

## STUDIES ON THE BIOLOGY OF *COSMIOMMA HIPPOPOTAMENSIS* DENNY, 1843 IN SOUTH WEST AFRICA

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### SUMMARY

A very rare African tick, first described in 1843<sup>1</sup>, *Cosmiomma hippopotamensis*, has been found again, this time in relatively large numbers, on vegetation in Kaokoland, South West Africa. Studies on certain aspects of its ecology and on its reactions to various potential hosts suggest that under natural conditions it prefers to feed on the black rhinoceros, *Diceros bicornis*.

### INTRODUCTION

*Cosmiomma hippopotamensis* Denny, 1843 has been found previously only in small numbers on a few occasions in south-western and eastern Africa. Little has been recorded about its hosts and nothing about its ecology.

Nine adults, including the types of this species, in the British Museum (Natural History) are said to have been collected in the 'Interior of South Africa'. According to Hyatt<sup>2</sup>, the original specimens (Accession No. 43.19: 1 ♂, 4 ♀ ♀) were obtained by a collector for the Earl of Derby, named Burke, at the 'parallel of Lalagor', a locality which cannot be traced now. The male and one female bear labels stating that they were found 'on Hippopotamus'. Three of the remaining four specimens (Accession No. 60.86: 1 ♂; 60.116: 2 ♀ ♀) were collected by Anderson at Lake Ngami but no mention is made of their hosts. The ninth specimen, a male, bears neither host nor locality data.

Later, a few specimens of *C. hippopotamensis* were recorded from East Africa by Neumann<sup>3</sup>, Hoogstraal<sup>4</sup> and Arthur<sup>5</sup>, also without host data. The species was found again in South West Africa in 1959, over 100 years after its original discovery there, when three males and three females were obtained at Ohopoho and Otjijanjasemo in Kaokoland, where they were said to be common on goats<sup>6,7</sup>. In 1964 Serrano<sup>8</sup> recorded another

two males from the black rhinoceros in the Cuando-Cubango Districts of Angola.

The intriguing fact that *C. hippopotamensis* was once said to be common on goats<sup>6</sup> and had never been seen again, stimulated a more thorough search for it in Kaokoland, a Bantu territory situated in the northwest corner of South West Africa.

### MATERIAL AND METHODS

Photographs of *C. hippopotamensis* were shown to stock inspectors working in Kaokoland and they were asked to be on the watch for such ticks. At the same time a survey was conducted in the area and ticks were collected from goats, cattle and black-faced impala, *Aepyceros melampus petersi*<sup>9,10</sup>.

After about 80 *Cosmiomma* ticks had been found, the area was visited and its physical geography, vegetation and fauna were studied. The way in which the ticks awaited their host(s) was noted, special attention being paid to the level to which they had ascended on the vegetation.

The following attempts were made to feed *Cosmiomma*:

