to existant ones are only seen after rains, when the soil is soft and easily workable. Cleaning up the holes, which have partly caved in, also takes place at such times.

It can therefore, easily be realised to what extent a colony situated in a favourable site and position, may increase by extension year after year. On the farm Beestekraal a colony has been dug up whose existence was known to the owner of the farm for at least fifteen years. The colony measured 80 x 105 ft. and had about 90 openings.

As has been pointed out before, the Geosciurus prefers to dig its own colony, and will not, like the Cynictis take refuge in any kind of hole. The latter will only dig its own warren, when it cannot find anything else to take refuge in. A pair of Cynictis was once found to have taken up their abode in an old caved in antbear hole, into which they had made a side entrance. They also make use of refuse heaps, boulder heaps like those found as support for gate posts. Graves in neglected farm cemetries are favoured by the Cynictis as the stones covering the loose soil into which they dig, afford a very good protection. Springhare warrens, both abandoned and inhabited, often harbour meercats too.

A very favoured abode is in the wind-blown sand mounds called "Trassie-bos" in Afrikaans. These mounds are formed by sand blown into and held by a thorny shrub Acacia stolonifera. As the sand mound increases, the shrubs grow out and so catch more sand. Such mounds may reach a height of three to five feet and obtain a diameter of ten to twenty yards. The holes dug into the soft mois sand eventually cave in in ~~any~~ dry weather, but the burrowing animal being enticed by the soft soil and good drainage, persists in cleaning up and excavates large confluent chambers in the mound, the soil or sand roof being supported

to some extent by the roots of the shrub, forming pillars or columns with sand packed around it. The burrows are therefore above the level of the ground.

On the Trompsburg Commonage the town refuse heaps deposited there were found to harbour Cynictis. One of the mounds selected for excavations was about 50 yards long and about 20 yards wide, and consisted mainly of coal ash and refuse from dust bins. The average height of the ash above the ground level where the openings and tunnels were made was about 20 ins.

Slightly more than one inch of rain had fallen four days before the excavations were made. Three openings were freshly cleaned out, the ash being still moist. Two Cynictis were seen to enter into one of these on our arrival.

As the whole of the refuse mound could not be dug up the warrens over an area of about 20 yards on either side of the freshly cleaned out warrens were gassed and the openings closed, and digging operations were started from the freshly cleaned out warrens.

About half an hour after the digging operations were commenced a Cynictis escaped from an opening which was 22 yards away from the starting point.

Remarks on Warrens in that Section of the Refuse Mound Excavated.

The ash was damp right through. The warrens extended obliquely down to the ground level, but nowhere did they go beyond the ground surface. The tunnels were very easy to follow in some places where the ash was comparatively solid. In others again the tunnels had partly caved in and were difficult to follow.

It will be noticed from the sketch that the network resembles an ordinary colony, but with the difference

that the tunnels have less interconnections and are therefore longer. Several breeding chambers were uncovered, but in none of them was fresh straw or bedding found. This indicates that ground squirrels had dug or occupied these warrens.

DESTRUCTION OF THE VECTORS.

In order to devise the most effective and yet economical method of destruction of these animals, the following methods were investigated:

1. Gassing the burrows with poisonous gasses.
2. Trapping.
3. Destruction of the burrows and their inhabitants by means of explosives.
4. Baiting.
5. Shooting and hunting.

Gassing the Burrows with Poisonous Gasses.

The effects of the following poisonous gasses were investigated:

(a) Hydrogen Cyanide.

(b) Carbon Monoxide.

(c) Sulphurous gasses.

(a). Hydrogen Cyanide.

Preliminary experiments with gassing were conducted on colonies both large and small selected at random into which meercats were seen to enter.

The gassing consisted of blowing finely powdered calcium cyanide dust (Cyanogas) with a hand-pump into the burrows. When this dust comes into contact with air it gives off hydrogen cyanide leaving a residue of inert calcium hydroxide and impurities contained in the powder.

