grass on horses and cattle—it has no action as far as my information goes upon sheep—resembles that of a narcotic, along with stimulation of the respiratory and urinary centre, disturbance of the cardiac mechanism, and the production of irritation in the urogenital tract. In increasing the flow of sweat it acts like opium. In about two days the more acute symptoms have passed off, but the general health of the animal suffers for some time. One of the inhabitants of the district was, at my request, induced to eat some of the fresh grass, and experienced very much the same symptoms; here, however, my informant cannot condescend to particulars.

The results which ensue upon the ingestion of Stipa viridula have nothing in common with the symptoms caused by the loco weed. These are not due to any definite plant, but to organisms living on and swallowed with various kinds of fodder.

A weak solution of hydrochloric or acetic acid in water was found to be the most effective in the extraction of what presumably contains the active agent. Alcohol did not remove so much of the active body; its addition to the concentrated watery extract produced a copious precipitate, which was not inactive.

This paper simply purports to be a preliminary notice, and quantitative experiments have been found to be impracticable at present owing to the difficulty hitherto found in separating some active body stable enough to resist drying and weighing even in the form of a salt. Injections of a liquid extract were not satisfactory; they certainly produced symptoms, but to what these symptoms were due it was impossible to say. Again, the acid extracts could not be used without at least partial neutralisation, and partial neutralisation precipitated much of the solid material present.

If to an extract, made with dilute acetic acid by percolation for a day or two, carbonate of sodium or caustic soda was added, an almost white precipitate was produced, but a large excess of the alkali was required before the total precipitate obtainable appeared. The filtrate of this was yellow-brown in colour, and if shaken up with ether, separated, and acidulated, and water added to the ether, minute quantities of a white amorphous body were obtained. The precipitate, washed on a filter paper with dilute acetic acid, yielded, on adding carbonate of sodium to the filtrate, a precipitate of small white crystals or flocculi, soluble on heating, reappearing on cooling, soluble in acids but precipitated partially by alcohol. The precipitate remaining dissolved in dilute hydrochloric acid, and only gave a small precipitate on adding an alkali, unless great excess was used, when a much denser yellow-white substance formed and fell. On evaporating any of the solutions to dryness, when by evaporation of water the acid remaining became of great strength, decomposition occurred with the formation of coloured bodies. Pure sulphuric acid added to the flocculi which fell on the addition of an alkali, after they had been purified and dried at a low temperature over sulphuric acid, gave a bright red-violet colour.

Alcoholic extracts were used at first, with a strength equal to two parts by weight of the grass in one of the extract. This extract was gently heated to drive off the alcohol, and then made up to its former strength with water. Analysis showed that it contained:—Total solids, 9.88 per cent.; ash, 2.68 per cent.; organic solids, 7.20 per cent. Chlorides and sulphates were present.

EXPERIMENT I.

5.43 P.M. The frog, weighing 22 g., was injected with 6.53 c.cm. of the extract, or from 1.67 g. of grass, equal to 24 c.cm. of the extract and 48.13 g. of the grass per kilo.

5.45 P.M. A discharge of green fæces from the bowel.

5.46½ P.M. Lying flat on back, motionless.

5.47 P.M. Able to move very sluggishly.

5.48 P.M. Respiration only 22 per minute, deep and full, one hind leg dragged.

5.55 P.M. If turned on back, is unable to regain normal position; breathing [illegible] per minute, shallow; sits up with difficulty; cannot jump; hind legs weak.

[illegible] P.M. All legs weak but also in spastic condition.

[illegible] A.M. Later a little more lively, can turn half over from back, but legs [illegible] on exertion, waddles, does not jump, bringing foredegs alternately [illegible] and drawing hindlegs; sits with hindlegs curled up in front resting on foredegs.

Later. Gradually recovered from all the symptoms.

EXPERIMENT II.

12.7 P.M. A frog [illegible] g. was given an injection of the extract equal to 24 c.cm. per kilo, or 4 g. of the original grass. The organic solids equal [illegible] g. per kilo.

