The Uganda Journal.

THE ORGAN OF THE UGANDA SOCIETY.

Vol. III. **JULY, 1935.** **No. 1.**

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Minutes of a Special General Meeting of the "Uganda Society" held on 27th February 1935.

THE UGANDA SOCIETY.

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THE UGANDA SOCIETY.

NOTICES.

1. There are no restrictions as to membership of the Uganda Society. Membership is open to all races and to Institutions and Clubs. No entrance fee is imposed. The annual subscription, which is payable in advance on 1st July of each year, is Shs. 10/- for single membership and Shs. 15/- for double members. The double membership is introduced for the convenience of families and entitles two members of a family to all the rights and privileges of a full member except that they receive only one copy of each number of the *Journal*.

2. Additional copies of the *Journal* may be obtained from the Uganda Bookshop, price Shs. 3/- per copy.

   A few single copies of each of the first two numbers may also be obtained from the Uganda Bookshop, at Shs 3/-. The bound Volume II may be obtained from the Uganda Bookshop at Shs. 15/-, and single numbers of that Volume at Shs. 3/- each.

3. Arrangements have been made with the Uganda Printing and Publishing Company Ltd., Kampala, to bind Volume I of the *Journal* at a cost of Shs. 2/50 and subsequent Volumes at Shs. 3/- per volume.

4. A limited number of 'separates' of each article are printed, and may be obtained on application to the Business Manager. Prices of these vary according to the length of article and the number and nature of illustrations.

5. Blocks of illustrations may be purchased on application to the Business Manager. The price of these is usually half the cost of production.

6. Subscriptions should be sent to the Business Manager, P. O. Box 410, Kampala, from whom Banker's Order Forms may be obtained. Members are particulary requested to pay subscriptions by Banker's Order, if possible.

7. Contributions to the *Journal* should be sent to the Editor, P. O. Box 262, Kampala. No guarantee is given to return any MSS. submitted. Articles should be typed in double spacing on one side of the sheet only and should not contain matter likely to cause political or religious controversy. Those submitted by Government Officials must comply with Colonial Office Regulations; they should either be submitted u.f.s. the Head of Department concerned or they should be addressed to the Editor, with a request that he will obtain the necessary permission for publication.

   Those sending photographs should send glazed prints if possible.

8. The postal address of the Secretary, the Treasurer and the Business Manager, and of the Society generally is P. O. Box 410, Kampala, and that of the Editor, P. O. Box 262, Kampala.

9. The postal address of the Society's representative in Great Britain is A. R. Morgan, Esq., O. B. E., 66 Brodie Avenue, Mossley Hill, Liverpool. Members resident in the United Kingdom may send their subscriptions to him.

10. The Society's Bankers are the National Bank of India, Ltd., Kampala.

EDITORIAL

The present number inaugurates the third year of the Society's resurrection, and finds it in a flourishing condition, with the membership well over 500. We would nevertheless repeat the warning of our predecessor that a membership of 500 is only the minimum required for the satisfactory continuance of the Journal on its present basis, and we would therefore urge all members to do their utmost to enlist recruits, and in particular to draw the attention of all new arrivals in their Districts to the advantages of joining the Society.

The Balance Sheet for the financial year 1934-1935 is not yet available but it is anticipated that it will show satisfactory progress during the year and that we shall probably be able to increase our Reserve Fund, invested last year.

It is hoped to hold the Annual General Meeting in July, when members will be able to review the financial position.

Since the publication of the April Number, a Special General Meeting of the Society has been held. At this meeting the change in the Society's title from "The Uganda Literary and Scientific Society" to "The Uganda Society" was approved as also was the new Constitution, for the drafting of which the members are greatly indebted to Mr. Mark Wilson. The meeting also approved the appointment of Mr. A. W. Devas Jones as Business Manager, it being understood that, while the Editor remained officially the Honorary Secretary and Honorary Treasurer, the work of these two officers would be carried out by the Business Manager.

The minutes of the meeting are published at the end of the present number, and copies of the new Rules will be distributed with the Annual Report.

We would take this opportunity of paying a tribute to the work done by our predecessor, Mr. E. F. Twining. It was very largely through his enthusiasm and untiring energy that the Society was not only refounded but attained in a comparatively short time such a large membership as to confound the pessimists and even to surprise the optimists. He was also responsible for making the *Journal* an accomplished fact, and took on his shoulders all the laborious and detailed work of negotiation with printers, block-makers, etc., in addition to that of enlisting contributors, and keeping them up to tbe mark, and attending to the thankless task of getting proofs corrected. Truly the Society was more than usually lucky in having Mr. Twining as its first Editor, Treasurer and Secretary, and, may we add, its Hitler.

We trust that we shall continue to receive the support that was given to Mr. Twining, and that there will be no falling off in contributions. We would repeat that it is essential for the Editor to have in hand sufficient copy to plan for two numbers ahead, and that this applies not only to major articles but also to "Notes". We hope to retain the latter as a permanent feature of the Journal, but so far our

experience has been that they are more difficult to obtain than longer articles. A "Note" should be anything of such a length as to fill from half a page to two pages of the Journal, and should surely be within the compass of a large number of members who have no time to write long articles. Photographs or drawings to illustrate such "Notes" will always be equally welcome. If possible, glazed prints should be sent.

On May 24th, the President of the Society gave a lecture on "Past Climates and Some Future Possibilities in Uganda" to an audience of about fifty members. This lecture, which was also the Presidential address for the year, will be published in the October number of the *Journal*.

We would take this opportunity of congratulating Mr. Wayland on his being awarded the Victoria Medal of the Royal Geographical Society.

On June 19th, Mr. W. C. Simmons gave a Lecture, illustrated by some excellent lantern slides, on "The Purbeck Coast of Dorset."

We are of opinion that the attendance at the two lectures was by no means as large as it should have been and that it is not fair to ask people to lecture unless members of the Society are prepared to give a greater measure of support.

We thank those members who have sent in their subscriptions for the year 1935-1936, and note with satisfaction that many have taken advantage of the Banker's Orders sent out in April. If all members paid by Banker's Order, the work of the Business Manager would be much simplified.

In no circumstances will copies of the *Journal* be sent to those whose subscriptions are outstanding.

We would particularly draw attention to Capt. C. R. S. Pitman's article on "The Snakes of Uganda," published in the present number. This is the first of five instalments, which will together form a comprehensive treatment of the subject, and will be plentifully illustrated. The illustrations will include several coloured plates.

We regret to have to announce the resignation of Mr. Ernest Haddon, as our representative in Great Britain. The Society owes him a deep debt of gratitude for his work in bringing the Journal to the notice of various learned Societies, and scientific bodies, as also to that of former residents of Uganda, now living at home; for acting as collector of subscriptions from members in Great Britain, and undertaking any work on behalf of the Society which could not conveniently be performed by the Honorary Secretary in Uganda. He now finds himself too busy to continue to perform these services.

Mr. A. R. Morgan, O.B.E., has kindly undertaken to act as his successor.

We desire to call attention to an omission in the Index to Volume II, P.309, where the name of Lubogo Y. K. should appear as the author of the article on "Basoga Death and Burial Rites."

We have to acknowledge the receipt of the following :—

Lt. Col. H. F. Stoneham. "The Birds of Uganda."

E. D. Tongue. "The Contact of Races in Uganda" (from the British Journal of Psychology, General Section, Vol. XXV. Part 3, Jan. 1935).

Bulletin of the Imperial Institute.—Vol. XXXII, No. 4, 1934.

Museum and Art Notes.—Supplement No. 12 and President's Report. (Art, Historical, and Scientific Society, Vancouver, B. C.)

Journal of the Royal United Services Institution.—February 1935.

"The Spiked Wheel Trap and its Distribution" (Ethnographical Museum of Sweden.)

Bantu Studies.— March 1935.

Man.—February, March, April, 1935.

Any member may borrow these publications on application to the Business Manager.

Kiganda Drums.

By Allan J. Lush.

'Le tambour nous l'avons entendu presque partout, au cours de nos voyages à travers le continent africain. C'est l'amusement cher au noir, et on ne trouve guère l'un chez lui sans l'autre.

Accompagnateur indispensable du chant, de la danse et de toute les cérémonies, il rit aux joies des vivants et pleure auprès des morts; il frappe le premier les oreilles du nouveau-né et conduit le veillard à son dernière demeure; le tambour fait partie de la vie courante de l'indigène, et ceux qui sont accoutumés au noir n'y font pas plus attention que lui. Mais, ils ne comprennent pas comme le noir, les batteries différentes qui constituent son langage à lui, langage qu'on entend à de grandes distances, tandis que les autres instruments paraissent muets à quelques centaines de metres. Un indigène reconnait au tambour ce que fait son voison; il peut dire exactement, sans guère se tromper, à quelle cérémonie, à quel passe-temps se livre ce dernier, et Dieu sait si la variété en est grande: ce peut-être l'initiation d'un enfant, de jumeaux, l'arrivée d'une jeune fille à la puberté, la prise d'armes d'un jeune guerrier, un mariage, un deuil, une lutte, une investiture. Ou bien, enfin, c'est simplement une des nombreuses danses et réjouissances locales dont la liste est toujours ouverte. Pour chacune d'elles le tambour varie ses accents et annonce au loin ce que fait son maitre'. (1)

This concise, yet comprehensive survey of the importance of drums to the African in general, is equally true in the particular instance of the Baganda, who, in one of their many proverbs, say, *'Tezirawa ngumba'* ('They—the drums—are not beaten without reason,).

Drums played a great part in the life of the Baganda in the past, and are still used considerably to-day, but the adoption of the western ideas and the discontinuance of rule by a despotic king and pagan religion have already ousted them from their paramount position. To-day, some of the important drums of the past are no longer beaten, and the majority of the young Baganda are ignorant of their names and history.

Although ranking as musical instruments, 'drums are put to a multitude of uses quite apart from music.....and they have a place in the most solemn, and in the most joyous ceremonies of the nation'. (2)

In the past 'there were literally several hundred different beats for the drums, and each rhythm was known by the people, and conveyed a definite meaning to them. One rhythm conveyed to the hearer that a certain chief was passing, another

that a certain dance was taking place, another a call to war, or a fire alarm and so forth. In the case of any urgent call or claim, it was the duty of the first person at a distance who heard the rhythm to repeat the message, and thus in a few minutes a claim or call was carried hundreds of miles'. (3)

As a general rule the drums *('ngoma)* belong to the Kabaka, and when he pr. sents a chief with any office, he confers upon him a drum. A person so promoted is said to have 'eaten a drum', *(ali·de 'ngoma)*. Or, if a son takes his father's place he has 'eaten his father's drum' *(ali de 'ngoma ya kitawe)*. Similar expressions are used of the Kabaka when he comes to the throne—he 'eats Buganda.' (4)

Children of the Kabaka, born while he is actually in possession of the throne, are known as *'Abantu b'e·ngoma'* (Children of the drum), as they are considered in the direct line of succession.

It is evident, therefore, that the word *'Ngoma* (drum) indicates power or authority, and is comparable to the English word 'sceptre'. This is borne out by the Kiganda proverb, *'Abantu magoma gavugira aliwo'*—(The drum beats for the Office, not for the person who holds it).

Kiganda drums are of two kinds. The first is made of a hollowed block of wood, tapering towards the base, and having skins stretched over the head and base. The skins are laced with thongs of hide. The drums appear to be named according to their size and use, and the important ones are also given names—a kind of personification. The other group of drums, known as *'ngalabi'* is, again, made up of drums of varying sizes. They are long and slender, and taper gradually to the base, but widen out to a flange which forms the bottom on which the drum stands. The top is covered with a skin, usually that of the big water lizard (Varanus; Luganda, *nswaswa)* which is pegged on. The bottom of the drum is left open. They are graceful and elegant in appearance, and frequently are engraved with geometrical and other designs. A large *'ngalabi'* is usually about four feet high. (5)

The following description of drum-making is by Roscoe. Although it is written in the past tense, it may be taken that the process is essentially the same to-day.

'Drum-making, another branch of woodwork, required also a knowledge of leather-working, in order that the hides might be prepared for the tops of the drums Two kinds of drums were used; one for ordinary purposes and one for dances or as a musical instrument. The latter was a long drum, having one end covered with skin and the other left open; the skin used was frequently that of a water lizard. The drum was three or four feet long, and seven to ten inches in diameter. A suitable tree was felled, and the portion cut for the drum was hollowed with a gouge, which had a long handle, to enable the workman to reach through the drum. The top or head of the drum was larger than the lower part; it was four or five inches long; and the remaining part of the drum gradually tapered to the bottom, where there was a flange to finish it off. The skin was stretched over the top, after being first wetted and pegged, so that it became taut as it dried; it was pegged down with wooden pegs which were cut off even with the skin, when it had dried. Drums used for dancing were engraved with geometrical designs near the top and bottom, they

were oiled with vegetable oil and the skin was kept well greased with butter. In finishing off any woodwork, the leaf of a particular species of tree *(Lwawo)* was used as sandpaper; as the upper surface of the leaf was covered with short, strong spikes, it made an excellent substitute for sandpaper. The other kind of drum was also hollowed out from logs of wood, and the bottom end tapered. These drums varied in size, from the small drum, used at the birth of twins, which was ten inches high and five inches in diameter, to a drum five feet high and four feet in diameter. When the log had been hollowed out and was ready for the skin, it was smeared over with cow-dung to keep it from cracking. No pegs were used in fastening the skin on this kind of drum, but it was stretched and laced to a second skin which covered the bottom; the laces consisted of twisted thongs of hide, and they were laced so closely that they enclosed the sides and protected the wood. Almost all the drums had a fetich inside. Only a few men knew how to make the fetiches. The skins were kept soft and elastic by being rubbed with butter'. (6)

In the past the ceremonial of the Court was intricate with the use of a large number of drums belonging to the Kabaka. Each drum or group of drums was named and men were specially appointed to take up residence at the Lubiri for the purpose of beating the drums. To-day, for two main reasons, there are far fewer drums in use. Firstly, in civil wars, battles and fires during and subsequent to Mutesa's reign a great many drums were lost and have not been replaced. Secondly, modern life is more exacting than the past in its demands upon the pockets of all classes of the nation, and so the Kabaka is unable to maintain an army of drum-beaters, and the drummers themselves prefer more profitable occupations. Hence, a large number of drums have fallen into disuse either from reasons of economy, or from a lack of drummers with a knowledge of the special beats attached to their use, and in most cases even the whereabouts of such drums is unknown.

The drums set apart for the sole use of the King contained fetiches, some of which have been examined and prove to be of phallic origin. It was thought that, when beaten and heard by the King, his vigour was increased. Such drums were considered sacrosanct and were used at specified times of the day or night for the benefit of the King (7). 'No woman might touch a drum when she was menstruating, lest it should kill her, and she should defile the drum.' (8)

Among the Royal drums the most important battery is that known as *Mujaguzo*. It is believed to have originated in the reign of Kabaka Mutebi, and to begin with there was only a single drum of the *'ngalabi'* type, supposed to have been handed down from the time of Kabaka Kimera. This drum is called *·Timba*, and is highly venerated. It gets its name from the design of a serpent which stands out in relief round the body of the drum. The chief Sekalala of Sese is the hereditary keeper of this drum. The Kabaka himself beats *·Timba* at his enthronement to declare that he has become Kabaka. When *Mujaguzo* is sounded *·Timba* must beat first.

Kabaka Mutebi made another very big drum, called *Kawulugumo*, and other small ones, which together with *·Timba* formed *Mujaguzo*. Each successive Kabaka increased the number, until, in Mutesa's reign, they numbered many hundreds. But to-day *Mujaguzo* has only about fifty drums, the main sections being :—

'Timba	One ngalabi
Kawulugumo	One large drum
Namanonyi	One large drum
Nkonyi	Four medium sized drums
Njawuzi	Five medium sized drums
Njuyi	Twenty-five small to medium sized drums.

Kawulugumo is beautifully decorated with cowrie shells, and is beaten by Lukungo Kawula of the Lugave Clan, and members of this clan beat the other drums associated with *Kawulugumo*. Kawula is the chief drummer of the Royal drums.

Namanonyi ranks next and is also decorated with cowrie shells. The accompanying drums are called *Ndubi* (comprised of drums from *Njawuzi* and *Nkonyi* mentioned above). They are beaten by members of the Butiko Clan, *Namanonyi* being beaten by Kimomera, the assistant chief drummer.

There were several occasions on which *Mujaguzo* was sounded, apart from the Coronation day. It was beaten when the Kabaka went off on a big expedition; it was beaten at special feasts. If the son of the Kabaka himself died, *Mujaguzo* was sounded, but not in the case of other princes. It was sounded when the Kabaka went to confer with the Spirit Mukasa (God of the Lake). It was always taken and beaten at the place where the Kabaka intended to visit; and when the Kabaka's relatives, who lived in Busiro, came on a special day to pay homage, it was also beaten. Thus the Baganda realise that something of importance is happening when they hear the sound of *Mujaguzo*.

The noise of the whole battery at close quarters is deafening, and nothing but a confused medley of sound, but at a distance the qualities of each drum may be distinguished, and to the native ear, at any rate, it conveys music of delicate charm.

The following description translated from Sir Apolo Kagwa's account of the Coronation of the present Kabaka, H. H. Sir Daudi Chwa II, shows the use of *Mujaguzo* in the ceremony:—

"Then the Mugema introduced the Royal Drum saying, 'This your drum is the chief drum which rules all your drums'.

Then Kawula of the Lugave Clan brought the drum-sticks and handed them to Kasu·ju and Kasu·ju handed them to the Kabaka. Then the Kabaka beat on *Mujaguzo*. And also Kimomera of the Butiko Clan, assistant of Kawula, took (other) drum sticks and handed them to the Kabaka, and he beat on the second *Mujaguzo* which is called *Namanonyi*." (9)

The drums of *Mujaguzo* are made from Muvule (Chlorophora Excelsa), but other drums are made from any suitable kind of timber according to the size of drum required. Light wood, not readily attacked by insects, is preferred.

There are many other drums and groups of drums, some of which are still in use. On some of these opinions vary as to their original use and it is difficult to arrive at the truth, and in other cases no information beyond the name has been obtainable. The notes which follow are, therefore, in some cases very fragmentary.

Drums announce the death of the king and also the end of the period of mourning. 'In the evening the Mugema sent the royal drums (*Nanzigo*) to the King, and they were beaten to let the people know that the mourning had ended . . . . . The drums warned the people to cease mourning; no sign of it might be found anywhere under penalty of death'. (10)

Two small drums called *Kangujunguju* joined together make *Kana·ba*. They are suspended from a stake to be beaten. At the death of a princess or the son of a prince *Kàna·ba* is the only drum beaten.

Among all the drums of the past the one of saddest recollection is *Busemba*. It is the drum of death. After a king had been enthroned his suite collected and carried out all the drums which surrounded them. One only, *Busemba*, was left there as if inadvertently. The unfortunate one who first drew attention to this apparent oversight, was immediately seized and put to death, and his arm-bones prepared as drum-sticks for this drum. So among the Kiganda proverbs is, '*A·jukiza Busemba, ye agikuba*' (He who draws attention to *Busemba*, shall afterwards serve to beat it).

The custom is said to have its origin in the following story. 'King ·Tembo killed Kimera in the forest, and the ghost haunted the king and wished to be avenged on him. To appease the ghost, ·Tembo made a drum, and directed that the drum-sticks used for beating it should be the bones of a human being, and the story adds, that, when the bones had been provided, the ghost of Kimera was quieted'. (11)

It is quite possible that this drum was used at executions and preceded the throngs of unfortunate condemned ones as they were hurried to their agony.

Being counselled by Europeans, King Mwanga refused to follow the custom of slaying an innocent to procure the famous drum-sticks, and so the Baganda have a saying, '*Busemba yazikira ku Mwanga*' (*Busemba* ceased with Mwanga).

Busemba is in the hereditary charge of Na·dunga of the Lugave Clan, but the whereabouts of the drum, if it still exists, is not known.

Another collection of drums is known as *Endoda*. It was established by Mutesa who wanted additional drums in *Mujaguzo* with a high pitch like *Ndubirizi*, and it consists of four drums, one large, two smaller, and one *ngalabi*. Its ·drummer is Kigonya of the Nsenene Clan. It is used at Sessions of the Lukiko, especially after the Kabaka declares an heir, saying, 'So and So is the heir of So and So' (Drum beats). It also accompanies the joyful applauses of the audiences before the Kabaka.

Entamivu or *Nkagwe* is a well known drum which was captured originally by Kabaka Kyaba·gu from the inhabitants of the Kya·gwe districts. The Kabaka himself used to beat it when he appointed the chief of a war-like expedition. This drum

never leaves the Lubiri. Nowdays it is used together with *Enjongo*, a slender drum of the *'ngoma* type and two others called *Bwayita*, to accompany the *amadinda* (native xylophone).

E·nyenya is a royal drum reputed to be of greater antiquity than *Mujaguzo*. But when *Mujaguzo* was established *E·nyenya* lost its importance and has now practically fallen into disuse. Its beat was '*Kungulu ntono, munda butekula*'.

Another interesting collection of drums is *Kawugulu*, consisting of the name-drums, which are two joined together, and two other smaller drums called '*Nsuku za·fe 'biri*, or *Kangujunguju*. *Kawugulu* originated in the reign of Mulondo, who became Kabaka while still a child, and whose uncles in the Butiko Clan wished to amuse him. So they made these drums which were all beaten together as the members of the clan danced round and round, wearing bells on their legs and girdles of plantain leaves or long-haired skins. Members of this clan are thereby a kind of hereditary court entertainers, and the dancers are called Ba·na·gunju, from Gunju the head of the clan.

Entenga consists of twelve small drums each tuned to a particular note in a scale. They are placed in a line together with three other drums—one large, one smaller and the third *Enjongo*. The small drums are first beaten to announce the tune, and then the other three join in with an accompaniment, and the result is very entertaining. They are considered to be very important drums, and are kept in the Lubiri, and many different songs can be played on them for the entertainment of the Kabaka. It is stated that Kabaka Kyaba·gu took *Entenga* from Kajujugwe of Bukerere, and the beater was Nagamala, son of Kyasimbi of the Lugave Clan. Nagamala was an attendant on one of Kajujugwe's men.

Buganda-mirembe. This drum is beaten by Batambulira of the ·Fumbe Clan. It was established in the reign of Kagulu, son of Ndawula. When his people abandoned him because of his cruelty, he made this drum, the name of which means Peace, to indicate that he had mended his ways and would no longer persecute his subjects. It is still in use.

Katenge·jo. This drum is beaten by Kanya and Kajoba. It is thought to have been established in the reign of ·Junju. It was captured from ·Junju by his brother Semakokiro in the battle at ·Ba·jo, which accounts for its beat, *Olukomera olw'e ·Ba·jo*' (The fence at ·Ba·jo). It is still in use.

Kirimal'abasa·ja ·nyago. (Many must die from spears). This drum was established by ·Suna, who wanted it beaten in the army when the soldiers were going to battle and when the *Abakondere* (trumpeters) played the song, "*Gulemye-mpangala, Abamanya mwesindike*". It was to encourage the warriors and is still in use.

Nakawanguzi. (The Conqueror). When the Kabaka was successful in his attacks on the surrounding tribes he ordered this drum to be made. It is still in use and the beater is Kiribata of the Ntalaganya Clan.

Ta·de. When the Kabaka went visiting or hunting and intended to stay away for the night, the Katikiro went in advance with many people. When the party returned the Kabaka received many congratulations, because the visit or the

hunting was considered to be a kind of expedition, and the people said, '*Ebemba tekyala etabala butabazi*' (Ebemba does not visit, he fights). The beating of this drum was part of the ceremonies, and the drummer is Kamya of the Ndiga Clan. It is still in use.

Kabalankoma. The Kabaka is like a Kabalankoma (wasp). When you go near him you must be wary, or he will find you guilty of some offence and you will be 'stung'. The drum is still in use and is beaten by Kyasi of the Lugave Clan.

Njagala-kweti·ka. (I want to carry on the head). All the Kabaka's servants had to carry things on their heads. From these servants he chose his chiefs. The drum is beaten by Kyemwa, and is still in use.

Bwesige. When the Kabaka saw that he was like a lake from which his subjects got all good things, he made this drum, '*Bwesige buli e·nyanja*' ('Trustworthiness is in the lake'). The drummer is Beyuna, and the drum is still used.

Kulebera. Seeing that it was the Kabaka alone who promoted people he made this drum to announce the fact. It is still in use and is beaten by Kyanjo. Its full name is *Kulebera-si-kugwa.*

Va-mu-lugudo. (Get out of the way). When the wives of the Kabaka were walking no one was allowed to be on the road in front of them. So a drummer went ahead warning people to clear the way. The drummer is Gunagwera, and the drum is still in use.

Kyejo. When the Kabaka executed mischief-makers, this drum was beaten as a warning to others. '*Kyejo-ki ta*' (Mischief kills). It is beaten by Nambigya of the Ndiga Clan and is still in use.

Basenge·ja. This is rather an amusing allusion. When the Kabaka saw the respect which was given to the beermakers by the people who crowded to watch them at the time of filtering, he made this drum that he might have similar respect. The drummer is Omutemi-w'ente. The drum is still in use.

Banta·de. The Kabaka chose the majority of his chiefs from attendants in the Lubiri. He established this drum to proclaim that he who was but a servant is now at liberty as a chief. The drummer is Butawuka, and the drum is still used.

·Nyanja. This drum is still in use, and its meaning is the same as that of *Bwesige*, already described.

Bwe-mba·ta. This drum used to beat to proclaim the fact that the Kabaka sometimes killed and sometimes acquitted people accused of wrong-doing. It sounds '*Bwe-mbata-bwe-mbabulirira.*' It is still used and is beaten by Lukade.