Two types of pumps were used, a single and a

double action one. The single action pump works like an ordinary bicycle pump, but is only much larger, about 3 inches in diameter. The air is blown through a chamber containing the powder, which is forced out in clouds.

The double action pump, known as the Schoeman pump, (see figure 1) forces the air on the downward stroke through a chamber containing the powder, which escapes from this chamber into the outlet in a cloud. On the upward stroke pure air is forced into the outlet, thus giving additional force to the current of air created on the downward stroke. Both types of pumps have a control valve to regulate the cloud of dust blown out.

This pump has the advantage over the other pump, in that it not only works quicker, thus saving time, but that the powder laden air is forced deeper into the burrows. The importance of this will be described later.

Method of Operations.

The powder control valve was adjusted so that a fairly heavy cloud of gas was blown out, but not so heavy as to allow a deposit of powder immediately in front of the loose end of the hose connected to the outlet.

The free end of the hose is inserted as far as possible into a hole, which is clean and well open. After insertion of the hose, the hole is filled up with earth, so as to prevent the escape of the gas. Pumping is then proceeded with. As soon as a perceptible cloud of powder emerges from a hole, this is closed with earth. Pumping is continued through the one hole until no more gas emerges. The hose is then inserted into another hole still open, and the process is repeated until all the openings in the colony are closed. The holes should be closed only when gas emerges, to allow free circulation of the gas and so avoid creating air pockets in the burrow.

Before any digging operations were commenced, the openings at which the gas was pumped into the colony were marked on the graph paper, adopting the same technique as was described in the previous chapter. The openings from which the dust was seen to emerge are indicated in the order in which it occurred, thus 1a, 1b..., 11a 11b, etc. represents the order in which the holes were closed while pumping proceeded.

Digging operations were started, and the tunnels were traced in the same manner as described before.

Results of Experiments.

The results of the experiments are more easily followed when reference is made to the respective sketch plans of the colonies.

Colony I. (Sketch I).

The colony was a fairly recently established one, situated in turf soil intermixed with lime pebbles. A single action pump was used and the gassing lasted for 15 minutes. The colony was dug up 4¾ hours after the gassing was completed. A dead Geosciurus male was found at the point XI, and a live female in a somewhat dazed condition at the point X2.

Colony III. (Sketch III).

As indicated in the sketch this was a fairly simple colony, which was dug up immediately after gassing. A live Cynictis was found in the cul-de-sac at the top of the illustration.

Colony IV.

As will be seen from the illustration it was a fairly large colony. Several meercats were seen to enter the burrows. It took about thirty minutes to complete

the gassing, using a double action pump. Excavations were started immediately after gassing. Dead mongooses were found at points XI and X5, while live ones were located at X2 and X4. The one at X2 was in a semi-conscious condition. At points XI and X6 dead squirrels were dug up.

Colony VI. (Sketch VI).

This experiment was conducted by the Zoological Survey Staff on a colony on the farm Beestekraal, Hoopstad district, on 3rd December, 1937. The colony was between 15 and 20 years in existence according to the owner of the farm. It is evident from the illustration that this was a very large and complicated colony, measuring 105 by 80 ft. across. Five squirrels were seen to enter into the warrens previously. Before gassing, all the old and disused openings were reopened to allow for better circulation of the gas. The dusting operations lasted 70 minutes using one double action pump.

At the points indicated dead squirrels were found, XI and X4 adults, at X2 and X3 juveniles, and at X5 three juveniles. The depth of the tunnels ranged from 1 to 3 feet.

Colony VII. (Sketch ~~VII~~ IV).

Date 16.12.37. (By curtesy of the Zoo. Survey). On this occasion Colony No. 112 Beestekraal, Hoopstad district was selected. It was formerly a springhare (Pedetis caffer) colony, but at the time of gassing inhabited by meercats. The soil is of a deep sandy nature and was somewhat moist, .56 ins. of rain having fallen on the 14th. The disused and fallen-in openings were reopened. The actual times of dusting were: A. - 7 min., B - 5 min., C - 3 min., D - 3 min., E - 4 min., F. - 2 min., G - 2 min., H - 3 min. Total time 31 minutes.