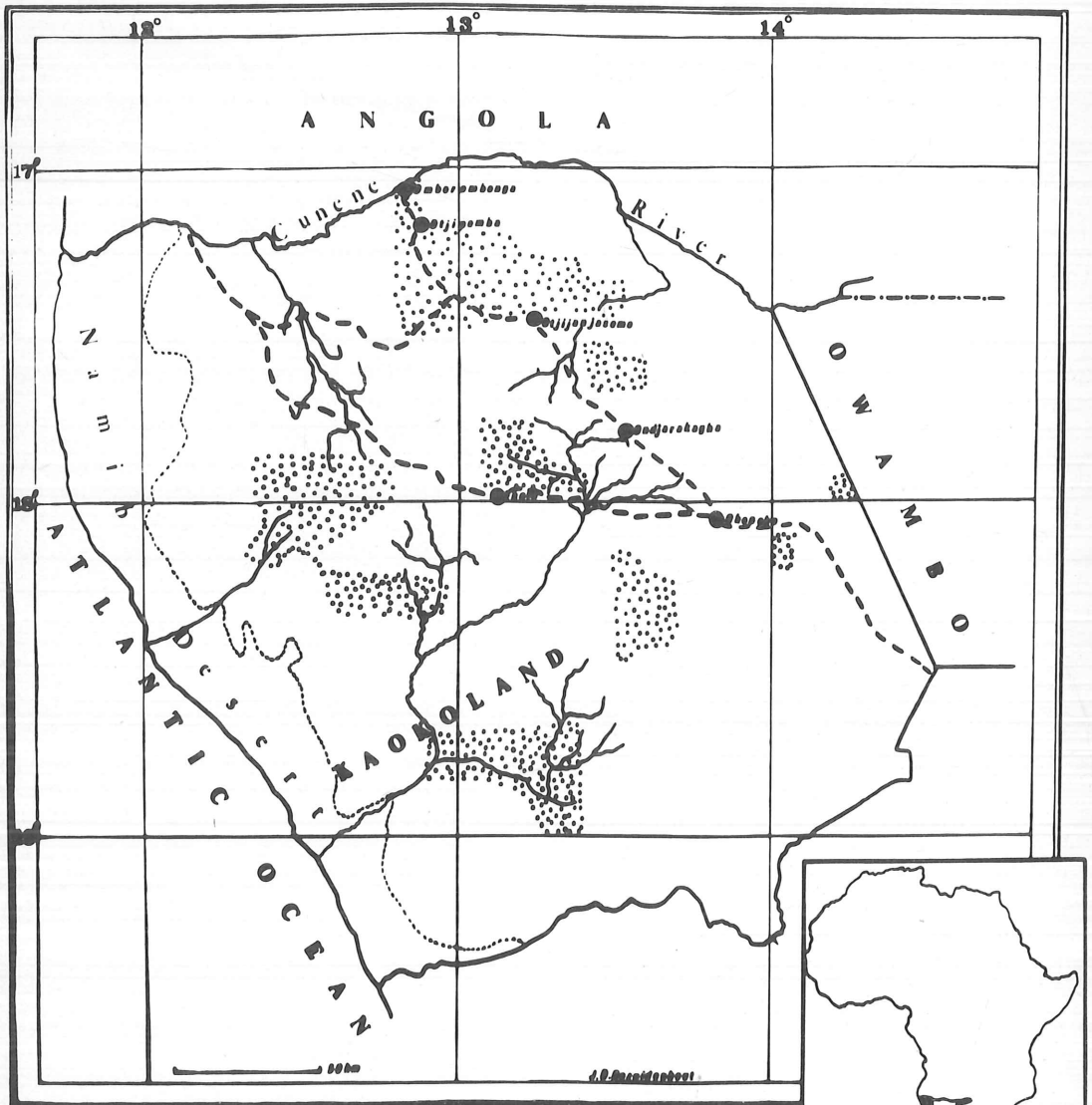
- a) Turtles (*Pelomedusa subrufa*) and tortoises (*Testudo* spp.) were common in parts where collections were made and we suspected that they might be possible hosts. Five *Cosmiomma* ticks (2 ♂ ♂, 3 ♀ ♀) were therefore placed on a turtle with enough water to cover it in a container. This experiment was repeated twice.
- Similar experiments, but without water, were tried with turtles and also tortoises.
- b) A monitor (*Varanus exanthematicus*) was put into a plastic container with some ticks for a period of 8 hours.
- c) Rabbits were tried as hosts by confining the ticks on their ears in bags.

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d) A goat was left for 18 hours tied to a bush which had about 20 *Cosmiomma* ticks on it. In another experiment a bag containing nine ticks (4♂♂, 5♀♀) was secured on the ears of a goat for an hour.

e) A black rhinoceros (*Diceros bicornis*), kindly provided by the Department of Nature Conservation and Tourism of South West Africa, was challenged by means to be described in another paper.



**Fig. I**

•••••	Distribution: Black Rhinoceros
●	Collecting sites: <i>C. hippopotamensis</i>
---	Authors' route

## RESULTS

### 1. Description of the collecting area

Kaokoland is bounded on the north by the Kunene River, which separates it from Angola, eastwards by Owambo, southwards by Kamanjab District and westwards by the Atlantic Ocean.

Relatively high mountains, the Baynes, Zebra and Otjihipa, lie on the north, represent east and west sides of the collection sites and rise in places to a height of over 2 000 metres. The rest of the area is covered mainly by rocky hills. Scattered throughout are numerous dry, sandy river beds, where water flows for a few hours after storms, as well as springs, which only dry up during severe droughts.

The vegetation differs from place to place, depending on whether the area is mountainous or relatively flat. In general, however, the veld-type is savannah with abundant *Colophospermum mopane*. It is further characterized by the presence of various *Commiphora* spp. and *Terminalia prunioides*.

Game is still very prevalent, the commonest species being kudu, impala, zebra and black rhinoceros.

