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A contribution of the ecology of the Steppe pangolin *Manis temminckii* in the Transvaal

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Abstract

Various aspects of the ecology of the Steppe pangolin in the Transvaal are discussed. These include distribution outside the Kruger National Park, activity times and movement. Food and feeding are discussed as well as aspects of reproduction and growth. Mortality factors and Management problems, indicate the necessity for greater in-depth studies of these enigmatic animals.

Introduction

The Steppe pangolin *Manis temminckii* is probably one of the least known mammals in Africa in spite of its fairly extensive distribution from Sudan in the north to the northern Cape Province and Orange Free State in the south. Various authors (Smithers 1971, 1983; Dorst and Dandelot 1970; Kingdon 1971; Stuart 1979; Rautenbach 1982; Coulson 1989) have recorded the distribution and aspects of habits and feeding. Van Ee (1966) recorded the first successful breeding of this animal in captivity. An extensive account concerning the biology of pangolins including *Manis temminckii* was written by E. Mohr (1961). Despite these accounts the Steppe pangolin largely remains an enigma. This paper contributes towards the biology and ecology of the species in the Transvaal.

Materials and methods

During the period 1977 to 1983, 32 records of pangolins seen by farmers and Nature Conservators were examined by the senior author. In many cases the animals were confiscated from members of the public and returned to the sites of origin. In two cases the pangolins were rehabilitated at sites far from their original haunts with no success. These rehabilitations were monitored using transmitters.

A transmitter was also used to follow a single female on several farms in the Thabazimbi district for a period of two weeks. The transmitters used in all cases were SM1 type (AVM-Instrument Co.), and LA12 receivers (AVM – Instrument Co.) were used in tracking.

The radio transmitters were attached using fibreglass resin and steel (0,008 gg) wire. Four small holes were drilled through one of the large posterior dorsal scales (near the root of the tail). Two small loops were made with the wire which then held the transmitter to the scale. Liberal application of resin attached the transmitter firmly to the scale and gave excellent waterproofing. The trailing antenna was made from steel guitar wire (0,008 gg) and 45 cm long (¼ wave length, frequency 148 mHz).

Tracking was done on foot using hand-held yagi antennae. Monitoring of the rehabilitation animals started at dusk while that of the free ranging female continued as the animal became active, both day and night. During the tracking of this female, sites visited and fed at, were examined and the prey collected. These were then identified. The pangolins did not react to torch light and carried on foraging unconcernedly, allowing a relatively close monitoring of movement.

Results and discussion

Distribution

The Steppe pangolin is widely distributed in the Transvaal being found in the bushveld areas of the western, northwestern, northern, north-eastern and eastern Transvaal. It is obvious from the frequecy of sightings that the western and north-western Transvaal are the stronghold of the species outside of the Kruger National Park, (Figure 1). Most sightings (69 %) were made between May and October possibly because it is easier to find them when the vegetation cover is least.

