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THE OCCURRENCE AND DISTRIBUTION OF *TROX* (COLEOPTERA, TROGIDAE) IN THE KRUGER NATIONAL PARK

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Abstract – Eleven species of *Trox* are recorded from the Kruger National Park, Republic of South Africa, and their distribution mapped. Six of these have a widespread distribution in the Ethiopian region. Elements of tropical northern (e.g. *T. mutabilis* Haaf), eastern (e.g. *T. unguicularis* Haaf) and south west arid (e.g. *T. zumpti* Haaf) faunas in the Park are discussed. *Trox radula damarinus* Pér. is re-established as a valid species on account of its distribution and the male genitalia.

Introduction

The Kruger National Park (KNP), Republic of South Africa, is an area of faunal transition, lying on the edge of the tropics and at the southern end of the lowveld that commences in Rhodesia (Kemp 1974). It was thus decided to investigate the *Trox* fauna of the KNP as part of a systematic and zoogeographical study of *Trox* of Africa, south of the Sahara.

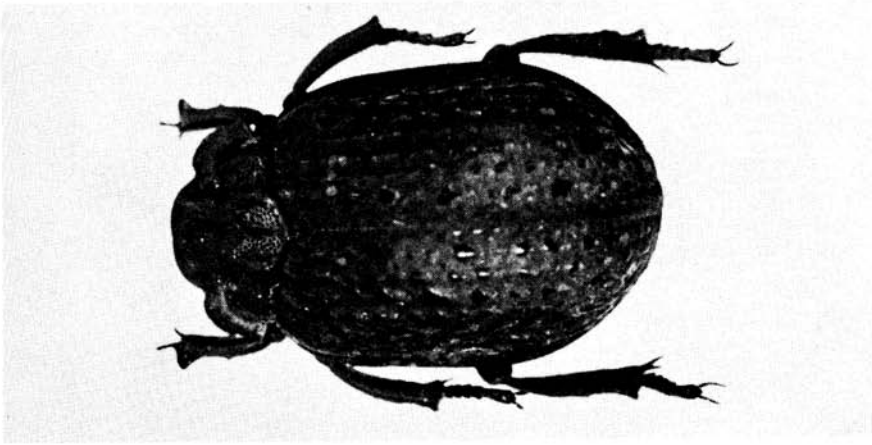


Fig. 1. A typical species of *Trox, T. squalidus* which is widespread in the Ethiopian region.

Adults (Fig. 1) and larvae of the genus *Trox,* which have a world-wide distribution, feed almost exclusively on decaying animal matter and are usually among the last of the succession of insects that invade carcasses (Britton 1970). They also feed opportunistically on carnivore faeces, owl pellets and other matter of animal origin. Van Emden (1948) reported *Trox procerus* Har. Larvae feeding on desert locust eggs in Somalia, but it is doubtful if these would be specific to the food source.

Because of the abundance of large carnivores and prey in the KNP, a situation is maintained where *Trox* can occur in large numbers. Owing to their association with carcasses, *Trox* may contribute to the spread of anthrax in the KNP a fact which has been recorded for flies feeding on carcasses (Pienaar 1961). Anthrax is a significant limiting factor of the roan antelope *Hippotragus equinus* population in the Park (de Vos, van Rooyen and Kloppers 1973).

Kemp (1974) recorded three major avifaunal elements in the KNP; a northern, tropical element; a south west arid element and an eastern coastal element. These faunal elements were compared to the *Trox* distribution patterns. According to Pienaar (1963, 1964 and 1966) the Lebombo Hills, which form the eastern boundary of the KNP, form a clear faunal barrier for the smaller mammals, reptiles and amphibians. It appears that this also applies to certain species of *Trox* which have the outer limits of their distribution in the Park.

The survey took place in December 1977 and 14 days were spent in the Park.

Material and Methods

Three basic methods were used to collect *Trox* specimens: baited pitfall traps; the examination of carcasses and piles of crushed bone and carcase meal (by-products of the meat-canning factory at Skukuza, which are dumped at various places in the KNP); and the collection of specimens attracted to a 250 watt mercury vapour lamp. Specimens and records in the insect collection housed in the Research Section at Skukuza, in the Transvaal Museum (Pretoria) collection and in that of the National Collection of Insects (Pretoria) were also included in the study.

