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# The use of Sernylan as an immobilising agent and anaesthetic for wild carnivorous mammals in South West Africa.

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## PRESENT STATUS AND DISTRIBUTION OF CARNIVOROUS MAMMALS IN S.W.A.

The three important predator species in South West Africa, lion *Panthera leo*, leopard *Panthera pardus* and cheetah *Acinonyx jubatus*, are fully protected in the Etosha National Park and other proclaimed game reserves of the S.W.A. Administration, but are regarded as vermin in the rest of South West Africa and the three Northern Bantu territories. Because of the high economic loss to livestock caused by these predators they are not tolerated on farms and are destroyed by being shot dead, trapped in gin-traps or poisoned with chemicals such as strychnine hydrochloride.

### I. LIONS

The present-day distribution of lions in South West Africa is limited to the Etosha National Park, Southern Kaokoveld, Okovango Territory and Western Caprivi. It is only in Etosha National Park however that lions are present in any number; estimated 250-300 during 1967. Occasionally lions leave the Kalahari Gemsbok Park in the southeast



Plate 1. Foot and Mouth barrier fence along eastern boundary of Etosha National Park damaged by elephants. (Photo: H. Ebedes)

of the territory and are killed by farmers in the surrounding areas. Lions from Etosha National Park frequently crawl through or under the well constructed Foot and Mouth Barrier Fence which extends for 280 miles along the eastern and southern boundary of the Park and maraud on bordering farms. The fence is 8' 6" high and consists of 16 strands of steelwire of which 1, 3, 5, 7 and 11 are barbed. The lower stands are 4" apart, the next four 8" apart and the upper wires 12" apart. The wires are supported by railway tracks implanted 3' into the ground and spaced 45' from each other. Wooden droppers spaced approximately 4' 6" from each other and fastened alternately to the upper and lower section of the fence give additional strength to the fence. Although some of these marauding lions return to the Park the majority are killed by farmers. Accurate figures are not available, but it is officially estimated that more than sixty lions were killed along the southern boundary during 1967. Damage caused to the fence by elephants searching for drinking water and certain types of food outside the Park, make the farms more accessible to marauding lions. (Plate 1). Marauding lions can cause considerable loss to livestock, which are easy prey and recently the writer investigated the killing of five cows and a stud bull by two mature lions in one night; most of the carcasses were not eaten. One can only sympathise with farmers suffering from losses such as these and stockowners are justified in seeking revenge.

The most probable reasons for lions marauding on farms are the search for new hunting grounds and territory and the seasonal migrations of zebra, wildebeest, gemsbok and eland away from the permanent waterholes at the start and during the rainy season. Cattle grazing unattended in the proximity of the fence are an attraction to lions and are easily caught. Solitary ageing lions find domestic stock easier prey to kill than wild ungulates.

The loss of lions along the boundary may have a detrimental influence on the prey-predator relationship in the Park. Lions are also one of the main tourist attractions to Etosha National Park and visitors are very disappointed if they do not see at least one lion during a visit to the Park. The provision of a 5 foot high wire-netting fence on the existing sixteen strand 8 foot 6 inch Foot and Mouth Fence, may contain potential marauders within the Park, but they will still be able to leave the Park through breaks in the fence caused by elephants or through erdvark excavations under the fence. Elephants are driven back to the Park by Nature Conservation personnel and the fence is patrolled and repaired by the Department of Agriculture.

By closer liaison with the farmers along the eastern and southern boundary and by obtaining their co-operation, it will in future be possible to capture marauding lions with the aid of dogs to corner them, and drugs and return them to the sanctuary of Etosha National Park. By using the described method one lion has already been successfully immobilised and returned to the Etosha National Park.

## 2. CHEETAH AND LEOPARD

Cheetah and leopard are still fairly well-distributed in some of the settled farming areas of South West Africa, although they have been ruthlessly exterminated in most areas. On farms with a substantial wild antelope population they are seldom troublesome, but with intensified farming procedure and reduction of the antelope population, these predators become a nuisance and their predations on sheep, goats and calves, a cause for considerable concern. A farmer in the Otjikondo area (Van der Colff. Pers. comm.) estimated that during 1967, four cheetah killed sheep and goats valued at more than R500.

