

## ***Urginea Capitata* Baker—The Berg Slangkop. Its Toxic Effect on Ruminants.**

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With a Brief Botanical Survey of Area

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### INTRODUCTION.

IN my previous report on *Urginea macrocentra* Baker, that appeared in the Director's 11th and 12th Report it was mentioned that in South Africa three species of Slangkop were known to be poisonous to stock. To this list must now be added *Urginea capitata* Baker—the Berg Slangkop.

As the name implies it is found in Natal mainly in the vicinity of the Drakensberg Range. This work was done on plants obtained from the National Park area near Bergville. Steyn (1932) states it is also found in the Transvaal and Griqualand East. The plant was identified by Dr. E. P. Phillips of the Division of Botany.

DESCRIPTION OF *Urginea capitata*.

*Urginea capitata* Baker; bulb globose,  $1\frac{1}{2}$ -2 in. diam.; leaves 6-8, not fully developed till after the flowers fade, linear, a foot long,  $\frac{1}{3}$ - $\frac{1}{2}$  in. broad; peduncle lateral, terete,  $\frac{1}{2}$ -1 ft. long; raceme many-flowered, capitate, globose,  $1\frac{1}{2}$  in. diam.; pedicels at first  $\frac{1}{3}$ - $\frac{1}{2}$  in. long, finally  $1\frac{1}{2}$  in. long; bracts minute, ovate, deeply saccate in the middle; perianth  $\frac{1}{6}$ - $1/5$  in. long, white inside, bright claret-purple outside; filaments clavate, much shorter than the perianth; style tricuspidate, as long as the ovoid ovary; capsule  $\frac{1}{3}$  in. long.

## HISTORY OF OUTBREAK.

On 31st October, Mr. Otto Zunkel who had taken over the National Park, sent 2 spans of oxen from his farm Needwood to this new farm and on 31st October they were placed in the "Pastures" camp. On the 1st November 144 head of mixed cattle were also placed in this camp while about 20 milk cows were drafted to the camp known as the Vemraan or Dooley camp. On 2nd November it was reported that the oxen were sick and purging profusely. On 3rd November, two oxen died in the morning and three in the afternoon, while on 4th November a further five died and a number of the mixed lot were also sick.

Mr. Zunkel then moved all his cattle, with the exception of the milk cows and their calves, back to another farm "The Lake" where deaths continued. He lost in all 44 head of stock. Blood smears were negative and chemical analysis of organs and ingesta showed nothing in the way of chemical or alkaloidal poisons.

About the middle of November Mr. Zunkel borrowed oxen from Ladysmith and Colenso and ran them with his milk cows and calves on Vemraan camp. All cattle here remained healthy.

As a result of a visit made it was seen that there was a great difference in the veld on Vemraan and Pastures camps. The former was grass veld with some low scrub and the latter open veld with many liliaceous plants, senecios and studded with Proteas. It was especially noted that *Urginea capitata* (at that time not identified) and many species of senecios occurred in much greater abundance on Pastures than on Vemraan. The *Urginea* showed evidence of having been browsed on fairly freely but only rarely were Senecios found eaten. The symptoms shown by the affected cattle were as follows:—tucked up appearance, sunken eyeballs, loss of appetite, no elevation of temperature, profuse diarrhoea with blood stained faeces with clots of unaltered blood in some cases. Post-mortem examination showed mild gastro-enteritis.

Mr. Zunkel placed his herd at our disposal and the following tests were arranged.

- (a) One seven months' old tollie to be forcibly fed with the plant.
- (b) 12 young stock (6-9 months) to be placed on Pastures.
- (c) 12 young stock (12-18 months) to be placed on Pastures.

None of these cattle had had previous access to Pastures. This plan was decided upon on the 7th December when the three groups of test animals were immediately drafted to this camp. The tollie was dosed at 7 p.m. on the 7th December.

Mr. Zunkel's farm was left on 8th December when he informed me he was placing all his cattle on Pastures the next day. He also informed me that the loaned oxen after dipping on the 6th had been placed in the Pastures camp on the 7th.

Allerton Laboratory was reached on 10th December when at 10 a.m. Government Veterinary Officer Diesel rang me up and informed me that the loaned oxen in Pastures were purging badly and requested my return.

Mr. Bayer, Lecturer in Botany, Natal University College, accompanied me. I have pleasure in attaching his survey report to my article as part of it.

Mr. Bayer's report will show that the botanical evidence pointed strongly to *Urginea* as the suspected plant.

