A PRELIMINARY NOTE ON THE USE OF QUILOFLEX (BENZODIOXANE HYDROCHLORIDE) IN THE IMMOBILIZATION OF GAME

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Since the publication by Hall *et al* (1953) on the use of paralytic agents in the capture of white-tailed deer, several workers have been engaged in research on the immobilising of wild game animals. Various drugs were used on different species of game in an attempt to develop a safe and practical method of capturing wild animals.

These drugs varied in their action on the animal from muscle relaxants to tranquillizers, hypnotics and narcotics. A suitable and reliable drug for all game species has not been found yet — probably as a result of the vast difference in the behaviour and physiology of the different species — but empirically an immobilising agent for any given species should conform to the following requirements.

(1) The drug should have a very wide safety margin. This is of great significance where one is confronted with free roaming wild animals, and the correct judging of the animal's body-weight is difficult.

(2) The latent period prior to the drug taking effect should be as short as possible. A time lapse of 10-20 minutes after the animal has been darted is usually sufficient for the animal to escape completely in heavily overgrown country.

(3) A reliable and fast acting antidote should be at hand in cases of overdosage or retarded recovery.

(4) In dealing with wild animals, tranquillizing or sedative drugs are essential and it would be of great advantage if a drug incorporated both muscle relaxant and sedative properties.

(5) The drug should be non-irritating to the musculature as intra-muscular injection is the only means of parenteral administration with the dart-syringe.

(6) The volume of the drug required for effective immobilization should be as small as possible. Under local conditions in the Kruger National Park, a total volume of 1-5 cc. would be optimal and 10-15 cc. maximal.

The most recent drug used by us in experiments on the impala (*Aepyceros melampus melampus* Lichtenstein) is 2-(y-methoxypropyl-aminomethyl)-1, 4-benzodioxane hydro-chloride, which is sold under the tradename Quiloflex by C. H. Boehringer Sohn (Germany) and distributed by Pfizer Laboratories S.A. (Pty.) Ltd., in South Africa.

Quiloflex is used in human medicine for the symptomatic treatment of spasticity due to pyramidal tract lesions. To the best of our knowledge this drug has never been applied in veterinary medicine for the immobilisation and capture of animals. On account of it's reflex transmission depressing properties, initial experiments were conducted to ascertain whether this drug would be of some value in improving the immobilizing technique.

At the moment *Quiloflex* is only supplied in 5 mgm/2 ml ampoules and tablets each containing 10 mgm. At these concentrations the dose for an animal weighing about 100 lbs. would have been of too large a volume, but through the kind co-operation of the manufacturers and distributors a concentrated solution of 500 mgm/cc was made available for experimental purposes. (Figs. 1 and 2).

After an animal had been darted with a projectile syringe containing *Quiloflex,* the following reactions were observed :

Ataxia occurred within 1-3 minutes. In 8 out of 12 cases the enzyme Hyaluronidase was added to the *Quiloflex.* In cases Nos. 2, 5, 6 & 7 the Hyalase was omitted — hence the slower absorbtion and longer reaction time (Table 1). In case No. 10 the long reaction time (5 minutes) was due to the drug being injected into the tendinous part of the muscle which is less vascular and thereby retarded the absorbtion rate.

After the first obvious signs of ataxia of the hind limbs the animals were still able to sprint for a few yards, if disturbed; otherwise they remained in a standing position. Defaecation was an almost constant symptom before the animal went down. Animals remained in a recumbent position, on their briskets, with head erect and normal respiration as if unaffected (fig. 3). When disturbed, the majority of experimental animals were able to rise and walk for a few yards. As the effect of the drug increased, knuckling over at the fetlocks was observed (fig. 4) and at this stage tranquillization had already commenced. Some of the animals could be walked for distances up to a quarter mile at a slow pace — a few steps at a time.

Quiloflex administered to impala by means of the Cap-Chur pistol and projectile syringe.