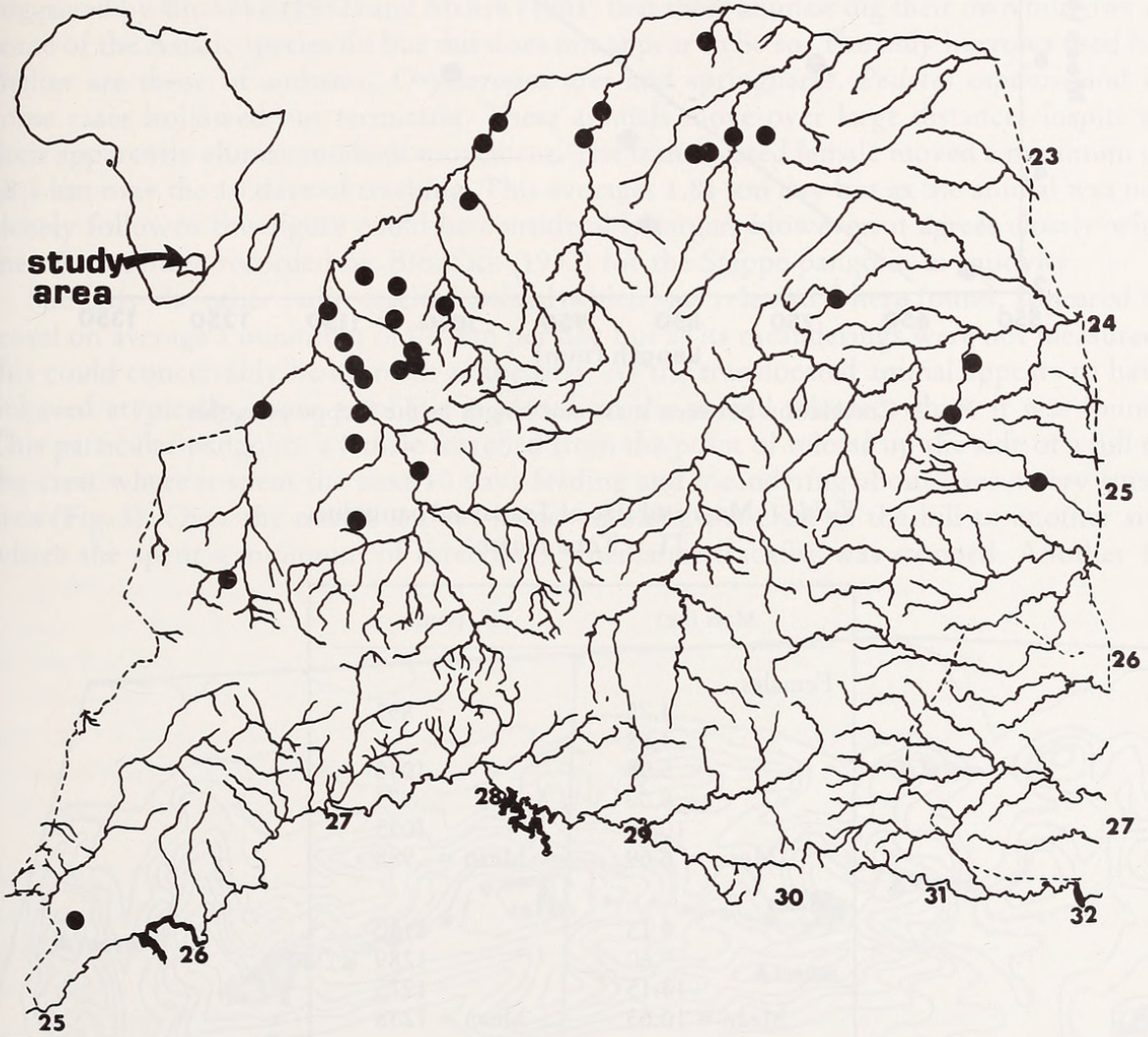

Fig. 1. Distribution of the Steppe pangolin *Manis temminckii* in the Transvaal, outside of the Kruger National Park during the period 1977 to 1983

Size and mass

Steppe pangolins in the Transvaal, are relatively small mammals reaching 1,3 m in length (nose tip to tail tip) but are most often between 0,7–1,0 m in length (Table 1). Males appear to be heavier and larger than females and there is a linear correlation between mass and length (Figure 2).