Gwe Ngo gwe Musota. The Kabaka saw that he was like a leopard and a snake, and so untouchable, and he proclaimed this by beating on this drum '*Gwe Ngo gwe Musota, Ekirimala abasa·ja ·nyago*'. (You are a leopard and a snake. That which ends all men is the spear). It is still used.

Kikolw'omuganzi. This drum was established by the Kabaka to honour certain favourites of his who were not chiefs. It is still beaten.

Mulyabyaki. A drum which was given by the Kabaka to the chief of an expedition. It sounded '*Gwa, Gwa, Gwa*', and is still used on important occasions. Another similar drum carried on expeditions, but now abolished, was called *Na·jemba.*

Wango-tabuka. The Kabaka is like a leopard. When you pass him you say you have been in danger of being killed. In appreciation of this popular conception this drum was established. It is still in use and is beaten by Wa·sonko of the 'Ngonge Clan. This is the copper drum referred to by Speke (see extract on page 20 below). Lord Lugard mentions the 'two copper drums of Uganda' one of which was given to him by Mwanga. The explanation of there being two drums would appear to be that Mwanga lost his possessions to Kiwewa and Kalema when they assumed the throne during his exile. Both these kings were supported by the Mohammedans, and this explains how Mbogo obtained possession of *Wango·tabuka.* When Mwanga was reinstated as Kabaka he made another drum to replace that lost to the Mohammedans. There is another copper drum '*Gaya*', which is beaten with the hands as distinct from *Wango* which is beaten with sticks *(eminyolo).* Speke refers to the drum *Wango* as being of French manufacture, but it is actually of native manufacture, the copper surround being added to a wooden mould. (12)

Kuku, ·kanga Balimi. This drum was made by ·Suna, who issued an order that women who did not cultivate their plantain gardens would have their hands cut off. The drum was beaten especially early in the morning, to warn the women to get to work, lest they lose their hands. It is no longer in use.

Kya·gwe-kireta. Whenever the Kabaka stays at a place the people gather from all directions. That is why this drum was established, '*Kya·gwe-kireta, ·Singo-kireta*' (*Kya·gwe* comes, *·Singo* comes, all come). It is now obsolete and was beaten by Lugayavu.

Sindika-tagenda. Another drum, now obsolete, which proclaimed the fact that the Kabaka was like a rock and no one could push him against his will. The drummer was Magwa.

Makumbi. Another obsolete drum similar to *Kuku, ·kanga Balimi*, warning people to cultivate their banana gardens or risk having their hands cut off.

Batankulu. The Kabaka had this drum made in recognition of the good service rendered by attendants who entered the Lubiri when already men. The beater was Kabinaga, but the drum is no longer in use.

Kababembe. This drum had an interesting past but is no longer in use. It was a war-drum belonging officially to Kibuka of Mbale, who, it is said, took the drum from Sekalala of Bugoma in ·Sese. Kibuka used it in the wars of the Kabaka Nakibinge (Omulwanyammuli—the fighter with reeds), the son of Kayima, against the Banyoro. When the Baganda heard the drum they would rush furiously upon

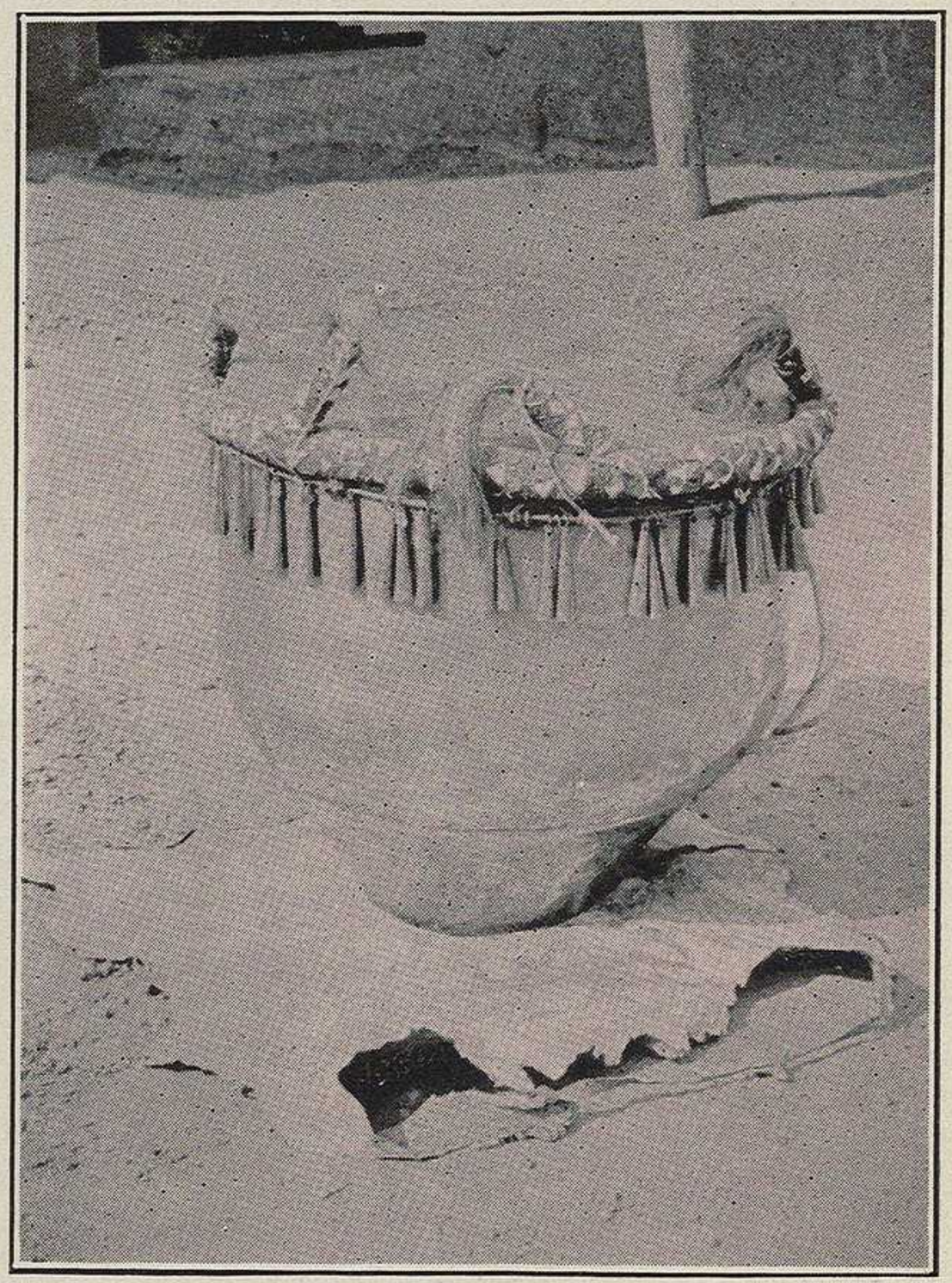

Photo: Dr. A. T. Schofield.

Wango-Tabuka.

Photo: Dr. A. T. Schofield.

Kyejo.

Photo: Dr. A. T. Schofield.

Endoda.

Photo: Dr. A. T. Schofield.

A group of Royal Mibala Drums & Drummers.

Photo: Dr. A. T. Schofield.

The three principal drums of Mujaguzo.
Timba *(centre)*, **Kawulugumo** *(right)*, **Namanonyi** *(left)*.
Kawula, Chief Drummer, is standing behind the drums.

Photo: Dr. A. T. Schofield.

Timba.
The chief drum of Mujaguzo.

the enemy. It sounded '*Tulimulo·ja*', and was beaten by Majuluba. After the wars it remained at Mbale in Mawokota in the Temple of the Lubale (Spirit) Kibuka (god of war). Later, the Kabaka established a corresponding drum to be beaten early in the morning to waken his attendants, and at that time no one was allowed to speak in the Lubiri before the drum had sounded.

Bawemukira. An obsolete drum which was established to proclaim the aquittal of a person who had been slandered. The drummer was Mbuga.

Mba·de-mmulowoza. At a time when there was peace and harmony in the land, the Kabaka working for his people's good, and the people respecting him, this drum was established. The beater was Kyenyi, and the drum is now obsolete.

Netunze. An obsolete drum which was beaten by Mugambwa of the ·Fumbe Clan. It was established by the Kabaka in honour of the loyal manner in which his servants risked their lives to serve him.

Gali·nya. Kabaka Semakokiro established this drum to record that his mother was of the ·Fumbe Clan. Its beat was '*Amafumbe gali·nya e Ba·ka*'. It is no longer used.

Yewalawala. Some people habitually avoided the Kabaka, but from time to time some of them were caught when expeditions were sent out to obtain human sacrifices. When such people were caught this drum was beaten. It is now obsolete.

Roscoe has a somewhat detailed description of a special drum, *Kawula*, but there is no evidence that a drum of this name existed. The hereditary name of the Kabaka's Chief Drummer is Kawula of the Lugave Clan, and it is possible that Roscoe confused the name of the drummer with one of the drums of *Mujaguzo*. The name of the Assistant Chief Drummer is Kimomera of the Butiko Clan. (13)

The use of drums played an important part in the old wars. It needs but little imagination to picture the scenes which have been recorded by Speke, Lugard, and Roscoe. Thus Speke, 'Within the square of men immediately fronting the king, the war-arms of Uganda were arranged in three ranks; the great war-drum covered with a leopard skin, and standing on a large carpeting of them, was placed in advance. . . . . Outside the square again, in a line with the king, were the household arms, a very handsome kettledrum of French manufacture, surmounted on the outer edge with pretty little brass bells depending from swan-neck-shaped copper wire. . . '(14). And Lord Lugard, 'We went outside the king's enclosure, on to the hill, amid a dense concourse. It was a remarkable sight, and one seldom seen by Europeans. The huge drums of war were produced and beaten, while the king, surrounded by his chiefs, stood with an umbrella held over him. At each stroke, made with all the vigour and energy of the drummer's body, he opens his mouth to its widest and gives vent to a guttural roar, which has a strange and impressive effect. . . (15) The king sent for one of the big war-drums, beaten by a grey-headed old negro. . . . He had the drum beaten for me close to himself to show me the way the war note was sounded. . . . Within five minutes masses of armed men began to assemble on every side, and came pouring in dense troops towards us from every direction, rushing along, shouting

and dancing and yelling.' (16) And Roscoe, 'As the war-drum beat in the royal enclosure the chiefs took up the rhythm in their own enclosures, and the sound was carried on in an ever widening circle, until within a short time all the war-drums in the country were sounding and the whole country was up in arms.' (17) 'It was a different matter when a fire occurred in the royal enclosure; then the war-drum sounded at once, summoning people to prevent the conflagration from spreading. No one who has heard the war-drum beat and has witnessed the assembling to the chief, will readily forget the scene.' (18) 'The army was expected to collect in four days after the drum had sounded.' (19)

Cunningham mentions a drum, '*Mavumisizi*,' which conquered Buddu for Buganda. The correct rendering of the name is '*Mavumirizi*.' The drum belonged to Luziga of the Ndiga Clan, who was sent out by Kabaka Junju, son of Kyabagu, and who conquered Bu'du and Kiziba. (20)

Drums are also associated with chieftainships. Each chief has his drum and the beat which he chooses, and it is conferred with his office by the Kabaka. The following is a list of the most important chieftainships, and the '*mibala*' (drum-beats) associated with each of them.

Ow'ekitibwa Katikiro	*Basenge ja.* (Another drum called *Serukoma* was also established after the battle of Busongola).
Ow'e'saza Mukwenda	*Nayimba.*
Ow'e'saza Kangawo	*Fe'k'abalemezi.*
Ow'e'saza Mugema	*Se'ny'enku.*
Ow'e'saza Pokino	*Se'gulu-ligamba.*
Ow'e'saza Kayima	*Amawokota gankosa.*
Ow'e'saza Sekibobo	*Kya'gwe etya?*
Ow'e'saza Kas'uju	*Kasa.* (This drum was established in the reign of Kabaka Mutebi. When Kas'uju was ordered to make *Mujaguzo*, he cut down a suitable tree for the purpose, and from a branch he made a drum for himself, calling it *Kasa*. This is the derivation of the Kiganda proverb, '*Ezitemwa okumu zawukanya emibala*' ('Drums from the same tree may differ in their beats')

The various Clans of the Baganda have their drums and '*mibala*' (particular drum-beats). Catch phrases have been put to the rhythm of the beats, in much the same way as certain doggerel rhymes are associated with the various British military bugle calls. A list of the Clans and their *mibala* is added as an appendix.

Selected Clans are also responsible for the making, beating, maintenance and safekeeping of certain of the drums. For example, the Njovu Clan had charge of the drums *Lugumira* and *Kibi*, which were beaten when the King went hunting. (21). The Butiko Clan had charge of the drum *Kawugulu*, which was made on their estate at Wagaba. (22) The Mbwa Clan made one of the chief drums of *Mujaguzo*. (23) In the Gomba district the Ntalaganya (Cephalopus) clan had the care of a sacred drum. (24)

Besides the royal drums, the chiefs' drums, and those of the clans, there are private ones. Any individual is at liberty to beat a drum if he wishes, and we find therefore, that drums are used as the major accompaniment for dancing and singing. The use of drums on the occasion of the birth of twins is particularly interesting. 'When the Mutaka (peasant) had gone back to his home, Salongo Omukulu (the adopted father of the twins) took out four big drums one *enkalabirizi*, one *kangujunguju*, and one *ka·kalabu*; these together were called *entu·jo* which they beat while dancing and they sounded well! And when he had finished beating them at his own place he went to the clan witch doctor who had foretold that he would have twins, together with those drums with which he beat *entu·jo*. After coming back he would beat *entu·jo* daily and women came every day to dance, and the men came to see how the women danced. During the festivities this song was sung:-

Kuba ku 'ngoma ewune	Beat the drums together,
Sewaswa kazala balongo.	Sewaswa has twins.
Zitu·ja, zitu·ja, za Sewaswa,	Sewaswa's drums are sounding, sounding,
Zitu·ja za Sewaswa.	The drums of Sewaswa sound,
Zitu·ja mu balongo be'.	They sound in honour of his twins. (25)

Drums are also beaten during the popular wrestling matches, and the onlookers clap their hands in time with them.

There are still a few small and unimportant drums used in the little huts which to-day pass as temples among some of the natives who still remain pagans.

In the past the drums used in the various temples were next in importance after the royal drums. The special beats attached to temple drums are known as *ebikasa*.

With regard to Mukasa, the Lake Spirit, Roscoe writes: 'There were two sacred drums in connection with the temple, which were named *Betobanga* and *Namikono; Betobanga* was the larger, and had human bones for drumsticks. Whenever the priest Gugu died the old sticks were thrown away and new sticks were procured. This was done in the following manner. A chief, named Sekadu, was sent from the island Busiro with a canoe to the mainland, to a place named Sango, between the islands of Singa and Busi. On his arrival there, the canoe was beached and a bunch of ripe plantains was placed on the prow, as though the men were about to ship them; the men then went off to the gardens leaving one of their number in hiding to watch the canoe. If a man came and took some of the fruit, he was caught, bound and placed in the canoe; if a woman came and attempted to take the fruit she was driven away by the man in hiding. After capturing their prisoner, the men were obliged

to row to the island Kibi without stopping; here they might spend the night, and on the following day they rowed to a small island Kaziri, where the captive was landed and put to death by having his throat cut. The body was left lying on the ground with a guard to protect it against crocodiles or birds until the flesh decayed. When the shin-bones were quite clean and bleached, the guard took them to Bubembe, and handed them to the priest Semagumba, who beat the drum two or three blows with them and handed them to Sendowoza, the man in charge of the drum. The drum (*Betobanga*) was beaten for the annual festivals, on which occasions the rhythm had to be kept up at intervals by day and night until the end of the festival; the drum also announced the appearance of the new moon, warned people of the monthly cessation from work, and made known when any special festival was to be held, as for instance, when the King sent to consult the god. '(26).

'Dungu (the god of the chase) had a special drum in which was a large fetich composed of portions of every kind of animal and bird hunted; all kinds of medicines used in making hunters' charms for the chase; miniature weapons; and pieces of cord and other materials employed in the making of traps. This fetich was set upright in the drum and fixed in its position by a mixture of the dung of wild animals and the blood of animals sacrificed to the god. When the medium wished to be possessed he smoked a pipe, and the drum was beaten, until the god came upon him'. (27) There is an illustration of this drum in Roscoe's book from which the quotation is taken. The drum is in the Ethnological Museum, Cambridge.

'At the temple of Kibuka (the god of war for north, west and south-west Uganda) the special drum for regular use was named *Tatata*. When a new temple was built thirty drums were beaten during the time that the god was being carried from the temporary temple to his new residence.' (28) This is the drum *Kababembe*. described on page 14. Roscoe has confused the sound of the *ekikasa* (drum-beat), Ta-ta-ta, with the name of the *ekikasa*, *Kababembe*.

The god of war for Kyagwe and Busoga was Nende, and his temple at Bukerere contained the drum *Wesinze Nende*. In all the wars against Busoga Nende was consulted. Also in the past it was the custom for the Sekibobo of Kyagwe, when appointed to his office, to go and pay homage to Nende.

There was a special temple for Mbajwe, the chief fetich of the king. 'In its temple were two smaller fetiches, a drum named *Kisa·ja* which was never beaten, and a fetich in the form of a knife-handle; also a drum named *Talileka*. There were also two men attached to the temple who beat the drums on special occasions.' (29).

Concerning Gulu (god of the heavens) Roscoe writes, 'When the rain was very heavy and the lightning severe, the people made fires which gave forth volumes of smoke, to keep the clouds from falling; and they beat drums, to let the god Gulu know where they were, that he might not hurt them with lightning.' (30).

It is quite natural that the importance of drums in all phases of the daily life of the people should be reflected in the language. There are the technical terms used in drum-making and drum-beating; there are, also, a number of idiomatic phrases and proverbs. Information about these is set out in the form of appendices.

Some investigation has been made into the popular and romantic theory, especially beloved of novelists, that the African in some secret way, which he steadfastly refuses to reveal to the European, is able to send messages by means of his drums. The announcement of the outbreak of war or any other danger by means of the alarm-drum has been already described, as has also the use of drums in announcing a death in the royal family and the cessation of mourning. There was another drum used during hunting. First it sounded, '*Wambi·zi musa·ja bamusala manyenya*'; then it sounded as in announcing war. Thus the people knew that leopard or lion-hunting was taking place. Also, there was a drum which announced to the people that there was urgent work to be done at the chief's place. It sounded, '*Tu, Tu, Tu*'. Apart from these uses, my informants say that it would be difficult or impossible to send ordinary messages by drum beating.

While much general information has been collected from books, and so acknowledged, many details have been supplied by Baganda friends, and in particular I should like to thank Ow'ekitibwa Katikiro (Prime Minister, Buganda), for his kind and ready assistance, without which some of the points could scarcely have been elucidated. The photographs illustrating this article were specially taken in the Lubiri by kind permission of H. H. the Kabaka.

Notes and References

(1) Foa—'Du Cap au Nyassa'.

(2) Roscoe—'The Baganda: Their Customs and Beliefs'. p.25.

(3) Roscoe—'Twenty-Five Years in East Africa',

(4) For a description of the Ceremony of 'Eating Buganda' see Roscoe—'The Baganda: Their Customs and Beliefs'. Ch.7.

(5) In many European houses the first type of drum is in use as an occasional table, while the second type makes a very serviceable lamp-stand. Small kinds of 'ngalabi' are known as 'Engabe' or 'Egabe', and are used for amusement at feasts and dancing and wedding parties, and at the end of the moon *(Okwabya olumbe)*.

(6) Roscoe—Ibid. p.407.

(7) Speke—'Journal' p.429 refers to the sanctity of the drums. 'I then tried to teach the king the use of the compass. To make a stand for it, I turned a drum on its head, when all the courtiers flew at me as if to prevent an outrage, and the King laughed. I found that, as the instrument was supposed to be a magic charm of very wonderful powers, my meddling with it and treating it as an ordinary movable, was considered a kind of sacrilege.'

(8) Roscoe—Ibid, p. 30.

(9) Sir Apolo Kagwa—'Empisa za Baganda.'

(10) Roscoe—Ibid. p. 108.

(11) Roscoe—Ibid. p. 213.

(12) Lord Lugard – 'Rise of Our East African Empire'. Vol 2. p.509.

Speke—Ibid. As quoted on page. (15)

Also 'Journal,' page 291 – 'I was now asked to draw nearer within the hollow square of squatters, where leopard skins were strewed upon the ground, and a large copper kettledrum surmounted with brass bells on arching wires and two other smaller drums.....were placed.'

(13) Roscoe – Ibid. p.27.

(14) Speke - Ibid. p.406. Reception of a victorious army at court.

(15) Roscoe—'Twenty Five Years in East Africa.' p.187. Roscoe attributes some ceremonial significance to this growling, but there does not seem to be any evidence to support this, The drummer is only indicating that he is putting all his energy into his work, and frequently the growl is a repetition of the rhythm of the drum-beat.

(16) Lord Lugard—Ibid. p. 111.

(17) Roscoe– 'The Baganda: Their Customs and Beliefs.' p. 349.

(18) Roscoe—Ibid. p. 21.

(19) Roscoe—Ibid. p. 355.

(20) J. F. Cunningham—'Uganda and Its Peoples.' p. 61.

(21) Roscoe—Ibid. p. 147.

(22) Roscoe—Ibid. p. 152.

(23) Roscoe—Ibid. p. 164.

(24) Roscoe—Ibid. p. 167.

(25) Sir Apolo Kagwa—Translated from 'Empisa za Baganda.' p. 191.

(26) Roscoe—Ibid. p. 296.

(27) Roscoe—Ibid. p. 311.

(28) Roscoe—Ibid. p. 305.

(29) Roscoe—Ibid. p. 327.

(30) Roscoe—Ibid. p. 315.

Appendix I

PROVERBS BASED ON DRUMS.

Abantu balamu magoma: gavugira aliwo.
The drum beats for the Office, not for the person. (*or*) *People are like drums; they flatter a person while he is present.*

Zitemwa kumu ne zawukanya emibala.
The drums may be cut from one branch, but their sounds are different.

Kyakayiga bw'akuba engalabi tayimbirira.
He who is learning to beat the ngalabi drum does not sing while he beats.

Oke·kera nga muk'omugoma nti "Ow'omwange lero agirese n'amayembe gayo"?
Are you joking like a drum-maker's wife who says, 'Oh, my husband has brought his prey with its horns on'?

(*It is rather difficult to appreciate this proverb. It was the custom that when cattle were killed at the Lubiri the drummers were given the heads. The wives, apparently, were in the habit of cracking the joke quoted in the proverb, and the husbands invariably replied to this effect, 'Yes, you joke now, but these horns will be very useful later on when you are sick.' The horns were used as cupping horns for bleeding a patient in sickness.*)

Ekiwumbya engalabi guba mwenge kubula.
That which rots the ngalabi drum is the scarcity of beer.

Oseya ng'engalabi y'ekyengera.
You appear here and there, like the ngalabi drum appears wherever there is beer.

Awalungi tewaba wa·nyu, Mujaguzo evuga n'o·ka e Bunyoro.
The pleasant places are not always your home; as Mujaguzo sounds, maybe you must go down to Bunyoro. (*The Baganda used to consider Bunyoro a dangerous and unpleasant place.*)

Ebigambo bikira e'ngoma okulawa.
Words sound louder than drums.

Gye ziregerwa, si gye zivugira.
The drums do not sound now, as when they were made.

K'e'ngoma, kamanywa mubambi.
It is the drum-maker who knows what is inside the drum.

Mu bana abangi temubula a·za 'ngoma.
Among many children, one must bring honour to the family.

Sekibe·te ng'omusa·ja akubira envwa engalabi nti, "Ezange teka wano".
You are uncouth, like a man who beats a plate for his vegetables, saying, "Put mine here". (It is considered bad manners for a person to drum on the table or his plate and order the women-folk to bring food.)

Tezirawa 'ngumba.
They (the drums) are not beaten without cause.

Appendix II

IDIOMATIC PHRASES DERIVED FROM DRUMS.

Okulya e'ngoma.
To eat a drum, i.e. to get a kingdom or chieftainship.

Oku·za e'ngoma.
To return a drum, i e. to be successful in getting promotion.

Omwana w'e'ngoma.
A child of the drum, i.e. a prince in the line of succession.

Okuvunika e'ngoma.
To upset the drum. Cf. English—to upset the apple-cart—to put anything into disorder.

Oku·bula e'ngoma.
To lift up the drum, i.e. to get on well.

E'ngoma y'ekikere.
A frog's drum, i.e. a big thick mushroom or toad's-stool.

Okutu·za ey'olukugunya.
To beat the thigh with the hand, i.e. to show great joy.

Omutima gukuli ng'ogw'e'ngoma.
Your heart is like that of a drum, i.e. you are fickle, never settled.

Okubera n'e'ngoma mu mutwe.
To have a drum in the head, i.e. to be stubborn.

Ono mulugwa gwa 'ngoma.
A senseless person.

Okutunula bakitu·jula ng'engalabi eyoza lumonde.
To look like an engalabi used for washing sweet potatoes. (Abuse).

Okukonola e'ngoma, *and* Okuwanula e'ngoma.
To be crowned. Cf. Okulya e·ngoma

Appendix III.

TECHNICAL TERMS USED IN CONNECTION WITH DRUMS.