No.	Sex	Actual weight in lbs.	Total Quiloflex in mgm	Dose mgm /lb.	Ataxia occurred in minutes	Animal went down in minutes	Handled after minutes	Time to recover in hours	REMARKS
1.	Adult ♂	100	1500	15.0	2	6	20	6½	Marked salivation; stopped after administration of Atropin sulphate.
2.	,,	110	1500	13.6	7	15	60	6	Atropin sulphate injected to counter-act salivation.
3.	,,	120	1500	12.5	2	5	60	6	No Atropin injected. Salivation lasted about 5 hours. Recovery uneventful.
4.	,,	110	1250	11.3	2	5	80	5	Atropin injected after animal had been walked for ¼ mile in a fully tranquillized state.
5.	Young ♂	65	750	10.1	3½	10	40	4	Animal tranquillized and remained on its brisket. Recovered completely.
6.	Adult	110	1000	9.0	4	15	60	3½	Animal tranquillized and remained on its brisket. Recovered completely.
7.	,,	120	1000	8.3	6	20	35	4½	Animal tranquillized and remained on its brisket. Recovered completely.
8.	,,	118	750	6.3	1¾	3	17	5	Animal darted in triceps muscles. Ran very fast for ¼ mile after being darted.
9.	,,	102	500	4.9	1	5	22	3½	Received Atropin I.M. and Venocortin (112 mgm) I.V.
10.	,,	106	500	4.7	5	21	90	3½	Darted in tendinous part of M. radiales. Although fully tranquillized this animal could not be handled and had to be roped 90 minutes, after being darted.
11.	,,	120	250	2.0	3	47	60	3	Darted in buttocks. Perfectly tranquilized after 60 minutes. Penicillin injection administered while on its feet, without securing the animal.
12.	Young ♂	60	1500	25.0	1½	2	4	4½	Overdosage. A slight opisthotonus observed after 5 min. Respiration laboured. 112 mgm. Venocortin I.V. 13 min. after darting. After 38 min. a trocar and canula had to be inserted as a result of bloat developing. Respiration came back to normal and animal's condition improved after a few minutes. Recovery uneventful.

The reaction reached its peak in $1\frac{1}{2}$—$2\frac{1}{2}$ hours time. During this period the respiration remained normal, the pulse rate slightly accelerated, and the animals were lying with the neck stretched out, as if asleep (fig. 5 & 6).

Although some animals gave the impression of being in a narcotic state, they could at any time be aroused. A stimulus, like a slap with the hand, was usually sufficient to raise the animal to its feet for a minute or two. The sedative action of this drug was remarkable. (Figs. 7 and 8).

It is abvious from these preliminary observations that *Quiloflex*, as an immobilizing agent of game, deserves further investigation. It has the following advantages and is in some instances superior to drugs used in the past.

(1) *Quiloflex* has a tremendously wide safety margin in the impala. In this initial experiment 12 animals were immobilized with a dose range of 2-25 mgm/lb.

(2) The reaction time of *Quiloflex* is the shortest we have encountered so far. A latent period of 1-3 minutes (Hyalase added) will facilitate the capture of most game species in the Kruger National Park.

(3) The sedative action of *Quiloflex* in the impala is of significance in the transportation of these animals.

(4) The tissue tolerance of this drug seems to be good. One animal was destroyed 10 days post *Quiloflex* administration. Except for a small scar where the needle pierced the skin, no abnormalities could be found in the musculature and subcutaneous tissues.

(5) The stability of the concentrated solution under local conditions seems to be satisfactory.

(6) *Quiloflex* is tasteless and odourless at a low concentration. This property is of great significance as the drug's application as an oral immobilizing agent (administered through the drinking water) holds promising possibilities. One impala ram was captured by means of a net, and dosed with an aqueous solution, containing 1.5 gm *Quiloflex*. The reaction commenced 6 min. after oral administration (by means of a stomach tube) and the animal could be handled after 35 minutes. Complete recovery occurred after 4 hours.

The only disadvantage of this drug is that the animal cannot be handled immediately after the reaction commences. There is a possibility though, that this could be overcome (if necessary) by supplementing *Quiloflex* with a short acting muscle relaxant such as Gallamine triethiodide (which has a reliable antidote). Further investigation will be conducted to ascertain the possibility of an effective antagonist to *Quiloflex*. Hydrocortisone administered intravenously or a minute dose of Strychnine sulphate may be of some value in case of overdosage.

In an initial experiment conducted to determine the efficacy of *Quiloflex* in the capture of other game species, three giraffe (*Giraffe camelopardalis* Linnaeus) were darted with this drug. One experimental animal died of obvious overdosage an hour after the administration of *Quiloflex*, the second subject

reacted, but was not sufficiently tranquillized to be handled and the third reacted perfectly. The latter could be handled, although it remained on it's feet. The dosage range in the giraffe seems to be in the region of 2-5 mgm/lb., but further investigation is necessary, and the results obtained will be published in a subsequent paper.

