BURROW SYSTEMS OF *DESMODILLUS AURICULARIS* IN THE KALAHARI GEMSBOK NATIONAL PARK

By

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Introduction

The Namaqua gerbil, *Desmodillus auricularis,* is widely distributed throughout the central, western and northern Cape Province, Botswana and South West Africa; it also occurs in western Transvaal and the Orange Free State (Meester, 1964). It is, therefore, a species primarily inhabiting the South West Arid Zone (Davis, 1962) where the rainfall is less than 20 inches (500 mm) per year, with marginal infringement into the South-West Cape and with isolated colonies in the Southern Savanna.

Although it is one of a number of murid species known to tunnel, no information has hitherto been available as to the structure of its burrow systems. The present paper deals with the structure of a number of burrows excavated during January and April, 1966, and forms part of an ecological study of rodents in the Kalahari Gemsbok National Park.

Desmodillus auricularis occurs throughout the Park, although not in the same numbers and in such large colonies as *Parotomys brantsi* (de Graaff and Nel, 1965). At the time of writing the exact habitat preference of *Desmodillus* in relation to that of other gerbils (*Gerbillus* and *Tatera*) and *Parotomys* has not been satisfactorily worked out, but the indications are that vegetational cover, slope and firmness of the soil may play some role, with the presence of a dominant species (probably *Parotomys*) being a contributory factor. *Parotomys* seems to favour areas covered by the Driedoring (*Rhigozum trichotomum*); *Desmodillus* occurs more frequently in open areas (with or without some grass cover) but also marginally in areas covered by the Driedoring.

During the latter part of 1964, and most of 1965, the numbers of rodents (especially the gerbils and *Parotomys*) showed a very drastic decline in the Park and elsewhere in the South West Arid Zone. Davis (1964) notes that gerbils (and *Parotomys*) are the primary vectors of plague in wild rodents; this sudden decline in numbers thus probably corresponds to an epizootic. At the beginning of 1966 a few colonies of gerbils and *Parotomys* were seen to be active; in April 1966 the number of colonies, and the area they covered, were noticeably larger than three months before. Therefore, 1966 seems to be an early post-epizootic and one can expect the numbers of rodents to increase markedly during the next few years. An interesting side-effect of this "population crash" of rodents concern some of their chief predators, viz.

LEGEND FOR FIGURES

1 to 7 — open entrances; [1] etc. — blocked entrances; S.C. — food storage chambers; N.C. — nesting chamber.

Figs. 1-4: Burrows situated in sandy soil at Twee Rivieren.

Fig. 5: Burrow situated in soil with calcrete outcrops at Twee Rivieren.

Fig. 6: Burrow situated in silt at Nossob Camp.