Omubala	*The particular beat of a drum.*
Ekikasa	*Drum-beat in honour of a 'lubare' (spirit).*
Mbutu	*Drums when beaten with the hands.*
Okutu·za	*To beat a drum with the hands.*
Omubutu	*One who beats a drum with the hands.*
Omugoma	*A drummer.*
Eminyolo	*Drum-sticks.*
Omugalabi	*One who beats an 'engalabi.'*
Okukuba e'ngoma	*To beat a drum.*
Okusamira e'ngoma	*To beat a drum with much force.*
Okutabula e'ngoma	*To beat drums of different sounds in harmony.*
Okubumbu·za amagoma	*To beat many drums in rejoicing.*
Okulaya e'ngoma	*To beat drums as an alarm.*
Okwamira	*The growling noise made by the drummers.*
Omulugwa	*A hollowed piece of wood ready to be covered with skins.*
Obusu bw'e'ngoma	*The upper surface of a drum.*
Entobo y'e'ngoma	*The bottom of a drum.*
Omusisirwa	*A bulky body, hence a huge drum.*
Okulega	*To stretch skins over a drum with laces.*
Olulere (Endere. pl.)	*Thongs for lacing drum-skins.*
Kafuzi	*Twisted thongs for lacing.*
Oluwawu	*A tree, the leaf of which is used as a substitute for sandpaper.*

Appendix IV.

DRUM-BEATS PECULIAR TO CLANS.

CLANS. (Ebika)	CLAN BEATS. (Emibala).
Butiko. (Mushroom).	Wekiriki·je Gunju a·ja.
Bugeme. (Sap from top of Lukindu Palm).	*(As above).*
Byenda. (Bowels).	Kifa mu ·nyanja muvubi y'akimanya.
·Fumbe. (Civet Cat).	Gali·nya e Ba·ka. *or* e Ba·ka basenge·ja. Tokoza mu lw'e·fumbe.
·Janzi. (Locust).	Mpagi.
Katinvuma. (A small shrub).	Wekiriki·je ·Jita a·ja *or* Asu·de kasu·de mu Kya-·dondo.
Kibe. (Jackal).	Bampita kasenge·ja.
Kasimba. (Genet).	Kyaguligamba.
Kitete. (Grass).	Ntembere Kisswa, wendisanga Mubuteme.
Kinyomo. (Red Ant).	Alinyaga ente, omutima talirya *or* Kababembe.
Kiwugulu-Kukufu. (Owl).	Kifa mu ·nyanja muvubi y'akimanya.
Kayozi. Jumpingrat).	Gwe Mikigi, gwe Nsasa.
Lugave. (Scaly ant-eater).	Lwa Ndugwa, lwa Katende *or* Seruku lulenge·ja.
·Kobe. (Yam).	Kasonzi mulwade. Asinda, bampa·de ·gumba.
Luyonkante. (Lesser Bustard).	Kifa mu ·nyanja muvubi y'akimanya.
Mbogo. (Buffalo).	Kyana kya mbogo, ·Senge. Kye ndikwatako ·Senge.
Mpologoma. (Lion).	Namuguzi akabira kasaga, *or* Kisa kya mpologoma, *or* Nsabira kyoto.
Mmamba. (Lung Fish).	Kalya ko·ka, *or* Emmamba sirya ama·zi nnywa *or* Kwata e·deku tu·de e Bembe.
Mpewo. (Oribi).	Nampima agenze ·Kungu.

Musu. (Edible Rat).	Kivu tiki·ze kuluma, ki·ze kutwalana, ju *or* Kivu kya·ja okuluma n'okutwalana.
Mutima. (Heart).	Kifa mu ·nyanja muvubi y'akimanya *or* Nakatete.
Mpindi. (Bean).	Sambigoto.
Mbwa. (Dog).	Kabwa kyoto, *or* Talika, talika; bamutwala ku kiyirikiti.
Ma·zi. (Water).	Namuguzi akabira kasaga.
Nkima. (Monkey).	Talya nkima, Se·nya enku twokye e·nyama.
Njovu. (Elephant).	Nakate ayuga, *or* Nsimbye amasanga.
Ngo. (Leopard).	Akana k'engo.
'Ngonge. (Otter).	Akabira kasimba.
Ngeye. (Colobus Monkey).	Tatula, asulumba busulumbi.
'Ndiga. (Sheep).	Wa·jangala musa·ja mukulu ogula ngabo: 'Mpa alimulisa ndiga.'
·Nyo·nyi. (Bird).	Mukyamba·de mulimu engo, *or* Waliwo nyonyi abuse.
Ngabi. (Bushbuck).	Ta·de kaku: 'Kalikuta', 'Kaleku,' 'Nayiga", *or* Katikuta ne kututwala e Busamba·ganyi.
Nvubu. (Hippopotamus).	Mu ·nyanja we·diramu ki? Nvubu.
Ntalaganya. (Small antelope).	Ka·do omulamazi.
Namu'ngona. (Crow).	Nkyabuza kagera.
Nkerebwe. (Squirrel).	Seruku lulenge·ja simanyi lulingwira.
Nsuma. (Kasulu–A Fish)	Wekiriki·je Gunju a·ja,
Nsenene, (Grasshopper).	Gwe mpagi gwe luwaga, *or* Nakimera muka ·Suna bw'asa bw'anegula.
Njaza. (Reedbuck).	Alika·ta alikalya.
Nte teriko mukira. (Tailless Cow).	Kifa mu·nyanja muvubi y'akimanya.
Nte ya lubombwe. (Spotted Cow).	Taliko kabi wante, *or* Ow'ensonyi tawesa.
'Nga'nga. (Hornbill).	Mukyamba·de mulimu engo, *or* Bampe omu·go newerekeze.
'Ngali. (Crested Crane).	Lwendi wa·nyonyi mbuse.
Nke·je. (Small Fish).	Kiso kya mbuzi, *or* Tungulako emu.

NOTE. *As a point of ethnological interest it may be noted that some of these clans have joined up with other stronger clans, but in order to give as complete a list as possible of clan–beats this fact has been ignored.*

The Major Pests of the Cotton Plant in Uganda.

By G. L. R. HANCOCK, M.A., F.R.E.S., F.Z.S.

The rapid spread of pink bollworm from the north through Gulu and Bunyoro into Buganda Province has brought to the fore the importance of insects to Uganda's main industry.

During the past nine years the writer has endeavoured from time to time to find out something about these insects and about the damage which they cause; though progress has not been rapid, enough is known to be of some interest and worthy of record.

Cotton is a crop particularly susceptible to insect damage, and Uganda has its full share of pests. In sowing cotton a number of seeds are placed in each hole and therefore one or two plants usually survive attacks by cutworms (larvae or caterpillars of Noctuid moths) or crickets. When a little older the plants may be attacked by a grub, the larva of a blue and orange Chrysomelid beetle (*Syagrus calcaratus*), which feeds on the roots and often kills the plants. These insects cannot however be considered the worst pests of the younger plants and in other countries the last-mentioned is rarely serious if cotton is not grown on the same ground in consecutive years.

INSECTS ATTACKING THE LEAVES AND SHOOTS.

The two main pests of the cotton plant (as opposed to pests of the fruit or boll) are two bugs belonging to the family Capsidae which are discussed in detail below.

Lygus vosseleri, Popp.*

This is a small greenish or brownish bug which is found among the apical shoots and tips of the cotton branches. The adult bug measures 4.5 mm. by 2 mm. and is shown in the photograph Plate I, fig. 1. inset. The eggs are inserted into succulent tissues such as the stem (or petiole) of a very young leaf and so far have been found only on one of the bug's alternative food plants "mpindi" *(Vigna catjang)*. The egg is relatively large and has at the outer end a lip-like rim. The nymph or young bug differs from the adult only in size and in the absence of wings, it is usually pale glaucous green in colour, occasionally brownish or marked with reddish brown.

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* The identity of this insect is still doubtful; either it is a very variable species or more than one species of *Lygus* is concerned in causing damage to cotton. *L. atratus*, Popp. and *L. nairobiensis*, Popp. have both been recorded from cotton in the Belgian Congo.

The only insects on cotton with which it can be confused are nymphs of certain bugs of a predaceous habit which, however, always have a little appendage resembling a tail which the *Lygus* nymph lacks. The time taken for the nymph to grow into the winged bug is 14 days, so that the life cycle is rapid.

The damage done by the sucking of this insect consists of small angular spots on the very young leaves, the spots being dark green at first and becoming brown shortly afterwards. As the leaves grow they crack and present a tattered appearance. The development of the shoots is retarded and even when the plant succeeds in producing bolls the bug attacks these when they are small, causing them to shed.

The damage to a plant placed in a cage with *Lygus*, is shown on Plate II, and a plant placed in a cage without *Lygus* is shown on the same plate for comparison. The caged plants were extreme examples of damage and absence of damage; plants usually lose many of their bolls for one reason or another and the bug rarely attacks every plant in a plot nor does it do so throughout the season; plants often have time to grow several branches before attack develops, or the insects may leave the plant which then produces normal growth. It is not easy to estimate the loss of crop from this insect but by spraying the young shoots in some plots, leaving other plots unsprayed as a control, the leaf damage has been considerably reduced and the yield increased by 25% as compared with the unsprayed plots. The damage is so variable from place to place and season to season that an estimate for the whole of Uganda could not be more than an intelligent guess based on observations.

An illustration of the damaged young bolls is given on Plate I, fig. 2. These bolls are shed and this damage is additional to that caused to the leaves and mentioned above. The losses to bolls and buds are considered in detail below.

Besides cotton this insect feeds on mpindi *(Vigna catjang)*, bijanjaro *(Phaseolus* sp.*)*, mpinamuti or kapenda *(Cajanus indicus)*, bulo *(Eleusine)* and mwemba *(Andropogon sorghum)*.*

Helopeltis bergrothi, Popp.

This insect is illustrated on Plate IV and is conspicuously coloured both in the adult and nymphal stages. As in the case of the cotton *Lygus* and for the same reasons, there is some doubt as to the identity of the species of *Helopeltis* on cotton; it is however almost certain that only a single species is concerned.

The eggs are laid in the tender stems; they are the shape of a sausage and have two filaments at one end which protrude from the slit in which the egg is deposited. These eggs are very difficult to find on cotton, but may more easily be found on sweet potato plants which, being less hairy, reveal the protruding

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* Very inadequate knowledge of the genus *Lygus* and the inaccessibility of the type specimens render it impossible to decide without elaborate experiments whether the species found on the various suggested alternative food plants are actually those which attack cotton.

filaments more readily than the hairy-stemmed cotton plant. The young nymphs are illustrated on Plate IV, as is also the damage caused to the plant. The whole plant appears stunted and bunched up so that in most cases such plants are very conspicuous in a plot. On searching under the leaves of such a plant one or more bugs or their nymphs may be found. It is often very difficult to differentiate between the damage caused by this insect and that due to bacteria which cause a serious desease, different forms of which are known as "angular leaf-spot" and "blackarm." Both insects and bacteria cause angular spots on the leaves and brown or black lesions or scabs on the surface of the stems. The cause of the stem-lesions cannot be ascertained when they have become old and dry. The bunched appearance of heavily-attacked young plants is characteristic of damage by *Helopeltis* and on older plants which have been attacked by this insect it is often possible to find bolls which show either slightly sunken pits or small raised scabs. It is best to look for the insects when possible, but sometimes they have moved off to some other plant and therefore cannot be found.

The differences between the damage caused by the insect and by "Blackarm" are tabulated below:—

"Black-arm."	*Insect.*
Fresh spots on the leaf water-soaked and shallow.	Fresh spots on the leaf not water-soaked, more sunken, often semi-transparent or papery.
Old spots on the leaf larger, appearing dark brown from the upper side.	Old spots lighter brown on the upper side, smaller and with more sharply defined edges.
Leaf normal green colour.	Leaf usually darker green and some times a little reddish near veins, which are often sucked, becoming brown or reddish.
Severely damaged leaves sometimes slightly curled downwards at edges.	Severely damaged leaves markedly curled downwards at edges.
Fresh lesions on stems, unhealthy within, wood grey-green tending to be slimy or moist; bark water-soaked; lesions occur at junction of petiole and stem or at base of boll.	Fresh lesions on stems often very superficial, healthy below.
Old lesions dark brown, corky, sometimes split.	Old lesions buff, rough, corky, more or less superficial.
Foliage not bunched.	Plant with bunching growth, often much dwarfed.

The length of life-cycle from egg to adult takes 30-36 days, of which the egg-period occupies 13-16 days, nymphal periods 17-21 days, the preoviposition period 4-7 days.

PLATE I.

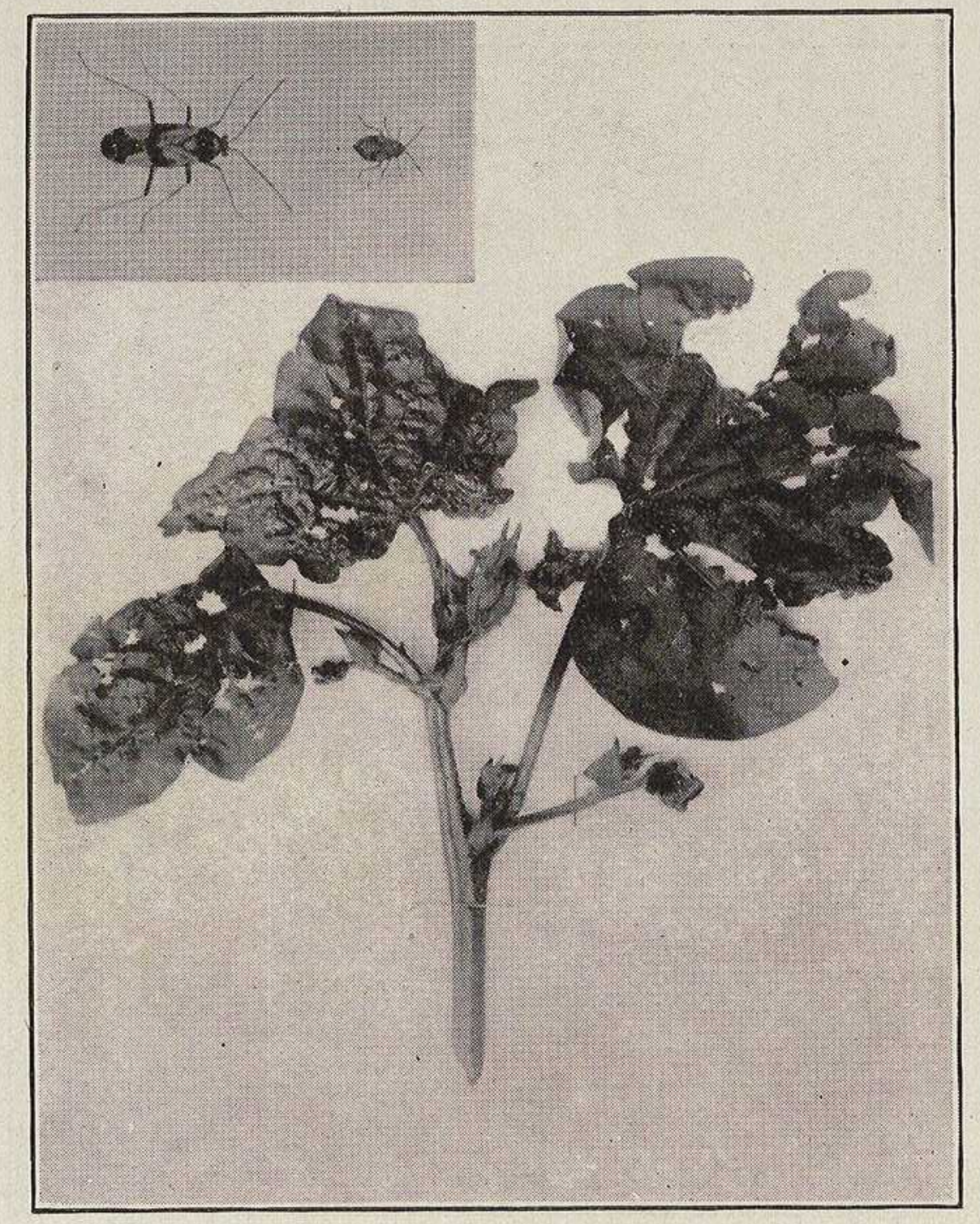

Fig 1.

A spray of cotton damaged by the bug *Lygus vosseleri*.

(*Inset*. Adult bug and nymph).

Fig 2.

Young cotton bolls which have been shed owing to the sucking of *Lygus vosseleri*.

Fig 1.

A cotton plant grown in a cage of mosquito netting into which *Lygus vosseleri* was introduced.

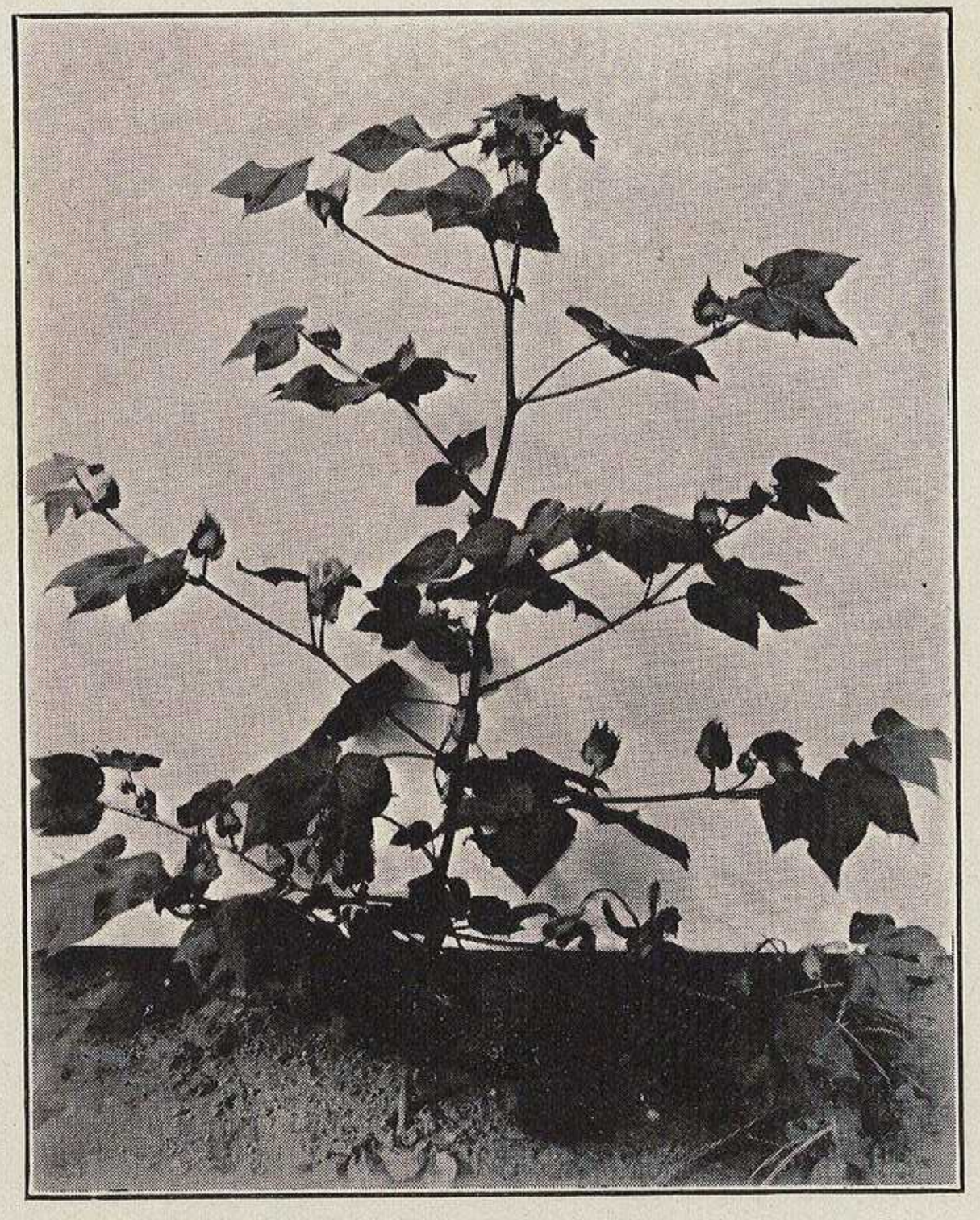

Fig 2.

A control plant under identical conditions but without the introduction of the bug.

The food-plants of this insect are very numerous and include (besides cotton) sweet potatoes, *Centrosema* spp., *Panax*, scented geranium, *Ricinus* (castor oil), guava, tea, *Bixa* sp., avocado pear and *Hydrocotyle* sp.

In the Congo the insect has been observed to migrate from *Centrosema* on to cotton and it is possibly some condition in the relative succulence of the plants which induces this movement. In cotton plots it is common to find isolated plants attacked; on other occasions attack is fairly general over wide areas of country or may occur in certain parts of plots where the soil or water-supply differs from that of the rest of the plot. It has been found in some cases that damaged plants show special root-characteristics, indicating a check in the development of the tap-root and a subsequent attempt to remedy this by the development of shallow-growing lateral roots. Both on tea in Nyasaland and on cotton in Uganda severe damage may occur where the soil is water-logged, whereas plants on better drained soil show no damage. *Helopeltis* appears to attack cotton in some seasons more than in others; during the past 1933-34 cotton season hardly a plant was attacked, whereas in 1932-33 considerable damage was done. In comparing notes with M. Bredo, Entomologiste du Congo Belge, it was found that the same observations had been made by him in the Congo.

Jassids.

Before considering the insects which damage the bolls reference must be made to the cotton-leaf hopper *Empoasca fascialis* (family Jassidae). This insect is very small, pale yellow in colour and feeds on the underside of the leaves of cotton, the nymphs and adults move in a crab-like manner and the adults jump off the leaves when taking flight. In examining a field for Jassids care must be taken to look for nymphs or actually to see the adult Jassids, as in walking through a field it is often possible to see numbers of small flies or Aleurodid bugs ("white flies") leaving the plants and these are easily mistaken for Jassids. The leaf-damage caused by this insect is characterised by the presence of a bright red edge to the leaf, inside which is a yellow area; the tissues so discoloured fail to assimilate normally. Similar symptoms have been found in the absence of Jassids and appear to be due to drought. Damage may extend over the whole leaf and cause its death. There has been much discussion as to whether this insect should or should not be classed as a major pest in Uganda. In South Africa very serious damage is said to occur whereas Sudan entomologists have found no resultant damage or loss of crop with a far higher Jassid population on the leaves than was ever found in South Africa. It is only in the drier areas of Uganda, especially in Teso, that Jassid has been stated to be associated with serious loss of crop. In the dry country at Biseruka on the Lake Albert escarpment there seems little or no indication of damage. Great care must be exercised in examining plants for Jassid damage. Any damage to the leaf tissues such as that caused by the feeding of *Lygus* or *Helopeltis* will be associated with red pigment; dry weather and maturity are often associated with red patches of various kinds and the presence of minute red mites (probably *Tetranychus* sp.) is a further complication since, while little is known of their effect in Uganda, some species are known to be capable of causing reddening of the leaf in other countries. As these mites occur under dry conditions they are not infrequently associated with

1. Abdomen below pallid or at most with orange markings.....*D. nigrofasciatus.*
Abdomen below with bright red bands.....2

2. Abdomen below marked with red and black, whole insect reddish; head longer than broad; transverse black mark on elytra a regular band.....*D. fasciatus.*

Abdomen below marked with red only, general colour more straw to olive; head as short as or shorter than broad; transverse black mark on elytra often in form of a blotch (as in Plate V).....3

3. Legs uniformly red; second and third transverse bands on underside of abdomen not reaching lateral margins.....*D. cardinalis.*

Legs with tibiae and tarsi brown, darker than femora; second and third transverse bands of abdomen reaching lateral margins and widening to form a complete border below elytra. (Plate V).....*D. superstitiosus.*

There are a considerable number of other species in Africa, some of which occur on plants of the same family as cotton (Malvaceae); these are not included here.

Dysdercus superstitiosus is illustrated on Plate V and there appears to be very little difference in the behaviour of the four species. The eggs are laid in the soil or under rubbish near the bases of the plants and observers in Rhodesia have suggested that a certain minimum amount of shade or moisture is required; the eggs are rapidly killed by exposure to the sun on the surface of the soil. The number of eggs laid by one female is about 400 to 500, and the most favourable conditions for egg-laying were found (under laboratory conditions) to be a supply of cotton-seed and green bolls; cotton-seed alone is suitable if damped frequently The nymphs are at first orange-yellow, rapidly becoming bright red; at which stage they are common in clusters on the cotton plants. The life cycle of *D.nigrofasciatus* in the laboratory at Kampala was found to be 50-60 days.

The damage caused by stainers to the cotton boll may be compared to that caused by a mosquito to a man: the bite itself is comparatively harmless; it is only when the disease organisms of internal boll-rot are introduced that damage is serious. The sucking is usually, though not always, followed by internal proliferation of the boll wall, in the form of soft whitish excrescences; these are shown in section on Plate V. External signs of the punctures are difficult to find.

The most important disease introduced by these insects is that caused by a fungus *Nematospora gossypii*, and the resultant staining of the lint is shown on Plate V. This dry yellow stain is associated with a weakening of the fibres. Stainers may also introduce bacterial diseases into the bolls, which sometimes become wholly or partly rotten, but the natural division of the boll by septa into locks (usually four in number) is a great protection against the spread of the diseases within.

In considering stainers there are two objectives, therefore, to be borne in mind; (1) To reduce the number of stainers and (2) To prevent the stainers becoming infected with disease organisms. While it will probably be impossible to remove the many plants on which stainers can feed and breed, it may be possible to reduce

those plants which are reservoirs of infection of the fungus, but in South Africa most of these plants are unfortunately infected. This organism has been found in the larger species of *Hibiscus (H. esculentus)* and occurs in cotton-seed. The food-plants of stainers include many species of *Hibiscus* (including the edible "malakwang") *Abutilon*, *Wissandula*, *Sterculia*, *Eriodendron* (kapok), and occasionally *Urena*.