The depth ranged from 1 to 4 feet. Six dead mongooses were found, one each at points XI, X4, X5 and two juveniles at X2. At points GI and G2 dead squirrels were found.

Colony VIII. (Sketch VIII).

An experiment was conducted on a "Trassiebos" colony No. 39 Beestekraal, Hoopstad District, 30.11.37. The colony measured 30 ft. in diameter. Two meercats were seen to enter the colony before the gassing operations. On excavations two dead Cynictis were unearthed at the points indicated.

Discussion of Results.

Ten colonies ranging from very simple ones to the most complicated imaginable including a trassiebos mound were gassed with Cyanogas and dug up at various intervals after gassing. The results obtained were on the whole satisfactory and encouraging. In all cases, except in three, all the meercats dug up were dead. In two of the three cases live meercats were found in comparatively small and simple colonies. Of the four animals, that were still alive, three were found in blind tunnels or cul-de-sacs. It is obvious, that in such cases the force of the air current is not strong enough to force gas into the blind passages. In the case of the Geosciurus (Colony I) found in a dazed condition in an open tunnel its escape may be due to the fact that insufficient gas penetrated to the point X2 when gassing took place from A and when gassing was commenced at B, a blind tunnel was actually formed as the openings on the far side from B had been closed.

Conclusion.

(1) It is possible to destroy all the meercats in a colony even in very large and complicated ones by

means of Cyanogas fumigation.

(2) In some instances when the burrowing animals have taken refuge in blind tunnels or cul-de-sacs, the gas fails to reach and destroy them. Especially is this the case in those tunnels which extend for great distances up to 30 feet.

(ii). The Minimum Lethal Concentration (M.L.C.) of Hydrogen Cyanide for Meercats.

At this point it became necessary to find out what minimum concentration of HCN was best suited to the purpose in view and also to determine for what length of time such a concentration could or had to be maintained in warrens.

For this purpose a lethal box of wood was constructed, with inside dimensions of 52·1 x 61 x 26·7 cms., with a small inlet door. About two thirds of one side was cut away and replaced with ordinary clear glass plate. On the top of the box, a hole 1½ ins. in diameter, fitted with a tight fitting rubber stopper, was made through which the Calcium Cyanide was to be introduced.

The testing and controlling of the HCN concentration was done as follows: A table later published by Steyn (1939), showing the sensitivity of the picrate paper test (Guignard Test) for Hydrocyanic acid, i.e. the time taken to discolour picrate paper in various concentrations of HCN. From the data contained in this table a graph was drawn of the concentration against the time taken to discolour the paper. See graph No. 11.

For the purpose of the experiment a number of Cynictis were caught alive, some with a net placed over an open warren while the colony was smoked or dug up - others by means of traps.

To determine the effect of various concentrations of HCN on the animals, an animal would be introduced into

the box through the opening for the purpose, and measured amounts of Cyanogas dust were lowered with a spoon into the box and distributed into the air by giving a sharp blast of air on the spoon with an ordinary motor tyre pump. The amounts of Cyanogas dust used were measured approximately in an ordinary graduated 10 c.c. cylinder - for three very good reasons, (a) no scale was available in the field and (b) even if available it would have been unwise to expose the powder to the air for any length of time while it was being weighed, and (c) since the concentration of HCN was being estimated by the picrate method, the exact amount of dust used was not of immediate importance.

Table VII.

Minimum Lethal Concentration (M.L.C.) of Hydrogen Cyanide for Meercats.

The lethal chamber, described above, was used throughout these experiments, its capacity was 84,852 cub. cms.