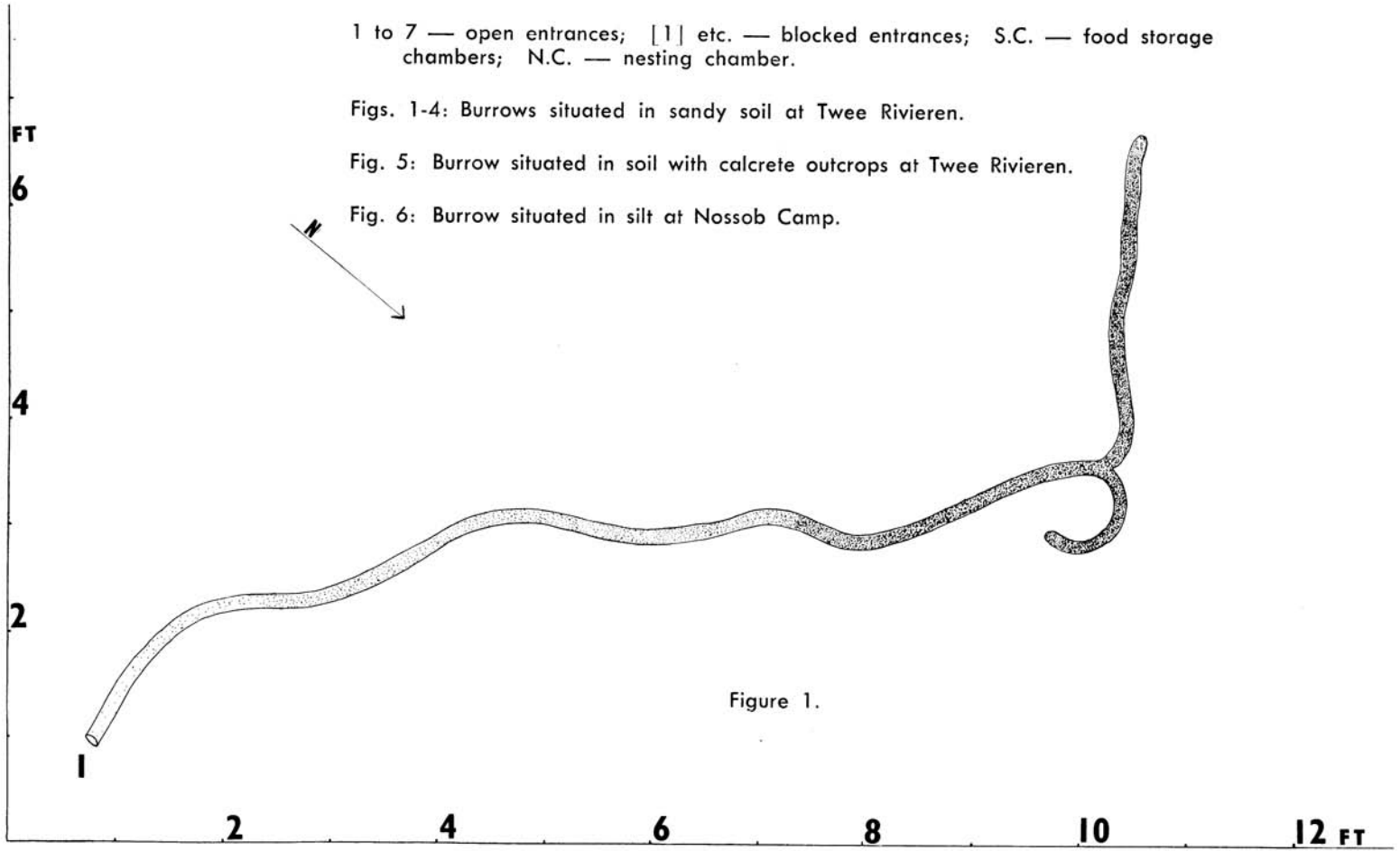