It is unlikely that anything can be done to reduce the amount of bacterial infection carried by a given number of stainers, since the bacteria are probably almost entirely derived from the outside of the boll itself and the role played by the stainers is merely that of permitting entry of these bacteria into the interior of the boll.

Stainers have been reported, both in Nigeria and South Africa, to migrate at definite times from wild food-plants on to cotton, and it may be possible to find one or more critical food-plants the elimination of which will leave the stainer without food at one particular season. An experiment in the destruction of *Sterculia Kirkii* was suggested in Southern Sudan and in the same country the baobab tree has been used as a trap, stainers being attracted to the tree and then destroyed. It must, however, be remembered that the four species of stainers may have different critical food-plants and that so far no indication has been found of sudden migrations on to cotton in Uganda.

The destruction of all old cotton-seed, and the uprooting and burning of all cotton plants and of *H. esculentus* (bamia) at the close of the cotton season are ways by which the stainer's chance of becoming infected can be reduced. To what extent the number of stainers would be reduced by these means depends on the importance of the wild species of food-plants and of the cultivated kapok and "malakwang".

The amount of staining of lint depends to some extent on the weather; disease organisms are notorious for developing more readily under damp conditions and there is some evidence that stainers are more prevalent (or possibly more active) on cotton in warm damp weather.

Bollworms.

These include the pink bollworm (*Platyedra gossypiella*, Saund.), the false codling moth *Argyroploce leucotreta*, Meyr., (sometimes erroneously referred to as the red bollworm), the spiny bollworm, also known as the Egyptian or spotted bollworm (*Earias insulana* and *E. biplaga*) shown on Plate III and the American bollworm or Corn earworm (*Heliothis* (*Chloridea*) *obsoleta*) which should not be confused with the American boll weevil which still occurs only in America. The Sudan or true red bollworm (*Diparopsis castanea*) has never been found in Uganda, though it occurs rarely in the Northern Congo and is a serious pest in some parts of Africa.

The above list appears rather formidable, but so far the pink bollworm is the only species which has appeared in very large numbers in any plot. It must, however, be remembered that although samples have been taken to ascertain the distribution of pink bollworm, such samples have never been taken to ascertain the percentage damage due to other insects which feed on the boll; such figures as are available have been collected in the course of the pink bollworm surveys. The work, being

primarily directed to pink bollworm was done at a season when this insect was believed to be at its maximum and when the other bollworms may or may not have been particularly prevalent. Other means of estimating the loss from these species are detailed in a later section of this paper.

The Pink Bollworm *(Platyedra gossypiella)*.

Perhaps the least said about the habits of this recent invader into Uganda the less there will be to retract. While volumes have been written on this insect, which is one of the major pests of the world, it is dangerous to assume that conditions in Uganda exactly correspond with those anywhere else. It will be at least three or four years before this insect has settled down in those parts of the Protectorate where it has already penetrated, and it is not till then that we can ascertain its status as a pest.

So far the eggs of this insect have not been collected locally as (probably owing to lack of experience) efforts to find them on the plants in the infested plots have failed. Two eggs were obtained by confining moths over a cotton plant by means of a mosquito-net, and these were laid on the underside of a leaf. The egg measures just under 1 mm. in length and in Egypt is laid by preference on the underside of the leaves (particularly when these are young), on the bracts and on the bolls, especially in the natural crevices in the middle of each lock; in the Sudan eggs are found chiefly at the base of the bracts on the inner side near the boll.

During hot weather in Egypt the egg stage lasts 3 to 4 days, in cold weather 7 days; at Kampala eggs hatched after 6 days. The larval period in Egypt is 9 to 15 days when in the active stage (see below) and the pupal period 8 to 110 days according to the season. In Uganda the pupal period has been found to last 10 days, corresponding with that of the Egyptian hot weather, and it is therefore reasonable to expect the larval period in Uganda also to correspond with that in Egypt. The complication in the life-history of this insect, which has resulted in its almost world wide distribution, is its habit of resting in the larval stage. This is correlated with hot dry weather or with winter conditions and is a most important factor to be considered in devising practical methods of control.

The caterpillar is at first yellowish, then becomes whitish and later the pink coloration develops to form two bands across each segment; the division between the anterior or broader band and the narrower posterior band is sometimes not very well defined. In Egyptian larvae there is a pale dorsal line dividing the bands longitudinally but this can hardly be seen in mature Uganda larvae. On the sides of the "shield" on the segment behind the head is a minute kidney-shaped white dot. The hooklets on the sucker-feet are arranged in a horseshoe.

The newly-hatched larva is very active and wanders over the plant until it finds a flower-bud or a young nearly full-grown green boll. It then bores into this and any opening is soon sealed over and becomes almost invisible. In Egypt it has been found that young larvae can exist for a short time by nibbling the leaves, a habit which enables them to survive the journey in search of a boll or bud.

When full-fed the larva spins a slender cocoon among cotton lint in bolls on the plant, among debris, on the ground or in the soil; in the last-named case the cocoon is woven with a mixture of silk and particles of soil. The resting larva may spin up in cotton lint or seal itself into an eaten-out cotton seed which it lines with silk; in many countries it will spin together two seeds forming the so-called "double seed." The posterior end of the pupa is pointed and bears a minute hook.

In Uganda the pink bollworm has been found on "bamia" *(Hibiscus esculentus)* but not as yet on other food-plants except cotton, though *Hibiscus cannabinus* and *Abutilon indicum* have been recorded as food-plants elsewhere and are abundant in Uganda. During the season between the destruction of the old crop and the planting of the new the active larva exists, so far as is known, on self-sown cotton plants, or plants which have escaped eradication. The period during which it can remain in a resting state in Uganda is not yet known but this may be found to be the most important way in which the pest tides over the interval between crops. The larva is known to be able to rest for at least six months in Uganda, but the climate may be found to be too equable for a really long resting stage to occur (larvae are known to rest for periods up to two years in Egypt).

The parasite, *Microbracon kirkpatricki*, which has been said to exercise a considerable check on this insect in Kenya, occurs in Uganda, but so far has proved very rare; another species of parasite has been bred, in Uganda, from the pupa. The larva is so well protected in the green boll that it is not difficult to understand its comparative immunity from parasites, but *M. kirkpatricki* can attack larvae when they are near the surface of a green boll.

Two other species of *Platyedra* occur on wild *Hibiscus* in Uganda and might be confused with the pink bollworm. These are *P.* [illegible] and *P. cuneatrix*. The larva of the former has the pink markings [illegible] and the horse-shoe arrangement of the hooks on the sucker-feet is also broken at the apex, while *P. cuneatrix* is uniformly dull red and has conspicuous plates at the bases of its hairs. This latter may be distinguished from the false codling moth (*Argyroploce leucotreta*) by [illegible] anal fork, the smaller [illegible] and more conspicuous) dorsal plates and by the sucker-feet which have the crochets arranged in a horse-shoe.

At present it is not possible to recommend detailed measures of control, but the rigid enforcement of the uprooting and burning of cotton and bamia, when the former has been picked, is one certain method of reducing the number of surviving larvae. If the insect can maintain itself on wild food-plants (for which there is as yet no evidence) the value of these measures will be lessened and should it be found to rest for lengthy periods in the seed, complete cleaning up of ginneries and stores and the disinfection by heat treatment of seed required for sowing will require consideration, while seed from infested areas not required for sowing will have to be sterilised or burnt. Even so, some larvae may survive in native huts or in bolls partly buried in the soil or in their resting cocoons in the soil itself, but it is hoped that with our generally moist climate few will survive in this way but that they will emerge to die before the new crop has grown sufficiently to be attacked.

COTTON PESTS 2. HELOPELTIS

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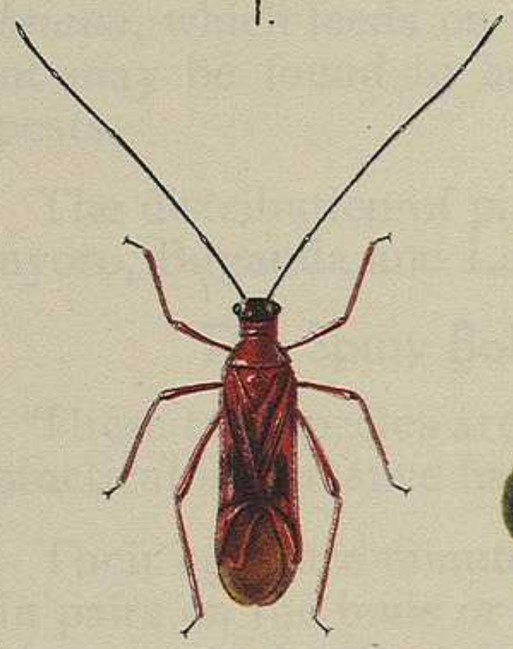

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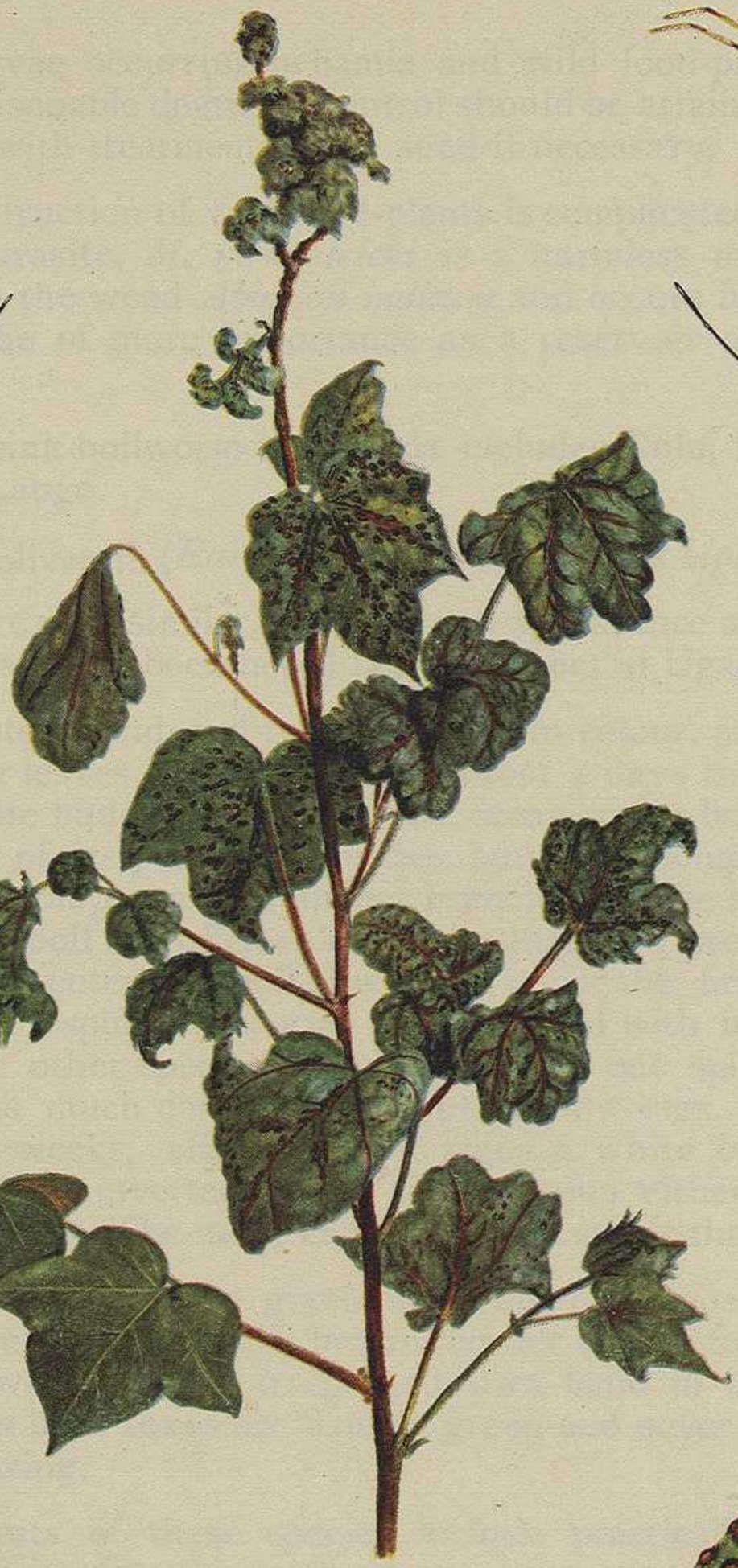

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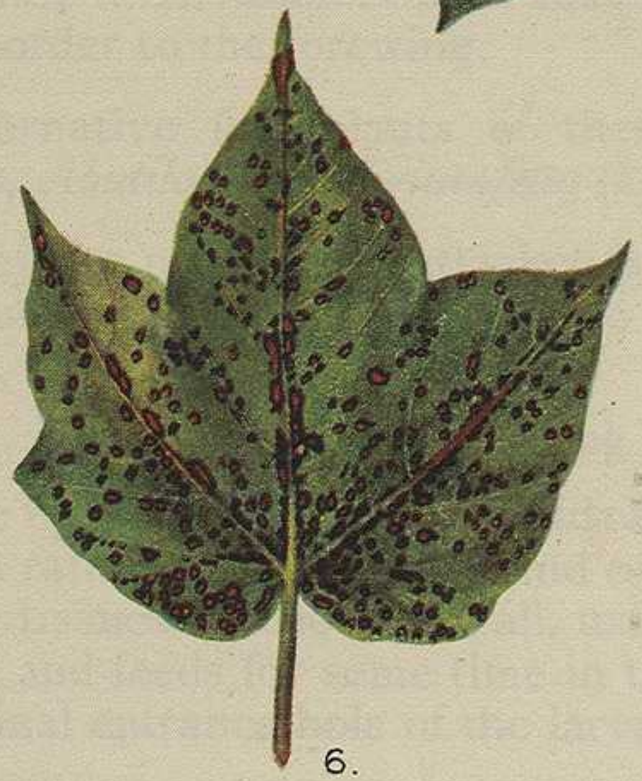

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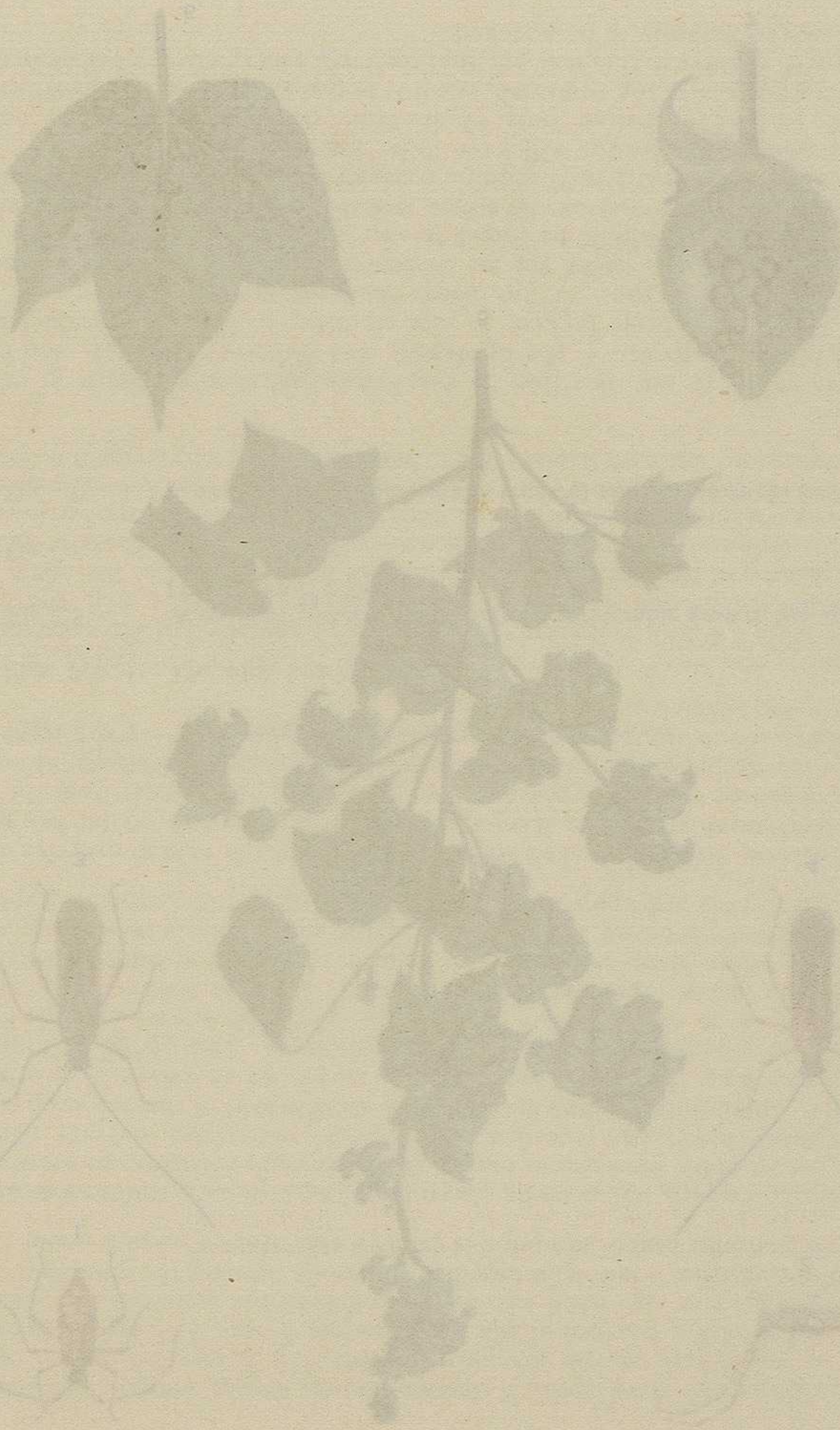

If the number of larvae occurring in bamia and wild food-plants is not large (as seems probable), a reasonable degree of control should be attained by destruction of the old crop together with treatment of the seed if necessary.

The question of destruction of wild food-plants is complicated by the fact that a natural host of the parasite, *M. kirkpatricki* is a harmless moth, *Crocidosema plebeiana*, which feeds on the weed *Abutilon indicum* and occurs in Uganda. This plant may be found to be of more importance as a reservoir of parasites than of pests.

The distribution of pink bollworm in Uganda includes Gulu, Madi, West Nile, Bunyoro, Buganda and Lango.

The Spiny Bollworm (*Earias insulana* and *Earias biplaga*).

These two species are very similar in habits and appearance and no differences of practical importance have yet been noted between them in Uganda.

Their eggs are minute, round, and turquoise blue in colour, and are laid singly or in pairs on the buds or leaves of cotton. After about 4 days the eggs hatch and the larvae attack either the buds or bolls. Larvae occasionally bore into the growing point of the plant or of its primary branches, but even though the tip may be killed the plant will often compensate by further branching. The larvae leave open the entrance hole into the boll and often enlarge it, so that their presence can readily be detected; they prefer to enter the boll low down under the bracts. The large and open aperture made by spiny bollworms is associated with much more decay than is the case with the other species of bollworm, and one spiny bollworm will generally cause at least as much damage as two pink bollworms. The life of the larva lasts for about two weeks, after which it spins a white or sandy-coloured cocoon rather the shape of an inverted boat. This is spun either on the plant or among debris on the ground. The moth emerges after two or three weeks.

The moths of the two species are green or yellow; in *Earias biplaga* the male and female both have a very narrow dark brown border to the forewings and the female is usually green with a broad irregular brown band in the middle of the wing, while in *E. insulana* both sexes are usually green and never have the narrow brown border to the forewing.

Alternative food-plants of these species include practically all species of *Hibiscus*, *Abutilon*, and *Triumfetta* (kinsambwe).

They are more easily attacked by parasites than the other species of bollworm and a number of species of parasitic wasps and flies have been bred from them in Uganda.

The False Codling Moth (*Argyroploce leucotreta*).

The eggs of this moth are laid on the bolls and are at first pale green in colour, they are rather flat, scale-like, and oval in outline. The newly hatched larva bores into the tissues of the boll wall, usually near the base or apex where these are thickest, and feeds for some time in the wall before entering the seed. Little sign of the original entrance-hole of the larva remains after it has penetrated into the boll.

The larva is very variable in colour; when young it is a dirty white, becoming mauve, grey, red or pink as it matures. It possesses large shining chitinous plates on the dorsal surface and the colour is distributed evenly over the dorsal surface and not arranged in distinct double bands as in the pink bollworm. The larva pupates either in the soil or in old decayed bolls on the plants, and spins a fairly tough cocoon not unlike that of a pink bollworm. The posterior end of the pupa is blunt and the pupa bears rows of tiny teeth at the posterior edge of each segment The moth is rarely seen but is greyish brown in colour; the male has a peculiar shining spot near the base of the hind margin of the hind wing. The length of life-cycle from egg to moth is about a month.

Parasites of the caterpillar have not been found commonly in Uganda. In Nigeria parasites of the egg are very abundant, but a hundred eggs collected in Kampala did not show any parasitisation.

Alternative food plants in Uganda include oranges, maize, guavas, sorghum, castor-oil fruits, and fruits of *Zizyphus*, while in Rhodesia the insect has been found on a number of other fruits and seeds but not on cotton.

The Corn Earworm *(Heliothis obsoleta)*.

This is a moderately large caterpillar which has been found at times to attack cotton bolls, usually early in the season. The amount of damage caused by it is occasionally considerable but the insect was not common at the times when observations were made with the object of estimating the damage to the crop. The caterpillar is very variable, usually greenish or brownish with fine interrupted longitudinal darker lines and is larger than any of our other bollworms. It feeds on a number of plants, including maize, tobacco, beans, peas, and other Leguminosae, *Justicia* sp. carnation buds and millet.

The damage done by this species to cotton does not appear to be sufficient to call for its further discussion here.

The Characteristics of the Three Pink Caterpillars found on Cotton.

The differences between the three pink caterterpillars found in cotton bolls which are likely to be confused with each other are detailed below; pink bollworm has so far been of much greater importance than *Argyroploce*. Neat circular exit holes in green bolls are formed by both the false codling moth and pink bollworm, and the presence of a large number of these is a good indication that pink bollworm is present; the converse cannot be taken as conclusive evidence. In the Congo it has been found that damage by *Argyroploce* decreases as the season advances whereas that due to pink bollworm increases rapidly at the end of the season.

Pink bollworm (*Platyedra gossypiella*)	False codling moth (*Argyroploce leucotreta*)	Scavenger larva (*Pyrodercces* spp).
Colour whitish with a double pink band, the front band wider than the hinder.	Colour uniformly pink, red, or slate.	Colour in two pink bands, both narrow and equal in breadth.

Length 11-13 mm. never pink when as small as *Pyroderces*.	Length 11-13 mm. never pink when as small as *Pyroderces*.	Size much smaller length about 7 mm.
Prolegs with less than 18 crotchets arranged in a horse-shoe.	Prolegs with 30-40 crotchets arranged in a circle.	Prolegs with apparently 18-23 crotchets: arrangement doubtful, either a circle or horse-shoe, (perhaps different species exist with different arrangements).
Thoracic shield with minute conspicuous white kidney-shaped area on each side.	Thoracic shield without white kidney shaped area.	Thoracic shield without conspicuous white kidney shaped area.
Last segment without a chitinous comb-like structure ("anal fork").	Last segment with a chitinous comb-like structure ("anal fork").	Last segment without "anal fork".
Dorsal surface with very small plates at bases of hairs.	Dorsal surface with large plates at the bases of the hairs.	Dorsal surface with very small plates at bases of hairs, which are relatively longer than in the other species.

ESTIMATES OF DAMAGES FROM VARIOUS CAUSES.

Damage caused to Bolls.

During the past few months the examination of bolls to ascertain the distribution of pink bollworm has given an opportunity for ascertaining the chief causes of damages during the 1933-34 season. These are tabulated below as damaged locks.

District	% rotten or badly stained due to stainer	% slightly stained due to stainer	% damaged by pink bollworm	% damaged by other bollworms	% damaged by diseases not carried by insects
Eastern and Northern Provinces	14.9	7.0	1.5	4.9	3.8
Lango	20.3	4.9	1.5	2.1	0.5
Bunyoro	11.3	5.4	2.6	2.3	3.4
Kiboga area of Buganda	7.2 *	3.8 *	1.4	3.8	6.6
Western Mubende District	24.3	6.7	0.3	0.8	4.7
Masaka District	23 0	9.3	absent	1.8	5.5
Bulemezi District	12.3	9.9	absent	1.5	2.1
Mpigi—Mityana survey	20.3	5.0	absent	2.2	9.4
Luzira survey	16.1	7.7	absent	0.8	1.7

Detailed figures of some of the more severely damaged plots are given :—

Place	Pink boll-worm damaged %	Rotten or badly stained %	Slightly stained %	Other boll-worms %	Other diseases %	No. of larvae in 100 bolls	Notes on the plot.
Hoima Road M. 70	16.0	11.5	4.0	13.5	6.0	Not recorded	early planted; $\frac{1}{3}$ picked.
Nakasongola	17.0	9.0	(included under stained)	Nil	1.5	Not recorded	early planted; $\frac{1}{2}$ picked.
Ngai	18.5	32.5	5.0	2.5	0.5	46	? planting date; $\frac{1}{2}$ picked.
Masindi—Gulu Rd. Km. 49.5	26.0	1.7	3.7	5.7	Nil	42	"first picking"
Masindi Port Rd.	11.7	14.7	1.7	1.7	0.7	21	large early-planted healthy plants $\frac{3}{4}$ harvested.

* In some of the records no distinction was made between stained and slightly stained.