### 2. Ecology of *C. hippopotamensis*

During March, 1971, *C. hippopotamensis* was found at Ondjarrakagha, Otjiboronbonga, Otjipembe and Ekoto, in the north-eastern quarter of Kaokoland between about 17° to 18°E and 13° to 14°S.

These areas are at altitudes between 1 000 and 1 500 metres, with a mean annual rainfall of about 250 mm. Specimens of the tick were collected from the following species of plant: the trees *Acacia reficiens*; *Colophospermum mopane*; *Combretum apiculatum*, *C. imberbe* and *C. hereroense*; *Dichrostachys cinerea* subsp. *africana* and *Securinega virosa*; the shrubs *Catophractes alexandri*; *Euclea divinorum*, *E. pseudebenus*; *Grewia flavescens*, *G. bicolor* and *Ximenia americana*; the grass *Cenchrus ciliaris* and the sedge *Cyperus marginatus*.

Infested vegetation was found along some of the footpaths leading to springs; they were mostly rhino paths where relatively fresh tracks and dung deposits could be seen. The concentration of ticks was greatest near the

water and decreased as one moved away from it; they were never found more than about 40 metres away.

*C. hippopotamensis* was usually collected from the tips of leaves or branches of bushes and from grasses at heights between 50 and 150 cm. Only two specimens were found at different levels. One was sitting 200 cm high in a *C. imberbe* tree and the other on the seed head of a grass, *C. ciliaris*, at a level of 17 cm.

Some bushes contained only one specimen but most carried more; from one a total of 56 ticks was collected. They sat on the side adjacent to the footpath, waiting for a host to pass by. They were only found on both sides of a bush when it was growing in the middle of a footpath. These ticks clumped together on top of each other, sometimes as many as seven being found at the tip of a leaf. Questing was pronounced when they were approached, but stopped immediately the observer got close to them, especially when they were touched. They made no attempt to climb on to the observers' hands or clothing.

### 3. Experimental hosts

a) In one of the three experiments with turtles in water, all nine of the females attached within about 20 minutes but only two of the six males. In the first experiment the ticks remained attached for 7 days but were then found to be dead when closely examined. In the second and third experiments they were dead by the third day. In the experiments conducted without water similar results were obtained.

In the case of tortoises a lower percentage of ticks attached and they also died after a day or two.

- b) *Cosmiomma* did not attach to the monitor.
- c) Rabbits are possible experimental hosts because *C. hippopotamensis* attached and engorged on their ears, though only after these had been shaved. Not all the ticks attached, and those that did, took nearly 2 weeks to engorge partially. Whether these ticks will produce fertile eggs remains to be seen.
- d) None of the *Cosmiomma* attached to the goat.

- e) The black rhinoceros proved to be an excellent host. When the ticks were released on its back they attached in the perianal area within 5–15 minutes. After engorgement, the females laid fertile eggs from which larvae hatched successfully. The rearing of these larvae will be described later.

#### DISCUSSION AND CONCLUSIONS

The writers' initial observations, based on circumstantial evidence, suggested the black rhinoceros as the most likely host of *C. hippopotamensis* in Kaokoland. The hippopotamus, the first recorded host of this tick, does not occur in the area where the present collections were made. A few hippopotami are present in the Kunene River about 90 km upstream from the one collecting site, and they may therefore play a rôle as hosts along the river, but they definitely do not reach the other collecting sites. These sites, however, do correspond with part of the recorded distribution of the rhinoceros in this area (Fig. 1)<sup>12</sup>.

The feeding habits of the rhinoceros are such that the ticks would be able to infest it readily<sup>13</sup>. It usually stands next to the shrub or tree on which it is browsing and sometimes pushes its head right in among the branches, slowly cropping the twigs. The optimum browsing height is between 60 and 108 cm, which corresponds closely with the heights at which the ticks were found.

Also, rhino deposit dung on certain footpaths leading to waterholes, the distances between these deposits becoming shorter the nearer one gets to the water. *Cosmiomma* ticks were also found along these footpaths, increasing in numbers nearer the water.

Subsequently the suitability of the black rhinoceros as a host was proved by infestation experiments with *C. hippopotamensis*. It was found afterwards that this animal already had been listed as a natural host in the Cuando-Cubango District of Angola<sup>8</sup>.

Although cattle, goats and black-faced impala<sup>9, 10</sup> are known to visit infested springs, no *C. hippopotamensis* could be found on them.

The way *Cosmiomma* ticks clump together on top of each other on leaf tips and twigs might be interpreted as a method of moisture conservation.

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