On arrival at the farm on the afternoon of the 11th December, 10 oxen had been purging badly but were recovering as a result of treatment while the tollie had died early that morning prior to our arrival. The post-mortem of the tollie revealed the following:— Pulmonary congestion and oedema, pericardial and endocardial extravasations, cyanosis of the mucosa of larynx, pharynx and trachea, slight gastritis, acute haemorrhagic enteritis of lower half of the ileum, acute haemorrhagic inflammation of rectum.

In the light of this it was decided to conduct feeding tests.

#### TOXICITY OF PLANT.

To be capable of causing so many deaths in so short a time points to the fact that the poisonous principle of the plant must be very powerful or that the plant must be present in great quantities. The natives, however, assert that buck eat freely of the plant and they themselves use the cooked leaves as an article of diet. What appears strange is the fact that the previous owner had introduced cattle frequently and at all seasons into the "Pastures" camp for the past seven years without loss. Moreover, he considered the grazing at "Pastures" the best on the farm and ran his milk cows here.

#### SYMPTOMS.

These under natural conditions were not numerous and are similar to what one would expect in plant poisons, viz. tucked up appearance, eyes sunken into orbital fossae, no temperature, loss of appetite, profuse diarrhoea. A rather characteristic symptom noted was excessively blood stained diarrhoea, which in some cases resembled pure coagulated blood. These are, of course, quite a different picture from what one sees in cases of *U. macrocentra* poisoning where constipation is marked. Symptoms appear quickly and then according to the severity of them the animal either lingers on or dies quickly.

POST-MORTEM IN NATURALLY PRODUCED CASES.

From actual field observations the following changes were generally found:—

No distension of the carcass, escape of small amount of ingesta from mouth.

Mucous membranes of lips, mouth, tongue and oesophagus normal.

Trachea and lungs: Normal.

Rumen and contents: Apparently normal.

Reticulum and contents: Apparently normal.

Omasum and contents: This stomach showed either "patchy" or marked inflammation of the leaves, with ulceration of the membrane over several of the inflamed areas. The contents were rather more fluid than normal and were slightly blood stained.

Abomasum and contents: This stomach showed either acute or subacute inflammation of mucous, submucous and muscular coats, patchy in character, in some, membrane detached and stomach contained blood clot.

Small intestines and contents: Very few slight patches of inflammation—lumen filled with black viscid fluid.

Spleen: Normal.

Kidneys: Slight inflammation.

Glands: Many of these were slightly haemorrhagic but not enlarged.

Liver: Enlarged, paler than normal and presented a "cooked" appearance.

Urinary bladder: Greatly distended with normal urine, appearance of bladder normal.

EXPERIMENTAL WORK.

(a) *Feeding Tests.*

No previous work\* done on this plant could be traced. In the experiments carried out it was found that the animals took the leaves of the plant quite readily when they were mixed with lucerne. The cattle used varied from 18 months to 4 to 5 years of age. These were constantly stabled during the experiment.

C. 442. Age: 18 months.

Fed with one pound of plant on 14th December, 1926, taken mixed with lucerne.

16th December, off feed and water; lying down most of time; faeces soft; evidence of abdominal pain.

*Remarks.*—This animal received 1 lb. of the plant but only developed mild symptoms. The symptoms continued until the 18th December, when indications of recovery became apparent. This animal was discharged about 2 weeks later quite recovered.

\* In 1926, Mr. P. L. le Roux, late Veterinary Research Officer, Onderstepoort, informed me that he had proved the plant growing at Ermelo toxic to sheep.  
(D. G. Stern.)

C. 423. Age: 2 years and 4 months.

Fed with 2 lb. of plant on 13th and 14th December, 1926, mixed with lucerne.

15th December, large quantities of fluid faeces passed; abdominal pain; animal off feed and water; lying down frequently. These symptoms persisted until 17th when the quantity of faeces became less, mixed with mucous, and blood stained. Eyes very sunken. Animal looking miserable. A second attack of purgation occurred on the 18th which persisted. Animal losing condition. A small quantity of food is now being taken.

*Remarks.*—This animal received 4 lb. of the plant and showed fairly marked symptoms two days after commencement of feeding. By the 3rd day symptoms were marked. No more of the plant was given and the animal gradually recovered, being discharged in about 2 weeks.

C. 427. Age: 4 to 5 years.

Fed with 3 lb. of plant on 13th and 14th December, 1926, mixed with lucerne.