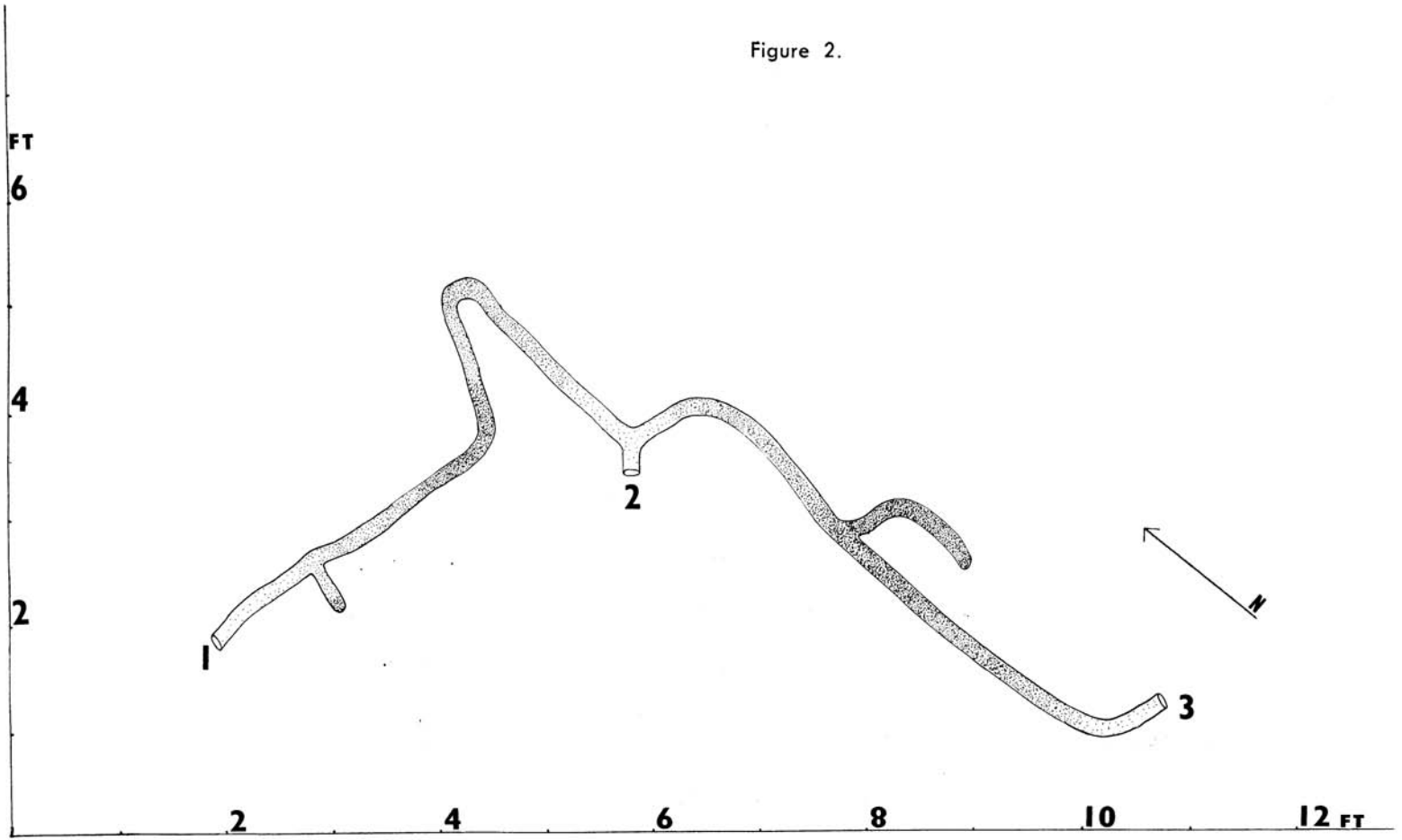