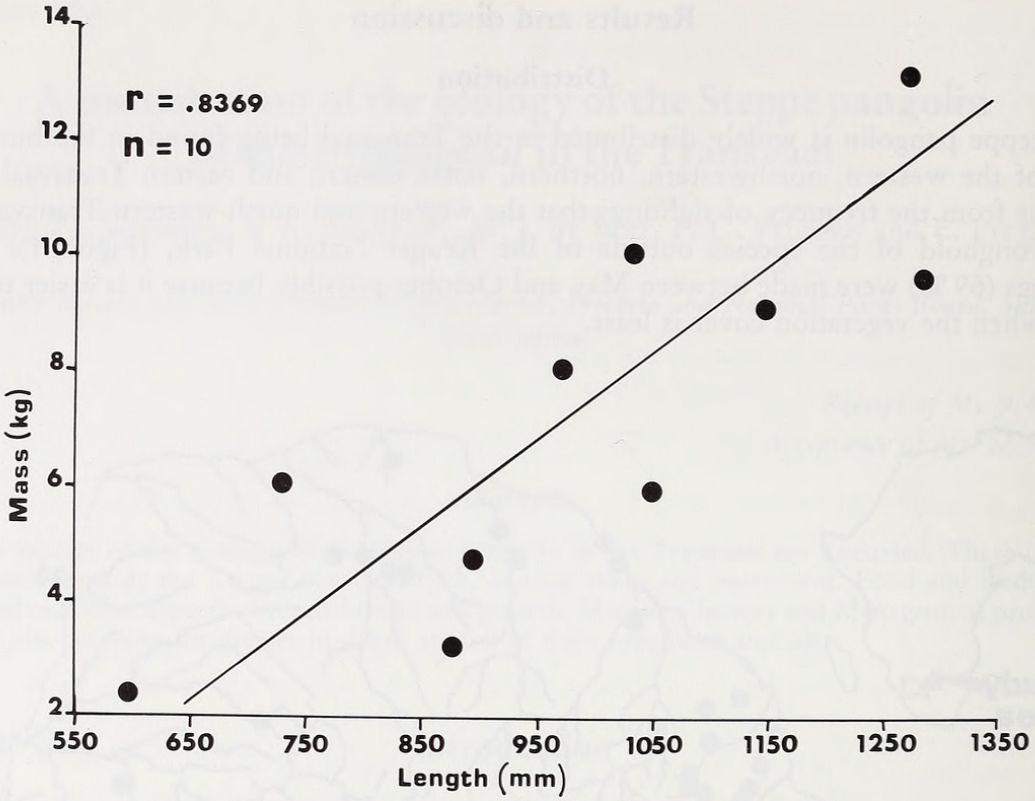

Fig. 2. Correlation between mass and length in the Steppe pangolin

Table 1. **Mass and size of Transvaal pangolins**
TL = Total length

Mass (kg)	TL (mm)
Females	
4.75	893
4.68	–
5.95	1040
8.00	973
10.09	1035
Mean = 6.69	Mean = 988
Males	
9.15	1150
9.60	1289
13.15	1275
Mean = 10.63	Mean = 1238
Juveniles	
0.39	–
0.50	–
2.40	595

Habits

Steppe pangolins are generally recorded as being nocturnal and partially diurnal animals (Smithers 1983; Dorst and Dandelot 1970; Kingdon 1971). According to recorded sightings and while radio tracking these animals it is apparent that they are crepuscular but forage into the night and even into the early hours of the morning, while also being found in broad daylight especially during the late afternoon. A summary of 17 pangolin sightings

by various observers in the Transvaal over a period of six years indicate a high frequency of activity (56 %) between 16h00 and 18h00. The remaining animals were observed at various times between midnight and midday.

An adult female translocated from the Vryburg District in the northern Cape Province and released on the farm Elandsfontein in the Thabazimbi District, Transvaal remained strictly nocturnal and moved about between 18h30 and 24h00, over a period of 10 days. Another female followed over a period of 18 days, initially followed a similar pattern of activity but changed its activity pattern repeatedly, becoming active in the early afternoon and sleeping by early evening (20h30).

