(6) It should be packed flat and not folded.

(7) It should be bought from the native by the piece and not by the weight. The best skins weigh on an average about one pound and measure about 4 square feet.

Specimens Nos. 9 and 10 are glacé kid skins of suitable size and shape. Observe the fine even grain.

In comparison compare specimen No. 11. Observe the coarse grain of the skin.

This skin is typical of those that come from the province of Bornu where you get a large goat with longer and coarser hair.

It is now proposed to conduct a cross-breeding experiment with the smaller fine-skinned Sokoto goat and the coarser skinned Bornu goat. The idea being to produce a cross-bred goat whose skin will be of greater market value than the pure Bornu goat.

Skins should be as nearly square as possible in shape and not too large. The value of a glacé kid skin and therefore of a raw skin depends on the number of various patterns which go to the making of a shoe upper that can be cut from a skin.

The various pieces of a shoe upper are shown on specimen No. 12. They consist of golosh, toecap, and vamp.

The ideal size and shape of a skin therefore is one that will give these various parts of a shoe without waste.

I regret that I have not been able to give you more detailed information on the points I have mentioned in this paper; but as I have already mentioned the whole question of goat skins and their relation to manufactured glacé kid has only recently engaged the attention of our Department; and again as I have come here direct from a leave of absence in England, I have not had access to the latest information on the subject.

The problem is not one confined solely to Nigeria, and I am sure that in the skin and hide trade of the various African Territories there exists an economic asset well worthy of our attention and endeavours.

I have not touched on the question of hides; but much that has been said with regard to bad flaying and drying of skins applies equally to hides.

Skin brands also seriously detract from the value of a hide and they should, as far as possible, not be applied to the skin of the upper parts of the body.

Paper No. 28.

POISONOUS PLANTS IN SOUTH AFRICA HITHERTO UNKNOWN.

By D. G. Steyn, B.Sc., Dr.Med.Vet., Veterinary Research Officer, Department of Agriculture, Union of South Africa.

The procedure adopted at the Onderstepoort Laboratories by the author in the investigations into the effects of plants on animals consisted in drenching rabbits and our domestic animals with the minced or ground plants, and in subcutaneous injections into guinea-pigs and rabbits with extracts made from these plants. Mostly the plant material forwarded to the laboratory was too scanty to allow of experiments being carried out with all species of domestic animals.

Whereas the drenching of animals is the most reliable method of experimenting with poisonous plants, it cannot be employed in the investigation of all plants. As an exception we may quote wilted grass (*Cynodon* sp.) and other plants containing prussic acid as such, as a large amount of prussic acid escapes into the air during the process of mincing.

Our knowledge of the distribution of plants in South Africa is by no means perfect, and I have no doubt that the plants mentioned in this article most probably have a much wider distribution than is at present realized or definitely known. Furthermore, it is of the utmost importance that the stage of development, and the state in which the plants were tested, should be carefully noted, as it is a well known fact that the toxicity of plants differ in their different stages of development, and that some plants decrease in toxicity during the process of desiccation. It is also of importance to name the parts of the plants, as certain parts of a plant may be innocuous, whereas others may be deadly.

I am indebted to Dr. E. P. Phillips, Principal Botanist, Division of Plant Industry, Pretoria, for having identified these plants for me and to A. O. D. Mogg, M.A., Botanist of the same Division, for the notes on distribution.

AMARYLLIDACEAE.

A. *Nerine* sp. (probably *N. marginata*, Harv.).

Synonyms.—Nerine.

Origin of Material Tested.—" Pokkraal," Worcester.

Distribution.—Tulbagh and Worcester, Ceres and Bokkeveld, South Western Cape.

Stage and State of Plant.—Mature plant in fruiting stage; mature fruit; leaves and stems completely dry. Bulbs very thready and dry. The bulbs were planted out and a definite identification will be made as soon as the flowers are available.