The time from insertion of animal into box.	Time taken for Picrate Paper to discolour:	Equivalent Concentration of HCN:	Remarks on condition of animal:
Experiment I. Beestekraal, 14.1.38.			
Object: To determine the reaction of a *Cynictis* to a concentration of 1 : 7,680 of HCN.			
Amount of $Ca(CN)_2$ introduced: Approximately 4 c.c. of loose powder.			
1 min. 6 secs.	45 secs.	1 : 7680	Falls over.
2 min. 41 secs.			Shallow breathing.
3 min. 26 secs.			Stopped breathing. Dead.

Experiment II. Beestekraal 14.1.38.

Object: To determine the reaction of a Cynictis.

Amount of $Ca(CN)_2$ introduced: 1·1 c.c. were added, which increased the concentration to 1 : 3,840.

1 min. 30 secs.	15 secs.	1 : 3840	After yawns, vomiting movements, dazed, falls over.
1 min. 35 secs.			Twitching of eyelids, and spasms of hind legs.
2 min. 45 secs.			Gasps and 15 sec. interval last one.
3 min.	45 secs.	1 : 7,680	Shallow gasps, last 15 sec. before death.
3 min. 45 secs.			Dead.

Experiment III.

Object: To determine the reaction of a Cynictis to a concentration of 1 :15,600 HCN.

Amount of $Ca(CN)_2$ introduced: Nil.

45 secs.	90 secs.	1 :15600	Yawns.
1 min.			Salivation.
2 min.			Profuse salivation and masticating movements.
3 min.			Uneven gait, leaning against side of box.
4 min.			Staggering movements and lies down.
5 min.			Respiration accelerated and occasional deep inspiration.
6 min.			Convulsions, slow breathing and occasional deep inspirations movements at 35 sec. intervals.
7 min.			Hair on tail rises, shallow gasps.
9 min.	2 min.	1 : 22800	Relaxing, hair on tail, feeble gasps.
9 min. 30 secs.			Dead.

Experiment IV.

Object: To determine effect of a low concentration of HCN on a Cynictis.

Amount of $Ca(CN)_2$ introduced: The box was cleaned of all obvious dust. The Picrate paper took 10 minutes to discolour; i.e. a concentration of 1:5-800,000.

3 min.			Sneezing.
5 min.			Sleepy appearance.
6 min.			Sits on hind-quarters like a dog.
8 min.			Apparently no effect.
10 min.			Apparently no effect.
13 min.			Apparently no effect.

.2 c.c. of $Ca(CN)_2$ blown into box.

1 min.			Salivation.
2 min.			Sneezing, salivating and masticating movements.
3 min.			Shakes head. Salivating.
6 min.			Profuse salivation, lies down.
8 min.			Gets up and lies down again.
9 min.			Incoordinated movements respiration accelerated. Sneezes and rolls over.
11 min.			Dyspnoea.
12 min.			Twitching of the muscles. Cheyne-Stokes respiration gasps at intervals of 8, 5 and 3 secs. irregularly.
15 min.			Shivering of head, hair rises on tail.
16 min.			Pupils dilated, shallow gasping, at 18-16-22-18 to 30 secs.
19 min.	2 min. 30 sec.	1 : 31,200	Hair subsiding on tail shallow gasps at 30-40 secs.
22 min.			Pupils dilated $\frac{3}{4}$, dead.

Experiment V.

Object: To test effect of HCN on Geosciurus. (Animal was bleeding from nostrils).

Amount of $Ca(CN)_2$ introduced: None added, picrate test 3 min. i.e. a concentration of 1 : 43,600.

5 min.			Apparently no effect.
6 min.			Slight uneasiness.
9 min.			Attempts to lie down.
14 min.			Apparently no effect.

.2 c.c. $Ca(CN)_2$ introduced.

