The first destruction raid undertaken under this new campaign was the Marah - Waaikraal one. Rabies was diagnosed in a Geosciurus at Marah on 11.2.36. and at Waaikraal in a dog on 20.9.38. At the time of the outbreak on Marah suspected cases were reported in yellow mongooses near the railway station of Sannahspost.

Description of the Area.

(Refer to Map No. 4).

The area borders on the Modder River. A weir across the river, situated near the railway line, causes damming back of the water to beyond Besemkop and forms thus an impassable barrier to meercats. Two spruits forming vleis run across the area to join on the farm Newlands. The whole area consists of rather flat bulks which rise gradually from the water courses. There are

no hills except for a small stony ridge on Valle.

The vegetation, consisting of mixed grasses, was dense on account of copious rains; 10 ins. was recorded during the latter half of January. The bults are extensively cultivated for mealies. Soil erosion is bad on the farms Woonhuis and Goupond.

Extent of the Infection.

The Modder River, which forms the Eastern boundary of Marah, where the first outbreak occurred, was considered to be the limit of the infection on that side, as the river at that part is impassable to meercats.

On account of the infection on Marah, and the suspected cases that were reported at Sannahspost railway station, and the outbreak at Waaikraal, the triangular area thus formed with Klipkraal in the centre, was considered the centre of the infection.

The majority of colonies were located along the two vleis running on either side of the station, and one through Ems, Waaikraal, etc., and the other along the boundaries of these farms and involving Jacobusgeluk, and Sannahspost farm. Further colonies were located on Valle, Rust-en-Vrede and Bourdillon along the river and at the foot of the low ridges. On Woonhuis, Goupond and Rampani where soil erosion was prevalent, and on the bult towards the station, only a few colonies existed on the bult between the two vleis and on the bult on Meyersgeluk, Baden and Kromdraai.

The infection was therefore considered to be amongst the meercats that stayed along the Modder River, and the two vleis referred to above, involving the whole area indicated on the sketch map.

Table XV is a summary of the work done in this area.

Remarks.

(a) At the outset it must be stated that this was the first time such a large area was treated, and coupled with inexperience of the gassing squad, labour shortage, only two boys being employed on some days, the work was carried out under difficult circumstances.

(b) From the number of colonies reopened at the final inspection, i.e. from the 20th to the 27th and the number of meercats trapped during that period, the results of the gassing and subsequent trapping appear to be disappointing.

(c) That out of 210 colonies, 62 were reopened on the day following the gassing and 39 on the second day, and 63 and 31 meercats respectively indicate that the gassing was not as effective as could have been expected. The conditions mentioned under (a) and the wet ground are responsible for this.

(d) In a great many instances birds were trapped at warrens which were reopened. These were later identified as Myrmecocichla formicivora, or the Anteating Chat. Dr. Austin Roberts of the Transvaal Museum, who kindly identified these birds, added the following description of their habits: "This is purely a South African species, occurring in open ground, and I have procured them even as far north as Ngamiland and Ondonga districts in S.W.A. It feeds on insects, and nests and roosts in burrows and in the roofs of burrows made by antbears and meercats, so that its being trapped in the way you mention is not unexpected."

The habits of this bird to reopen warrens that have been gassed and closed somewhat confused the issue, in that in many instances warrens that have been opened by them, were attributed to the work of meercats.

(e) The trapping during the last seven days greatly

reduced the number of meercats in the area. A final inspection was made in the areas where the majority of the colonies were located, i.e., along the Modder River, the two vleis, and the bult on Woonhuis and Klipkraal, the vicinity of Sannaspost Station. In all two Geosciurus only were seen and seven or eight colonies were found open.

Thus indicating that the number of meercats on the farm was reduced to an almost negligible amount.

(2) Tafelkop - Sterkfontein : Bloemfontein District.
29.5.39. - 8.7.39.