Because of their nocturnal habits it is difficult to assess the status of leopard in Etosha National Park. Neither leopard nor cheetah appear to be numerous although there is an abundance of prey. According to Mr. B. J. G. de la Bat who was Chief Warden of S.W.A. for many years, cheetah were regularly seen in the Okaukuejo area during the late fifties. In 1957 Mr. C. Rocher, the present Chief Nature Conservator, saw 13 cheetah on a afternoon's drive from Chudop to Namutoni Fort — a distance of some four miles. According to Nature Conservator Peter Stark (pers. comm.) the number of cheetah in the Park have declined since the early sixties and it is possible that many succumbed to diseases such as rabies, anthrax or distemper. In an attempt to save as many cheetah and leopard as possible from extinction, the South West African Administration has been purchasing these animals from farmers and releasing them in Etosha. Officers of the S.W.A. Nature Conservation Branch assist farmers by setting special catching traps on farms where these animals are reported to be a nuisance. Difficulties have been experienced in getting the animals out of the traps and crating them for transportation to Etosha National Park. The increasing demand for live cheetah and leopard in zoos all over the world and wildlife parks and reserves in Southern Africa where these animals are not numerous, encouraged a South West African wild animal trapper to purchase live animals caught in gin-traps. The price offered for a live animal was often worth more than the skin and several farmers in the Windhoek district co-operated with the licenced game dealer resulting in more than 150 cheetah and several leopard being saved in four years. These cheetahs were released by the National Parks Board and Natal Parks Board in their Parks. The problems of retrieving the wild captured animals from traps, transporting them and treating the wounds, caused by the traps, was solved by injecting Sernylan to immobilise and anaesthetise the animals.

Members of the cat family have strong homing instincts and two cheetah and two leopards purchased from farmers and released in Etosha Park during February, 1968 were reported killed on farms South of the Park within six weeks of being released. These four animals were marked; the three adults with "Sterkolite" neckbands and plastic rotortype ear tags and one leopard cub with plastic ear tags. Immobilising these animals with Sernylan after

they were trapped, facilitated weighing, measuring, marking and innoculating them against rabies and anthrax.

This paper briefly records some of our experiences with immobilising wild carnivores with "Sernylan" (phencyclidine hydrochloride).

#### THE USE OF SERNYLAN

Sernylan (Parke, Davis and Company).

Sernylan or phencyclidine hydrochloride, (1-(1-phenylcyclohexyl) piperidine hydrochloride) acts on the central nervous system causing either depression or stimulation depending on the dosage-rate used and the species. At the recommended dosages there is usually a reduced response to the environment, reduced aggressiveness, ataxia, hypnosis, immobilisation and anaesthesia. Unlike the classical anaesthetics, animals anaesthetised or incapacitated with Sernylan may show the following:

- (1) Simple reflexes such as the patellar and corneal are not completely eliminated,
- (2) The eyes may remain open,
- (3) Muscle tone is increased in most cases, but where a decrease occurs it is not marked,
- (4) Respiration and blood pressure are not usually depressed except in deliberate overdosage.

Convulsions and respiratory depression may result from overdosage. Salivation, decrease in body temperature, disorientation, hyperventilation, anxiety and restlessness have been reported to be the side-effects associated with Sernylan administration." — (Extract from descriptive notes on Sernylan Parenteral by Parke, Davis and Company).

Sernylan is available in multidose containers of 20 mg/ml and 100 mg/ml.

Campbell and Harthoorn (1963, quoted by Graham-Jones, 1964) used a combination of Sernylan 1 mg/lb. plus Largactil (May Baker) 0.4 mg/lb plus Hyoscine 0.05 mg/lb to anaesthetise large Felidae.

Graham-Jones (1964), records the use of Sernylan at a basic dosage rate of 2 mg per kilogram bodyweight with or without Promazine hydrochloride at 1 mg per kilo bodyweight.

Harthoorn (1965) recommends the addition of Pethedine at a rate of 5 mg/lb bodyweight to the Sernylan so that the amount of Sernylan used could be reduced and recovery hastened by reversing the Pethedine with Nalorphine hydrobromide. This drug combination was found useful to prevent respiratory depression in a particularly sick animal. Harthoorn further recommends Sernylan-chlorpromazine combinations and 0.5 mg Sernylan per lb plus 5 mg Scopolamine per 100 lb of bodyweight for field immobilisations. Sernylan is well tolerated by domestic cats and doses of 0.30 mg to 6.0 mg per pound bodyweight were used by Harthoorn without adverse effects.