1 min.			Salivation.
2 min.			Convulsive movements.
3 min.			Lying on side and making running movements. Breathing spasmodically.
4 min.			Frequent deep gasps, salivation stopped. Testes retracted. Hair on tail raised fanlike.
5 min.			Occasional prolonged inspiration. Hair on tail subsides.
6.min.			Hair smoothes down, heart beat fast, gaps at 30 sec. intervals.
7 min.			Gasps at irregular intervals.
10 min.	2 min.	1 :22,800	Heart beat slower, inspiration prolonged.
11 min.			Heart beat hardly perceptible, inspiration slow.
13 min.			Faint shallow gasps.
14 min.			Heart beat stopped. Dead.

Experiment VI. Philip 25.5.38.

Object: To observe reactions of two animals under approximately identical conditions. Two Cynictis were introduced and marked A and B.

Also the effect of moisture: About two ounces of water were poured into the box and air from a motor tyre pump played over it, to evaporate it.

Amount of ~~Ca~~ $Ca(CN)_2$ introduced: Not measured. The picrate test was 5 min., i.e. 1 :180,000.

9 min.	5 min.	1 :180,000	Apparently no effect.
	More $Ca(CN)_2$ blown into box.		
1 min.			Apparently no effects.
3 min.			A. Sneezed, uneasy walking about. Fell down on undispersed powder. B. Apparently no effect. In far corner of box.
4¼ min.			A. Deep respirations. B. Apparently no effect.
5 min.			A. Violent spasms and kicking. Hair on tail rising slowly. Accelerated gasps. B. Apparently no effect.
7 min.			A. Occasional deep inspirations. B. Twitching of abdomen. Respiration accelerated walks about. Comes near to the gas. Unsteady gets up. Short shallow inspirations.
11 min.	1½ min.	1 :16,100	A. Pupils dilated. B. Down but still able to lift itself.
14 min.			A. Intermittent breathing, shallow. B. Respiration shallow and accelerated, intermittent deep inspiration.
17 min.	2 min.	1 : 23,000	A. Hair on tail subsiding. Dead. B. Same as before.
24.min.			B. Taken out of box and put in fresh air. Corneal reflex absent.

Experiment VI (cont.)

2 minutes after being taken from the box:	B. Deep gasp. Resp. accel. corneal reflex faint.
10 min.	Pulse accel. twitching of toes, forced expiration.
12 min.	Opening and closing of eyelids. Muscular control gradually being ~~restrained~~.
21 min.	Comes to a sitting position. Falls over again. Violent spasms.
26 min.	Eyes closed. Respiration deep and forceful. Pulse accelerated.
30 min.	Able to rise, looks round, very weak.
31 min.	Attempts to run but falls over. Gets up. Animal recovering rapidly.

Experiment VII. Beestekraal 26.1.38.

Object: To test effect of a higher concentration of HCN on a Cynictis, under same conditions as previous experiment.

Amount of $Ca(CN)_2$ introduced: •1 c.c¢ loose dust.

5 min.			Sleepy appearance. Head between forelegs.
10 min.			Sneezing, eyes rolling. Expiration forced.
15 min.			Respiration regular but shallow.
20 min.	6 min.	204,000	Same as before.
25 min.			Unsteady in sitting position. When box tilted falls over, but rights itself.
30 min.			Sits with head hanging as if sleeping.

$Ca(CN)_2$ introduced .7 ccs.

1 min.	1 min.	1 : 10,300	Head sinking.
2 min.			Spasms, stretching of limbs, gasps.
3 min.			Respirations imperceptible. Dead.

Discussion of Results.

The concentration of Hydrogen Cyanide which gave the optimum result, killing the experimental animals in less than four minutes were 1 : 7,700 and higher. Desired effects were obtained with concentrations of 1 : 12,000 to 1 : 24,000 killing the experimental animal in 9 to 10 minutes. A concentration of 1 : 31,200 killed the experimental animal in slightly over 19 minutes, while a concentration 1 : 43,700 failed to have the desired effect.