The Steppe pangolin in the Transvaal spends these resting periods in available cover which is usually under a large rock, pile of stones, litter and vegetation. It has been suggested by Bigalke (1932) and Mohr (1961) that these animals dig their own burrows as some of the Asiatic species do but this does not appear to be so. The only burrows used for shelter are those of antbears, *Orycteropus afer* and springhares, *Pedetes capensis* and in some cases hollowed out termitaria. These animals move over large distances inspite of their apparently clumsy mode of movement. The translocated female moved a minimum of 18.1 km over the 10 days of tracking. This averages 1.81 km day but as the animal was not closely followed this figure could be considerably larger. However, it agrees closely with the 50 m/minute recorded by Bigalke (1932) for the Steppe pangolin in captivity.

Similarly the other radio-tracked animal which was released where found, appeared to travel on average a minimum of 0.7 km per day but as its meanderings were not measured, this could conceivably be as much as the first. As the translocated animal appears to have behaved atypically, more emphasis is placed on the animal released where it was found. This particular pangolin, a female travelled from the point of release up the side of a hill to the crest where it spent the next 10 days feeding and meandering about over a very small area (Fig. 3). Over the next five days it moved along the crest of the hill to another site where she spent a minimum of three days whereafter tracking was stopped. Another 18

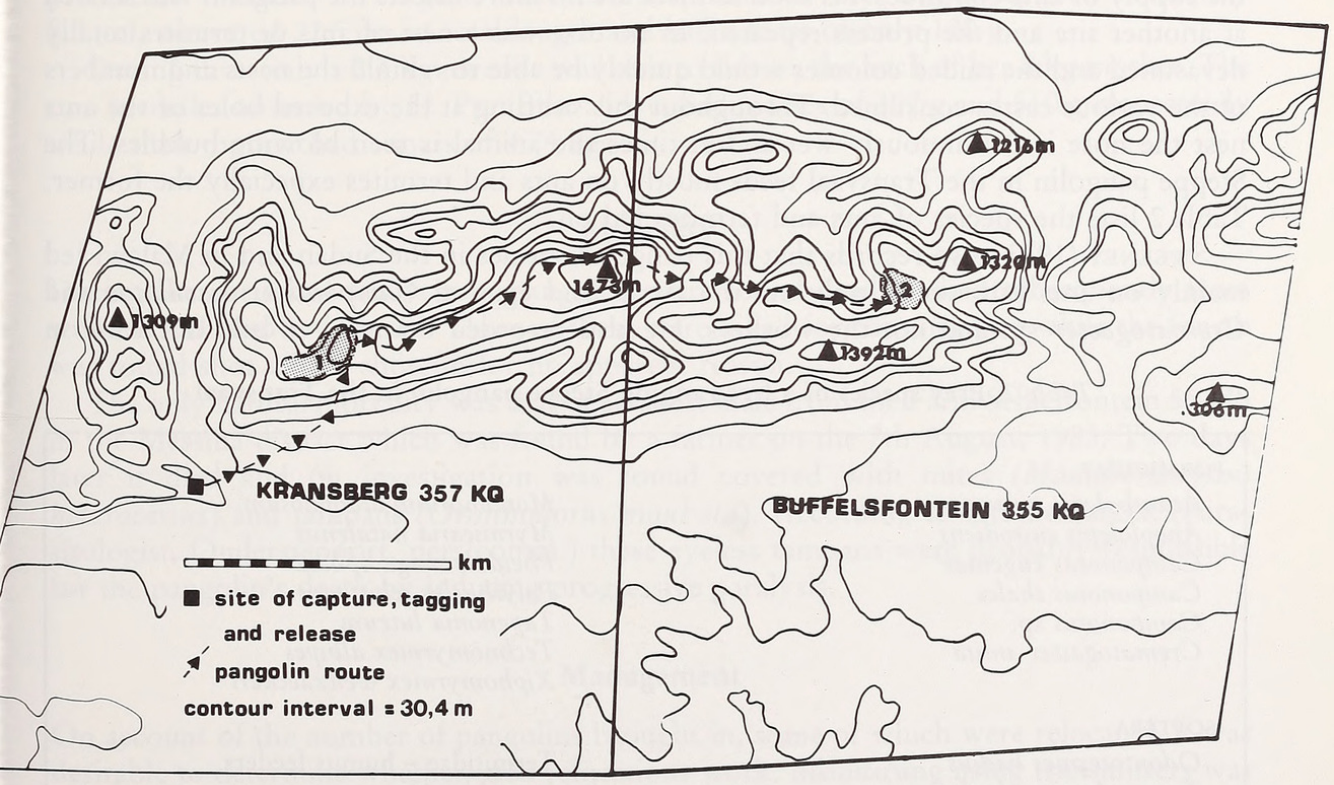

Fig. 3. Movements of a resident Steppe pangolin over a period of 18 days. The shaded areas 1 and 2 are where the pangolin foraged over 11 and a minimum of 3 days respectively

days later the signal from its transmitter was located in the close vicinity of where it was last seen.

It is apparent that the animal used a system of bases from which it foraged, obviously locating sufficient food on her excursions. In fact she was seen to forage in places where she had previously foraged. The foraging excursions were of relatively short duration ranging from five to six hours. When she went to ground she chose sites under and among boulders and stumps and in holes, on occasions using the same holes as she had on previous occasions and on other occasions new hiding places. One such site was used for seven days with the animal returning to it after each foraging excursion. On one hot day (28 March 1981) the female was observed to lie up in the shade of some small trees and rest. It was then observed to lie on its back and expose its bare belly. This was moist, whether from sweat or urine and permitted the animal to cool off. Such stops occurred on several occasions thereafter, lasting from a couple of minutes to as much as 1½ hours. It was noticed that all pangolins kept in captivity urinated on themselves squirting urine in short bursts.