Symptoms.—The quantity of the plant material forwarded only allowed of a few rabbits being dosed.

Bulbs.—A rabbit dosed with 50 grams of bulb showed the following train of symptoms within three minutes after dosage, restlessness, pronounced weakness (paralysis) of the neck, so that the animal was unable to hold the head up, marked dyspnoea, and an accelerated and subsequently imperceptible pulse. The animal died within twelve minutes after dosage under symptoms of asphyxia. Death most probably was due to heart failure.

Post-mortem Appearances.—A pronounced general cyanosis; heart markedly dilated and both ventricles distended with coagulated blood masses; and a marked hyperaemia of both lungs.

Dry Leaves and Stems.—50 grams had no effect on a rabbit.

Matured Seed.—They resemble those of a pomegranate very closely. 25 grams caused death in a rabbit within 24 hours after dosage, after the animal had shown the same train of symptoms as those caused by the bulb. A diarrhoea set in after 10 hours.

Post-mortem Appearnces.—In addition to the above described lesions, this animal showed a pronounced acute haemorrhagic gastro-enteritis.

B. *Vallota purpurea*, Herb.

Synonyms.—Berglelie, George-lily, Knysna-lily.

Origin of Material Tested.—Messrs. Hall and Son, P.O. Tomango, Transvaal.

Distribution.—Tomango (cultivated) and Knysna, George and the Outeniquas, Southern Cape.

Stage and State of Plant.—Only fresh bulbs, which were about 8 cms. in diameter and covered by dark brown scales, were forwarded. The bulbs were minced and dried, and after ten months storage proved to be of the same toxicity. They contained 68.3 per cent. of moisture.

Toxic Principle(s).—The toxin is mostly soluble in water, much less soluble in absolute alcohol, and practically insoluble in ether and chloroform. The toxin is fairly thermostable, 10 minutes boiling partially destroying it.

The above owners lost a number of calves from these bulbs, which had been dug out of a land.

Symptoms: Guinea-pigs.—2.5 grams equivalent of fresh bulb injected subcutaneously in the form of an aqueous extract, killed guinea-pigs within 30 hours after injection, whereas 20 grams equivalent killed within 5 hours after injection. These animals showed pronounced apathy, progressive paralysis starting in the hindquarters and spasmodic breathing. Prior to death the animals were in a state of complete paralysis.

Post-mortem Appearances.—Heart in diastole; and hyperaemia of the lungs and whole gastro-intestinal tract.

Rabbits.—8 grams of the dry bulb (=25.28 grams fresh bulb) produced diarrhoea with inappetence, whereas bigger quantities caused death within 30 hours after dosage. Smaller quantities produced a passive diarrhoea with inappetence, whereas bigger quantities caused death within 10 hours.

Post-mortem Appearances.—Heart in diastole; hyperaemia of the lungs; marked degeneration of the liver; pronounced acute haemorrhagic gastritis and a slight acute catarrhal duodenitis.

Dogs.—A dog drenched with 32 grams of the dried bulb vomited within five minutes and recovered within thirty-six hours from the resulting inappetence and apathy.

Sheep.—100 grams of the dry bulb produced lassitude, inappetence, diarrhoea, accelerated respiration and pulse, and death within seventeen hours after dosage. Prior to death the pulse was imperceptible.

Post-mortem Apearances.—Marked general cyanosis; degeneration of the myocard; pronounced hyperaemia and oedema of the lungs; the trachea and larger bronchi contained coagulated blood masses; numerous haemorrhages in the bronchial, mediastinal and retropharyngeal lymph glands; pronounced degeneration of the liver; and a marked acute catarrhal abomasitis and enteritis with haemorrhages in the mucosa.

Microscopical Pathological Anatomical Diagnosis.—Extensive uniform fatty degeneration of the lobules; marked hyperaemia of the kidneys and fatty degeneration of some of the tubules; extensive uniform fatty degeneration of the myocard; and an acute haemorrhagic lymphadenitis.

