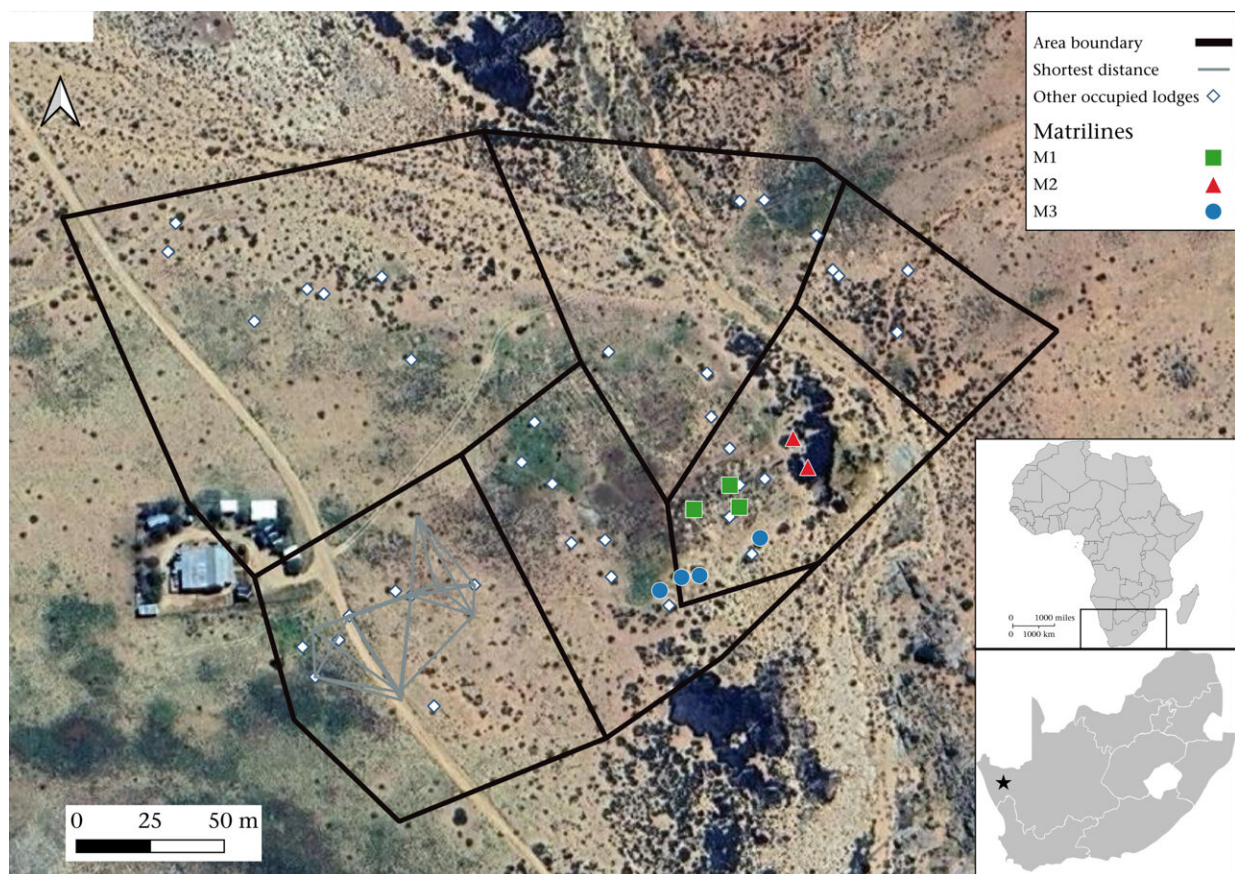


Some solitary mammals have surprisingly social lives: What one researcher has learned from a tiny south African rodent

August 13 2024, by Lindelani Makuya



Satellite image of the field site (star in insert map). Credit: *Animal Behaviour* (2024). DOI: 10.1016/j.anbehav.2024.06.022

We probably all know someone who lives a solitary life. But not everyone realizes that there are solitary individuals in the animal kingdom, too. Examples of solitary species are some shrews, and large predators, such as [black bears](#) (*Ursus americanus*) and [leopards](#) (*Panthera pardus*).

Solitary living is defined by the social organization of individuals, where both males and females sleep and forage alone for more than 50% of the time and mainly meet for courtship and mating.

My Ph.D. advisor, Carsten Schradin, and I [have examined](#) solitary living among mammals based on evidence from paleontology as well as from [comparative studies](#). Our findings suggest that these mammals' ancestors lived in pairs, not alone—which suggests that solitary living must have evolved as a specific adaptation.

This knowledge contributes to the bigger picture of mammalian social evolution and is key to conservation efforts for solitary mammals. Many endangered mammal species are solitary. By understanding the behavior, constraints and adaptive value of solitary living, we can do more to [conserve them](#).

However, as we and other behavioral ecologists are realizing, life for many solitary animals is more complicated than we previously thought. More and more solitary species have also been found to be social. They may live alone, but they sometimes interact with other members of the same species, and these engagements are [often amicable](#). This contradicts [earlier understandings](#) that suggested solitary mammals were always aggressive and avoided members of their own species.

The species I'm studying for my Ph.D. is a case in point. In [a new paper](#) we've been able to show that the bush Karoo rat (*Otomys unisulcatus*) from the succulent Karoo in South Africa's Namaqualand region is not

as solitary as was believed. It has a kin-based [social structure](#): Though an individual will live alone, its neighbors tend to be close kin, and these close relatives overlap more in their ranges than do non-kin neighbors.

By learning more about the bush Karoo rat and other solitary mammals like it, scientists can get closer to understanding the different forms of social systems that led to solitary living.

The bush Karoo rat

The bush Karoo rat is a small rodent (adults weigh about 100g) endemic to the semi-arid succulent Karoo and Nama-Karoo regions of South Africa. These little animals build extensive stick nests (lodges) that are 100 times bigger than themselves and can be used by multiple generations. Lodges offer a favorable micro-climate with high humidity and mild temperatures as protection against the harsh Karoo environment.

To better understand how the rats interact with other members of their species, we fitted 125 individuals with mini-GPS data loggers. This was the [first study of its kind](#) worldwide to use these loggers on a small rodent.

Unpacking the data

Using the GPS data, we found that although bush Karoo rats are mostly solitary living, small kin groups can form which consist of either a mother and her adult offspring, or sibling pairs. The daily home ranges of neighbors overlapped more between kin than between non-kin.

Our study added to growing evidence on solitary living, showing that there is lots of complexity, which is mostly driven by kinship. The

female kin structure and rare female kin groups we observed could indicate the starting point for the evolution of social groups.

In other words, we hypothesize that mammal social groups may have originally formed, long ago, when female kin started living in [close proximity](#) with each other and interacting in various ways.

These findings further echo what's been discovered about some other rodent species, such as the giant kangaroo rat (*Dipomys ingens*), which is endemic to California in the US. Females of this species often have close female kin as [neighbors](#). They share resources, reducing competition.

What comes next?

The next question, which will require us to collect more data with mini-GPS loggers, is whether bush Karoo rat individuals who overlap also share more food resources. If this is the case, it may be an indication of early forms of mutual cooperation, as observed in many group living [species](#).

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