This obviously has a cooling function but also permits the animal to advertise its presence to other pangolins as it moves about an area. This was confirmed while following the female on the farm Kansberg, where she was seen to leave wet marks on the rocks which she traversed. In addition, the urine has a pungent odour which is recognisable by humans and therefore even more pronounced to the smell sensitive pangolin.

Foods and feeding

Pangolins forage by walking slowly along sniffing in likely places. Once a nest of ants or termites has been located the pangolin rips open the nest with the short powerfully armed front feet. The exposed holes are sniffed at extensively and the tongue is only extended down those holes where there are large quantities of these insects, other holes are ignored. At each site the animal will remain still with its tongue extended down the hole and while the supply of ants continues. As soon as there are no more insects the pangolin will scratch at another site and the process repeated. In no case was a nest of ants or termites totally devastated and the raided colonies would quickly be able to rebuild the nests and numbers of the various castes consumed. Throughout this sniffling at the exposed holes of the ants nest the nose is continuously wet and at times the animal is seen blowing bubbles. The Steppe pangolin in the Transvaal feeds mostly on ants and termites expecially the former. Table 2 lists the species of ants and termites fed on.

Sweeney (1973) also records that this pangolin species in the Sudan and in Malawi fed mainly on ants but would only eat the larvae and eggs of *Camponotus maculatus* and *Crematogaster* sp. and not the workers. He also recorded that they would not feed on

Table 2. **Prey species of a free ranging Steppe pangolin in the Transvaal**

FORMICIDAE	
Acantholepis capensis	*Monomorium albopilosum*
Anoplolepis custodiens	*Myrmicaria natalensis*
Camponotus eugeniae	*Pheidole megacephala*
Camponotus thales	*Polyrhachis schistacea*
Camponotus sp.	*Tapenonia luteum*
Crematogaster amita	*Technomyrmex albipes*
	Xiphomyrmex weitzaeckeri
ISOPTERA	
Odontotermes badius	Termitidae – humus feeders
Trinervitermes rhodesiensis	(possibly *Alyscotermes* sp. or *Astalotermes* sp.)