COMPOSITAE.

A. *Dimorphotheca calendulacea*, Harv.

Synonyms.—Namaqualand Daisy.

Origin of Material Tested.—Gardens at Onderstepoort, Pretoria.

Distribution.—Namaqualand, now widely grown as an ornamental plant in gardens.

Stage and State of Plant.—In the flowering stage; picked at 1.45 p.m. on 3.8.28.

Toxic Principle.—Hydrocyanic acid. This plant belongs to the "bietou" family. The sodium picrate paper test for hydrocyanic acid carried out with the leaves, stems and petals was strongly positive.

Symptoms.—The symptoms of prussic acid poisoning are too well known to be described here. Sheep were drenched with 300 and 500 grams of the plant respectively. The former dose had no effect on the animals, but the latter caused transient symptoms of prussic acid poisoning. Unfortunately no more material was available, but there is little doubt in my estimation that bigger doses than 500 grams would kill animals with symptoms typical of prussic acid poisoning.

B. *Geigeria aspera*, Harv.

Synonyms.—Vermeersiekte bossie (Vomiting bush).

Origin.—(1) "Boschkoppies," Kroonstad, O.F.S.
(2) "Dankbaar," Senekal, O.F.S.
(3) Devon Station, Transvaal.
(4) "Potberg," Standerton, Transvaal.
(5) "Rietspruit" Ermelo, Transvaal.

Distribution.—Widely distributed in the Orange Free State and Highveld of the Transvaal.

Toxicity.—*Geigeria aspera* is about ten times as toxic as *Geigeria passerinoides*, the most toxic stage being the pre-flowering one. Attempts to isolate the toxin have failed. As in the case of *Geigeria passerinoides* the toxicity of *Geigeria aspera* decreases on storage, until after a month the toxicity has almost completely disappeared.

Symptoms.—These can best be described in four different forms, one and the same animal suffering from one or more forms at the same time:—

(*a*) *The real vomiting form*, which is characterized by the greenish stomach contents running from the nostrils and lips. When sheep are kraaled during night time the vomited stomach contents may often be seen on the backs of other sheep in the morning. Many animals get choked during the act of vomiting by drawing the stomach contents into the lungs.

(*b*) *The hoven form*, which usually accompanies one or more of the other forms, is characterized by marked bloating and continual groaning.

(*c*) *The stiff form.* The stiffness is most pronounced in the hind legs. The affected animals prefer to lie down and when urged are unwilling to rise. In flocks running on "Vermeersiekte" veld one frequently comes across these sheep affected by this form only.

(*d*) *The paralytic form*, to which goats seem to be more susceptible than sheep, may vary from a general weakness to complete paralysis, and it usually starts in the hindquarters. Goats were often seen to be able to raise the body on the front legs, but completely incapable of moving the hindquarters.

In addition to the above symptoms, the pulse and respiration became accelerated, the former becoming weaker and weaker as death drew nearer.

In flocks running on " Vermeersiekte " veld, chronic cases of " Vermeersiekte " may often be seen. These animals show a greenish diarrhoea and lose condition very rapidly. Death generally is due to general debility.

Dogs and pigs vomited immediately after dosage.

Post-mortem Appearances.—Marked general cyanosis; pronounced hyperaemia and oedema of the lungs: numerous subepicardial and subendocardial haemorrhages; degeneration of the liver; haemorrhagic swelling of the mediastinal, retropharyngeal and submaxillary lymph glands; and a pronounced acute catarrhal gastro-enteritis with numerous haemorrhages in the mucosa.

Microscopical Pathological Anatomical Diagnosis.—Fatty changes in the liver and myocard and a pronounced haemorrhagic lymphadenitis.

C. *Geigeria zeyheri*, Harv.

Synonyms.—Vermeerbossie (Vomiting bush).