Baited Pitfall Traps

Plastic buckets (2,5 *l*), were sunk into the ground and baited with rotten meat. Mono-ethylene glycol was placed in the traps as a preservative for trapped insects. To prevent rain from entering the traps a thin metal plate was placed over each trap and raised on the one side, thus forming a sloping cover for water run-off.

Examination of Carcasses and Bone Piles

It was found that very little meat need be present for *Trox* to be attracted and even months old blood stains on the ground remained at-

tractive. Soil under bones, pieces of hide and other remains was carefully examined. Leaf litter and rotten timber up to 3 m from the carcasses were also examined for sheltering specimens.

Seven carcasses (3 elephant *Loxodonta africana,* 2 buffalo *Syncerus caffer* and 2 giraffe *Giraffa camelopardalis*) and five piles of crushed bone and carcase meal were examined. Carcasses or bone piles were found and examined in the vicinity of each of the base camps.

Collecting at Light

A 250 watt mercury vapour light was suspended over a white sheet which was placed on the ground and any *Trox* specimens which were attracted were collected by hand. Adult *Trox* are reported to be strongly attracted to light (Britton 1970).

The survey was started at Skukuza and bases were established at each of the following places: Skukuza, Satara, Letaba, Shingwidzi, Punda Milia and Pafuri. Traps were set in the vicinity of each of these camps which are an average of about 80 km apart. In this way it was hoped to collect a representative sample at each base and so obtain an idea of the distribution of *Trox* in the Park. Carcasses or bone piles were examined or traps were set at 11 localities in the Park: Skukuza, Satara, Mahlobyanine, Kingfisherspruit, Nwanedzi, the Olifants River Bridge, Letaba, Shingwidzi, Shingomeni, Punda Milia and Pafuri, while museum material from a further seven localities was examined.

Due to the extent of the area (1 948 528 ha) this survey must be regarded as preliminary but this report does indicate the occurrence of the predominant species of *Trox* and their distribution in the Park.

Results

The greatest concentration of *Trox* (500 specimens of four species in an area 1 m x 1 m x 15 cm) was found in the ground under the remains of an elephant which had been dead for about one month. All that remained of the elephant were the stomach contents, a few bleached bones and what appeared to be a large blood stain on the ground.

Trox penicillatus Fahraeus

Trox penicillatus was recorded from Nwanedzi and Satara (Fig. 2). Haaf (1953) recorded this species from the Cape, Natal and Transvaal but does not specify which parts of the Provinces. The records from the KNP fall within the arid lowveld (Acocks 1975) but it is possible that *T. penicillatus* has a wider distribution in the Park.

Trox sulcatus Thunberg

Trox sulcatus was only recorded from Skukuza (Fig. 2). This represents a new northern record for the species which had previously only been recorded from the Cape (Haaf 1953).