Young, (1966) anaesthetised a young lioness with 1.4 mg/lb Sernylan + 1.6 mg/lb Largactil and a leopardess with 2.6 mg/lb Sernylan + 3.3 mg/lb Largactil.

Coetzee, (1964) successfully used Sernylan orally to immobilise two captive chimpanzee, *Pan troglodytes*.

Bourn H. (1967 pers.comm.) anaesthetised over seventy wild Chacma baboon *Papio ursinus* required for medical and surgical research in the Cape Province with Sernylan and reported very favourably on the results. Mortality as result of the drugs was nil. Baboons are routinely anaesthetised with Sernylan for experimental kidney transplant operations at the Karl Bremmer Hospital in Cape Town. (Dr. Groenewald 1968 Pers. comm.).

Delfs, W. (1968, pers. comm.) a wildlife trapper and exporter of wild animals, has anaesthetised more than 130 trapped and/or captive cheetah by the oral administration of Sernylan at an average dosage-rate of 0.35 to 0.40 milligrams per pound bodyweight. His method of spraying the drug into the open snarling mouth of the trapped or captive animal by means of a hypodermic syringe attached to the end of a rod six foot long is unique and interesting and presents great possibilities for anaesthetising carnivorous mammals in zoos. Some of the cheetah were immobilised up to six times at intervals of 4 days with no adverse effects. Delfs found that a dosage of 1 milligram per pound bodyweight was excessive for cheetah because of convulsions and prolonged anaesthesia which on one occasion lasted for 72 hours.

Seven leopards were successfully anaesthetised at an average dosage-rate of 0.35 mg per lb bodyweight. In addition Delfs has successfully anaesthetised the following animals with Sernylan:

- 10 Caracal lynx *Felis caracal* — 0.50 mg/lb
- 2 African wild cat *Felis libyca* — 0.50 mg/lb
- 4 Brown Hyaena *Hyaena brunnea* — 0.3 mg/lb
- 2 Black-backed jackal *Canis mesomelas* — 0.25 mg/lb
- 4 African hunting dog *Lycaon pictus* — 0.50 mg/lb

Epileptiform convulsions appeared to be a common side-effect with cheetah and the writer has advised Mr. Delfs to inject either a tranquillizer or an intravenous barbiturate to eliminate the spastic condition. It is of interest to note that not all cheetah exhibited the increased spasticity, but unfortunately no statistical data is available on this aspect.

#### TRANQUILLIZERS

Two tranquillizers, Acetylpromazine (Boots Pure Drug Company) and Siquil (Squibbs Laboratory) were sometimes used in combination with Sernylan. The chemical structure and activity of these compounds have been adequately described by other workers and do not merit further discussion in this paper.

#### METHOD

The Palmer Powder Charge Cap-Chur gun and Palmer Short Range Projector with 1 ml, 2 ml, and 3 ml Palmer automatic projectiles fitted with barbed



needles were used for darting the animals. The lions were darted in the open veld from the safety of a closed motor vehicle. The two oral injections were squirted into the mouths of the trapped leopards with a hypodermic syringe.

## RESULTS

The results obtained from immobilising and anaesthetising 20 carnivorous mammals (14 lions, 3 cheetah and 3 leopards) with Sernylan are summarised in Table 1.

TABLE 1.

Details of immobilisation and anaesthesia of three species of carnivorous mammals (lion, cheetah and leopard) with Sernylan Parenteral.