Trinervitermes geminatus. In Malawi they were observed to eat worker driver ants, those of several *Camponotus* species and *Trinervitermes* sp. nymphs. The pangolins were reluctant to feed on *Odontotermes smeathmani* when the nest was unopened, but would eat these termites when the nest was artificially broken open. SWEENEY (1973) also recorded that the pangolins never broke open nests of *Trinervitermes* and *Macrotermes* but ate the termites when these were found. The pangolin foraged for termites under cow pats and wood sometimes picking these up and holding them to the chest.

Although this last observation has not been observed in the Transvaal, it has also been found that pangolins do not break open *Trinervitermes* or *Macrotermes* nests but appear to concentrate on litter feeding termites and on those termites found away from the nest. They do, however, concentrate far more on ants of the family Formicidae as the accompanying table shows.

A large male Steppe pangolin defaecated, after being in captivity for approximately 60 h, 160 g of faecal material, largely soil but also some vegetation, sand, remnants of formicid ants and termites. There were even several stones measuring up to 9 × 3 mm. These are no doubt accidental ingestions. Another day later this animal voided a further 107.5 g of faecal material much the same as the last. Therefore this animal had ingested at least 267.5 g of food and secondary material prior to capture as no food had been consumed since.

Reproduction

The Steppe pangolin gives birth to a single neonate (VAN EE 1966; SMITHERS 1983; MOHR 1961; COULSON 1989). This was substantiated during the course of this study with one exception, that of a female, observed by H. PETTIFER (pers. comm.) on the farm Tangala in the Transvaal lowveld, accompanied by two young of similar sizes which indicated that they were from the same litter. This would be the first recorded birth of twins in the species.

During the course of this study an injured female gave birth to what appears to be a premature neonate, in August. This neonate, born at the Onderstepoort Veterinary School, measured 22.5 cm in total length and had a mass of only 120 g.

During this study a 2.4 kg juvenile was seen to ride on the back of her 8 kg mother. The two juveniles observed by H. PETTIFER above, had masses of 392 g and 510 g respectively while their mother had a mass of 4.74 kg.

Mortality

During the period of study, four pangolins were found dead or died subsequently from wounds inflicted by humans. Three of these were killed for consumption while the fourth was found shot with a shotgun for no apparent reason.

The only natural mortality was that of an adult male from the Farm Schietfontein 55 MS in the Messina district which was found by a farmer on the 7th August, 1983. Two days later it died and on investigation was found covered with mites (*Manitherionyssus heterotarsus*) and tampans (*Ornithodorus moubata*). According to Dr. BOOMKER (Parasitologist, Onderstepoort, pers comm.) these eyeless tampans were probably responsible for the pangolin's death by inducing progressive paralysis.

Management

On account of the number of pangolins brought in, some of which were relocated, it was desirable to determine whether such relocations work. Monitirung using transmitters was only carried out with two individuals one of which subsequently proved to have been injured by a knife or spear in the upper region of the hind limbs. In both cases the animals

were found dead 10 days after release. Mention has already been made of the female from Vryburg, while the injured animal came from the Thabazimbi District and was released at the Hans Strydom Dam Nature Reserve on top of the Waterberg. The female from Vryburg was found dead with the head and soft parts of the body consumed. Whether the death was a result of predation or stress could not be deduced as rains had obliterated any tracks. From the behaviour of this animal it is likely that relocations or translocations may be unsuccessful. Until more knowledge of this species' habits is acquired it seems wise at this stage to only attempt to relocate confiscated animals in those vicinities where they were initially found and not try to translocate them to nature reserves where their death could result.

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Zusammenfassung

Ein Beitrag zur Ökologie des Steppenschuppentieres Manis temminckii in Transvaal

Angaben über das Steppenschuppentier (*Manis temminckii*) in Transvaal werden zusammengetragen: Verbreitung außerhalb des Krüger-Nationalparks, Körperlängen und Gewichte, Aktivität und Ernährung. Die Bewegungen eines Weibchens wurden längere Zeit telemetrisch kontrolliert.

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