Outbreaks of rabies occurred in Cynictis on Tafelkop 8.10.38. and on Sterkfontein 9.12.38. On the latter farm mongooses behaving strangely were seen for some time prior to the outbreak. The localities where the infected mongooses were discovered are about 9 miles apart.

The Description of the Area.
(Refer to Map No. 9).

This centre is situated in the South-western part of the Bloemfontein district on the Fauresmith border. The area is marked by a loose range of high hills running from north to south. The altitude of the highest point, Tafelkop, is 5312 ft. while the altitude of the plains is only 4500 ft. Small ridges of stone kopjes are scattered over the farms Deelgenoot, Verona, Palmira, Fortuin, Mara, etc. A large dry pan is situated on Sterkfontein, into which leads a shallow vlei rising on Tafelkop, with tributaries originating from the range of high hills.

On inspection, colonies were found along the vlei and extending up to the foot of the high hills and along the scattered kopjes on the western part of the area. The infection was considered to extend from Tafelkop to

Sterkfontein along the vlei and outwards towards the hills. Extermination of the meercats was therefore undertaken over the area on the west of the range of high hills from Mooiuitzicht to Sterkfontein up to the scattered hills on Deelgenoot, Verona, Palmira, Fortuin, Mara. The area was approximately 18,600 morgen in extent.

Results - See Table XI in Appendix.

Remarks.

The results on the whole seem very satisfactory.

(a) Out of a total of 1,591 colonies treated, only 71 were reopened on the day following gassing and 34 on the second day. Which indicates that gassing is the most effective means of killing the majority of the meercats, especially in view of the fact that only 57 and 46 meercats were trapped on the two days following the gassing.

(b) 605 colonies were found reopened at subsequent visits, which is less than half of the colonies treated. A record was unfortunately not kept for the first 25 days, of the number of colonies visited at the periodic inspections. During the 69 days on which this record was kept, 3,954 visits on colonies were made, which shows that each colony besides the inspection on the day subsequent to the gassing and the second day thereafter, was inspected at least a further three times.

(c) The success obtained in reducing the number of meercats is clearly shown that during the final inspections of the colonies, when almost half of the 1,591 colonies were visited, only 104 colonies were reopened and at which only 23 Cynictis, 3 Suricata and 43 Geosciurus were trapped.

(d) As in the case of the previous area, a considerable number of birds, the total being 222 for the whole

area, and 90 mice and rats, were trapped. These birds and small rodents are, therefore, responsible for the re-opening of a large number of warrens, and they should be regarded as an important factor when the number of colonies found reopened at the subsequent and final inspections is taken as a measure of the amount of success attained.

(e) An important fact to which little significance has been attached, is the number of carcasses in various stages of decomposition of all three species of meercats, that have been found on the infected areas, at colonies or in close vicinity to them. The localities in which these were found on the Tafelkop - Sterkfontein area are very suggestive of these animals having died of rabies, and the presence or absence of such carcasses may be an indication of the extent of the infection.

Carcasses of meercats were found on the following points marked on the map: in area VIII, IV, IX, V and XV, eleven of Cynictis and one of Geosciurus, while in areas XXI, XXIII, XXII and XXIV twelve of Cynictis and two of Geosciurus. While none were found in the other areas. It may be assumed, therefore, that two distinct centres of infection were present in this area, coinciding with the places where the infected animals were actually found.

(3) Sunnyside : Bloemfontein District.
13 - 29.7.39.

On the 4th May, 1939, an outbreak of rabies was diagnosed in a cow, which grazed in the camp marked No. III on the sketch, and on the 21st of the same month a rabid Cynictis was found in the same camp at the spot marked "Y Cyn".

Description of Area.
(Refer to Map No. 7)

The farm Sunnyside, situated about three miles from Bloemfontein, is bounded on the west and north-west

by small holdings of 5 to 10 morgen in extent. The water-main for Bloemfontein water supply from the Modder River runs over the farm. The farm Vaalbank Suid adjoins Sunnyside on the North. A dry spruit arising on Bloemsig runs through Camp III on Sunnyside and through Vaalbank Suid. To the east of the spruit the country is very level, while on the west the land is higher and stony ridges are found.