RESUMÉ.

The drug *Quiloflex* (Boehringer) has been used in preliminary tests to determine its value in the immobilization of game.

In field trials with impala (*Aepyceros melampus melampus* Lichtenstein) twelve animals were immobilized by intra muscular injection (administered by projectile syringe) and one animal received the drug per os (stomach tube). Dosages are mentioned and the effects of the drug described.

Three Giraffe (*Giraffe camelopardalis* Linnaeus) were also darted and although work on this species is incomplete, preliminary dosages are given.

The advantages of this drug are discussed.

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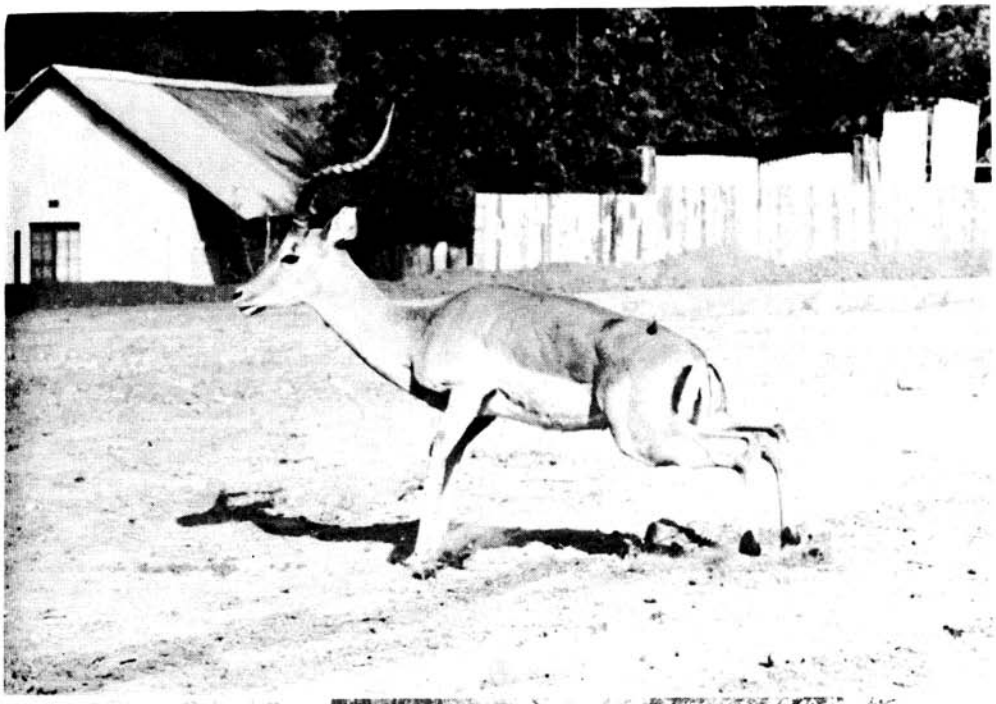
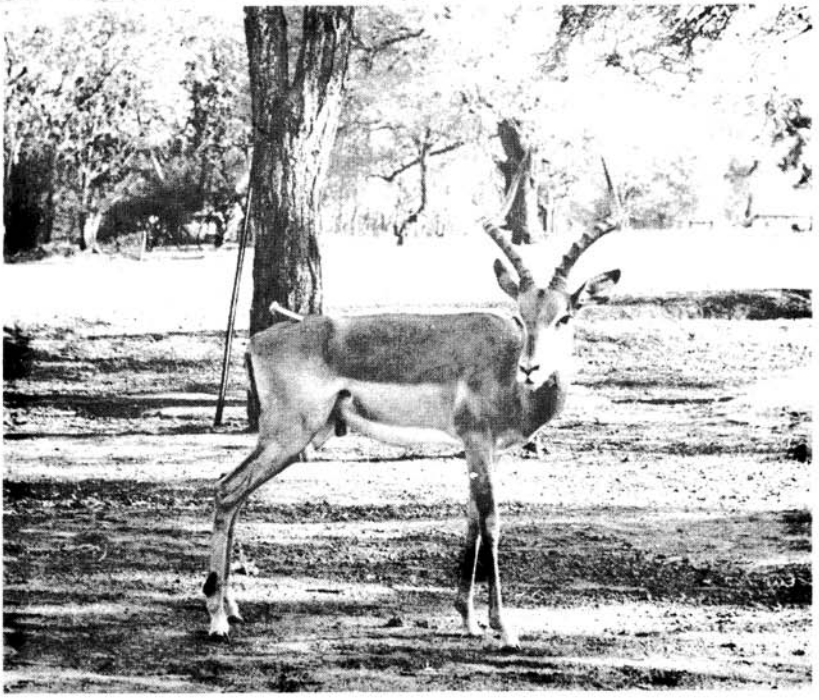
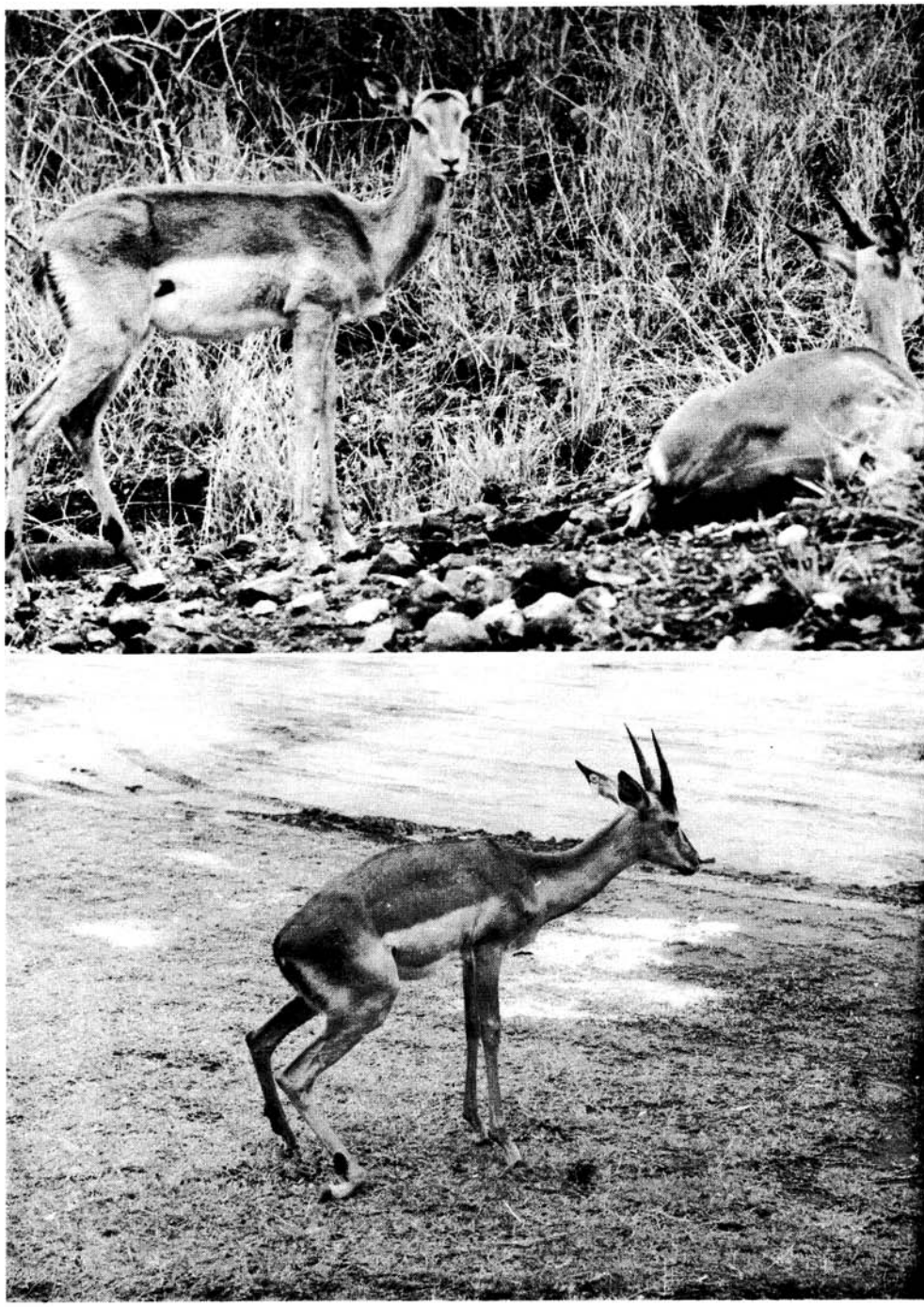




Above — Fig. 1.
Impala ram startled by impact of dart in hindquarters.