It is estimated that a concentration of Hydrogen Cyanide of 1: 31,200 would kill meercats in a confined air space, but for practical purposes the aim should be to obtain concentrations of between 1 : 30, - 24,000 or higher, and that concentrations of 1 : 36,000 or lower would not be sufficiently strong to kill the animals in their burrows. Theoretically therefore the concentration to be aimed at both from the point of view of economy and of rapid destruction of the animal must lie between the ranges of 1 : 24,000 and 1 : 30,000.

(iii). The Concentration of Hydrogen Cyanide in the Burrows of Meercats.

In view of the fairly high concentration of Hydrogen Cyanide, which is fatal to meercats and the comparatively big length of tunnelling in the maze constituting the colony, it is obvious that success in fumigation depends largely on the concentration of Hydrggen Cyanide attained in the burrows, and on the length of time this concentration is maintained in the burrows.

In order tp investigate this, suitable colonies of different types were selected for the purpose. The openings were marked on graph paper in the usual way. The openings on which the tests were to be performed were selected in such a way as to be representative of the colony and as evenly distributed as possible. These

openings were opened up to a depth of about 18 ins. to make sure that single tunnels were being dealt with, and to obtain their representative perimeter. This was also an advantage in the operations as the firm and damp soil facilitated the insertion of the aparatus.

Into these selected and prepared holes white glass cylinders 3 ins. in diameter and about 12 - 18 inches long were inserted, being as near as possible to the diameter of the tunnels. These cylinders resembled long winchester bottles, with the bottom knocked out, and in fact such bottles had to be pressed into service also. The open end was pushed into the burrow and the neck end with the rubber stopper protruded out and enabled one to insert the test papers and see it turn colour. The cylinders were securely packed with damp soil so as to prevent any escape of gas. The rubber stoppers were withdrawn and the positions of the cylinders were marked on the ground plan with Roman numerals.

Gassing operations were then commenced in the usual way. As soon as puffs of dust emerged from a cylinder the rubber stopper was replaced, thus sealing up the opening in the same way as if closing it with earth. The sequence in which the dust emerged from the cylinders was recorded in the usual manner.

At definite intervals and more or less in rotation the concentration of Hydrogen Cyanide in the cylinders was tested, by inserting picrate test papers fixed on thin pieces of wire through the stoppered openings and thus visible through the glass. Care was taken to insert the papers and to replace the stoppers as quickly as possible so as to prevent the escape of gas. The time taken to discolour the picrate papers was recorded for each cylinder. The interval between testing was fixed arbitrarily at 15 minutes, as this interval allowed just sufficient time to

do the round of tests and to obtain the greatest number of tests for a definite period.

The results are recorded in Table VIII in appendix.

The corresponding concentration of Hydrogen Cyanide was obtained from the curve by reading the times which the picrate test paper took to discolour. This information was recorded for each cylinder in a colony. Graphs, for each colony, were then plotted of the Hydrogen Cyanide concentration against the time interval, after the gassing was completed. The different graphs are marked to correspond with the data recorded in table VIII.

The colonies were then dug up and details as to inhabitants etc. recorded in the usual way.

Samples of soil were collected at the depth of the tunnelling, to determine the moisture content of the soil. This was done in the following way. About 500 grams of sand were weighed and heated in an oven at a temperature of approximately 230° F. until constant weight was attained, when the percentage loss of weight taken to be moisture, was calculated.

Experiment I.

This was conducted on a "Trassiebos" colony on the farm Wintershoek, which adjoins Beestekraal in the Hoopstad district. The gassing took 14 minutes to complete. The glass cylinders, after the tests were completed, were left in position over night, and a test on each, the following morning revealed a trace of Hydrogen Cyanide. Incidentally a dead Cynictis was found in cylinder No. 11 in the morning, and a warren closed with sand was found reopened.

Experiment II. (Sketch IX).

The colony selected was a typical colony in

soft sandy soil on the sandbult on Beestekraal. Seven meercats were chased into the colony. The times of dusting were from A to E 13, 10, 6, 8 minutes and 30 seconds respectively.