15th December, small quantity of greenish faeces passed; later grunting, off feed; evidence of great abdominal pain; paddling movements with the hind feet continuous; not lying down.

*Post-mortem.*

Died about 7.30 on night of 15th December.

The post-mortem showed: Cyanosis of pharyngeal mucosa; oedema and hyperaemia of lungs; Trachae: foam.

Heart: Inhibition right ventricle and extravasations left ventricle.

Liver: Congestion.

Kidneys: Congestion of intermediate zone. Linear hyperaemia of cortex.

Abomasum and duodenum: Slight patchy hyperaemia.

Ileum: Acute haemorrhagic enteritis; contents blood stained.

Large intestines: Acute patchy hyperaemia.

Rectum: Diffuse hyperaemia with well marked longitudinal lines of acute hyperaemia; mucosa thickened and catarrhal.

*Remarks.*—Being an older and well grown out animal 6 lb. of the plant was fed, death resulted in two days from commencement of feeding.

C. 472. Age: 4 to 5 years.

Fed on 13th and 14th December, 1926, with 4 lb. of plant leaves mixed with lucerne.

15th December, purging profusely large quantities of fluid faeces; no food or water taken; animal dull.

16th December, no faeces passed.

17th December, diarrhoea again commenced in the afternoon; larger quantities fluid faeces passed; eyes sunken; rapid loss of condition; abdominal pain; nasal discharge.

*Post-mortem.*

Death occurred on 19th December, 4 a.m.

Post-mortem showed: Cyanosis of pharyngeal mucosa.

Oedema and hyperaemia of both lungs. Foam in Tracheae.

Extravasations left heart.

Slight congestion of liver, spleen and kidneys; marked patchy hyperaemia of mucosa of abomasum, especially of folds. Acute diffuse hyperaemia of duodenum with Zebra markings. Jejunum: ditto.

Ileum: Cherry red mucosa, contents deeply blood-stained, bright brownish red, increasing in intensity to ileo-caecal valve. Caecum: ditto.

Colon: Patchy hyperaemia.

Rectum: Intense diffuse hyperaemia; mucosa thickened, covered with tenacious blood exudate. Collection of blood clots in front of anus.

*Remarks.*—This animal received 8 lb. of the leaves but only died in 5½ days from the commencement of feeding.



Fig. 1. *Urginea capitata* Baker, about one-third natural size.

C. 468. Age: 3 to 4 years.

Fed on 17th December with 1 lb. of plant leaves mixed with lucerne.

Symptoms shown were only mild, similar to C. 442 and this animal recovered rapidly.

(b) *Toxic Dose.*

From these tests it would be difficult to give an exact figure for the amount of the plant to be eaten to set up fatal cases. One would suggest that for an average sized beast the amount would be between 6 and 8 lb. From the fact that these experimentally fed animals ate the plant quite readily on two occasions when it was mixed with lucerne one could quite imagine that under field conditions animals would eat fair quantities at one time. This would rather indicate that the taste was not objectionable to them.

(c) *Symptoms.*

In neither of the animals that died was blood stained diarrhoea present; this was probably due to the rapidity of the poison. If they had had smaller doses and lived longer dysentery would probably have been present. No temperatures were raised during the feeding experiment.

(d) *Post-mortem.*

The lesions observed in these animals were almost identical with those seen in naturally occurring cases in the field.

CONCLUSIONS.

(a) A description of *Urginea capitata* and a survey of the area in which it was found is given.

(b) Symptoms and post-mortem changes as observed under both field and laboratory conditions are given.

(c) Results of feeding the plant to experimental animals are recorded.

(d) It appears as if fatal cases of poisoning by this plant can be produced by feeding from 6 to 8 lb. of *Urginea capitata*.

(e) The taste of this plant does not seem to be objectionable to animals as it was taken quite readily when mixed with lucerne.

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9. BOTANICAL SURVEY OF AREA.

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A PRELIMINARY survey of the two camps showed that they were ecologically very different in composition.