12.4 P.M. Lying prone, irritation of feet caused movement of leg, no respiration or heart beat visible. Practically dead. Killed, the heart when placed in saline solution beat 4 times in the minute, the ventricular systole much prolonged, the auricle contracting more strongly. Two drops of the extract dropped upon the heart increased the vigour, but not the rate of its beat.

12.5 P.M. Heart stopped.

EXPERIMENT III.

Another frog injected with [illegible] g. per kilo showed similar symptoms, but to a slighter degree, and recovered from the effects in some hours.

EXPERIMENT IV.

The very copious precipitate which fell on the addition of a moderate excess of carbonate of sodium was treated with dilute acetic acid after it had been caught on a filter paper, and washed with a solution of the same salt. The acetic extract was made alkaline again with the carbonate, and thoroughly shaken up with ether in a separator. The watery portion of the mixture was removed after twenty-four hours, and a small quantity of a solution of hydrochloric acid in water added to the ether and shaken up with it. The acid watery solution was then removed from the ether. Carbonate of sodium added to alkalinity, and the resulting white precipitate washed by decantation with weak solutions of the salt.

Only a qualitative experiment was made as to the effect of this precipitate, which was only slightly crystalline under the microscope, largely amorphous. Attempts to weigh the amount of the actual body present at 100° C. failed.

A large rabbit was injected at 12.50 with 25 minims of a suspension of this precipitate, which was so fine that no difficulty occurred in its injection.

12.50 P.M. 25 minims injected under skin of back. Pupils widely dilated.

12.52 P.M. Legs paretic. Shivering.

12.53 P.M. Both front legs lame.

12.54 P.M. Pupils contracted, breathing hurried, restless in aimless way.

12.57 P.M. Every now and then stopped moving, and seemed about to fall asleep.

1 P.M. Inclines to one side when moving, cannot hop, drags hind legs.

1.1 P.M. More restless again. Movements when walking similar to crawling.

1.2 P.M. Pupils less contracted.

1.3 P.M. Heart beating 143 to minute. Breathing rapid.

1.5 P.M. (15 minutes interval). Same dose repeated. Pupils dilated at moment. Contracted almost at once after the injection.

1.6 P.M. Appeared frightened from imaginary causes. Went backwards for some years. Pupils almost pinpoint, but changing very irregularly. Breathing 184 a minute.

1.10 P.M. On several occasions almost closed eyes; remained quiet; appeared to be nearly asleep. Movements crawling.

1.30 P.M. Has become brisker; still unable to move freely by hopping. When sitting head leans to one side and legs are spread out.

2 P.M. Lethargic, stupid, not so paretic, but less inclined for voluntary movements.

No urine or fæces were passed. The rabbit lost all its previous plump, puffed-out look, its hair flattening down and becoming awry.

As far as these observations go little more can be advanced than that Stipa viridula contains some body or bodies which it is difficult to isolate, but which cause marked symptoms in frogs and rabbits as well as in the horses and cattle observed in its native habitat. From the descriptions given based upon frequent personal observation, the grass appears to act not only as a powerful nervous narcotic but as a diuretic, a sudorific, and as an irritant both of the respiratory and cardiac organs.

In the frog and rabbit a narcotic and paralytic power is well shown, but in the frog the respiratory movements appear to be slower, the heart acted in a manner somewhat recalling digitalis, while in the rabbit the pupil is contracted, the respirations and heart-beat are quickened, while the behaviour of the animal strongly suggests the idea that it suffers from hallucinations. The movements of fright shown by the rabbit evidently arising from imaginary objects apparent in front of it were most marked, and culminated in its progression backwards for some feet, a mode of progression unsuited to the rabbit's conformation, and most unusual in the species, while alarm was indicated the while by the position of the ears and the constant shrinking back of the head.

Though Stipa inebrians and Stipa viridula may be different plants the effects on the rabbit undoubtedly suggest that Stipa viridula was the cause of this cuniculus inebrians.