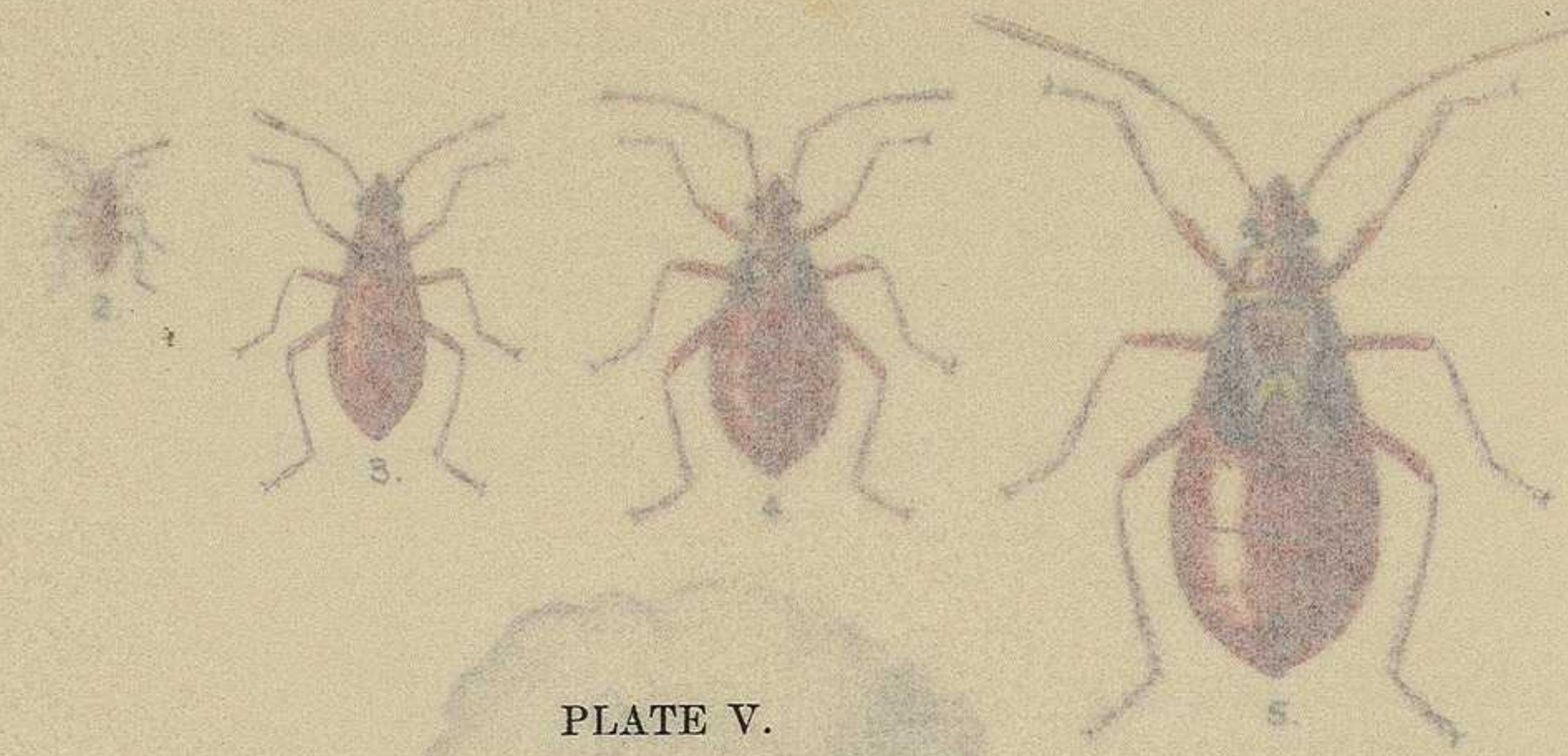

PLATE V.

The Cotton Stainer, ***Dysdercus superstitiosus.***

Fig. 1 The young nymph just after hatching from the egg.

Figs. 2 - 5 Later stages in the development of the nymphs.

Fig. 10 The adult *Dysdercus*.

Figs. 6 & 7 The cotton seed bug *Oxycarenus* sp, which does not cause staining of cotton but sucks the seeds thus reducing the percentage which germinate.

Fig. 8 A damaged boll showing on the left staining due to bacteria and on the right yellow stain due to the fungus *Nematospora*.
The upper lock is healthy.

Figs. 9 & 11 show the proliferation of the boll wall due to sucking of the stainer and Fig. 11 shows also a boll completely rotten owing to the introduction of disease.

District	% rotten or badly stained due to stainer	% slightly stained due to stainer	% damaged by pink bollworm	% damaged by other bollworms	% damaged by diseases not carried by insects
Eastern and Northern Provinces	14.9	7.0	1.5	4.9	3.8
Lango	20.3	4.9	1.5	2.1	0.5
Buyoro	11.3	5.4	2.0	2.3	3.4
Kiboga area of Buganda	7.2	3.8*	1.4	3.8	6.6
Western Mubende District	13.0	5.3	absent	0.8	4.7
Masaka District	23.0	9.3	absent	1.8	5.5
Bulemezi District	12.3	9.0	absent	1.5	2.1
Mpigi—Mityana survey	20.3	5.0	absent	2.2	9.4
Luzira survey	16.1	7.7	absent	0.8	1.7

Detailed figures of some of the more severely damaged plots are given :—

Place	No. of bolls in 100 bolls damaged	Roughly stained	Pink bollworm damaged	Notes on the plot.
Nakasongola	17.0	9.0	(included under stained)	Nil	1.5	Not recorded	early planted; $\frac{1}{2}$ picked.
Ngai	18.5	32.5	5.0	2.5	0.5	46	? planting date; $\frac{1}{2}$ picked.
Masindi - Gulu Rd. Km. 49.5	26.0	1.7	3.7	5.7	Nil	42	"first picking"
Masindi Port Rd.	11.7	14.7	1.7	1.7	0.7	21	large early-planted healthy plants $\frac{3}{4}$ harvested.

* In some of the records no distinction was made between stained and slightly stained.

COTTON PESTS 1. DYSDERCUS

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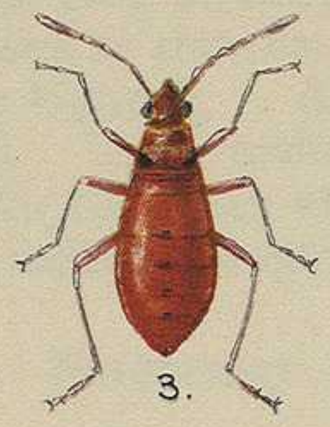

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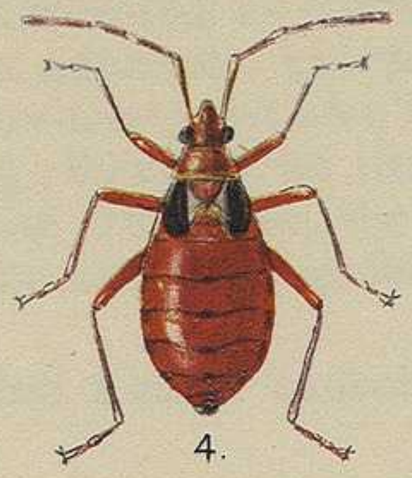

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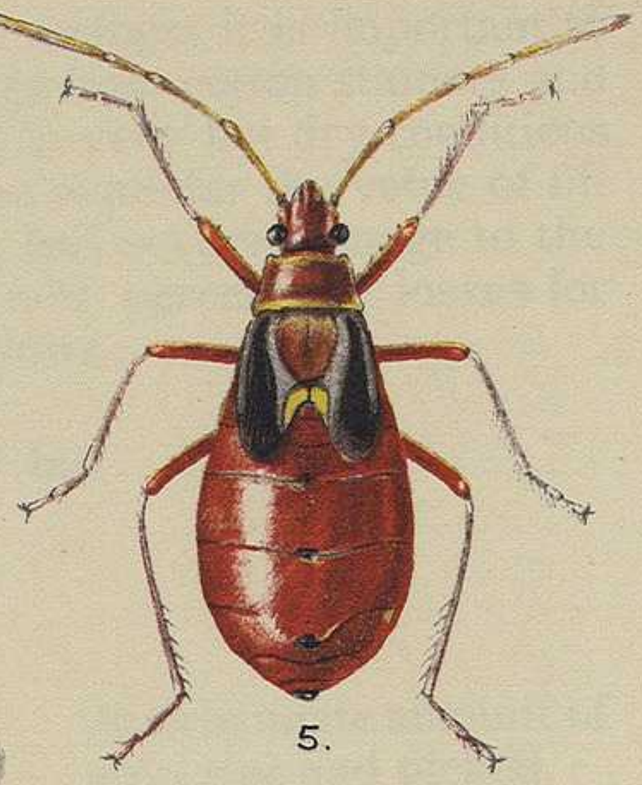

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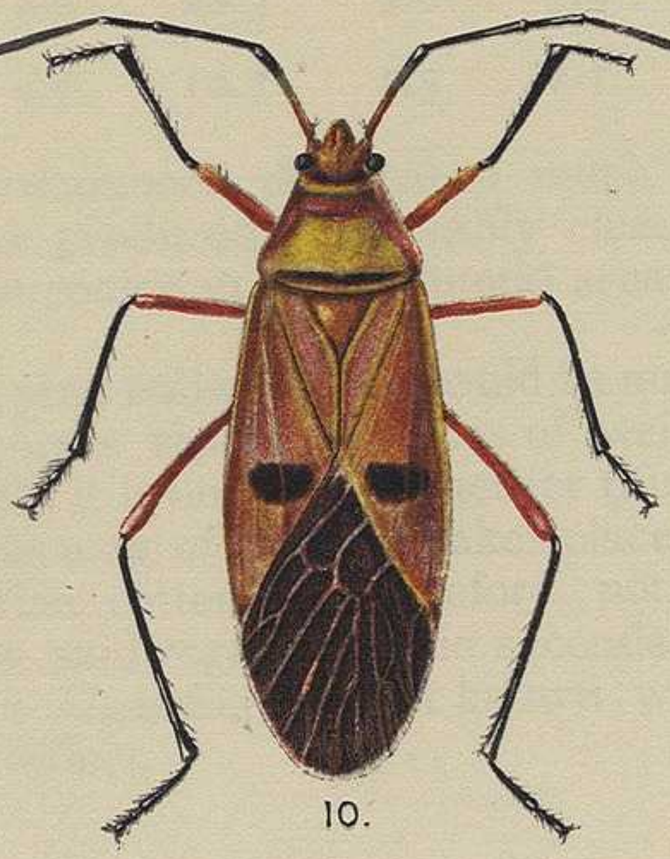

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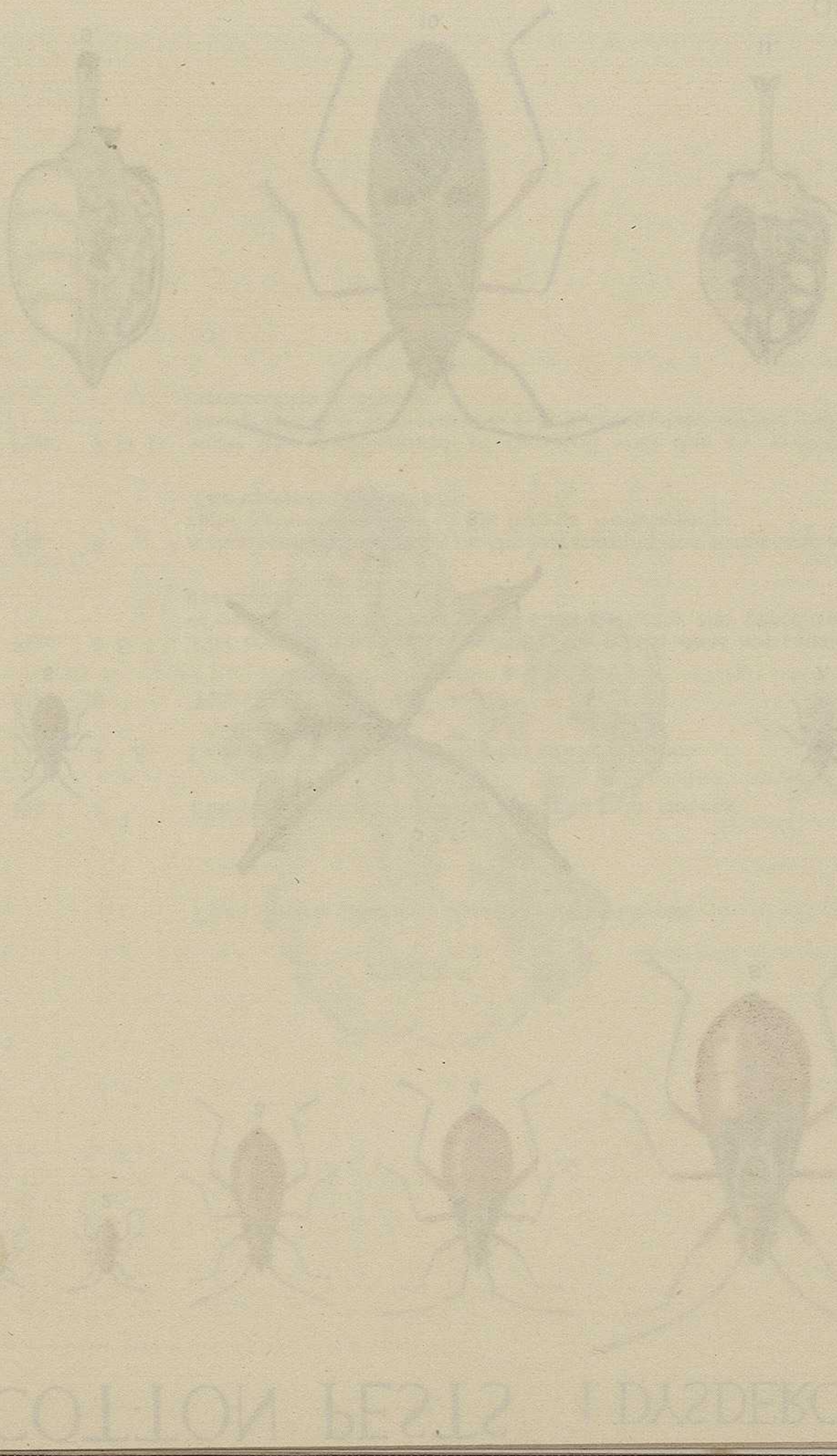
John Bale Sons & Danielsson, Ltd London.



In estimating the nett loss from pink bollworm and stainers it is important to consider the amount of crop already harvested, as damage from cotton stainers and pink bollworm increases as the season advances, except in very hot dry conditions which rarely occur in Uganda. Allowance must also be made for the value of fifi cotton which is saved. After making allowance for the less severe damage to the earlier pickings and for the value of the fifi cotton, the nett percentage losses for some of the districts mentioned may be estimated as follows :

	Percentage Nett Losses caused by				
	Pink bollworm	Stainer	Other bollworms	Diseases	Approximate amount of crop ripe and picked.
Eastern and Northern Provinces	1.5	11.9	4.9	3.8	1/4
Lango	1.5	12.3	2.1	0.5	5/8
Bunyoro	2.6	8.4	2.3	2.4	Averaging 3/8; very variable; some mostly picked (very dry areas); some not yet ripe (cooler and more humid areas).
Western Mubende District	0.3	21.4	0.8	4.7	Nil to 1/10. (figures obtained assumed to be nett loss).
Masaka District	0.0	20.3	1.8	5.5	1/5
Bulemezi County	0.0	10.7	1.5	2.1	1/5

In a year with a less pronounced dry season much greater losses are to be expected. This season has produced remarkably clean cotton. The highest losses from stainer are in the cooler and more humid areas, Mubende and Masaka.

In considering damage by pink bollworm it should be noted that in Egypt damage to one lock caused by bollworms results in a loss of weight of 10% in each of the other locks of the attacked boll; it is not stated whether this is correlated with a loss of quality, but in Mexico weakening of the fibre takes place. The number of damaged locks in the case of Egyptian cotton is, therefore, not a true indication of the actual losses, but little can be said regarding this secondary damage to such varieties of cotton as are grown in Uganda, nor is it known whether insects other than bollworms produce a similar effect.

Another method of estimating damage was to collect from selected rows on various plantations all fallen buds and bolls and to examine both these and the residual crop. The numbers of the damaged buds and bolls which were injured by each species of insect on the Kampala Plantation, ascertained from two experiments carried out in this manner, were as follows:-

Small buds shed, damaged by bollworms						71	(1.4%)
Large	,,	,,	,,	,,	,,	257	(32.2%)
Small bolls		,,	,,	,,	,,	103	(10.0%)
Large	,,	,,	,,	,,	,,	32	(25.6%)
Small	,,	,,	,,	,,	Lygus	295	(30.7%)
Large	,,	,,	,,	,,	,,	28	(21.7%)

*

These figures require much more detailed analysis than is possible here and must be compared with the total numbers of buds and bolls formed (the figures given above being for bolls shed and not for bolls formed), but it is possible to say that damage to very small buds appears to be slight, while damage to larger buds is serious. The damage to the small bolls is equally serious, but the total number of large bolls shed is comparatively small, so that the influences causing the shedding of a high proportion of this small number are not of great importance.

The analysis of bolls harvested in two experiments in 1929-30 gives the total loss (estimated as stained, rotten and mummied bolls) as 46.5%. This latter figure is rather high when compared with the observations carried out during the 1933-34 cotton-season and detailed above; while this difference is in part due to the very favourable weather conditions existing in 1933-34, the writer considers that it would be rash to estimate damage from all causes to mature bolls over a period of years at an average exceeding 25% until further work has been done, but 13 samples, totalling 750 bolls (3000 locks) collected in Gulu and Madi at the end of 1932 showed stainer-damage to 51% of the locks.

In considering the younger bolls and buds it must be remembered that not all would have given clean cotton; many would have been damaged by stainers and many others would never have matured. Though the loss of *potential* crop, therefore, is possibly 30 or 40% the *actual* loss is likely to be not more than half this.

The losses to the world's cotton due to insect damage are estimated at 25%. The same figure was given some years ago as an estimate of the losses in the Sudan. It is perhaps premature to attempt to give an accurate estimate of Uganda's total losses.

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* The percentages are in each case the percentage of each size of bud or boll shed and not the percentage of the total possible crop.

FACTORS WHICH INFLUENCE THE NUMBER OF INSECT PESTS PRESENT ON A CROP AND THE AMOUNT OF DAMAGE WHICH THEY MAY CAUSE.

The comparatively new branch of biology which deals with the study of the very numerous factors which influence the numbers and behaviour of animals or plants is known as ecology. Of this subject the study of those factors which influence the numbers of various pests present on a plant and the amount of damage which they cause is a very important part. These factors and complexes of factors are discussed below under what appear to be the most important headings. In practice many of them operate simultaneously and sometimes in opposite directions, a fact which renders the problem of control of pests one of extreme complexity and difficulty.

I. Isolation.

The age of an island in mid-ocean can be roughly gauged by a consideration of the size of its insect population (reckoned in species, not individuals) and the distance from the nearest mainland. A newly-formed volcanic island has no insect population; as time goes on more and more species reach it, either by flight, by the aid of wind-currents, on floating debris or by other means.

A crop planted for the first time in a restricted area in the middle of a continent is an ecological island and cotton in Uganda was in this position until comparatively recently. There are both advantages and disadvantages in such a position: some of the pests which attack the crop are liable to have been left hehind, but such pests as have reached the "island" are likely to have arrived there without their natural enemies and thus to increase to a very high degree and to do very considerable damage.

In the case of cotton-cultivation in Uganda one of the pests left behind was the pink bollworm, but progressive increase in cotton growing both here and elsewhere has brought the Uganda "island" into close juxtaposition with cotton-areas of the Sudan, and (through the Sudan) Egypt, and allowed the pink bollworm to reach the country. The isolation which was our safeguard has broken down. To a smaller extent this factor of isolation operates even with pests within our "island": it is common to find a freshly opened plot, surrounded by dense elephant-grass, showing very little or no signs of the pests having discovered it; such a plot, is an ecological islet. This condition occurs more frequently in the more densely forested country or in elephant-grass country and progressively less in "short-grass" country where in the case of main cotton-growing areas, the population is denser and plots more numerous.

2. Weather and Climate.

All farmers accuse the weather of being the cause of the multitude of woes to which their crops are heirs. Even when the farmer is shown that insects and not the weather are doing the damage he is not entirely convinced and he is very often right, since abnormal numbers of insects are often due to abnormal weather.

Weather and climate (the latter a complex of temperature, humidity, rainfall, etc.) have been proved in certain cases to have profound effects on insect activity and abundance. The effects of climate may be direct or indirect, and in dealing with an insect which is attacking a plant these two effects and also the component of the complexes involved in each case, can often only be separated by controlled experiments. In dealing with an insect like the tsetse fly, provided food is present in unaltered quantity, direct effect can be fairly accurately measured, but with plant-feeding insects any lack of moisture which may directly affect the insect simultaneously affects the plant and through the plant-juices again affects the insect, but this time indirectly.

In dealing with cotton pests the direct effect of climate is of paramount importance in the case of the resting larva of the pink bollworm and is the crux of any recommendations for control which we may make. Humid conditions encourage damage by stainers; in dry weather these insects have been seen to suck members of their own species and to feed on plants which are not suitable as permanent food and are probably used merely as a source of moisture. Their willingness to drink poisoned bait is not apparently affected by weather, since such baits are equally effective in wet or dry weather unless the bait is washed away.

Two simple examples of the direct effect of weather are that of rain causing the soil to seal over larvae or pupae of pink bollworm (as has been stated to take place in Egypt when flooding occurs) and that of showers making the soil suitably damp for the eggs of cotton stainers or sealing in their eggs and thus destroying them.

The indirect effects of weather can only be conjectured. Weather may produce in the plant conditions favourable or unfavourable to the insect; possible examples of these are the association of Jassids with dry conditions and the fact that it has been noted that bolls attacked by *Lygus* are shed more readily in wet that in dry weather.

3. Soil Conditions.

The effects of the physical and chemical nature of the soil and the water which it contains are so inextricably bound up with weather and climate that they cannot be dissociated from the indirect effect of climate on the insect. Climate acts on the plant to a very large extent through the soil in which conditions can be modified by cultivation and the application of manure to encourage the type of plant growth required to avoid loss from insects.

4. The Condition of the Plant.

A further influence affecting the degree of insect damage and density of insect population on a plant is the condition of the plant. This is dependent in part on the soil and climatic complexes and in part on the inherited characteristics of the plant. In making observations on damage caused by pests these combined influences are very difficult to dissociate one from another, and their combined effects govern the "condition" of the plant. There are indications that certain insects will feed on a plant only when it is succulent, and this is possibly true both for *Helopeltis* and *Lygus*. Damage by *Helopeltis* has been found to be correlated, in addition, with shallow root-development of the plant, presumably acting indirectly through the sap.

Jassid-resistant strains of cotton have been grown in a number of different environments and in none of these environments have they supported a large population of Jassids or suffered appreciable damage from these insects; in this instance it is clear that the most important factor is some quality inherent in the plant. On the other hand many strains of cotton may suffer damage * or little or no damage, according to the types of soil and climate in which they have been grown, and in some cases irrespective of the density of their Jassid population. In the latter instance any resistance to loss of crop which the plant may possess (either by reason of failure to maintain a high population of Jassids or by failure to react to the attacks of such a population) may be lost by placing the plant in unfavourable conditions of soil or climate and it is possible that the comparatively high and stable degree of resistance possessed by the "Jassid-resistant" strains would be broken down if they were grown in conditions yet more unfavourable than those in which they have as yet been placed.

5. Multiple Infestation.

Attack by one insect may produce conditions favourable or unfavourable to attack by a second insect, either on the same or on another part of the infested plant. The introduction into Egypt of the pink bollworm was followed by a marked decrease in the number of spiny bollworms to be found in the bolls. This decrease in numbers has been maintained, but the cause is obscure. An insect feeding on the roots of cotton might well produce conditions in the plant which were favourable to the attack of another insect on the leaves, but this aspect has never been studied in Uganda.

Jassid and red mites are sometimes associated on the leaves of cotton and it is not improbable that attack by one of these may facilitate attack by the other.

It has been stated by Elton* that "no species in a community, unless it happens to live a very isolated life or be very rare, is without its effect upon numbers of the rest of the community".

6. Predators and Parasites.

These are among the most important natural checks on insect populations, but in the case of the majority of cotton pests in Uganda they have not been shown to be of very great importance. None of the bugs attacking cotton has exhibited parasitisation to any high degree. With regard to bollworms, parasites may be an important factor and it is important to remember that the pink bollworm may have left its natural enemies behind in its country of origin. The fact that there is some indication that the numbers of spiny bollworm and of false codling-moth reach a maximum before the end of the cotton season and then decrease is an indication of

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* It is a moot point whether "Jassid-damage" is really caused by these insects; it is at least possible that their presence in considerable numbers is one symptem of a disease which may or may not be caused, wholly or in part, by them.

* Elton, C. "Animal Ecology," London (1927) p. 122.

the possible presence of parasites in numbers sufficient to control these pests. The numbers of pink bollworm tend to show a steady rise but this is checked by larvae entering the resting stage, so that any influence exerted by parasites would be obscured in a season such as the present one (1933-34).

Parasites are sometimes dependent for their existance on some alternative host if the cotton pests become very greatly reduced in numbers. In the case of pink bollworm an alternative host is *Crocidosema plebeiana*. Other bollworms have food-plants other than cotton, on which the parasites are able to find them practically throughout the year.

Climatic influences affect parasites as well as pests; a humid climate, such as exists in parts of Uganda, results in the vegetation remaining green throughout the year and thus maintaining a continuous supply of hosts for the parasites.