Below — Fig. 2.
Two minutes after being darted — commencement of drug action.



Above — Fig. 3.
Young impala ram lying in normal position 10 minutes after being darted.

Below — Fig. 4.
Typical "knuckling" stance of impala prior to going down.

Fig. 5.
Three impala rams at peak of drug reaction — 1½-2 hours after drug administration.

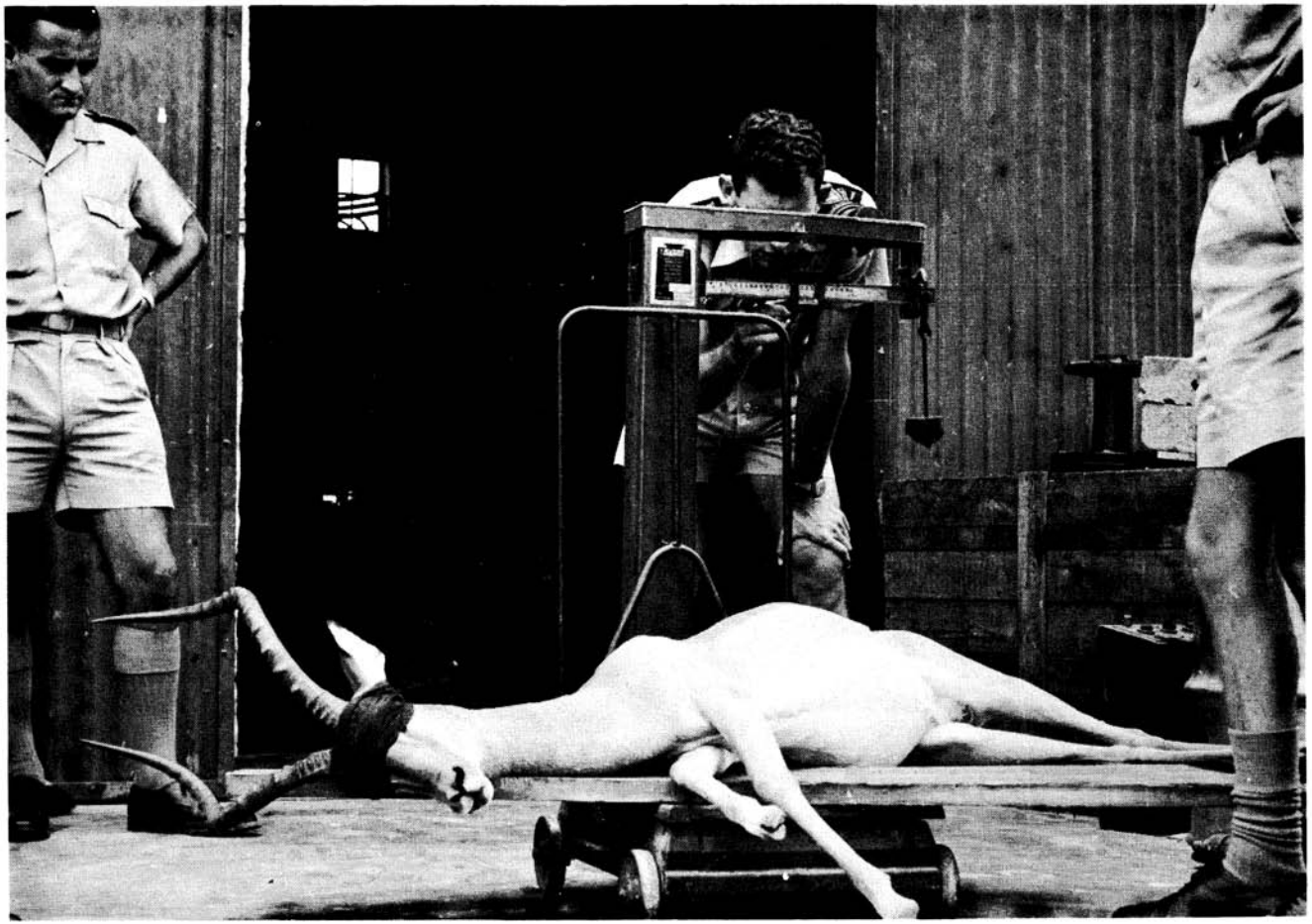
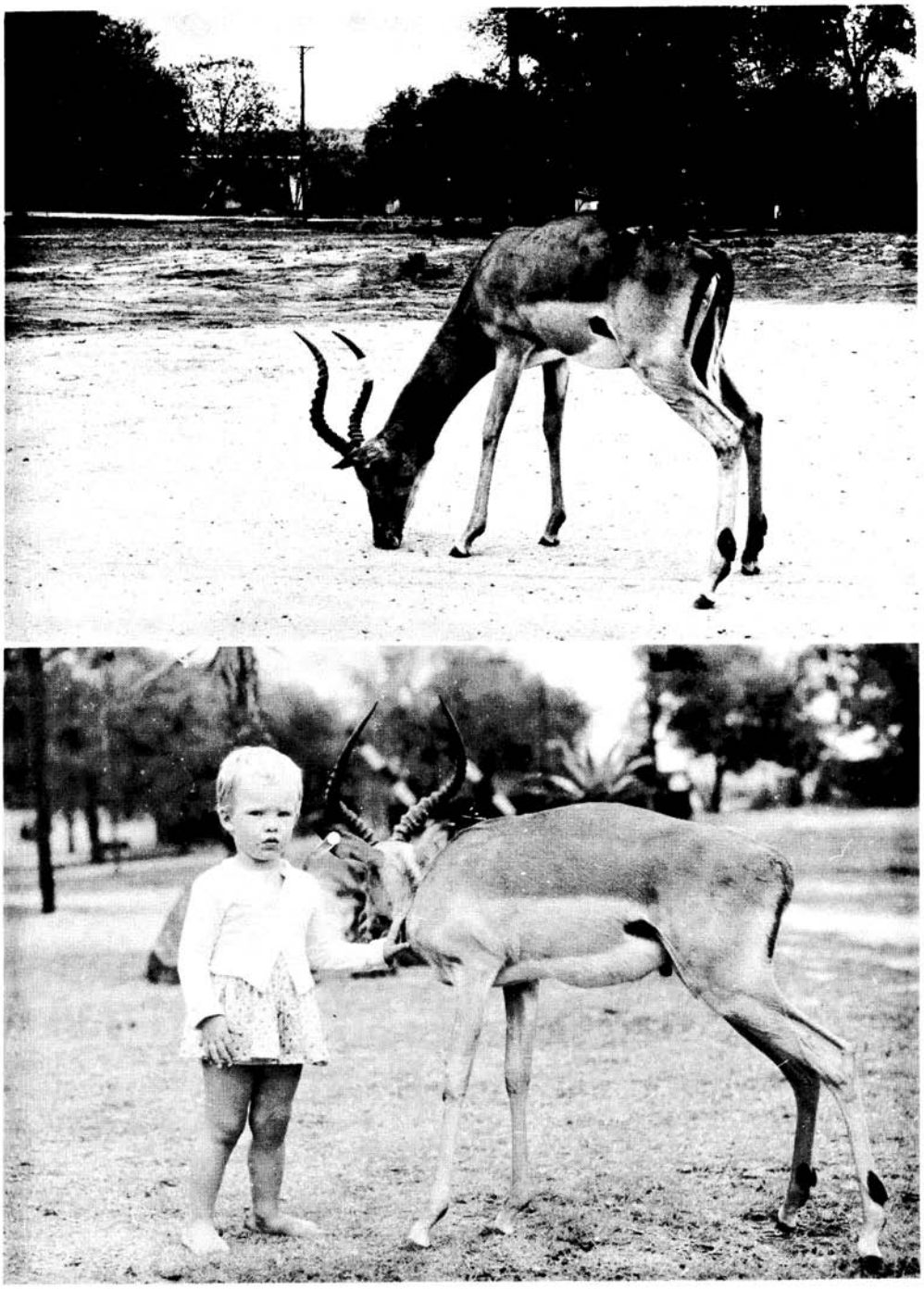


Fig. 6.
Immobilised impala ram being weighed.