REFERENCE.

1 *Die natürlichen Pflanzen-familien.*

A PRELIMINARY NOTE ON THE PHARMACOLOGY OF THE ALKALOIDS DERIVED FROM THE MESCAL PLANT.

By WALTER E. DIXON, M.B., B.Sc.Lond., etc.,

Salters Research Fellow in Pharmacology at St. Thomas's Hospital.

THE plant Anhelonium Lewinii belongs to the small group of the Melocactear, and is native to Mexico. It is used by the Kiowa and other Mexican Indians during certain religious ceremonies; they eat the so-called dried fruits, or, as they are termed by the natives, "mescal buttons." Lewin, Prentiss and Morgan, Weir-Mitchell and other Americans, have made some few experiments by eating the buttons, but no account has at present been given of the pharmacology of the derived alkaloids. Heffter has described a method by means of which four alkaloids were prepared.

Mr. Edmund White, B.Sc., pharmaceutist at St. Thomas's Hospital, by a method modified from Heffter's, prepared for

me four crystalline alkaloids from the "mescal buttons"; the alkaloids and percentages obtained were as follows:

1. Mescaline	...	... 1.16 per cent.
2. Anhelonidine		
3. Anhelonnine ...	...	... 0.46 "
4. Lophophorine...	...	... 0.13 "

All are freely soluble in water, and possess a remarkable similarity in their physiological actions. It is not proposed here to give detailed differences between these substances, but only to indicate the general conclusions obtained. The following data apply to all:

Skin.—Absolutely non-irritant, hence injection is a suitable mode of administering the alkaloid. A 5 per cent. solution has no effect when applied directly to the conjunctiva.

Mouth.—The substance behaves as a specific sialagogue.

Gastro-intestinal.—After large doses nausea and vomiting may occur. Small doses are apt to cause constipation, but, when the dose is large, diarrhœa sometimes occurs, and in exceptional cases even bloody stools have been observed.

These results are produced whether the alkaloid is given by injection or by the mouth.

Blood.—No effect.

Circulatory.—From the therapeutic point of view this is the most important action, although any action on the circulatory system by this plant has been denied by some observers. Small doses slow the heart, and cause it to beat much more vigorously, whilst after a varying period, dependent on the dose, the beat recovers its normal rate, and generally exceeds it, but is never very rapid.

There is also a considerable rise in arterial pressure. These results are probably due (*a*) to direct stimulation of the intracardiac ganglia and nerve terminals of the vagus, and (*b*) to stimulation of the vasomotor centre.

In toxic doses paralysis of the nerve endings of the vagus and subsequently of the nerve cells occurs. In a cat, after section of both vagi, the heart beat was slow and arterial pressure increased by an injection of 0.025 g. of the alkaloid, when a strong stimulation of the vagus failed to produce inhibition.

Respiration.—In moderate doses no effect. Toxic doses give rise to rapid shallow respiration and death subsequently occurs from failure of the respiratory centre. This is the main danger to be apprehended when experimenting with the drug in the human subject.

Nervous.—There is a preliminary stage of excitement, talkativeness and exuberance of spirits followed by a stage of intoxication. Like Indian hemp its effects vary considerably in different individuals. During the stage of intoxication there are increased reflexes, wide dilatation of pupils, auditory and nasal hyperæsthesia, inco-ordination, tremors, blunting of cutaneous sensation, a rapid flow of ideas with difficulty in concentrating the attention and sensory hallucinations, especially visual.

These latter consist of a kaleidoscopic play of colours ever in motion and the tints constantly changing. The movements may be linear, rotatory, or pulsating. The visions generally are only seen with closed eyes. Colouring of external objects is exaggerated. Intellection and introspection seem to the experimenter to be normal. Occasionally there is an indescribable sensation of dual existence.

Lethal doses produce complete paralysis, and death is due to respiratory failure. *Post mortem*, a faradic current applied to the motor nerves produces contraction.