Location of Meercat Colonies.

One was struck by the number of warrens in the loose soil, which covered the water-main. Groups of warrens, which could hardly be termed colonies, existed every few yards. The warrens swarmed with Cynictis. On one occasion while driving along the main, over the farm Sunnyside, 11 Cynictis were seen escaping into the warrens. Colonies were also frequent along the dry spruit and especially on the higher ground to the west on Vaalbank Suid. While none were found on the plots, and scattered ones on the rest of Sunnyside and Vaalbank.

On account of the fact of the infected cow in camp III and that a rabid Cynictis was found near the water main, it was considered that the infection existed in the meercats along the main and those in camp III, and possibly amongst those on the bult on Vaalbank Suid to the west of the spruit. The localities where a further infected Cynictis and the carcasses of meercats were found, to some extent supported our assumption of the extent of the infection.

During the gassing operations an infected Cynictis was found at the spot "Z Cyn", and eleven carcasses of Cynictis in area II and III all near the water main, while that of four Cynictis and one of a Geosciurus were found in area IV along the dry sloop and to the west of it.

The area mapped out to be treated, was the whole

of Sunnyside, the portions of Roodewal and Vallambrosa which adjoin Sunnyside and that portion of Vaalbank Suid on which the infection was thought to exist. The area treated is marked by a broken line on the sketch.

Results. See Table XII.

Remarks.

(1) Out of the 429 colonies gassed, fourteen were open the following day.

(2) As the area was comparatively small, the colonies in the area which were considered actually infected were visited at least three times subsequent to the third day after gassing.

(4) Edenburg Commonage.

The following outbreaks of Rabies have occurred on the Edenburg Commonage. In April and August, 1933, the disease was diagnosed in two Cynictis found at the points marked X on the sketch map of the Commonage. In June, 1939, a further case occurred in a Cynictis at the point marked XI, and a week later another suspected case in a Cynictis occurred in the same spot.

Description of Area.
(Refer to Map No. 6)

The area treated consisted mainly of Karroobush covering the fairly flat country, in Area I a low ridge of hills extends from North to South, while in Area II an isolated kopje existed. Two vleis traversed this area, in which colonies were plentiful. The limits of the infection were considered to be along the two vleis, as the bults on either side contained only a few colonies which were widespread over the area. The carcasses found in the veld confirmed this. Carcasses of two Cynictis and one Geosciurus were found in Area II, while in Area IV,

that of a Cynictis and Suricate each was found.

The Results are summarized in Table XIII.

Remarks.

The results invite little comment, as they are practically the same as those of the areas done previously. Three weeks later a second visit was paid to this area to determine to what extent immigration of meercats into the area had taken place. The whole area was gone over twice during two successive days and traps were set at all warrens that were found to have been reopened.

The results of the trapping were as follows: 217 colonies were visited, of which 60 were reopened, and 160 warrens were cleaned by animals. 71 meercats were trapped, Cynictis 36, Geosciurus 21, Suricata 15, Ictonyx 4, Pedes caffer 1, and Anteating Chats 7.

These results show that migration of meercats, once an area has been cleaned of them, does not take place very rapidly into such an area, from which it may further be concluded that it is possible to keep such an area free from meercats by trapping only.

(5) Trompsburg Commonage. (Refer to Map No. 5)

Description of Area.

This area includes the whole of the Commonage, and the farms Spes Bona and Middelfontein. The area consists of semi-karoo veld, with isolated low hill ranges and kopjes. The spruit running from South to North through the area is very shallow and broadens out into vleis, especially near the southern boundary. Weirs across the spruit result in water pools existing almost throughout the year.

Extent of the Infection.