Figure 1.

Figure 2.



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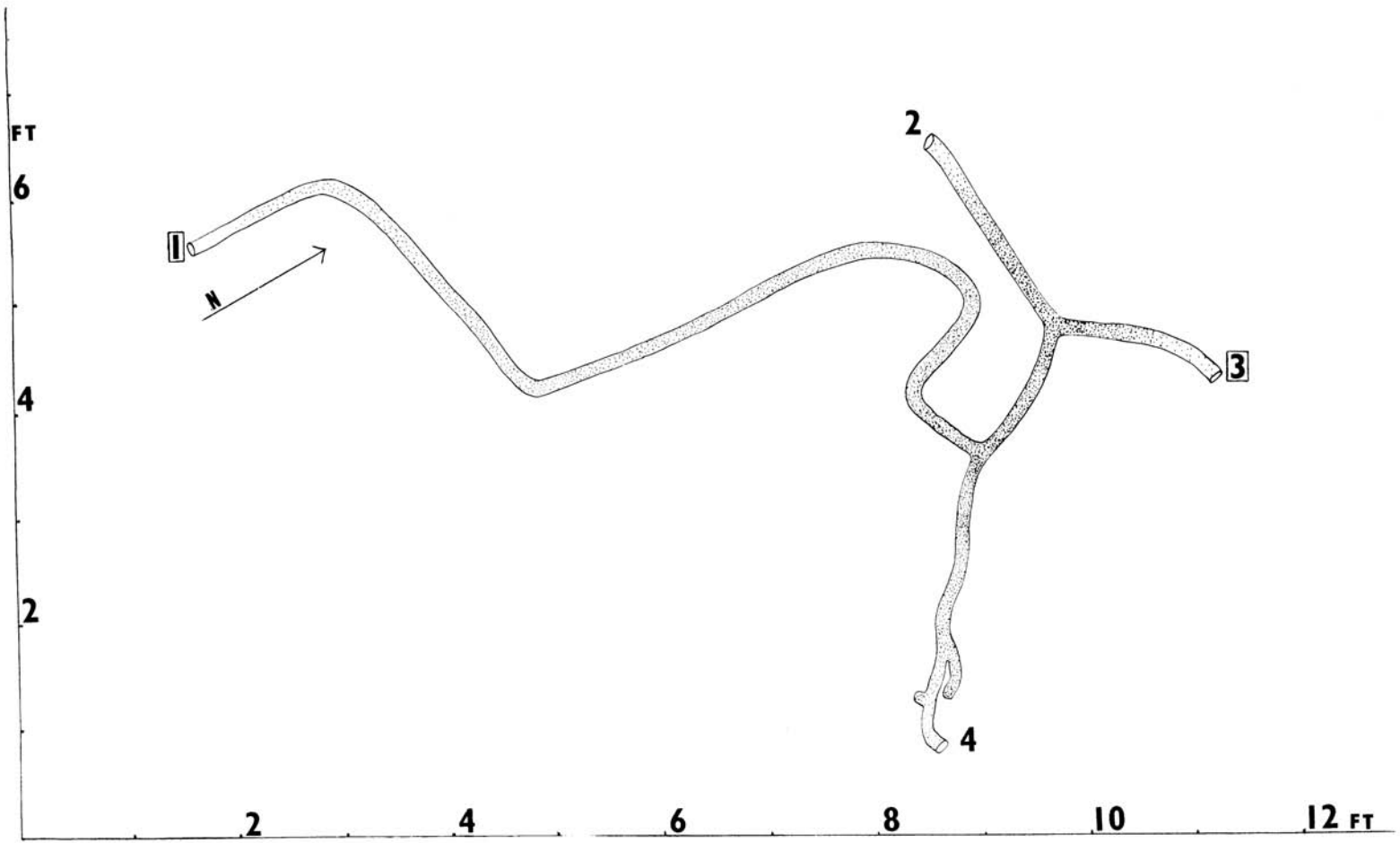


Figure 4.