The important effects of these alkaloids in therapeutic doses would appear to be:

1. A direct stimulation of the intracardiac ganglia.
2. An initial slowing of the heart.
3. An elevation of arterial tension.
4. A direct stimulation of the brain and motor centres of the cord, as shown by the increase in reflex excitability.

A Fund for Women Medical Students.—According to the provisions of the will of the late Miss Arethusa L. Forbes, of Brooklyn, the residuary estate, after a few bequests to relatives, is left in trust with instructions "to apply the net income of all the estate which shall remain after the payment of existing debts to the payment of the tuition and instruction of meritorious young women at the Women's Medical College of the New York Infirmary."

MEMORANDA:

MEDICAL, SURGICAL, OBSTETRICAL, THERAPEUTICAL, PATHOLOGICAL, Etc.

A CASE OF HÆMORRHAGE INTO THE PONS VAROLII.

The following case presents some points of practical interest: On September 11th I was sent for to see an old man at a public-house. The only history I could get was that he was found lying on his back on the bed with his feet on the floor, and quite unconscious. He had gone to bed in his usual condition, "drunk."

I found him comatose, with contracted pupils, livid countenance, and heavy breathing. He was quite powerless, and his head dropped forward unless propped up. He appeared like a person suffering from opium poisoning. He died about two hours after I saw him.

With the assistance of Dr. A. J. Wheatley I made a *post-mortem* examination. The only point calling for notice was the condition of the brain. The dura mater was adherent in two or three places to the surface of the brain. There was some subarachnoid effusion of bloody serum. The pons Varolii contained a clot about the size of half a walnut communicating with the floor of the fourth ventricle. There were no other visible signs of disease in the brain.

Leonard Cane, M.D.Lond., B.S.,
Physician to Peterborough Infirmary, etc.

CONGENITAL SUBLUXATION OF THE HEAD OF THE FIBULA.

The following case was sent to me for examination by Dr. Brittin. The patient was a child, aged 9 months, and since it was 3 months old the parents had noticed that "one of the bones of the left knee slips in and out." On examining the knee there was apparently nothing abnormal, but when the child moved the leg the head of the fibula suddenly appeared prominent under the skin at the side of the knee, the biceps tendon at the same time standing out like a cord. Another movement sent the head back with a loud crack, and the tendon disappeared. I could not produce this dislocation by manipulation, but by standing the child up it immediately reappeared, and reduced itself with another crack. The tibia remained in its normal position, so I concluded that there was probably some congenital absence of the tibio-fibula ligaments, as the head of the fibula was quite movable when thrown out of its place.

P. Clennell Fenwick, M.B.Lond.,
Christchurch, New Zealand. M.R.C.S., L.R.C.P.

A CASE OF HYPERPYREXIA.

At 7 P.M. on September 25th I received an urgent call to a single woman, aged 20, wildly singing and shouting, and requiring restraint. She was so violent, trying to bite and so on, that it was impossible to examine her properly. Her previous history gave no clue at all. The present attack was said to have commenced with absolute suddenness, and with no immediate cause. It appeared to me to be an acute maniacal attack. I quieted her with an opiate, and saw her early the next morning, when she was quiet. The most obvious symptom about her was anæmia. She was somewhat undersized, perhaps, but not at all wasted; the clavicles were well covered. The finger nails were very extraordinary, being all of them markedly concave. No *râles* in the apices. Temperature 97, and pulse 120. The heart sounds were ful and rapid, but quite pure. No œdema of feet or elsewhere tonsils swollen.

Not satisfied with the want of relation between pulse and temperature, I visited her again between 5 and 6 P.M., and took the temperature very carefully; it was 97.2°. The patient was quiet, and answered questions intelligibly. I ordered a sleeping draught at 8 P.M. Nevertheless, a fresh maniacal attack broke out soon after, and was not quieted till after two more doses. The next morning I saw her about noon, and found her temperature 106.2°. I had some antipyrin with me, which I at once administered,