Above — Fig. 7.
Typical stance of an animal that had been risen to its feet by a slap of the hand.

Below — Fig. 8.
Impala 3 hours after darting illustrating the ideal tranquillizing effect of Quiloflex. Note plastic ear tag.

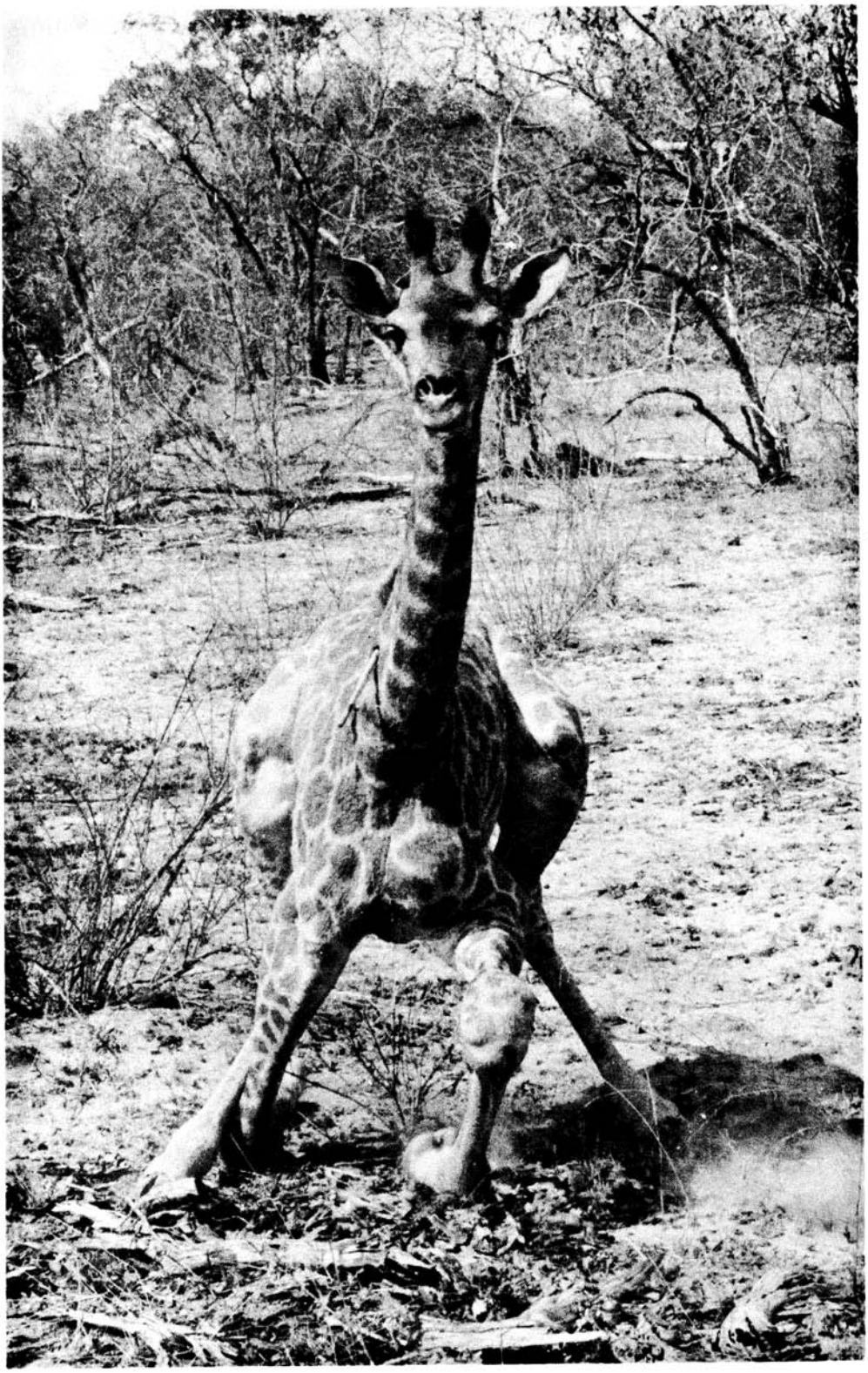


Fig. 9.
Young male giraffe lying down 1½ minutes after being darted. Note dart-syringe in neck.