*The Pastures Camp.*

The Pastures camp (in which the deaths occurred) was an open community. Only in the lower parts of the camp were grasses at all abundant, and even

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then they were rather sparse. Owing to grazing they were not much more than 3-4 inches high. In the upper parts owing partly to road-making operations, and also probably to increased erosion due to the steepness of the ground, the vegetation was very thin and only a few ruderal species were able to exist successfully. Amongst the grasses noticed were *Digitaria (ternata)*, *Setaria verticillata*, *Eragrostis (plana)*, *Andropogon schirensis*, *Panicum natalense*, *Aristida Galpini*, *Paspalum* sp. Associated with these were noticed *Senecio sera*, *S. speciosus*, *S. nastulatus*, *Helichrysum aureonitens*, *H. appendiculatum*, *squamosum*, *Haplocarpa scaposa*, *Eriosema* sp., *Crotolaria* sp., *Hermannia veronicifolia*, *Rhus discolor*, *Acalypha peduncularis*, *Oxalis* sp., *Cynoglossum* sp., *Scilla* spp., *Hypoxis* spp. and *Urginea capitata*.

Owing to the paucity of the grasses, the associated plants showed signs of having been eaten by the cattle. Although a careful search of the camp was made for known poisonous plants none were seen. A few plants of *Morea rivularis* were found which were near a small stream, outside the camp. These had not been touched by the cattle. *Urginea capitata* was, however, very common in the camp, and scarcely a tuft of leaves of this plant could be found that had not been cropped. A few of the *Hypoxis* spp. (of which there were common) had also been eaten off.

*The Vemraan or Dooley Camp.*

The Vemraan camp was typical high veld grassland. It had evidently not been strongly grazed and the grass stood 18-24 inches high. The chief grasses noted were *Themeda triandra*, which was dominant, *Monocymbrium ceriseaeformis*, *Setaria (verticillata)*, *Tricholaena setifolia*, *Eragrostis brizoides* and *chalcantha*, and *Trichopteria simplex*. Amongst the associated plants the following were noticed: *Helichrysum squamosum*, *H. adenocarpum*, *Senecio sera*, *Acalypha (peduncularis)*, *Cluytia natalensis*, *Scilla* sp., *Hypoxis* sp., and a few shrubs of *Buddleia salviafolia*. These associated plants were not numerous and had evidently not been touched by the cattle. On the eastern side of the camp the composition was somewhat different, consisting of Bracken Fern societies, and containing numerous associated plants, viz., species of *Helichrysum*, *Senecio*, *Cluytia*, *Acalypha*, *Scilla*, *Hypoxis*, and *Urginea capitata*. As the grazing on this side was poor, the cattle had kept to the grasses at the top of the slope.

As a result of this survey, it was felt that the poisoning, since it was probably of vegetable origin, must be due to *Urginea capitata*. In order to make quite certain that the plant did not occur in the Vemraan camp to the same extent as in the Pastures camp, it was decided to make the survey more intensive. Accordingly, a handy quadrant was improvised out of a few yards of string and a few sharp sticks. This was easily pegged down and moved about, and enclosed an area of four square yards. At first the quadrants were mapped rather intensively, but it soon became apparent that the time at our disposal would not permit of such a procedure. It was therefore decided to concentrate upon *Urginea capitata* and the spp. of *Hypoxis*. Quadrants were taken in places where *Urginea capitata* was very common, and also where it was less frequent. These are designated respectively as maximum and minimum quadrants in Table 1 below.

TABLE 1.

	Pastures.		Vemraan.	
	<i>Urginea.</i>	<i>Hypoxis.</i>	<i>Urginea.</i>	<i>Hypoxis.</i>
Quadrant No. 1: Maximum Quadrant...	49	6	4	nil
Quadrant No. 2: Maximum Quadrant...	67	42	3	7
Quadrant No. 3: Minimum Quadrant...	14	32	nil	67
Quadrant No. 4: Minimum Quadrant...	11	43	nil	70



Several quadrants were taken in places where the distribution was medium and the average of these is given in Table 2:—

TABLE 2.

	Pastures.		Vemraan.	
	<i>Urginea.</i>	<i>Hypoxis.</i>	<i>Urginea.</i>	<i>Hypoxis.</i>
Average quadrant.....	22	16	nil	62

These showed that in places the frequency of *Urginea capitata* was very high indeed in the Pastures camp. As many as 67 plants occurred in four square yards. In the Vemraan camp *Urginea capitata* was relatively rare. The *Hypoxis* spp. were much more frequent here than in the Pastures camp. Accordingly with the assistance of natives, kindly lent by Mr. O. Zunkel, of the National Park, a few sackfuls of *Urginea* plants were collected and brought back to the Veterinary Laboratory at Allerton for further investigation and feeding tests.

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PLATE.

1. Sketch of plant showing flowering head that appears first.