No.	Species	Sex	Weight lbs.	Age	Injection site	Sernylan		Acetyl-promazine mg.	Siquil mg.	Immobilisation time. Min.	Temp °F	Recovery time. Hours
						mg.	mg./lb.					
1	Lion	M	c 400	c5y	Shoulder	100	0.25	10	—	14	106	4
2	Lion	M	400	c7y	Shoulder	100	0.25	10	—	12	103.5	6
3	Lion	M	400	c7y	Shoulder and hip	60+40	0.25	14+16	—	32	104	5½
4	Lion	M	500	c7y	Hip	125	0.25	—	15	24	106	+2
5	Lion	F	c 420	c7y	Shoulder	100	0.24	—	30	40	103	6
6	Lion	M	c 350	2y	Shoulder	100	0.28	—	10	25	102	+2
7	Lion	M	c 600	8-9y	Lumber	140+40	0.30	—	12+10	45	109.4	+4
8	Lion	M	c 500	+10y	Hip	200	0.40	—	—	15	101	12
9	Lion	M	40	4m	Hip	10	0.25	—	—	6	—	4
10	Lion	F	45	4m	Hip	20	0.44	—	—	3	—	+10
11	Lion	F	360	5y	Hip	250	0.69	—	—	14	105.2	8
12	Lion	F	310	4½y	Hip	250	0.80	—	—	11	99	9
13	Lion	M	390	c7y	Shoulder	160	0.41	—	8	20	103	3
14	Lion	M	c 420	8y	Hip	150	0.35	—	30	18	105	+6
15	Cheetah	M	80	?	Oral	40	0.50	—	—	28	107.4	14
16	Cheetah	M	85	3-4y	Hip	30	0.35	—	10	30	105.6	14
17	Cheetah	M	90	4-5y	Hip	40	0.44	—	12	18	107.2	7
18	Leopard	M	46	c8m	Hip	25	0.54	—	—	20	105	10
19	Leopard	F	83	c3y	Oral	30+10	0.48	—	10	53	105	9
20	Leopard	M	111	4y	Hip	50	0.45	—	30	8	103.2	5

c = Estimated weight or age

Sernylan Parenteral  
Acetylpromazine  
Siquil

Parke, Davis and Company  
Boots Pure Drug Company  
Squibbs Laboratory

100 mg/ml or 20 mg/ml  
10 mg/ml  
20 mg/ml

Immobilisation times for lions injected intramuscularly at dosage rates of 0.24 to 0.80 mg per pound bodyweight varied from 3 minutes to 45 minutes.

The leopardess took a long time to become anaesthetised because a portion of the Sernylan injected into her mouth was wasted as she turned her head to avoid the spray. A few drops of Sernylan accidentally landed on the right cornea of the eye and within two minutes a marked mydriasis was observed (Plate 2). The eye was normal within 24 hours.

A constant finding in all the animals prior to their becoming recumbent was a slight shaking of the head and vacant staring into the sky as if they were experiencing hallucinations. Yawning was seen in one lion. Salivation was never copious in any of the animals. In all cases with the exception of two lions, the eyes remained open all the time. To prevent possible injury to the eyes by direct sunlight they were blindfolded. According to Bourn (pers. comm.) baboons salivate copiously and the eyes are usually closed while under anaesthesia.

Epileptiform convulsions lasting from 10 to 25 seconds at intervals of 4 to 6 minutes were observed in one cheetah. A barbiturate, "Sagatal" (May Baker) 5 ml was injected intravenously and smooth surgical anaesthesia without spasticity resulted.

The two central metatarsals of the left paw which were crushed in a trap were surgically excised. The injured paw recovered and the animal was walking normally after fourteen days.

Eight of the lions anaesthetised were wounded in fights with other lions and their injuries were treated (Plate 3).

All the animals immobilised were marked with ear-tags. In addition six lions, two cheetah and the leopardess were marked with coloured plastic neckbands (Plate 4). One lion was branded on the buttocks and shoulder with a hot branding iron. The marked lions have been seen on many occasions in the vicinity of the areas where they were originally marked, indicating a fixed home range. Two of the eartagged lion cubs immobilised and marked in 1966 and their mother were shot dead on a farm east of Namutoni Fort, three months after they were marked. An old lion was marked at Ombika Fountain about a mile from the southern boundary fence to determine if he would leave the Park and has often been seen in his original territory — a possible indication that the netting wire fence is effective in keeping potential marauders within the Park.

Two cheetah and the two leopards which were purchased and introduced into the Park from farming areas and released without a suitable detaining



Plate 2. Mydriasis of right eye of leopardess caused by drop of Sernylan which accidentally landed on cornea. Eartags in right ear. (Photo: H. Bourn)

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Plate 3. Injured lioness treated under Sernylan anaesthesia. (Photo: H. Ebedes)