Extremely little is known about such potentially important predators as birds, but guinea-fowl shot in cotton plots frequently contain numbers of stainers in their crops and, although these birds do a certain amount of damage both to cotton and to food-crops early in the season, it is possible that to refrain from shooting them in cotton plots after the bolls begin to ripen might act as an appreciable check on the numbers of stainers.

7. Amount and Duration of Food Supply.

All cotton pests are obviously dependent on a supply of food. When the cotton is young they come on to it from various wild food plants or other sources and finding suitable food the insects will increase unless hindered by parasites or any of the other factors mentioned above. It is obvious, therefore, that the quicker the crop can be harvested the less chance the insects have of increasing in numbers. A plant which matures quickly has therefore an advantage in the race, particularly against insects which attack the bolls, though it must be remembered that such a plant must be able to avoid serious damage in its early stages. The rapidity with which a boll ripens (which depends both on the type of cotton and on weather) determines the length of time during which it is exposed to attack and therefore, to some degree, the amount of damage. Another factor which favours increase in the numbers of insect pests is a lengthy sowing period: if in the same locality some cotton is sown early and some later there is a great probability that the more serious pests (stainers and pink bollworm) will have so increased on the early-sown plots that the later plots will start with a heavy infestation. In this case there is a continuous supply of fresh food being made available for the insects. In the case of *Lygus* and *Helopeltis*, the effects of climatic and other factors may be so great that the anticipated effect of a lengthy sowing period may not be obtained; in the case of stainers, dry weather may perhaps check their increase but it rarely stops it sufficiently to effect an appreciable decrease in the amount of damage.

8. Alternative Food-Plants.

These may have three different effects on the insect population, which are as follows :-

(a) The carrying over of the pest from one cotton season to another.

(b) Attracting the pest away from the cotton at certain seasons.

(c) Keeping up a supply of parasites either by harbouring a small number of the pests as food for the parasites or by feeding some insect which acts as an alternative host for the parasite.

In the case of (a) these alternative food-plants are a danger, but they are so numerous that the destruction of all the weeds on which cotton pests are known to be able to exist is generally out of the question, and their abundance is such that they may reduce the efficiency of other methods of control, by constituting an uncontrollable reservoir of the pests. The wide range covered by such alternative food-plants is indicated by the lists of them given in the sections dealing with individual pests.

(b) This use of alternative food plants is an aspect of the old idea of a "trap crop" which is used as a bait and then destroyed.

It would be impossible at present to induce the African to plant trap crops and to destroy them at the right time but it may be possible so to arrange his crop rotation that an insect such as *Lygus,* which attacks both cotton and cultivated Leguminosae may feed happily on this latter crop without causing it serious damage, or at least cause less financial loss to this crop than to cotton.

In the Sudan stainers have been found to feed on baobab seeds and these trees in places form the chief nucleus of the stainer population during the periods when no cotton is available; the stainers thus collected on the trees can be destroyed by burning. In Uganda the baobab does not occur naturally, but it is possible that one of the many other food-plants of stainers may be found to be their sole focus at some particular season, so that it may be utilised as an attraction (if sufficiently easy to locate and not too numerous) or may be destroyed and thus create a gap which these insects might find hard to bridge.

Both in Nigeria and in South Africa stainers have been proved to migrate from various plants on to cotton and seem, therefore, to have seasonal food-preferences. In the Sudan, besides the baobab, *Sterculia kirkii* has been found to be a most important food-plant.

In considering alternative food-plants it is convenient to include cotton-seed and "volunteer" cotton plants among them. These are sources of disease and of stainers which have no counterbalancing beneficial effects. In the case of one ginnery, volunteer plants growing in the compound were found to have 22.5% of their locks damaged by stainers, even though the plants were not old enough to have produced any ripe bolls; this compared with an average of 7.2% for the district. These plants, being near old seed, could readily be infected with internal boll rot by stainers obtaining the infection from the seed dump.

(c) Only in the case of *Abutilon indicum*, mentioned above as a food-plant of an alternative host of the pink bollworm, can these plants be considered as of proved benefit. The eradication of *Abutilon* would in any case be extremely difficult even if it were found to be a critical food-plant of cotton stainers.

9. Mechanical Destruction.

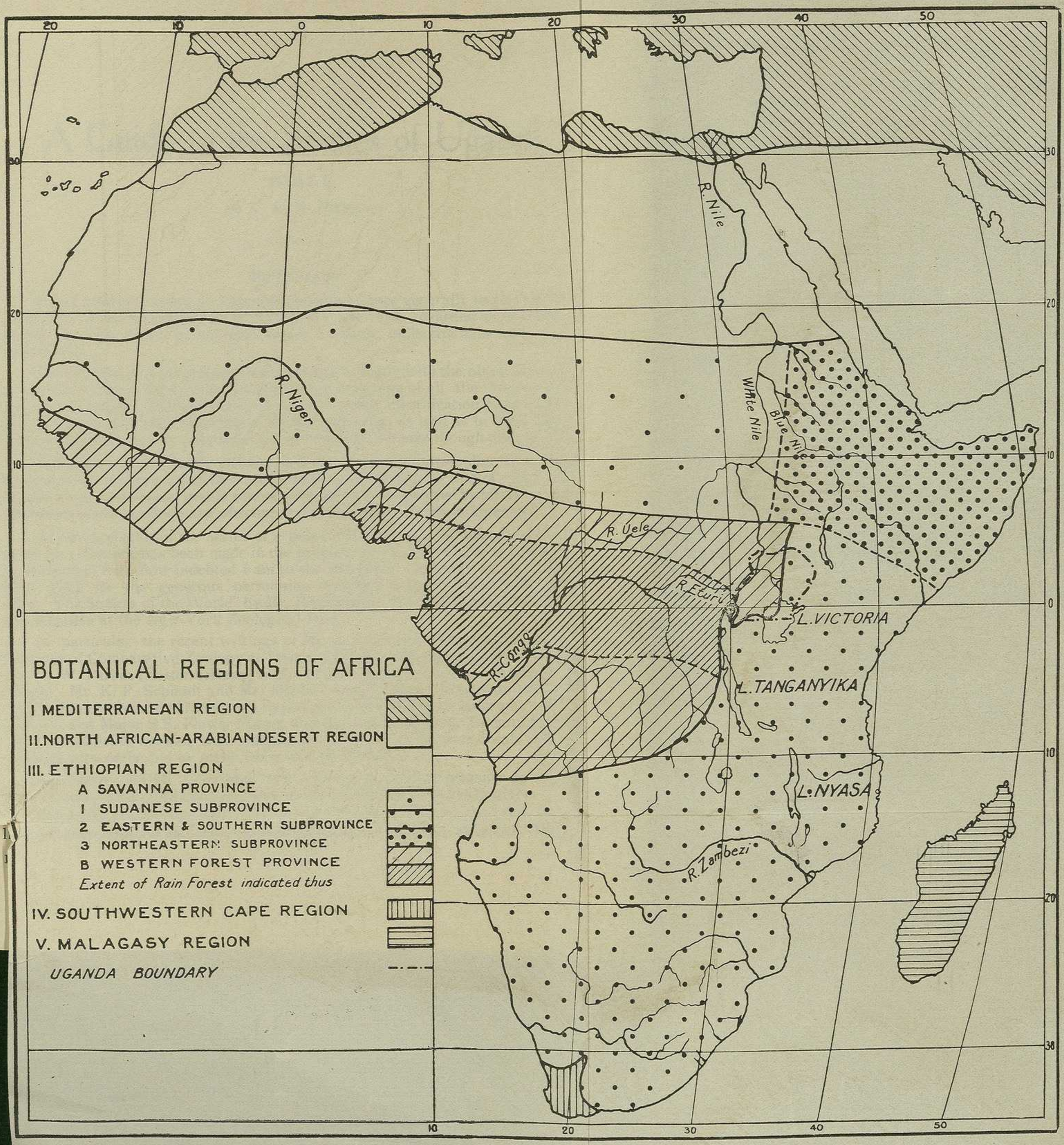
This is a simple method of reducing the number of insects. It includes such measures as collecting and destroying stainers, picking off and destroying damaged bolls (thus destroying both disease organisms and surviving bollworms) when the cotton crop is being picked, and picking off *Helopeltis* from attacked plants. The cultivation of plots assists in exposing eggs of stainers and pupae of bollworms to the sun or to the attacks of predaceous enemies.

The Relationship of the Above Factors to Agricultural Practice.

When all the above factors are considered together it becomes a matter of considerable difficulty to devise practical methods which will enable the harvesting of a large and clean cotton crop. The normal methods of plant sanitation enforced by law in Uganda, perhaps supplemented by simple mechanical methods, are one of the means which can be employed. In addition work has been in progress for some years to ascertain the best time to plant cotton, the best kind of cotton to grow and the best distance apart to space it, so that by these means pests may to some extent be dodged and at the same time the plant is given as good a chance as possible of growing in such a way as to take advantage of the local soil and climatic conditions which will enable it to produce the largest possible number of bolls.

The writer wishes to express his thanks to Mr. H. Hargreaves, Government Entomologist, under whom the work on which the above article is based has been carried out, and who has kindly given permission for the inclusion of some of his more recent results.

The writer hopes to give a more detailed account of some of the experiments and observations included above in a more technical journal at a later date. References to literature have been omitted from the above article as they tend to make the subject even more ponderous than it is already.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R. Nile
R. Niger
White Nile
Blue Nile
R. Uele
R. Ituri
R. Congo
L. VICTORIA
L. TANGANYIKA
L. NYASA
R. Zambezi
BOTANICAL REGIONS OF AFRICA
I MEDITERRANEAN REGION
II. NORTH AFRICAN-ARABIAN DESERT REGION
III. ETHIOPIAN REGION
A SAVANNA PROVINCE
1 SUDANESE SUBPROVINCE
2 EASTERN & SOUTHERN SUBPROVINCE
3 NORTHEASTERN SUBPROVINCE
B WESTERN FOREST PROVINCE
Extent of Rain Forest indicated thus
IV. SOUTHWESTERN CAPE REGION
V. MALAGASY REGION
UGANDA BOUNDARY
10
20
30
40
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FIG 1.

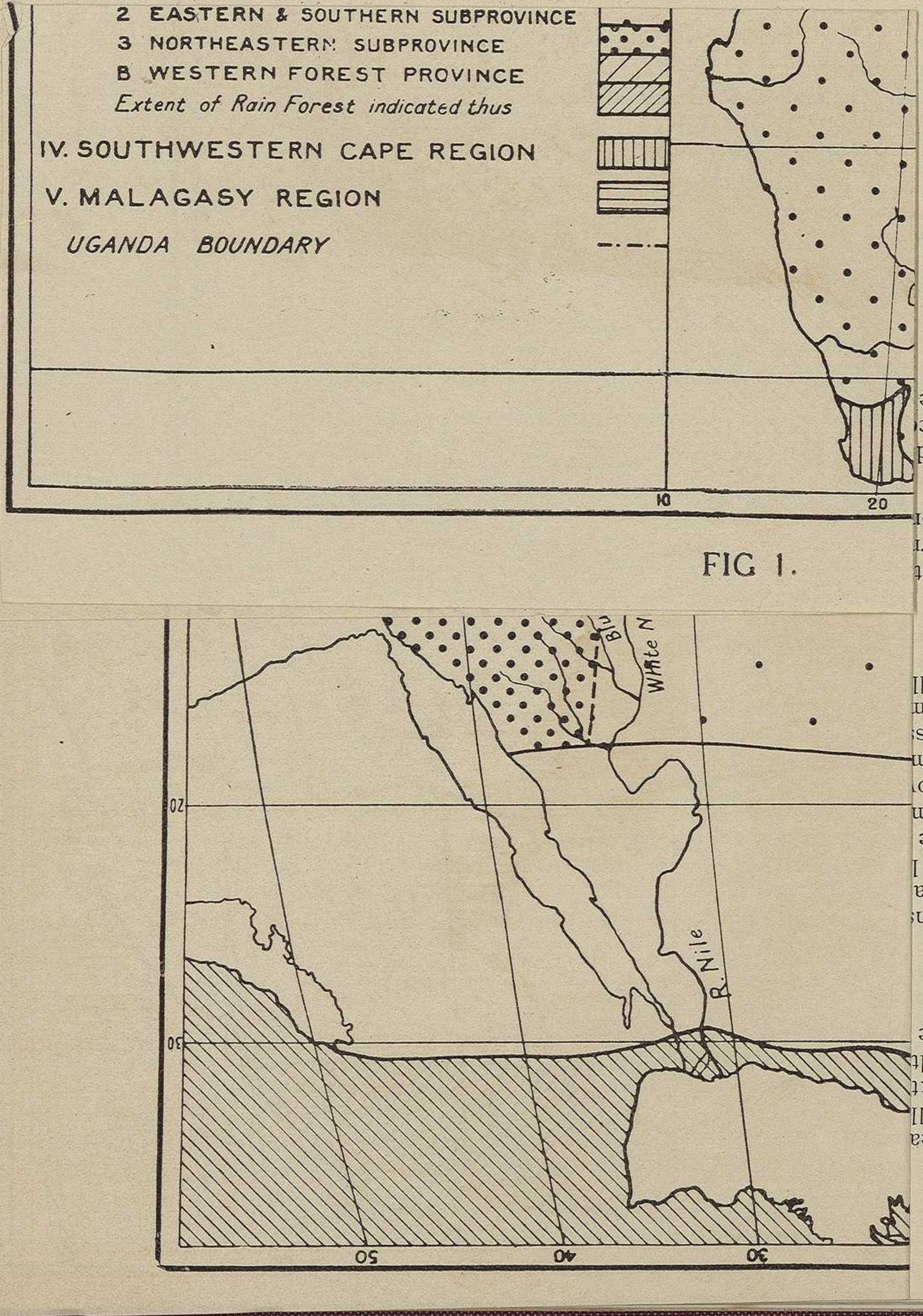
2 EASTERN & SOUTHERN SUBPROVINCE
3 NORTHEASTERN SUBPROVINCE
B WESTERN FOREST PROVINCE
Extent of Rain Forest indicated thus
IV. SOUTHWESTERN CAPE REGION
V. MALAGASY REGION
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FIG 1.

A Guide to the Snakes of Uganda.

PART I.

By C. R. S. PITMAN.

Introduction.

It is, I believe, correct to state that the human race generally has an instinctive antipathy towards snakes, all of which are apt to be regarded as valueless and deadly so that there is common resort to their indiscriminate and wasteful destruction.

This treatise has accordingly been written, not only with the object of affording a descriptive list suitably illustrated with line drawings of all the known species and where possible coloured plates in order to make identification more easy, but to provide a better understanding of snakes generally, as well as to draw attention to their very definite role of benefactors to humanity, strange though this may sound.

Although it can be justly claimed that this list is both up-to-date and comprehensive it is considered that the title "Guide" is preferable to that of "Handbook", for the very good reason that it cannot pretend to be supported by all the published references some of which are obscure and many not available in Uganda.

At the conclusion of the series of articles will be given a full list of the literature to which reference has been made in the preparation of this "Guide", but it must be mentioned here how indebted I am to the Macmillan Company of London and New York for the generous permission accorded to quote freely from that fine work, "The Snakes of the World" by Mr. Raymond L. Ditmars, Curator of Mammals and Reptiles at the New York Zoological Park.

In particular the recent writings of Mr. A. Loveridge (Eastern Africa) of the Museum of Comparative Zoology at Harvard College, Cambridge, Massachusetts: Mr. H. W. Parker (Eastern Africa) of the British Museum (Natural History): Dr. J. Chapin, Mr. K. P. Schmidt and Mr. Herbert Lang (Belgian Congo) on the results achieved in the course of the Congo Expedition of the American Museum of Natural History: and Major S.S. Flower (Egypt and the Anglo-Egyptian Sudan) have provided a valuable working basis supplemented by comprehensive local collections acquired personally and by other interested enthusiasts.

Mr. Parker and Mr. Loveridge have assisted in no small measure by identifying and classifying specimens and with much valuable advice freely given.

The value of the descriptive list is very greatly enhanced by the carefully prepared line drawings, and the skilfully executed paintings of the artist, Miss O.F. Tassart.

Also, I am much indebted to Mr. D. O. Mathews of the Land and Survey Department for the preparation of the two maps.

As considerable reference is made to (i) harmless, (ii) back-fanged or rear-fanged, and (iii) venomous snakes, it will be as well to explain these terms.

On this subject Mr. Raymond L. Ditmars in his fine work the "Snakes of the World" has given an exceedingly lucid exposition.

"An arrangement of serpents in series based on the structure of the teeth, figures prominently in scientific writings.

Aglypha. Non-venomous snakes. All the teeth solid. Some may be fang-like in size, but not grooved nor canalicular.

Opisthoglypha. Mildly poisonous snakes with a pair or pairs of fangs in the *rear* of the upper jaw, these teeth provided with a simple groove for introduction of poison.

Proteroglypha. Cobras, Mambas, Coral Snakes and their allies—the *Elapidae*..... with a pair of permanently erect grooved fangs in the forward portion of the upper jaw.

These poison-conducting teeth are more highly developed than with the rear-fanged snakes. They are deeply grooved, but have practically folded about the groove to form a canal beneath the anterior surface. The enfolded groove opens at the tip for the discharge of poison.

Solenoglypha. Viperine snakes. The fangs of proportionate great length, attached to movable bones and folding against the roof of the mouth when the jaws are closed. The poison channel is a central internal canal" The term "Viperine" includes the Pit Vipers of the New World.

Snakes are far more abundant in species or kinds in the tropical latitudes. It is the serpent amongst all reptiles which has become adapted to conditions of lower temperature through its care in selecting favourable hibernating quarters, and in consequence it has most extensively pioneered in extending its members from the headquarters of reptile life, i.e. the zones of heat and humidity.

Snakes have become specialised respectively to markedly different environment. Thus we have exclusively desert, arboreal and semi-aquatic species, as well as forms with a vertically compressed, oar-like tail which haunt the tropical seas.

The Cobra probably originated in Africa which is the centre of cobra distribution; the dreaded King Cobra of Asia, the Old World's largest poisonous serpent is a northern ally of a form which must have once existed in the Equatorial African headquarters of the genus.

In Africa cobras are absent only from the regions of true desert.

Africa is also the focal point of occurrence of the typical vipers, which occur, usually abundantly, in any part of the Continent, save in the lifeless desert wastes or at excessive altitudes, and are found only in the Old World.

They do, however, penetrate well within the desert regions, where they are represented by the hideous Horned Viper *(Cerastes)*, a species which does not occur in Uganda.

This is a highly specialised form which traverses the soft sands of its habitat by throwing lateral loops of its protectively coloured body.

The tropical and southerly portions of Africa are practically everywhere inhabited by big vipers with bodies that are proportionately so enormously stout and provided with such tremendous heads and excessive length of fangs that they are the most grotesque and repulsive of all serpents, besides being frightfully poisonous.

There are also, in Africa—in Uganda restricted to parts of the Ruwenzori and south-western Kigezi regions—some strictly arboreal and somewhat slender vipers. There is also a genus of African vipers—and nasty, poisonous little creatures they are too—having narrow, plated heads, suggestive of a harmless species, which are addicted to burrowing. It is all very confusing. Some of the most innocent in appearance are the most dangerous.

Snakes, as is the case with other vertebrates and many species of invertebrates, are subject to curious numerical fluctuations dependent on various factors all of which are not fully known.

It is well-known that Uganda is plentifully stocked with snakes. But, in the course of the normal routine of the majority of the European community, contact with snakes is liable to be exceptional. Uganda, with its vast areas of swamp, is a particularly favourable habitat and the vicinity of any damp locality will usually be found to harbour a bewildering quantity and variety of snakes.

Snakes do not obtrude their presence as a rule and one may go many months without seeing one.

In Uganda, during the periods of heavy rain, especially during the "long" rains, snakes are most in evidence.

Harmless species are often more prone to attack than the deadly varieties. Aggressiveness during the breeding season is a characteristic in certain members of both types.

Sportsmen stalking game, when the unusual posture of crawling along the ground is adopted, frequently have most unpleasant *rencontres* with snakes, but even thus meeting unexpectedly face to face and the advantage with the snake, I cannot recollect hearing of any fatalities.

As the relative abundance of deadly to harmless (and mildly poisonous) species is often approximately fifty/fifty it is amazing that human fatalities are so rare, and testifies that the first instinct of most snakes is self-protection and not aggression.

Uganda's Geographical Situation and its Effect on Distribution.

Loveridge *in litt.* records "From its central position in the very heart of Africa one might naturally assume that the cold-blooded fauna of Uganda would surpass that of its eastern neighbours. Actually this is far from being the case, nor does it seem probable that more intensive collecting of these groups is likely to alter its status to any considerable extent. Undoubtedly careful study and discriminative collecting along the western borders of the Protectorate will add quite a number of species hitherto known only from the Congo and the Sudan."

Uganda's unique geographical situation will be seen at a glance from the map (Fig. 1) of the botanical regions of Africa. These are practically coincident with the zoö-geographical regions or faunal zones, and as is only to be expected differ but little from areas well-defined by variations in the extent of the mean annual rainfall. Uganda, botanically, lies within the Ethiopian Region, which is divided into (a) the Western Forest, and (b) the Savanna Provinces.

The Western Forest includes a large area of "Rain" Forest which has an important influence on faunal distribution, and in which the average annual rainfall is in excess, often considerably, of sixty inches.

The Savanna Province is further sub-divided, *vide* the map, respectively into the :-

(i) Sudanese,
(ii) Eastern and Southern, and
(iii) North-Eastern or Abyssinian.

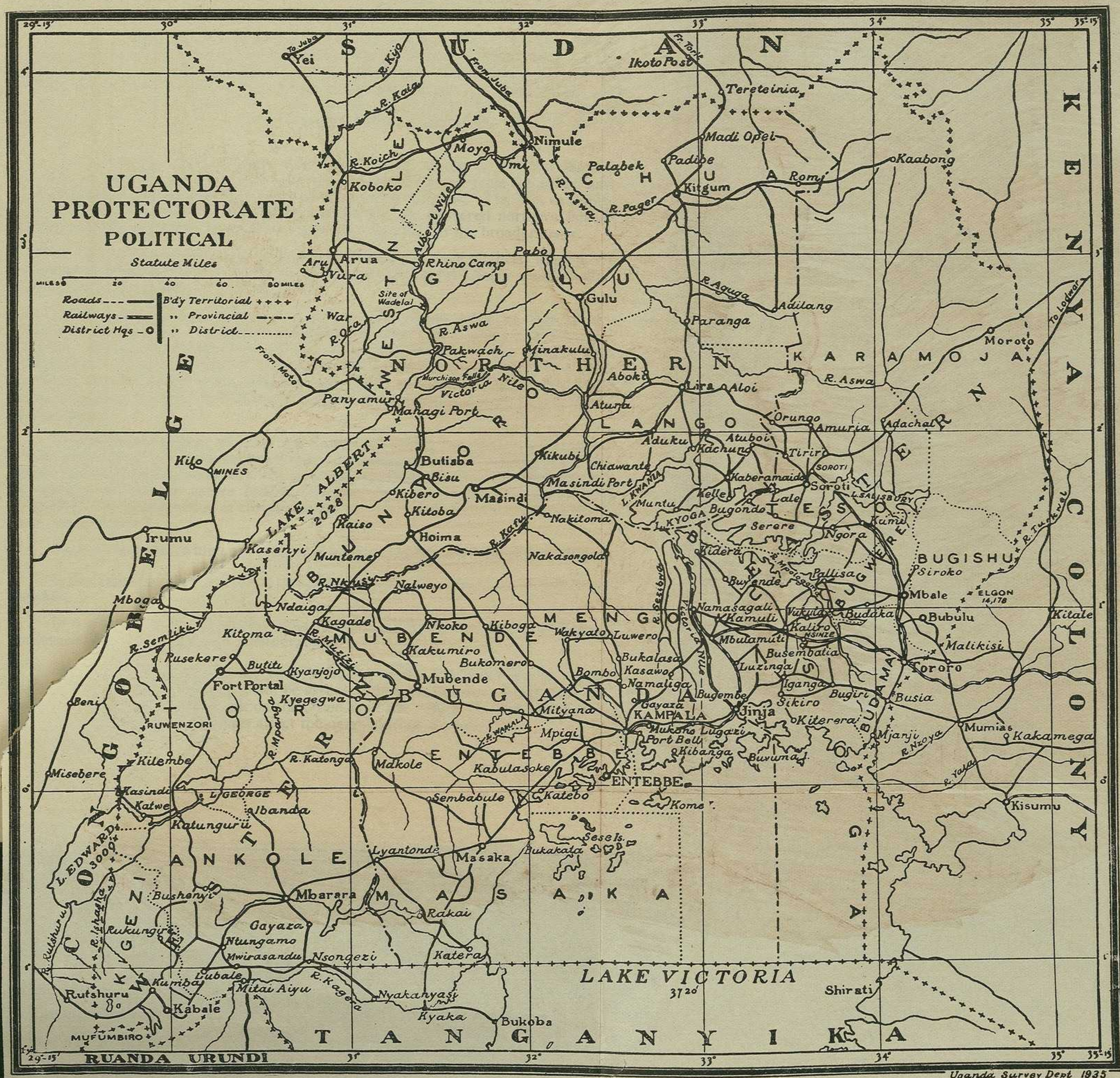
Sub-Provinces, all of which in varying degrees influence the reptilian distribution.

. A narrow strip in the extreme north of Africa—the Mediterranean Region, biologically is Palearctic; but in spite of the Nile valley, well-pronounced throughout the greater length of its course, providing what appears to be a ready highway, Palearctic influence is absent amongst the Uganda snakes. This is scarcely surprising as Ethiopian conditions are unlikely to be favourable to the residence of Palearctic forms.