Origin of Material Tested.—School grounds, Onderstepoort, Pretoria.

Distribution.—Pretoria and Waterberg Districts of the Transvaal, so far as is at present known.

Stage and State of Plant.—All stages of development were tested. The plant was freshly picked for the experiments.

Toxicity.—*Geigeria zeyheri* is about three times less toxic than *Geigeria aspera*, the pre-flowering stage being more toxic than the flowering and post-flowering stages. This plant was tested at regular intervals of 14 days during a period of one year, and it was found that the toxicity disappeared to such an extent after the first heavy summer rains that it was impossible to kill sheep, whereas prior to these rains 400 grams of the plant caused pronounced symptoms of " Vermeersiekte " and 900 grams killed within 48 hours after dosage. The symptoms, post-mortem appearance and microscopical pathological anatomical diagnosis resemble those of *Geigeria aspera* very *closely*.

LEGUMINOSAE. (Papilionatae.)

A. *Lotononis involucrata*, Benth.

Origin of Material Tested.—" Pokkraal," Worcester, Cape Province.

Distribution.—South Western Cape.

Stage and State of Plant.—Only a small quantity of the leaves which were in a half dried state, was available. The plant was picked in the flowering stage.

Toxic Principle.—In the fresh state all parts of this plant with the exception of the roots contained a large amount of hydrocyanic acid. During the process of drying the plant lost practically all the hydrocyanic acid.

Symptoms.—A sheep drenched with 130 grams of the half dried plant showed typical symptoms of hydrocyanic acid poisoning which passed off after a few hours. On the second day after dosing a pronounced greenish foetid diarrhoea, from which the animal recovered after 3 days, set in. I have little doubt that comparatively small quantities of this plant would kill sheep.

B. *Phaseolus lunatus*, Linn.

Synonyms.—Java bean, white kidney bean, Rangoon bean, Haricot de lime, seven year bean, Burma bean.

Origin.—" Spionkop," Davel, Transvaal.

Distribution.—Widely cultivated, especially in the warmer parts of the Union.

As the evidence with regard to the toxicity of this plant is so conflicting, it will not be out of place to mention the results of experiments I have conducted at the Veterinary Laboratory, Nooitgedacht, Ermelo, with material collected on reaped white kidney bean lands, on the farm Spionkop, near Davel. This investigation was prompted by the fact that the owner of Spionkop suffered losses amongst his sheep running on these reaped kidney bean lands, the symptoms and post-mortem appearances being typical of prussic acid poisoning. Lander, in his " Veterinary Toxicology " (1926), page 102, says: " Several cases are on record relating to Java bean poisoning. Thus, McCall gave Java bean meal to a collie, a cow, and a horse; that supplied to the horse having first been boiled for one hour. Fifteen to twenty minutes elapsed before the appearance of symptoms, which ended fatally in the case of the dog within two hours, and in the case of the cow and the horse within four hours."

Long, in his " Plants Poisonous to Live Stock," (1917), page 32, also quotes instances of poisoning in stock. To my mind the solution of the conflicting evidence with regard to the toxicity of the Java bean lies in the fact that there are different varieties of the plant, the colour of the beans being white, pinkish, purplish, pale brown, black, etc. Long mentions the fact that the white forms of this bean can be fed to stock without any danger, and that the coloured varieties contain a cyanogenetic glucoside, phaseolunatin.

Cases of poisoning from eating roots have been reported amongst boys of the Reformatory, Heidelberg, South Eastern Transvaal, but, unfortunately, as has already been remarked, with all other such cases of poisoning, the colour of the bean seeds was not noted.

Other cases of poisoning of a similar nature have been reported in human beings.

Symptoms.—These are identical with prussic acid poisoning.

Experiments at Nooitgedacht.

Prussic acid tests with the bean stalks, roots and ripe *white* kidney beans, both with and without the addition of dilute hydrochloric acid, were all negative.