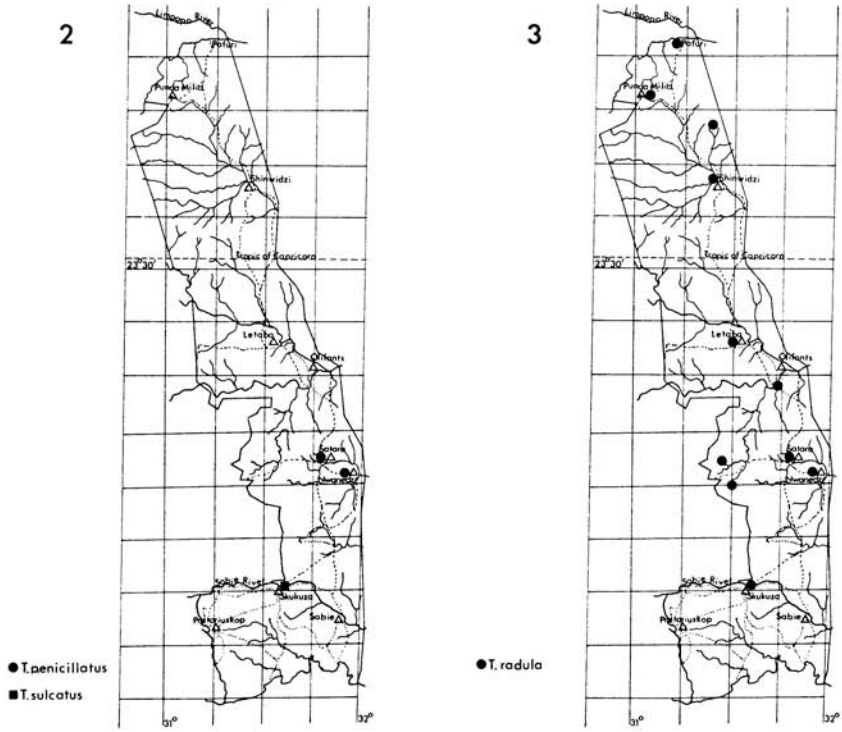


Fig. 2. Distribution of *Trox penicillatus* Fahraeus and *T. sulcatus* Thunberg in the Kruger National Park.

Fig. 3. Distribution of *Trox radula* Erichson in the Kruger National Park.

Trox radula Erichson

Trox radula was recorded from each of the localities in the KNP where sampling was done (Fig. 3) and it was found to be the species which reached the highest population densities. Hundreds of specimens were often found feeding on carcasses or bone piles. *Trox radula* is widespread in Africa south of the equator (Haaf 1954).

Trox damarinus Péringuey

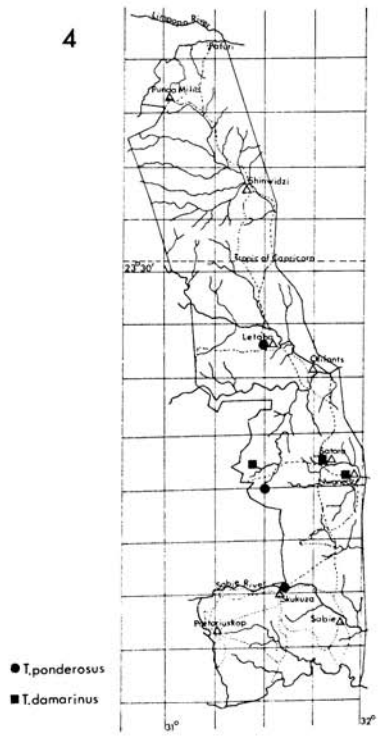
Trox damarinus Péringuey is re-established as a valid species here on account of its distribution and the male genitalia. Haaf (1954) recorded *damarinus* as a subspecies of *T. radula* Erichson but the two species occur sympatrically in the KNP and specimens of the two species were even found feeding on the same carcase at Nwanedzi. The genitalia of the males of the two species differ considerably (Scholtz *in prep.*)

Trox damarinus was recorded from Satara, Nwanedzi and Kingfisher-

spruit (Fig. 4). This distribution falls within the arid lowveld (Acocks 1975) which corresponds with the fact that this species has only been recorded from the dry regions of South West Africa, South Africa and East Africa.

Trox ponderosus Péringuey

Trox ponderosus was recorded at Skukuza, Mahlobyanine and Letaba (Fig. 4). Skukuza is the furthest south this species has been recorded and previously it was thought to occur only in Mozambique, Rhodesia, East Africa and Ethiopia (Haaf 1954). During the present study material was also examined from various localities in the north-eastern Transvaal (outside the KNP) and northern Botswana.