No less than eight cases of Rabies have been diagnosed in Viverrids on the commonage from June, 1932, to July, 1939. The rabid animals were all found in an area two miles square on the Southern side of the village. The Genet which

was infected on Spes Bona was found near the commonage boundary. The infection was considered to extend amongst the Viverrids on the southern half of the Commonage and probably on those portions of the farms Spes Bona and Middelfontein adjoining the Commonage.

In 1937 a careful survey was made of the infected portion of the Commonage. The positions of the larger colonies and groups of colonies were recorded on a sketch map, to assist in recording the results of extermination experiments.

The object of the experiment was to determine to what extent gassing only was successful. At the conclusion of the experiments it was considered that all the meercats were exterminated except a few, which took refuge in the kopjes. As a further case of Rabies occurred in July, 1939, the experiment must be considered as having been unsuccessful.

While traversing the area in the recent attempt to eradicate the meercats, a considerable number of colonies were still found closed and many which had been reopened were unoccupied.

It is therefore essential before any measure of success in eradicating Rabies in an infected area can be obtained, that all meercats in such an area must be exterminated.

The Results are summarized in Table XIV.

Remarks.

(a) The carcasses of dead animals were found as follows: Area II that of a Cynictis, and a Suricata and 4 Geosciurus in Area V.

(b) 266 colonies were fumigated, and of which 17 were reopened within two days of the gassing and 11 meercats were trapped in them.

(c) Each colony was inspected at least 8 times during the 19 days.

(d) During the final inspection the areas Nos. I, II and III, marked as A on the summary, considered to be the centre of the infection were very carefully inspected. The results of the last days inspection when 159 colonies were visited of which a few only were reopened and no meercats trapped, showed that if not all the meercats have been exterminated, then only an odd one may have escaped. The extermination of the meercats must, therefore, be considered as having been successful.

(Y)

Summary of work performed on the five infested farms and including the expenditure involved.

Area	Approximate size of area in morgen.	Number of Colonies gassed	Number of meercats trapped.			Number of days taken to exterminate the meercats.	Amount of Cyanogas used.	Cost of Cyanogas.	Wages and rations of labourers.	Total Cost
			<u>Cynictes.</u>	<u>Suricata.</u>	<u>Geosciurus.</u>					
Marah, Waai-kraal.	6,850	210	150	47	364	38	175 lbs.	£10.18. 9.	£ 21. 3.10.	£ 32. 2. 7.
Tafelkop - Sterkfontein	18,300	1,512	384	119	648	79	513 "	£32. 1. 3.	£ 80.10. 9.	£122.12. -.
Sunnyside	4,400	429	141	14	105	16	75 "	£ 4.10. 9.	£ 16. 8. 1.	£ 20.18.10.
Edenburg Com.	3,100	279	168x	26x	132x	13x	37 "	£ 2. 6. 3.	£ 16. 5. -.	£ 18.11. 3.
Trompsburg Com.	8,250	266	151	32	67	22	63 "	£ 3.13. 9.	£ 18.19.10.	£ 22.13. 7.
Total	40,900	2,696	994	238	1,296	165	863 "	£55.10. 9.	£150. 7. 6.	£208.18. 3.

x Include the number of meercats trapped on a subsequent visit for two days.

The cost of Cyanogas is calculated at 1/3 per lb., being a price quoted to Municipalities.

The wages of a native labourer amounts to 2/5 per day plus 2½ lbs. of mealie meal.

The Salary of the Supervisor is not included in the column of expenditure; it amounts to £1. per day.

The above data, when calculated on a basis of 1,000 morgen, gives the following details approximately:

The number of colonies were 66. This figure may be taken as representative of the number of colonies on average infested ground.
 The number of Cynictes trapped were 22.
 The number of Suricata trapped were 6.
 The number of Geosciurus trapped were 31.

The amount of Cyanogas used was 21 lbs.

The number of days taken to gas were 4.

The total cost amounted to £5.1., and if the salary of the Supervisor is included, £9.1.