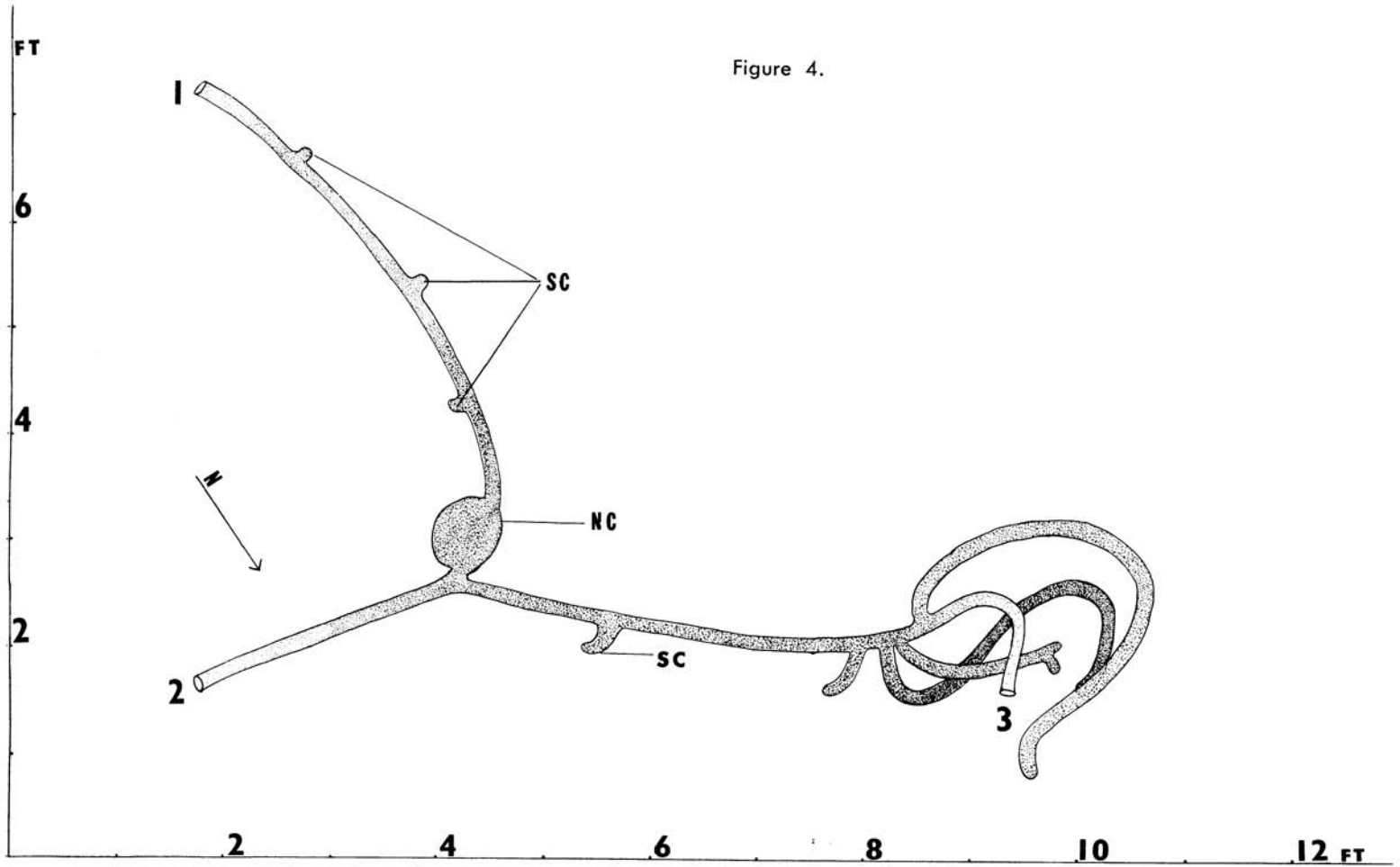