But, at the same time, it cannot be overlooked that the trans-continental North African/Arabian Desert Region must act generally as an insurmountable barrier denying contact (except through the medium of the Nile valley) between the North and Ethiopia.

On the other hand there is a very definite tendency on the part of the Ethiopian influence to penetrate further and further north into Egypt via the Nile valley. Such penetration is apt to be accelerated and extended remarkably by accidental distribution through the medium of steamers and railways.

The North African/Arabian Desert Region with its specialised climatic conditions so divergent from those of fertile Uganda can hardly be expected to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Kamuli
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Budaka
Kitoma
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Mbutamuti
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Malikisi
Rusekere
Butiti
Kyanjojo
Bukomero
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Kasawo
Namaliga
Luzinga
Tororo
Fort Portal
Mubende
Bugembe
Iganga
Bugiri
Busia
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Mityana
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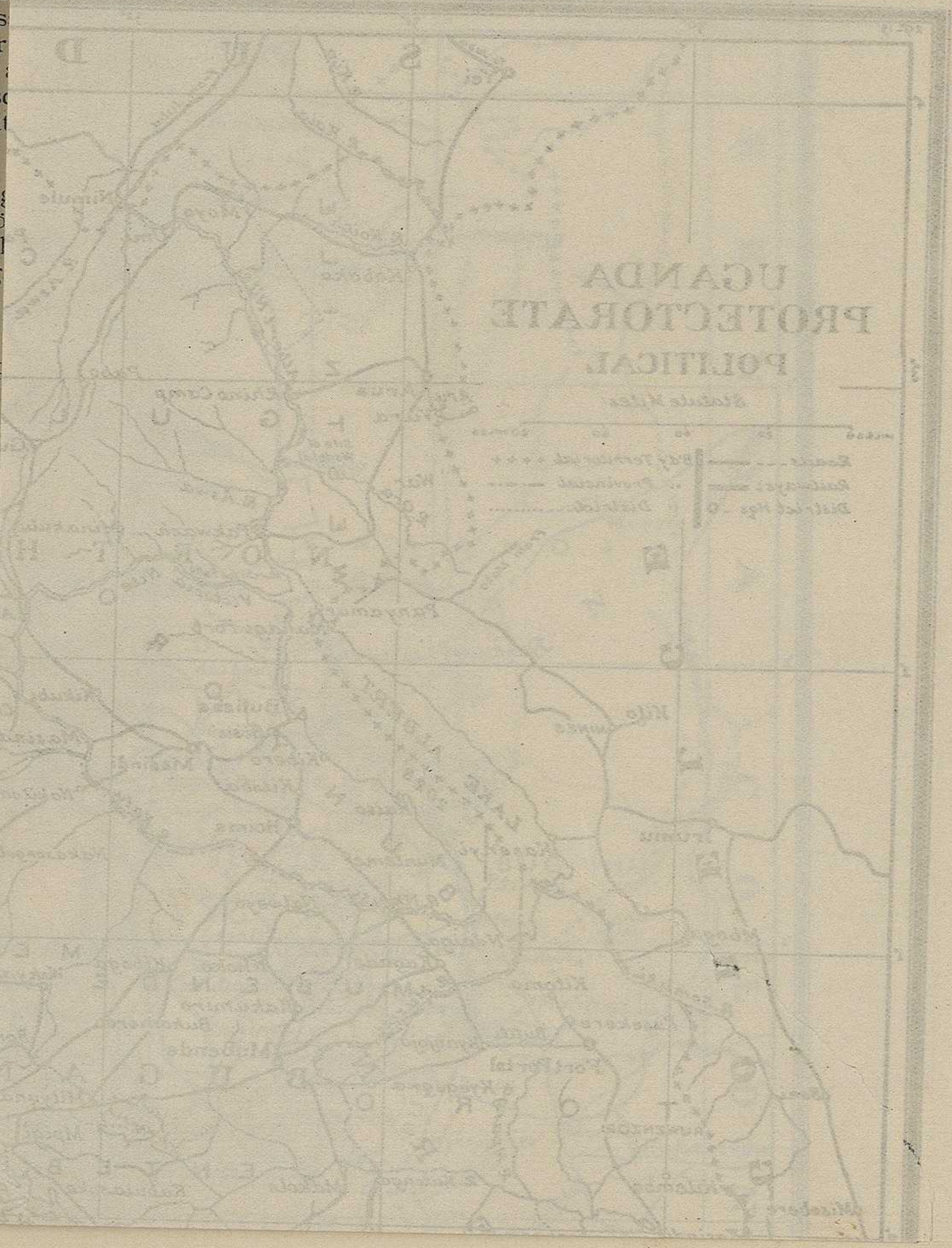

exert any faunal influence even in the drier eastern and north-eastern localities of the Protectorate, but the day may not be far distant when progressive desiccation due to the gradual encroachment south of the ever-hungry desert may tell another story.

It is through the desert zone, or along its borders, that a distinct Asiatic influence, well-instanced by the Saw-scaled or Carpet Viper—*Echis carinata* and the Sand Boas—*Eryx spp*, has crept into North-Eastern Africa. A hundred years ago the "Rain" Forest influence was predominant in the greater part of Uganda south and west of the Victoria Nile, as well as in the coastal forests of Busoga, extending easterly as far as the Kakamega Forest, south of Mt. Elgon, in Kenya Colony.

The low-lying "Rain" Forest zones of Uganda, owing to ruthless deforestation, are speedily becoming more and more isolated the one from the other, and are in consequence conveniently referred to as forest "islands," The best examples left are the Mabira Forest and certain of the densely timbered northern islands of the Victoria Nyanza, which constitute forest " islands" in the broader sense.

The Mabira Forest and the afore-mentioned islands have all been imperfectly investigated faunally, and students in all branches of natural science could profitably spend many months in these localities.

In the case of the recession of a botanical region such as that of the Western Forest with its highly specialised "Rain" Forest zone, the ancestral affinity will persist longest, of all the vertebrate fauna, in the reptiles and amphibians which on account of their habits and restricted range of activities must perforce remain behind when mammals and birds can move elsewhere to more congenial surroundings. The "Western" influence in the Mabira Forest is particularly pronounced.

In British Somaliland, which is not so very far to the east, Parker notes that :- "The high degree of specialisation of the fauna suggests that the country possesses some marked differentiation from the surrounding countries, but the relatively low proportion of endemic *genera* further suggests that this isolation is not of long standing. A consideration of the geological history of the country confirms these two suppositions."

There is, however, a high percentage of endemic *species* and *races* in Somaliland.

In the island of Madagascar on the East Coast of Africa there are no poisonous snakes.

In the detail of species will be found further remarks on distribution as directly influenced by physiographical considerations.

As a rule in the case of the two Provinces of the Ethiopian faunal region, although there are exceptions, it can be accepted that the Savanna fauna does not penetrate the "Rain" Forest, but on the other hand the "Rain" Forest and Forest Fauna is more likely to and does affect the neighbouring Savanna.

The foregoing remarks should suffice to give a general indication of the peculiarly interesting faunal situation in Uganda.

To illustrate the effect of climate and its concomitant vegetation on distribution one can quote the highly-poisonous cobras and puff-adders, both consisting of large species which should be familiar to many.

There are three types of cobras each of which may attain a length of seven feet, and in certain species a known maximum of 8½ feet. *Naia melanoleuca*—the Black-lipped Cobra, is the "Rain" Forest representative which still persists in parts of the Victoria Nyanza region of the Protectorate such as at Kampala and Entebbe after the disappearance of its humid, forest habitat.

Naia nigricollis—the Black-necked or Spitting Cobra, is a Savanna species, which appears to be replaced in the more arid and lower lying regions of the north and east, and in the Lake Albert littoral of the western rift by *Naia haie*—the Egyptian Cobra.

Similarly the three massive vipers of the genus *Bitis* popularly known as "puff-adder", are restricted respectively to (a) the Savanna, *Bitis arietans*,—the (true) Puff Adder; (b) the "Rain" Forest, *Bitis gabonica*—the Gaboon Viper; and (c) regions of the "Rain" Forest liable to seasonal innundation, *Bitis nasicornis*—the Rhinoceros-horned Viper or River-Jack.

Before closing the subject of distribution there is one important factor requiring attention. Politically, the Protectorate is considerably smaller than in the early days of its association with the British Empire, and in consequence the records of some of the early collectors no longer refer to territory included in present-day Uganda. This of course confuses considerably the distribution of species, the case of the Common or "Black" Mamba–*Dendraspis angusticeps* being a striking example. There is a Western Forest species of Mamba—*Dendraspis jamesonii* which is common in Uganda in suitable localities, but the "Black" Mamba, that serpent of sinister reputation, as far as I am aware does not occur above the western scarp of the great rift. Past records within our limits refer to a time when the Protectorate boundary on the east extended as far as Lake Rudolf in the low-lying vicinity of which the "Black" Mamba is found.

Adjustments of boundary during the past thirty-five years whereby Uganda limits have contracted appreciably include a withdrawal respectively, in the east and south-east from Lake Rudolf and the Mau Escarpment (Kenya) and in the north from Gondokoro, to existing boundaries, *vide* the present-day map (Fig. 2).

The inclusion in Uganda of the southern portion of the one-time Lado Enclave (the West Nile district) has also added to the confusion. Uganda distribution of course refers to the Protectorate as now constituted (1935.)

Beneficial Activities.

Rodents, i. e. rats and mice, form a large part of serpents' food, and a number of snakes are of important economic value to agriculturists in many parts of the world. The particular abundance of a number of species of snakes, including some of

the various dangerous kinds, is often brought about by multiplication of rodents occurring around outlying human settlements. Thus the prevalence of venomous snakes, the Puff-Adder being an excellent example, in a number of cases is not altogether an evil. As rodent-eaters snakes are particularly valuable.

It is admittedly stupid to kill non-poisonous snakes which are harmless to man and most effective as destroyers of the four-footed pests which do so much damage to economic crops and products.

If the annual loss to the country due to the depredations of the lesser rodents, particularly to grain in the bin, could be correctly assessed, it would assume staggering proportions almost impossible to credit.

The Puff Adder, though an unpleasing neighbour, is voracious in its dealings with rats, and it frequents human habitations at certain seasons not to seek out unsuspecting human victims but to satiate its appetite with the ravagers of the grain-bin. These remarks should not be interpreted as advocacy of any special protective measure for snakes, which is at present unnecessary; but it is a plea for a broader outlook towards snakes in general and for abstinence from that uncompromising attitude which demands the sacrifice of every serpent no matter the circumstances.

It is well-worth fostering an interest in these little-known creatures which fill a niche in nature as ordained by the Creator. One of the objects of this "Guide" is to educate generally, and it is hoped the young idea particularly, concerning the differences between the highly toxic and harmless species, as many are recognisable in the field.

Characteristics and Habits.

It is best to start at the beginning, and although the fact is well-known to the majority there are many who do not realise that snakes are hatched from eggs. The eggs are not necessarily laid, for some snakes are viviparous and produce living young, though most of them do deposit their eggs and these are styled oviparous.

As in the case of birds the eggs of reptiles are large and heavily laden with yolk. They are dull whitish in colour, though they soon become stained darkly with the soil or rubbish covering them.

Oviparous harmless species may be induced in confinement, and under other unusual conditions of life, to become viviparous. The converse however is not known.

According to species the number of eggs varies tremendously and appears to be smallest in many of the harmless forms. The greatest number personally noted was seventy-five contained in the two ovaries of a puff—adder nearly four feet in length; and eighty-five eggs of *Chlorophis* sp. unearthed near L. Mutanda, in S. W. Kigezi, are believed to have been produced by several females.

Snakes' eggs, though there are exceptions, are usually more cylindrical than those of birds and the shell is pliable like very thin leather: in many the length usually approximates twice the breadth. An egg if dropped lightly on the ground

will bounce! Eggs are deposited in a variety of situations in which there is a combination of suitable moisture, adequate drainage, and shade which produces the even, humid temperature necessary for successful hatching, for once the eggs are laid the parent in most cases takes no more interest in them.

The snake usually prepares a circular or ovoid hollow in soft soil and covers her eggs with rotting vegetation, refuse or other similar materials. The eggs actually swell as they absorb moisture. Before hatching the tiny reptiles develop on their snouts an "egg-tooth" with the aid of which they are able to slit the tough integument imprisoning them and escape.

In most species the period of incubation is about eight weeks. The eggs of the python are spherical and the size of oranges, and though fully rounded when found in the condition of warmth and humidity requisite for successful incubation, speedily collapse and shrivel when removed. The female python which lays her eggs, usually thirty to fifty in number, in a conveniently sheltered situation—often at the bottom of a pig-hole—does not cover them with rubbish, but having pushed them into a heap, coils herself around them, and during the period of incubation only leaves them to visit water which she usually does twice a day. Twenty-four hours before hatching is due they are abandoned. While brooding there is an appreciable increase (which may be as much as 12°Fahrenheit) in the python's temperature over the normal, and it is suspected that the brooding parent not only emanates considerable warmth but also exudes a proportion of moisture enabling the eggs to be kept at the right heat.

Snake eggs generally, as previously mentioned, do not receive prolonged attention from the parent and coiling around them appears to be for the purpose of keeping the mass of eggs from drying, as they require moisture to keep them fertile.

Masses of python's eggs I have come across have invariably been in sheltered, humid spots. One frequently finds several abnormal and undoubtedly infertile eggs in a python's set. These are brownish, oval, and with hard calcareous shells closely resembling the eggs of birds, though rather pitted.

Most African vipers are viviparous and the young are either hatched immediately the eggs are deposited, or emerge from the eggs before they leave the ovary.

There seems to be no well-defined breeding season and although it may be possible to recognise periods of intensity or "peak" periods, breeding evidently takes place all the year round judging from the examination of some hundreds of specimens.

In countries of markedly contrasting climates snakes mate after hibernation: similarly in dry, tropical regions of limited rainfall frogs and toads are mating at the breaking of the rains, immediately after the period of estivation.

Many young snakes in the early days of their existence are entirely insectivorous. The rate of growth varies a good deal and is of course dependent on climate and food supply, but normally it is rapid. As the tiny snakes increase the size of their meals and their prey, so correspondingly is the rate of growth accelerated.

Interesting details in connection with the rate of growth of pythons are recorded in the notes on the common African representative. Climatic conditions in the greater part of Uganda are too equable to influence growth as periods of hibernation are unnecessary.

Snakes re-act appreciably to temperature changes and in cold climates retreat seasonally into secluded, sheltered spots for the winter quarters in which they hibernate.

They can endure, while benumbed and motionless in hibernation, a temperature close to freezing, but at or below that point when water freezes they are liable to be killed.

In the Eastern African highlands various species of snakes are often found after dark lying in a state of torpor on roads and paths. These have been lying in wait for the small members, both warm and cold-blooded, of the vertebrate fauna which, with the setting of the sun, frequent such localities. The sudden chill of evening unexpectedly renders the snakes helpless.

In Northern Rhodesia in winter-time, there is a big contrast in day and night temperatures, and at that season when motoring along the Great North Road in the morning, before the sun had really penetrated the woodland and warmed the ground, I have come across numerous puff adders within the space of a few miles which had evidently been overcome temporarily by the excessive cold during their previous evening's hunt for rodents.

During the snakes' winter sleep animation is partially suspended, so that in the spring time they emerge in much the same condition as when they entered.

A snake's activity is influenced by the temperature of the air. Its normal blood temperature is recorded as being usually one degree higher than that of the air.

A temperature of 70°F. to 90°F. is best conducive to its activity. Below seventy it slows down: at fifty it is nearly helpless : while at forty it barely shows signs of life.

In consequence snakes are absent from the higher altitudes and in Uganda it is unusual to find them above the 8000 feet level.

Where evenings, nights and early mornings are cold one can sleep on the ground when camping out, knowing full well that there is no chance of a wandering snake being one's unwelcome bed-fellow!

In excess of 90°F. a snake seeks cooler shelter, such as undergrowth or damp ground, where evaporation produces a lower temperature at the immediate surface. In the tropics shelter is invariably sought to avoid undue heat.

During the hot weather the African Python goes to the nearest water and lies right in it, often wholly submerged, throughout the heat of the day.

Tropical snakes sometimes have "dens" in which they can avoid intense heat, just as utilized by their brethren in other climes to escape from excessive cold.

A most curious and interesting phenomenon is the power to cast the skin; this takes place periodically, and one of the occasions on which it almost invariably happens is immediately after hibernation. As the time for a change of skin approaches the snake's lidless eyes become dim and white with the thickening of the old skin. I have seen an excellent description of their appearance—"like bubbles filled with smoke." Then the eyes clear as an oily secretion forms under the old epidermis or skin, loosening it on the body.

Transformation is now imminent, and the snake pushes the loose skin *back* over the upper and lower jaw by rubbing amongst some hard material such as rock, tree roots, or rough ground and once it has freed its head it creeps out of its old covering by catching the moist tissue-like garment in stubbly grass or similar formation, to emerge resplendent in its new coat.

The cast skin is turned *inside out* the entire length of the body clear to the tip of tail, and the process takes place so skilfully that the shed skin is complete in every detail, even to the peculiar scale over each eye which resembles a concave lens in miniature. The process may take half-an-hour.

At the time of sloughing, or changing the skin, snakes are liable to be bad-tempered.

Snakes and lizards are covered with scales, which are embedded in the skin. Over these there is a thin, transparent, horny layer. This is the portion which is shed (or sloughed) periodically. Reptilian scales and avian feathers have much in common, but whereas in the former only the thin outer covering of the scale is shed, in the latter it is the whole feather which is cast at the time of moult.

One of the most interesting features of the reptilian eye—common also in the members of the closely-allied avian order— is the nictitating membrane used to clean the front of the eyeball. This is practically a third lid resembling a transparent sheet which in the birds can be drawn upwards across the eye at will. It can be easily observed by watching crocodiles or the larger birds, especially the owls, at close quarters.

Snakes have neither upper nor lower lids and in consequence this membrane is drawn permanently across the eye, and is shed when the skin is changed. Also, they have no external ears.

A snake cannot strike with accuracy when more than the anterior third of its body is off the ground, and when it strikes the movement is forward (or slightly upward) and downwards.

In the case of the vipers, the movement is more often a side-stroke, in a lateral plane.

Snakes range in size from thirty feet pythons weighing in excess of 300 lbs. to midgets of less than six inches which can glide through an orifice one-eighth of an inch in diameter.

The subject of the length of the larger snakes is a fruitful source of exaggeration. In this connection some amazing claims have been made. A few years ago, it was reported in all solemnity from the Toro district that a python *one hundred and thirty feet* in length had been killed in the Semliki valley, but there was no tangible evidence of this terrifying giant as the local Bwambwa quickly converted it into stew.

That it was a well-known python of considerable age and size there was no question—its existence had often been brought to my notice and I believe some of the local natives venerated it,—but 130 ft. of python would probably need for sustenance an elephant weekly!

Hearsay always likes to add a few feet to the authenticated records of the large constricting serpents. In over thirty years' quest for a really outstanding specimen, the largest the New York Zoological Park has been able to acquire is a Reticulated Python from Malaya just 24 ft. long.

Maximum measurements of this species of python from authoritative sources are 33 ft. and a few inches in excess of 30 ft.

The largest skin the late Sir Frederick Jackson ever saw—I am of course referring to the African Python—was 27 ft. long without head and with part of the tail missing. Another skin of a specimen killed in the Mabira Forest of Kyagwe given to him measured 22 ft. The largest one killed by Sir Frederick was 15 ft. 5 inches in length and weighed 60 lbs. In the Baringo district (Kenya) Sir Geoffrey Archer came across a 19 ft. python that had just uncoiled itself from a young waterbuck.

The African Python is the Old World's third largest snake—it is often called the Rock Python. It is unusual for the African Python to attain a length much over 20 ft. and the average of adult examples is 16 to 17 ft. I have not had the opportunity of measuring many in the flesh, and, of the few I have, none has exceeded 15 ft.

In the New World there is one huge species—the Anaconda of tropical South America, of considerably more aquatic habits than the Python. Though there have been many exaggerated stories about its size, it is unquestionably the world's largest living serpent as far as weight is concerned, though not in length.

The greatest lengths of captive specimens in the New York Zoological Park are recorded respectively as 19 ft. with a circumference of 36 inches at the thickest part of the body (weighing 236 lbs.), and 17 feet.

Most misleading about the Anaconda is its proportionately great bulk. The 17 ft. specimen was as heavy in body as a 24 ft. Reticulated Python.

First hand information from reliable sources reduces the maximum length of the Anaconda to 25 ft. with a weight in excess of 300 lbs.

Wild stories persist of the existence of 40 and even 50 ft. monsters, but in spite of the lure of a thousand dollar reward for a skin in excess of 40 ft. such a trophy has never materialised.

The giants amongst the deadly Elapine snakes are the King Cobra or Hamadryad of Asia, probably the world's most interesting snake, and the Mamba of Africa.

The King Cobra is not only the world's largest poisonous serpent and the most deadly of all reptiles, owing to the great amount of the particularly powerful nerve-destroying toxin its glands secrete, but is possibly the most dangerous of all living wild creatures. Remarkable for the deadliness of its fangs, it is extremely active and commonly inclined to attack. Coupled with insolence, sometimes prompted by curiosity, but more often by anger, is an intelligence that renders it unique.

The King Cobra and the Mamba are both of the slender, "racer" type, the former attaining a length in excess of 18 ft.—not long ago a specimen in captivity in the Gardens of the Zoological Society of London in Regent's Park measured more than 17 ft.—while the latter is known to exceed 12 ft.

Although the King Cobra can be described as decidedly slender, and in the larger specimens weighs about a pound per foot of its length, it is foot for foot nearly twice as thick as the largest Mamba.

The King Cobra is a cannibal, but avoids tackling other poisonous species. In ten months a 14 ft. specimen devoured 145 ft. of harmless species!

There are cases on record of elephants being killed by the King Cobra after having been bitten on the tender skin at the end of the trunk or on the foot at the juncture of the nail. An elephant is said to die in about three hours after being bitten.

Snakes vary tremendously in shape, and it is incorrect, as is often claimed, that harmless snakes are readily distinguished by slender outline, and similarly it is equally wrong to assign all species with wide heads and thick bodies to the viper family.

The harmless and the back-fanged species are classed *Colubrine*, the latter distinguished as a separate sub-family—*Boiginae*.

Closely allied to the *Colubrine* are the *Elapine* or deadly, front-fanged species, which are also sometimes referred to erroneously as *Colubrine* with the qualification "deadly".

The *Elapine* members are readily recognisable by the presence in the upper jaw of a pair of short, rigidly-set poison fangs.

In shape they are mainly slender, yet they include some of the world's most deadly reptiles. Indiscriminately mixed with harmless serpents of ordinarily narrow head and moderately slender body, no one but an expert could distinguish members of this dangerously deceptive family.

In this connection can be quoted two interesting episodes concerning the importation of snakes into Great Britain during 1934.

In the first, a species of Green Mamba was found accidentally included in a consignment of similar-hued green Boomslangs which were not being handled with particular caution.

In the second, a Covent Garden fruit porter for several days carried about in his coat pocket a small example of a Fer-de-lance, a particularly deadly South American species, which he had found in a bunch of bananas!

In all probability in each case the snake's inactivity was due to unaccustomedly low temperatures, and thereby, mercifully, fatalities were avoided.

The vipers belong to a family in which fang-development has reached the zenith of perfection. This has been previously mentioned, and later will be described more fully.

In relationship snakes are closely-allied with the lizards, and belong to the same scientific order—the scaled reptiles.

Snakes differ from lizards in the body skeleton, being composed simply of a back-bone and ribs. The cobra's hood is actuated by long, spreading, anterior ribs. In a few snakes there are vestiges of pelvic bones and rudimentary (internal) hind limbs.

There are, of course, forms of legless lizards, resembling snakes, but they lack the loosely-connected, expansible jaw-structure for engulfing the prey entire, characteristic of snakes.

A snake has a definite neck, though externally it is difficult to discern where it begins and ends.

Snakes are believed generally to be short-lived, but reliable data are scanty.

Snakes have specific places to which they resort regularly, and their range extends as far as two miles from these places. These regular resorts are the mating grounds. A snake's wanderings are not aimless and are directly influenced by two necessities—food and water.

Most reptiles are very lethargic. Excessive heat or cold respectively produce similar conditions of sleepiness.

In regard to movement, the speed, strength and agility of many species is amazing. Some of the larger, slender-bodied types, popularly styled "racers"—for instance the mambas,—can glide with the speed of a running man.

This is a remarkable instance of true specialisation in a group of creatures which have lost their limbs yet have acquired remarkable dexterity with apparently little effort through no visible means.

The slow forward progress of a viper is not a glide, but if closely watched it will be observed to consist of a movement of the ribs beneath the skin, and it has been aptly likened to a centipede clad in a cerpent's skin using its limbs in walking fashion.

The normal gait of the slower-moving species when not frightened is also assisted by the hitching forward and drawing back of the broad shields beneath the body – the sharp, overlapping *edges* of which are directed *backwards*. The sharp edges of the beneath-the-body scales of arboreal species such as the Mamba and Boomslang usually exhibit signs of considerable wear.

An American research worker after lengthy experiment and investigation has come to the conclusion "that the forward speed of the quick-moving species depends upon one or more declivities or projections upon the ground. All that is necessary is some form of resistance from the rear enabling the snake to push forward. The action is indicated by the forward progress of quickly-moving snakes being in undulations, never in a straight line."

The undulations may be slight, but there is always some part of the body indicating a lateral bending to one side or the other. The rear of the lateral, and there are usually several undulant loops, indicates a spot or spots offering resistance for the elongated body to be propelled forward, and utilised in rapidly thrusting it ahead. On smooth surfaces snakes can maintain a high speed if a few unevennesses are present, but where nothing exists for anchorage or propulsion of the lateral folds a snake flounders and literally tries to swim.