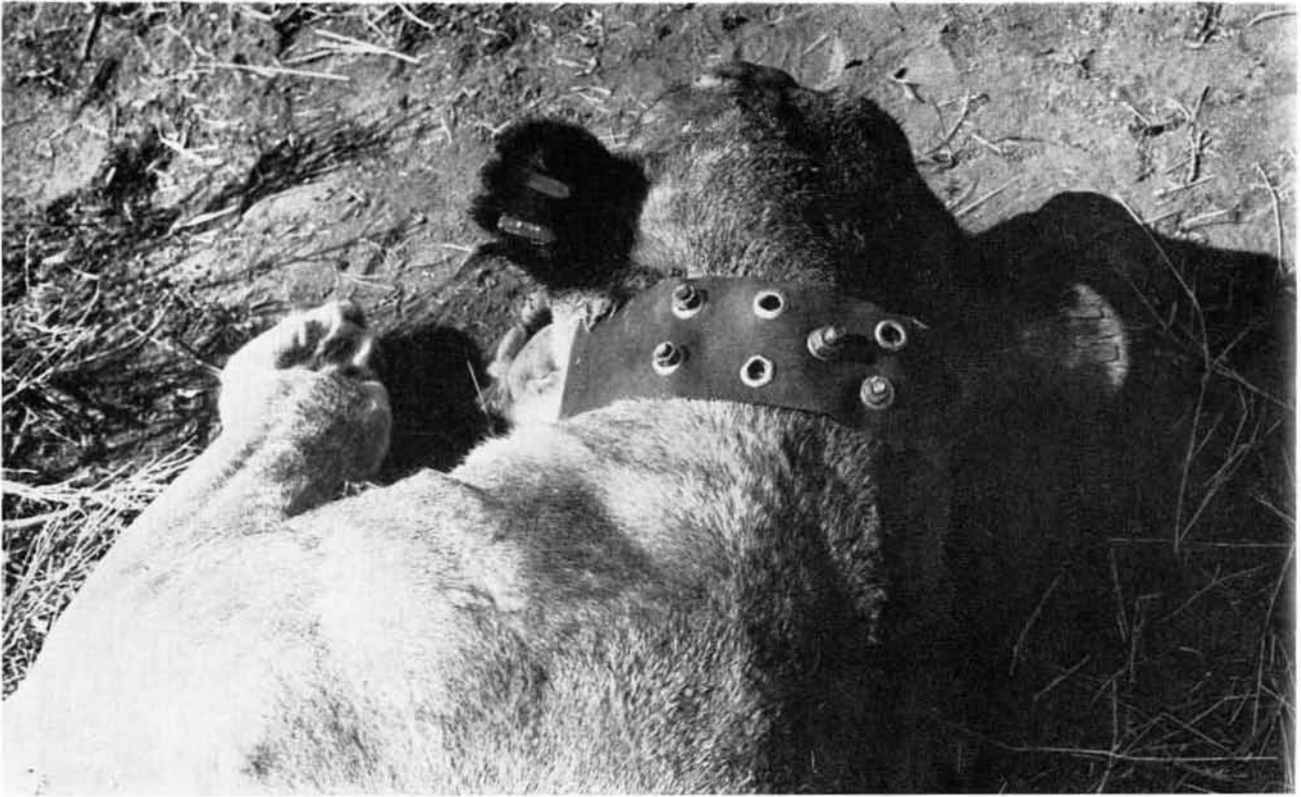


Plate 4. Lioness marked with "Sterkolite" neckband and roto-type eartags. (Photo: H. Ebedes)



and acclimatisation period, were killed on farms south of Etosha. In future, introduced animals will have to be kept in captivity for several months to acclimatise them to their new environment before they are released.

All the animals reported on in this paper recovered uneventfully from the Sernylan anaesthesia and there was no mortality due to the drug.

#### DISCUSSION AND CONCLUSION

The dosage-rates used by us to anaesthetise three species of wild carnivorous mammals are lower than those used by other workers. A dosage rate of 0.4 mg to 1 mg per lb. Sernylan alone, or in combination with a small quantity of tranquillizer such as Acetylpromazine, Siquil or Largactil is recommended to achieve safe and satisfactory anaesthesia. Although no known specific antagonist or antidote is available, anaesthetised animals recovered on their own and no mortality was recorded with Sernylan. Because of the wide safety margin it is now possible for Nature Conservation personnel to immobilise and anaesthetise lion, cheetah, leopard and other carnivorous mammals for a number of procedures such as the capture of marauding animals, release of animals from traps and catching cages, translocation to zoos, sanctuary areas and National Parks, marking, weighing (Plate 5), measuring, inoculations against infectious diseases and medical and surgical treatment of injured and wounded animals.

Plate 5. Weighing an immobilised lion in the veld. (Photo: H. Ebedes)

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