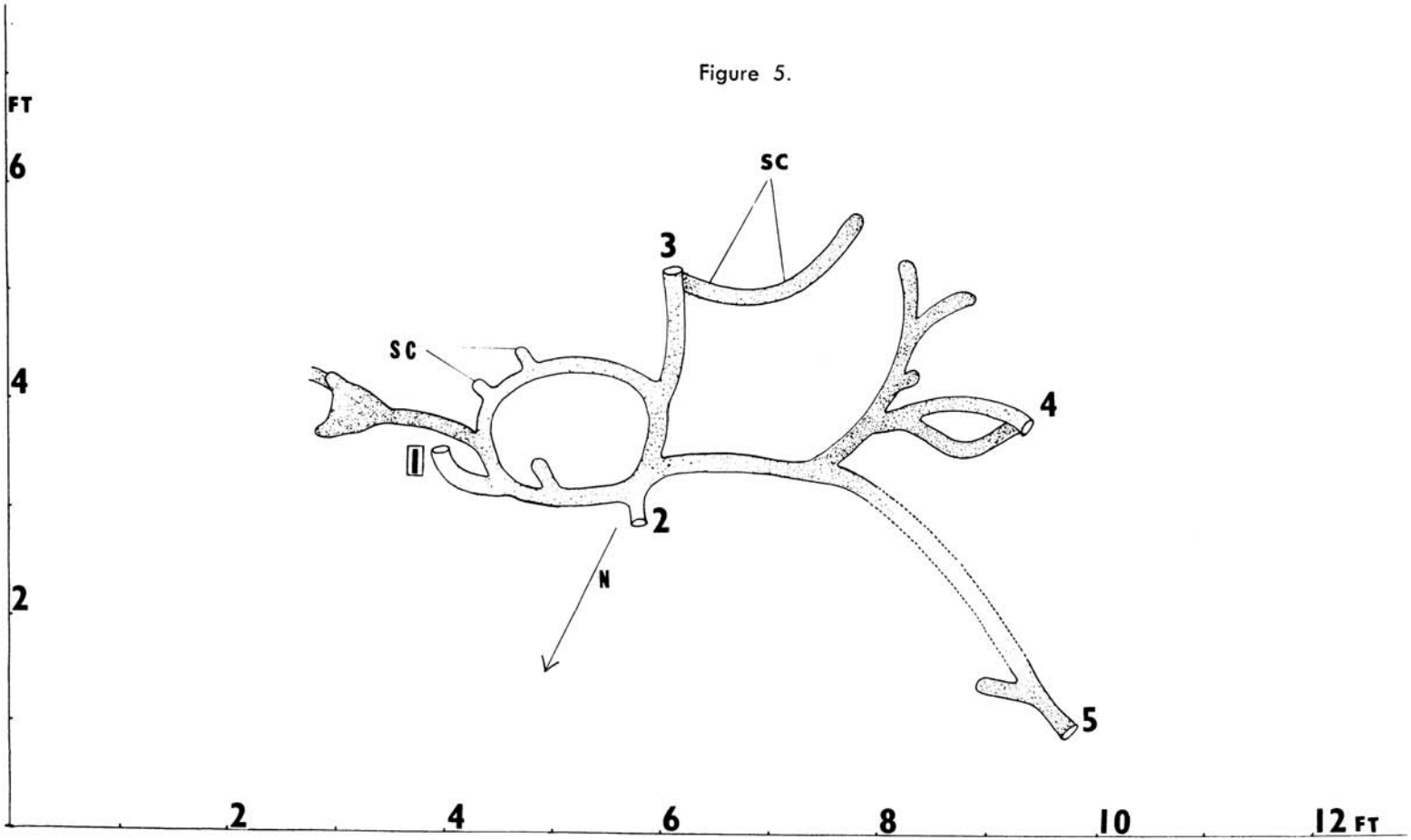