The following dead animals were found, see Sketch IX, six suricates at points S, and one Cynictis at C, and a live Cynictis at X.

The soil could be moulded by hand with fairly hard pressure. The moisture content was 2·6%.

Experiment III.

Colony No. III on Beestekraal (Sketch X) was selected for this experiment. The colony was of the same nature and soil as the preceeding one. Three yellow mongooses entered the colony. The times of gassing were as follows A to D, 9, 13, 1, and 9 minutes respectively. Hole C was found to be closed. From Cylinders Nos. 111 and VII no Cyanogas emerged, and on excavations the warren of No. 111 was found to be partly filled with loose sand at Z, while for No. VII no obvious cause could be found. Two dead mongooses were found at C_1 and C_2.

The moisture content of the soil was 2·8% taken at X. The soil could be moulded with the hand on pressure.

Gassing with Compressed Air.

The rate at which an air current flows through a tunnel is resisted by opposing forces created by

(a) the length of the air way;

(b) the perimeter of the airway;

(c) the degree of roughness of the surface;

(d) and the number and angles of the turns in the airway.

It is perfectly clear, that the comparatively small force created by an ordinary double action hand-pump is

soon reduced to a negligible amount on account of the length of tunnelling formed by the network in a colony. The comparatively small perimeter of the outlet pipe to that of a tunnel and the numerous turns sometimes at acute angles combined with the roughness of the surface of the warrens would further retard the force of the air current created by the pump.

It was considered, that the failures in many instances were due to poor distribution of the dust along the deeper tunnels, and that this might be overcome by using a jet of compressed air, which would create greater force and volume to overcome some of the retarding influences. Further, that in the case of blind tunnels or cul-de-sacs the greater velocity of the air-current would create a partial vacuum in them and that when the air current ceased, air laden with cyano-gas powder would be sucked into them, and so kill meercats, which might have taken refuge in these.

A small Curtiss Pneumatic compressor, driven by a "Mar-vil" two stroke engine mounted on a cylindrical pressure tank 30 ins. long and with a diameter of 14 ins. was acquired. The tank was tested to a pressure of 150 lbs. per sq. ins. This plant was mounted on a donkey cart for transport purposes on the veld. (See photograph).

A special insuflator designed by Dr. Thomas was used in connection with the compressed air outfit.

Description of the Thomas Insuflator.
(See Figure 2).

The insuflator consists of a can, 10 ins. deep, with a diameter of 5 ins., fitted with a handle similar to the ear of a cup. On the top of the can is an opening (a) fitted with a screw cap for filling the insuflator with powder. The insuflator is connected to the pressure

tank with ten yards of pressure hose pipe, which is connected at the point (b), where a spring release stopper is fitted. At the point (c) a bifurcation exists in the air supply tube into which a three way stop cock is housed with a hand lever. The one tube (e) leads into the can for about 3 inches at an angle, while the other (g) forms a deviation which joins the outlet tube (f). A short length of hose-tubing is connected to the outlet (f). for insertion into the warren.

By pressing the spring release stopper (b) compressed air enters along the tube, and by manipulating the lever of the three way stop cock (c) the air-flow into the can can be regulated, while the rest of the air escapes along the bye-pass (g) into the outlet tube (f). The air laden with powder escapes into the outlet (f). The concentration of powder blown into the warrens can therefore be very accurately regulated.

Plan of Experiments.

The following two experiments were planned to serve a double purpose, (a) to serve as a repetition of the Hydrogen Cyanide concentration test conducted on Beestekraal and (b) to compare the efficiency of the compressed air outfit for fumigation purposes with that of the ordinary double action hand pump.

The procedure adopted with the compressed air outfit was exactly as that adopted with the hand pump.

Experiment IV. (Sketch XI).

For the purpose of this experiment a colony (A) was selected on Bestersrust adjoining Phillip in Hoopstad district. The colony was situated on a high bank on the side of the pan. The soil, although sandy in nature and fairly moist, was hard lower down owing to