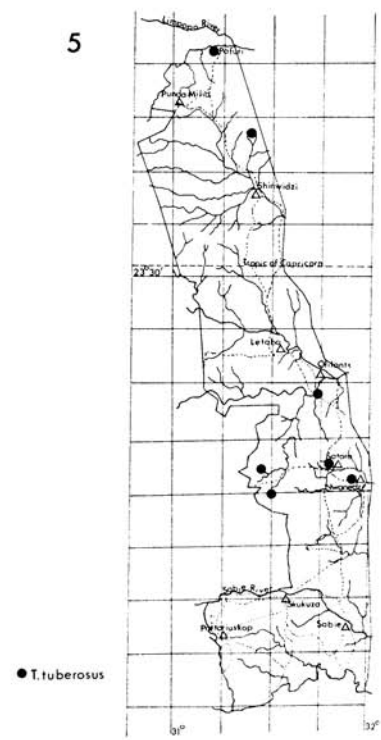


Fig. 4. Distribution of *Trox ponderosus* Péringuey and *T. damarinus* Péringuey in the Kruger National Park.

Fig. 5. Distribution of *Trox tuberosus* Klug in the Kruger National Park.

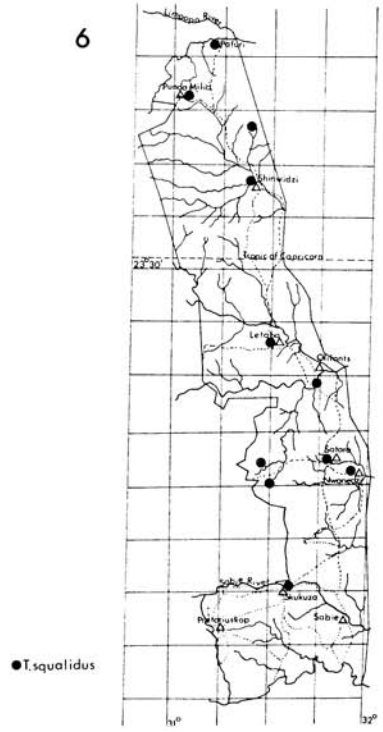
Trox tuberosus Klug

Trox tuberosus was found to be widely distributed from Satara northwards (Fig. 5), and although Haaf (1954) recorded this species from

South Africa without specifying which areas, no material could be traced from any part of South Africa but the Transvaal. Satara appears to be on the southern distribution limit of the species. North of the Limpopo River the species is widespread (Haaf 1954).

Trox squalidus Olivier

Trox squalidus was recorded from each of the localities in the KNP where sampling was undertaken (Fig. 6). This species is widespread throughout the Ethiopian region.



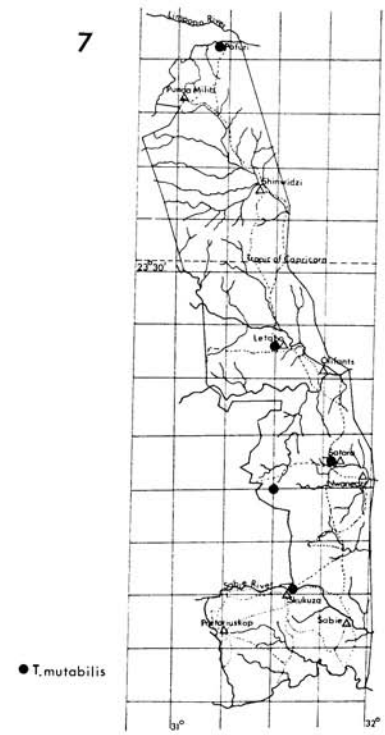
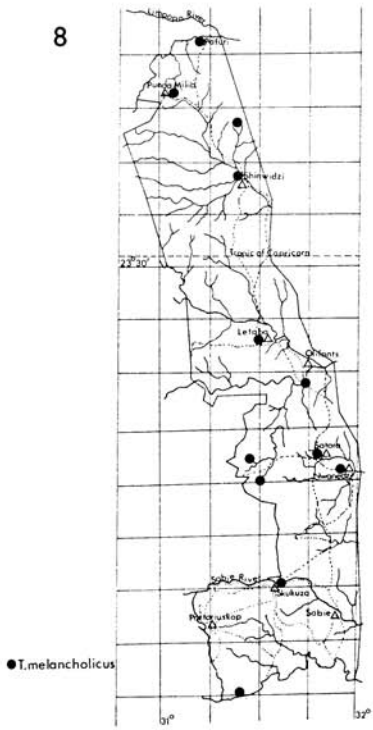


Fig. 6. Distribution of *Trox squalidus* Olivier in the Kruger National Park.