Figure 5.



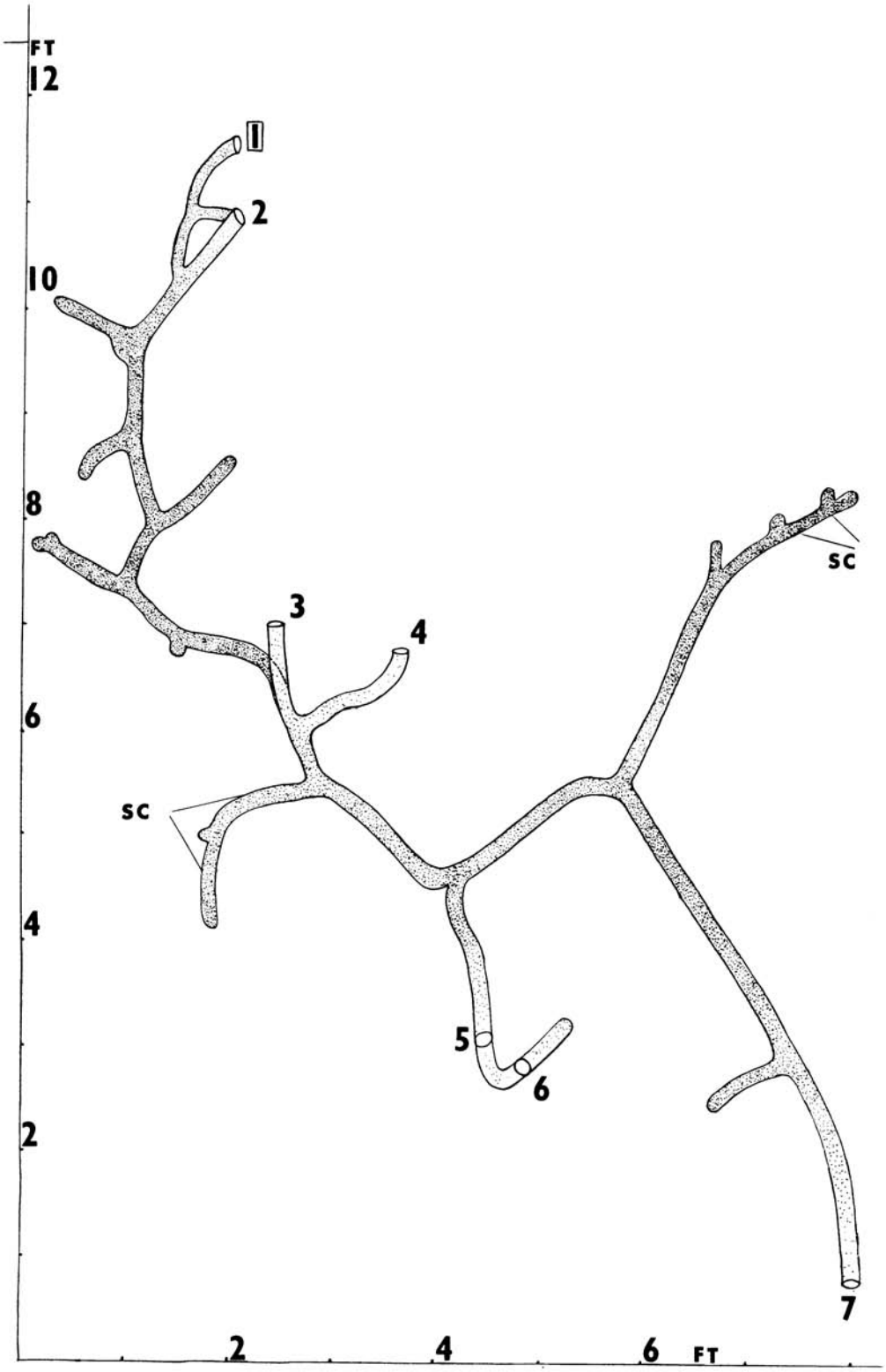


Figure 6.

various species of owls. In 1963 when the rodent population of the Park was very large owls were common; in 1966 they were virtually absent.

The burrows discussed here were all situated near to the rest camp at Twee Rivieren, with the exception of one at Nossob Camp some 90 miles upriver from Twee Rivieren. Those at Twee Rivieren were situated in a dune street, on flat patches with calcrete rocks occuring on the surface, and on west-facing slopes with deep sand; vegetation (where present) consists mainly of scattered clumps of grasses and some Driedoring bushes (*Rhigozum trichotomum*). This area falls in zone V (Leistner, 1959). The single burrow excavated at Nossob Camp was situated in the consolidated silt of the old river bed next to the camp buildings. The area is covered mainly by grasses and falls in zone III (Leistner, 1959).

Method

Snap traps were used to catch and thus determine the inhabitants of the burrow systems. The selected systems were delimited in the form of a rectangle by means of markers, which were also planted at one-foot intervals along the sides of the rectangle to aid the plotting of the system. Starting from a specific entrance, the main tunnel was first opened up and then the side tunnels, using a spade to remove the bulk of the soil and thereafter by careful manual excavation. The systems were mapped on a grid (graph paper) during the course of the excavation.

Discussion

Desmodillus tends to congregate in colonies inhabiting fairly complicated and extensive burrow systems, although the intricacy of and area covered by individual systems vary considerably. It would appear, however, that the burrows of *Desmodillus* are more intricate and extensive than previously thought (Roberts, 1951). Systems close together (up to a few yards apart) are commonly linked by a number of well-defined pathways; where these systems occur in open areas these pathways sometimes continue away from the systems to nearby clumps of vegetation. It would seem, therefore, that *Desmodillus* is a communal animal, although the number and composition of the individuals in a specific system was not ascertained. As far as activity outside the burrow is concerned, the Namaqua gerbil is strictly nocturnal; inside the burrow some animals are active throughout the day as well, as shown by leads from a thermistor thermometer being gnawed through quite close to the entrance holes during the day.

The area covered by individual systems varies considerably (see figs. 1 and 6). Correspondingly, the number of entrances varied between one (fig. 1) and seven (fig. 6). Except in the case of the system still under construction (fig. 1) it could not be ascertained whether the burrows excavated were new, or old systems re-inhabited. The latter was probably the case in most instances, taking into account a number of disused burrows in the vicinity.

The burrows at Twee Rivieren are situated in a dune street with a top layer of very loose (and dry) sand from 2 inches to 9 inches thick, with moister and more consolidated sand below. The diameter of the burrows is approxi-

mately 53 mm; from the entrances the burrows slope down quite steeply to below the loose top layer. The depth of the tunels varies considerably, mostly between 1 and 2 feet below the surface. Only very occasionally does the depth exceed 2 feet. In most of the systems one or more blocked entrances were encountered, some being blocked for quite a distance. Blind alleys and small chambers leading from the main tunnels are common. Both seem to be used as food storage chambers (see figures). Faecal pellets were found all along the systems, but they were seldom concentrated in specific spots.

Where the burrows occur in an area with calcrete rocks reaching the surface the system tends to be more intricate than elsewhere, as the direction of the tunnels is influenced by the presence of rocks. Blind alleys are, therefore, even more common than in systems occurring in sand without rocks, and the tunnels wind around, underneath and through cracks in the rocks.

The one system excavated at the Nossob Camp corresponds in complexity to those occuring in sand at Twee Rivieren, but the tunnels are deeper below the surface.

Seeds of the dubbeltjie (*Tribulus* spp.) has been stated to be the staple diet of *Desmodillus* (Roberts, 1951; Davis, 1962) and these seeds were found in most of the systems analysed, with large storage chambers in some of the systems, and smaller chambers in others. The systems near the rest camp at Twee Rivieren also contained seed pods of the mesquite tree (*Prosopis* sp.) which indicate that *Desmodillus* on occasion will forage up to at least 30 yards.

In one system (fig. 4) an enlargement in the main tunnel was encountered. The diameter of this enlargement was approximately 16 cm; it was filled with finely shredded pieces of grass (in somewhat mouldy condition) and probably represents an old nesting site.

In April a few recordings of the temperatures and relative humidity in one system were made by means of an Atkinds psychometer. The nosepiece of the instrument was inserted some four inches into the entrances and air was drawn over the dry and wet bulbs for about a minute at a time. Probably on account of the loose upper layer of sand being hot and dry, the temperatures in the first foot or so of the burrows were constantly higher than outside, and the relative humidity constantly lower. Deeper down in the burrows, however, the reverse would probably be the case (Bolwig, 1958). As is to be expected the temperature inside the burrow fluctuate less than outside, and the same applies to the relative humidity.

The associated fauna consisted of both vertebrates and invertebrates; at least three species of lizards, two of scorpions (families Buthidae and Scorpionidae) and large numbers of large millepedes were encountered in the systems.

Acknowledgements

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