Fig. 7. Distribution of *Trox mutabilis* Haaf in the Kruger National Park.

Trox mutabilis Haaf

Trox mutabilis was recorded at a number of localities from Skukuza in the south to Pafuri in the north (Fig. 7) and is probably widespread in the Park. This species has not been recorded from southern Africa before and the known distribution was restricted to East Africa (Haaf 1954).



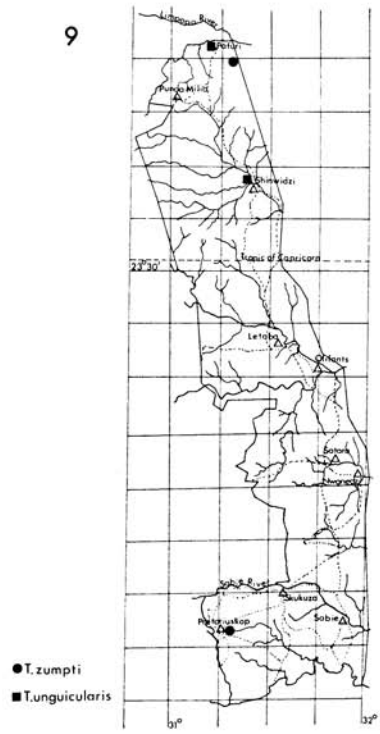


Fig. 8. Distribution of *Trox melancholicus* Fahraeus in the Kruger National Park.

Fig. 9. Distribution of *Trox zumpti* Haaf and *T. unguicularis* Haaf in the Kruger National Park.

Trox melancholicus Fahraeus

Trox melancholicus was recorded from each of the localities in the KNP where sampling was done (Fig. 8). It is widespread in the Ethiopian region.

Trox unguicularis Haaf

Trox unguicularis was only recorded from Shingwidzi northwards (Fig. 9). Haaf (1954) recorded the species from Mozambique, north-eastern Rhodesia and East Africa. It appears as if the Lebombo Hills may act as a barrier for the westward distribution of this species. These hills act as a barrier for the smaller mammals, reptiles and amphibians (Pienaar 1963, 1964 and 1966). The Lebombo Hills which flatten out at a point roughly level with Shingwidzi stretch along the eastern borders of the Park from Shingwidzi southwards.

Trox zumpti Haaf

Trox zumpti was recorded from the Nyandu Sandveld in the north-eastern region of the Park. A doubtful museum record from Pretoriuskop also exists (Fig. 9). The Nyandu Sandveld shows numerous affinities with the fauna and flora of the western arid regions of southern Africa (Kemp 1974). Van der Schijff (1964) reported that this sandveld area shows affinities with Kalahari sands and that certain vegetation types are similar in the two regions. He suggests that the Limpopo Valley may have served as a corridor for the migration of desert savanna species from the west. A. Davis (*pers. comm.*) recorded a scarab *Scarabaeus flavicornis* (Boh.) from this area, which is usually found in the arid sandveld regions of the Kalahari and southern South West Africa. Only 13 specimens of *T. zumpti* are known to exist in collections around the world, all of which were recorded from sandveld areas of South West Africa, Rhodesia, Botswana and South Africa. The two known South African records are from areas where the soil type is described as sandstone, shale, limestone and marl (Uys and Enslin 1970) which only occurs in two areas of South Africa, the Nyandu Sandveld and a narrow strip in Zululand, stretching from Ndumu in the north to Mtubatuba in the south. The specimen from the Zululand sandveld area was collected at Ndumu.

Discussion

Trox diversity was equally reflected by traps, carcasses and bone piles, but as would be expected, numbers of specimens attracted to carcasses and bone piles were much higher than numbers attracted to traps.

The KNP was found to be an interesting faunistic area with clear transition of various *Trox*-faunal elements within its borders. Elements of the tropical northern (e.g. *T. mutabilis*), eastern (e.g. *T. unguicularis*) and south west arid (e.g. *T. zumpti*) faunas as reported by Kemp (1974) for the avifauna, are also present in the case of *Trox*.

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