Some of the strictly arboreal species have a dexterously prehensile tail which coils advantageously like a spring around a bough.

Nearly all snakes, even the cumbrous Puff Adder, can swim with ease, many with extreme rapidity. Some of the fresh-water snakes are expert in quickly diving to the bottom to hide or to pursue prey.

Most of the smaller, burrowing snakes have either a conical head or a sharp, wedge-shaped snout which enables them to bore quickly into soft ground—in some the tail is terminated by a sharp spine.

Methods of prey killing have developed along unique lines. Snakes owing to their structure are particularly vulnerable so that their means of defence and offence must of necessity incapacitate their prey or an enemy exceptionally swiftly and effectively. Constriction or squeezing is resorted to by a large number of the nonvenomous kinds.

In attack and in defence snakes must be sure and quick, and the enveloping coils are flung about a victim before it has the opportunity of inflicting injury.

The whole operation of seizing the prey with the jaws, coiling about it, and the beginning of constriction may be completed within a couple of seconds. The prey is usually too confused by the rapidity of attack to defend itself.

Many fairy tales have been recorded concerning constriction which actually is not nearly so powerful as often alleged, and is intended to prevent a victim from breathing. In the case of the python constriction is not intended to crush the bones of the animal seized. It is a quick method of killing, quicker and more positive than is indicated by the habits of most carnivorous animals.

There is a story of a man performing in a circus who had allowed a seventeen feet python to wind around him. Without warning and for no apparent reason it drew its coils together a little tighter. The man dropped dead and his bones were found to be broken in eighty-four places.

A full-grown male Thomson's gazelle with horns which was swallowed by a python 11 ft. 9 ins. in length was found to be so crushed that the ribs of the antelope protruded on the opposite side of the body. The spine was broken in four places, the pelvis fractured, and one thigh bone broken. The swallowing process took 1 hour 30 minutes.

Bone-breaking force is unnecessary, and incidentally few snakes are capable of it. In the event of a mis-timed or faulty attack, the victim may defend itself vigorously, and then it is necessary to squeeze all the tighter so as to put an end to the defence as speedily as possible.

Pythons frequently exhibit large scars from wounds—wild swine usually defend vigorously with their tushes—acquired in tussles with their prey.

A python does apparently sustain a good deal of injury in the process I imagine of swallowing abnormally large victims, when its body becomes unduly distended, for I have seen the skeleton of a fifteen feet python in which a proportion of the ribs had been fractured—evidently from excessive internal pressure—and had healed showing considerable ossification at the site of the injuries.

Some of the smaller Colubrine snakes swallow their prey alive, this being typical of the toad-and frog-eaters.

Toads and frogs usually inflate themselves prodigiously when seized by these snakes, but the serpent, being provided with greatly enlarged teeth in the posterior portion of the mouth, is able to puncture the distended body which becomes deflated and is then swallowed more easily.

Snakes, according to the several species, have a varied bill of fare ranging from insects in the case of the harmless Earth or Blind Snakes, which resemble the English Slow Worm, to antelopes as large as sheep and calves in that of the python.

Some feed exclusively on eggs, others catch birds, rodents and various small mammals, and so on.

Rats, frogs and other small vertebrates which constitute a snake's normal prey are liable to be passed by at close quarters and missed by the hunting serpent if they remain motionless.

The back-fanged snakes have a very similar provision to that of the Colubrine, though employed quite differently, and most of them are only mildly poisonous to human beings. Feeding largely on lizards it is necessary for them to subdue their prey quickly and in consequence the fangs introduce a benumbing poison.

Once the prey has been seized several rapid forward motions of the maxillary bones advance the upper jaw sufficiently to bring the rear fangs into action.

They serve the dual purpose of hooks to hold their prey, as well as to inject their paralysing poison which speedily renders the victim limp and inert so that it can be easily swallowed.

A good instance is that of the arboreal Boomslang which preys to a great extent on chameleons, particularly tenacious and vigorous customers which would be almost impossible to subdue without the aid of a powerful paralysing agent; in fact boomslangs which have seized chameleons often fall out of trees during their desperate efforts to overcome the victim.

The deadly cobras and mambas seize in similar fashion but their more potent poison is far quicker in action and enables energetically active and savage creatures like rats to be seized and incapacitated almost instantaneously.

The mode of attack of the vipers is aptly termed dramatic. Few of the vipers retain their hold of the prey after striking it. Their usual action is to strike from a lateral S-shaped loop of the neck, either while gliding or from a coiled position. The whole action, from the launching of the head forward until the return to the original position with closed jaws, appears like nothing more than a flash of movement. The human eye is unable to diagnose the operation, yet the same is complex in several perfectly completed actions, which are worth describing in detail.

As the jaws start forward in the strike they are widely opened. The long recurved fangs on their movable bones swing forward until they point almost directly at the object to be struck. Reaching the target they are imbedded partially by the thrust and by a biting movement simultaneously started At the instant of the biting movement, in fact creating that movement, certain muscles in the upper jaw contract and in so doing press against and squeeze the poison glands. The bite is accompanied by an instantaneous jct of venom from the hollow fangs, which leaves the orifice at the tips now deeply imbedded. The flash of withdrawal of the fangs is almost as quick as penetration and the serpent resumes the original position.

The whole process of striking, injecting the poison and return to the lateral loop of the neck is accomplished as quickly as the fall of an object like a pencil from one's hand to the ground,

In connection with the strike or bite of snakes there exists a popular fallacy concerning the manner in which a snake opens its mouth. The general and casual idea is that it is the *upper* jaw which is raised, but, if one thinks of one's own mouth, one will realise that such a feat is impossible and that the *lower* is the movable jaw. This is further discussed when dealing with the huge vipers of the genus *Bitis*.

If a viper with its enormous length of fangs misses its stroke, having originally opened its mouth so wide that the jaws are in the same plane, the fangs do not penetrate the lower jaw as one would expect but, owing to the flexible coupling at the front of that jaw, the chin contracts and avoids the stroke.

Injected into the vital parts of a small animal the effect of the poison is almost instantaneous. Death may occur within a few seconds; often the bitten animal drops with scarcely a quiver. At all events consciousness is very short and the serpent calmly awaits the result, confident that its prey cannot escape.

It appears to be generally believed that quickly administered wounds through fleshy parts are comparatively painless and, if this is truly the case, that flash of the viper's fangs and deep injection of a quickly overwhelming toxin form the cleanest method of killing in obtaining food that exists among the vertebrate animals.

An observation by Major S. S. Flower offers conclusive confirmation—"When the viper *(C. cerastes)* struck a sparrow, the bird hardly appeared to be aware of the fact: the stroke was so sudden that onlookers might think that the snake had missed its aim: 27 to 90 seconds later the sparrow would roll over—dead".

Brief allusion has already been made to the varied diet of snakes. In this connection mention has been omitted that some eat fish. A considerable number feed only on warm-blooded prey (birds and mammals) while others of similar size take only cold-blooded prey (frogs, toads, fish, etc.). Both types would starve if these foods were reversed. There are, however, plenty of species which are omnivorous. Some eat eggs swallowing them entire and breaking them with the muscles of the throat or passing them into the stomach where the shells are dissolved by the gastric juices. An African species which is common in Uganda lives entirely upon eggs and has bony projections in the throat for cutting the shells. Truly cannibalistic species seem to be absent from Africa, although there are several which readily devour their own kind. The cannibal snakes and in fact all species which feed upon cold-blooded prey, appear to digest their food quicker and feed at more frequent intervals than those subsisting on warm-blooded prey, and may require food at intervals as frequent as five days to a week apart.

After a good meal snakes lie dormant for a time, and may go some weeks between meals. Of all animals, snakes suffer least from the want of food.

The bones and even the teeth of mammals are dissolved by the gastric juices, but the hair or fur is not affected by digestion, even retaining its colour and lustre. Likewise, the hoofs of wild swine and small antelopes—actually compressed or solidified hair—swallowed by pythons, are not wholly digested.

As robbers of the hen-roost some species, especially the venomous Black-necked Spitting Cobra, are an unmitigated nuisance, and it is when such dangerous kinds enter dwelling-huts in search of prey, and when the rodent-eating, sluggish Puff Adder frequents human habitation that fatalities are liable to occur.

There is one other portion of the snake's (and lizard's) anatomy, which is unique and which immediately attracts attention.

This is the peculiar forked tongue, which is in frequent use as an investigating organ when the reptile is in motion or particularly alert. This quivering member, swept through a vertical or horizontal plane, with tips expanded, imparts a sinister effect to the snake in the eyes of the ignorant and misinformed. Thus the tongue is sometimes thought to be a *stinging* organ; *but it is in no way connected with the venom apparatus of poisonous species.* When at rest the tongue is drawn into a tubular sheath in the lower portion of the mouth.

The highly specialised tongue appears to be an organ of various functions—to detect vibrations and to pick up, can we call it "taste", various odours either in the air or on the ground. The sense of scent through the nostrils seems to have given way to this acuteness of pick-up by the indispensable tongue. With some snakes it is undoubtedly used to intimidate, in others it may be the means of attracting its prey.

In intimidating, the tongue is slowly waved with tips widespread, or it is thrust forward held motionless like an elongated sting. No wonder, with common resort to such antics, it is often thought that a snake actually possesses a sting.

In most snakes the tongue is blue-black, but in some it is vermilion at the base and black at the fork and tips, or even more startling, among the kinds particularly prone to threaten, the organ may be yellow or green or of some other brilliant (or "poisonous") hue.

Snakes, owing to the absence of the necessary vocal chords—in spite of the manifold claims to the contrary—are unable to utter any sound other than the usual hiss. But frogs and toads which are preyed on to a great extent by certain species of snakes—and there are types of frogs which live largely in trees—are capable of producing and sometimes do utter the most unearthly shrieks and strident cries. The agonised scream of an invisible captive frog, apparently emanating from a visible snake, may well have given rise to the idea of a "crowing" snake.

In Uganda, as well as throughout the greater part of Africa—and this is most of the Continent—in which the Puff Adder and its relatives of the spectacular genus *Bitis* occur, there is a prevalent native belief that these big vipers are responsible for a curious booming or siren-like hooting heard at night. Similarly the Python is credited with bleating like a goat.

Unidentified, mysterious noises of the African night, particularly in the swamp and humid forest regions of Uganda, are most likely attributable to certain, very vocal, arboreal frogs.

The mode of attack of the large constricting serpents—including the Python, is a subject of constant controversy, and particularly in regard to the method of overcoming man.

It is not so much a matter of size, as the part of the victim that may be enveloped. Do not imagine that the Python is prone to attack, for like most snakes it usually endeavours to escape when disturbed or alarmed.

A ten to twelve feet specimen can be dangerous if part of its coils entangle a man's arms and others are around his neck, and if it endeavours to constrict with all its strength.

A snake in such a position may grasp the victim's clothing with its teeth, which makes it difficult to disentangle its coils by reaching for its head and thus unwinding the body.

The *tail* serves as the proper medium for thus untangling the coils. The tail is not only harmless—the Python is capable of biting savagely from the other end—but the power of the constricting muscles is more easily overcome by pulling the coils open from this direction.

A ten to twelve feet specimen is dangerous if a man is alone, but one about fifteen feet or over could immediately render a man helpless and stop his breathing by constriction.

It is doubtful if even a twenty feet Python could swallow an average adult human, owing to the breadth of the shoulders, but so far I have heard of no one who has been unfortunate enough or rash enough to try the experiment! The swallowing capabilities of these large snakes is another source of ridiculous exaggeration, though they can swallow creatures of much greater size than the girth of their own bodies.

I have seen and heard first-hand of situtunga, pig, duiker, reedbuck, young waterbuck, bushbuck, impala and other smaller mammals and birds being taken. A thirteen feet Python I once killed had swallowed a female situtunga not quite fully grown, but which must have weighed about 60 lbs. This probably constituted a maximum meal, and I imagine its jaws must have been stretched to nearly bursting point. A thirty feet Python would probably be able to swallow an antelope of not unusual bulk, weighing about 150 lbs.

This indicates the limits of the Python's swallowing capacity. Stories of pythons swinging from trees and grasping and constricting buffaloes and the larger antelopes are, I am afraid, born of an over-fertile imagination. Big snakes do not wantonly attack the larger jungle-life with the malicious intent of squeezing it to death.

Also, constriction is not so pronounced that the prey is crushed into an elongated mass and thus rendered easier to swallow. Actually, there is little or no change in the form of the victim, which is simply killed by being so squeezed that it is unable to breathe.

It is a prevalent belief that a Python in the course of seizing its prey intentionally strikes it a blow severe enough to disable it. This is incorrect, as the strike of a big serpent, though sometimes extremely powerful, is not intended as a blow; it is solely a seizing movement.

The pythons have what can be described as elastically attached jaw mechanism, enabling them to swallow food of very large dimensions. As in certain other species, the lower jaws are provided with lever-like connections enabling them to move forward extensively, and grasp and swallow by subsequent pulling of recurved teeth. Pythons possess rudimentary, internal hind limbs, which project from the body as a pair of spines or blackish claws, and around which the natives in various parts of Africa have woven the most fantastic legends.

Owing to the flexible jointing at the fore-end of the lower mandible, which allows the two jaw bones to work independently of each other as the necessity arises, as well as to the expansible linking of the rear end with the skull, a snake can accommodate its mouth to the size of meal it wishes to swallow! It has no breast-bone and the skin stretches conveniently.

The teeth of snakes are long, sharp and recurved, and in number, size and development vary tremendously.

A python can open its entire head till the jaws are in the same plane.

Once a victim is impaled on the rows of recurved teeth escape is impossible, however much it wriggles. It is dragged back into the mouth and down into the gullet by alternate movements of the independent lower jaw bones.

A python can readily disgorge its prey, and in captivity sometimes, after feeding, a strapping of insulating tape is placed round the snake's neck to prevent this happening. Nearly all snakes, including the vipers and cobras, are capable of disgorging their prey when necessary. After the prey has been seized any sudden demonstration or noise will usually cause the snake to disgorge, both in the wild state and under cage conditions. A snake does this in self-defence.

The death-dealing fangs of the poisonous species although easily damaged and rendered innocuous are speedily replaced.

Generally speaking, only one-eighth approximately of the known species of snakes are equipped with highly developed poison-conducting fangs, and of this fraction not more than 60 per cent. are lethal to man.

In the deadly Elapine species the fangs are comparatively short and rigidly attached with a groove in front near the tip, down which the venom, of neurotoxic (nerve-destroying) action, flows.

In the viperine snakes the fangs, which are nothing more nor less than hypodermic needles, are of such length that they are attached to movable bones, as previously mentiond, and fold backwards inside the mouth when the jaws are closed. As all poisonous snakes frequently renew and shed the fangs, a row of renewals, from developing points to full size, will be found behind the functioning fangs. This is particularly pronounced in the great vipers and I have often been asked whether I am aware that the Puff Adder is not infrequently double-fanged. In many Puff Adders, Gaboon Vipers and Rhinoceros-horned Vipers I have examined in this country, and elsewhere, the doubled-fanged appearance, due no doubt to the imminence of shedding of the fangs in use, has been most striking.

Venoms are broadly separated into two types—(a) Neurotoxic, or nerve-destroying, and (b) Hæmotoxic, or blood (and tissue) destroying. Certain large vipers of the genus—*Bitis*, as will be described later, secrete a combination of these venoms.

Respiratory failure is the principal symptom of a neuro-toxin.

Ready recognition of the two widely divergent deadly groups of snakes will ensure resort to the use of the correct remedy which may make all the difference between life or death.

Most snakes are not immune to their own poison, and swiftly succumb if they bite themselves or are bitten by their own kind or other poisonous species. As a rule snake-eating types do not prey on poisonous species, and, if they do, are careful to avoid being bitten: a notable exception is the King Snake of North America.

Snakes, such as the harmless Colubrine, the back-fanged *Boiginæ*, and the deadly Elapine (Cobras, Garter Snakes and Mambas), which subsist mainly on cold-blooded prey naturally secrete a neurotoxic agent; while the Vipers or Adders, which consume primarily warm-blooded food, generally store a poison which is hæmotoxic in action, though, as just mentioned, in some both are found.

In connection with the toxicity of the various types of poison, and the characteristics of the better-known deadly species, the African Continent, according to Ditmars "has an extremely interesting variety of poisonous serpents . . . . . Some are particularly dangerous owing to excessive fang length and high toxicity of venom; and among others there is a manifestation practically unique. This is the ability and deliberate intent of certain cobras to 'spit' their poison in the direction of the eyes of intruders. At least two African cobras have expertly developed the effective defence of ejecting their venom in a shower of fine drops towards an enemy's eyes. This is done with definite intent. As this type of poison is at once absorbed through the conjunctiva, the spray, if reaching its mark, and it is directed with force and accuracy, throws the victim into a condition of pain and confusion, enabling the cobra to escape."

"The Spitting Cobra or Black-necked Cobra, *(Naia nigricollis)* comes close to being the most dangerous snake of Africa, being second only to the active and deadly mambas which sometimes viciously attack. Its size and power enable it to eject effectively its venom to a distance of eight feet or more and thus reach the eyes of a standing person. It is the type of attack which usually strikes the victim as a complete surprise. Moreover, it is administered in an instant, the snake rearing and spitting upon slight provocation."

"The term 'spitting' does not correctly indicate the manner of ejecting the poison, as the performance is accomplished with the jaws slightly parted and the venom comes directly from the openings at the tips of the fangs. The performance is very quick. The snake rears and it may instantly spring to the pose. Facing the object of anger it looks intently at one's face .. .. .. if it seeks to direct the poison upwards it curves its rearing pose backwards, thus directing its head upwards. The ejection of the poison is an instantaneous operation. The jaws are slightly opened and closed so quickly as to appear like a snapping motion and during this action the poison leaves the fangs. There is no dribbling or spilling of the fluid. It issues in twin jets and the jaws of the snake are clear of it while the feat is accomplished. There is every indication that, at the instant the snake prepares to eject the poison, it contracts the temporal muscle over each poison gland thus producing pressure to force the toxic fluid a considerable distance. This flies with such force that its impact can be distinctly heard against ordinary glass five feet away. At the instant of ejection the snake emits a sharp hiss. This ejection of air might be an accompanying token of anger, or it may assist the travel of the poison".

I have quoted at length as this is a most valuable account in detail of the 'spitting' method of attack, and is based on repeated, carefully executed observations on the part of reliable zoologists.

If a human being is unfortunate enough to receive a dose of poison in the eye, the sooner the affected organ can be washed the better. Immediate attention even with water will probably negative the possibility of unpleasant consequences, though the use of an antiseptic such as a weak solution of permanganate is preferable, and the application of boric in solution or milk is also claimed to be effective. I once saw a small dog which had received a full dose in one eye. No washing had been possible for some time and as a result, during a period of three weeks, an opaque, milky-white film developed and gradually extended over the whole eye. This film then cleared slowly in about the same time leaving the eye, as far as could be discerned superficially, as good as before.

Ditmars' description of the poison is strikingly clear.

"The immediate result is intense pain and temporary blindness caused by the superficial blood vessels absorbing the venom. This conjunctivitis subsides in a few days if prompt treatment is applied..... It is probable if nothing were done to dilute or wash away the poison from the absorbent membranes, serious impairment of sight, or blindness, would result. Not enough of the poison appears to be absorbed through the conjunctiva to produce fatal organic symptoms; in fact, the poison of this snake—possibly through the provision of rapid secretion in the glands—does not seem to be so toxic when injected into tissue as others of its genus."

"Astonishing amounts of poison are expended.....after a vigorous demonstraction and the discharge of four to six jets of poison the glands rapidly refill. This seems to be a particular provision.....the new fluid is of much lighter specific gravity than older storage and consequently of lower toxicity."

The maximum distance the poison can be ejected by six feet examples has been measured at twelve feet, so that to stand within six feet would be unsafe, as from this distance, in its reared pose, a large specimen could accurately direct a spray of poison forward and upward into one's eyes.

On occasion (to be described later) the big viper—*Bitis nasicornis* has been known to spit.

An important consideration when discussing snakes is the relative abundance of harmless and deadly species, and in the case of the latter, the proportion of Elapine to Viperine.

With the object of obtaining data concerning this all-important aspect, opportunity was taken in 1933, during a period of a few weeks when in the vicinity of the Mabira Forest in Kyagwe, to collect as many snakes as possible.

Fifty-five were examined and the result is illuminating. Though by no means conclusive it does give some idea of the relative abundance respectively of the venomous, back-fanged, and harmless species.

The harmless, burrowing, blind, Earth Snake—*Typhlops punctatus* (of which there were four), and the harmless, solid-toothed Colubrine snakes were represented by 26 specimens or 47 per cent.

The back-fanged Colubrine snakes *(Boiginæ)* numbered 5, or 9 per cent and the venomous species 24, or 44 per cent, of which the Viperine outnumbered to Elapine, represented principally by the Black-lipped Cobra, by slightly more than two one (17 to 7).

The actual species which turned up most frequently were:-

(a) *Boaedon olivaceus*, a harmless cream-bellied black species—12.

(b) *Bitis gabonica*—10 (Venomous—the Gaboon Viper).

(c) *Naia melanoleuca*—5 (Venomous—Black-lipped Cobra).

(d) *Bitis nasicornis*—4 (Venomous—Rhinoceros-horned Viper or River Jack).

The Gaboon Viper is possibly the most plentiful species although, on account of its cryptic coloration and in spite of its large size, it is unlikely to attract attention. The Black-lipped Cobra is certainly more plentiful than its total of five suggests, as is also the River-Jack. Another poisonous species is the little *Atractaspis* or Burrowing Viper, black, small and slim with glossy scales, which rarely attains a length of two feet, is insignificant looking and apt to be treated with scant respect, but in attack is amazingly quick. One example turned up in this Mabira collection.

Of the venomous species, although the sluggish Viperine are of course far easier to collect than the active Elapine, I am inclined to believe that the percentage of 71 Viperine to 29 Elapine is a reasonably accurate estimate of relative abundance in this particular area. One Mamba only was brought in, a somewhat alarming experience, for on account of its captors' fear that in the event of it being seriously damaged no reward would be forthcoming, this six feet specimen was brought to me without bonds of any description, and more alive than dead.

I was surprised at the abundance of venomous species, constituting as they do nearly fifty per cent. of the total; but still more interesting in the other half is the comparative scarcity of back-fanged varieties and the overwhelming proportion of harmless forms.

During October 1933, in the Muko region of the Kigezi district, at the north end of Lake Bunyonyi (altitude varying from 6500 to 7500 feet), one hundred snakes were examined in the course of a week. Eight species were represented of which seven were harmless and one poisonous.

The poisonous species is the Tree Viper—*Atheris nitschei*, which is abundant and associated with swampy localities and their vicinity. The degree of deadliness of the poison is not known, and this viper's bite probably rarely proves fatal to human beings. A total of thirty represents its percentage abundance in this collection.

Of the seven harmless species, totalling seventy specimens:-

(a) *Boaedon lineatus*—the Brown House Snake, is the commonest—23.

(b) *Chlorophis emini (=irregularis)*—Emin's Green Tree Snake, always associated with water—15.

(c) *Duberria lutrix*—18.

(d) *Dasypeltis scaber*—the Egg-eating Snake, in both a black and red-brown form—10.

(e) *Lycophidion capensis*—the Wolf Snake—4.

The non-occurrence of the Puff Adder is noteworthy: the Cobra also appears to be absent or remarkably scarce in this elevated lake region. That there should be no back-fanged species amongst so large a number is also noteworthy.

Fatalities fortunately are not of such frequent occurrence as is generally believed; in fact, exhaustive enquiry only tends to accumulate evidence to the contrary, and authenticated cases of deaths from snake-bites are few and far between.

Quite a light tap from a pliant stick will irreparably damage a snake's backbone and incapacitate the creature.

The action of the poisons injected is discussed further in the notes on individual species.

Snake-Bite Treatment.

Anti-venoms suitable for dealing with the bites of African venomous snakes are prepared at the Pasteur Institute in Paris, and at Port Elizabeth, South Africa (under the direction of Mr. F. W. Fitzsimons). Anti-venoms are injected into the victims of snake-bite—and the lives of valuable stock and dogs have also been saved by their prompt use—for the purpose of neutralising the toxins introduced by the snake. An anti-neurotoxic serum is particularly useful in checking respiratory failure; and according to Ditmars, "it would seem important, if not imperative, to give blood transfusions in all severe cases of snake-bite poisoning with great hæmorrhage, shock and toxemia."

Snake-bite outfits should be included in the personal effects of those who visit or live in Africa and should invariably accompany all field-workers. I cannot do better than emphasise Mr. Ditmars' *dictum*—"travellers should carry the protective accessories indicated for the country, not only with a thought of themselves, but for the native assistants they employ on their respective missions."

The protective equipment consists of hypodermic syringe, the requisite needles, and a supply of anti-venom. Sterilised needles, protected with a little cotton wool, can be conveniently carried in a small, stout, glass tube containing spirit.

It is not necessary to detail the procedure to be adopted in the case of snake-bite, though it cannot be over-emphasised that rapidity of treatment, and particularly the *correct* treatment, is all important.

First-aid should aim at neutralizing the venom locally, and preventing its absorption into the human system, by ligatures applied in the right places, but the application of a ligature for longer than half-an-hour is dangerous. In the event of difficulty in breathing, artificial respiration may be necessary.

There is a widespread belief that in snake-bite cases the consumption of excessive quantities of alcohol, for instance neat whisky, will produce beneficial results. Actually, a stimulant in small quantity—coffee strong and black being probably the best—can be administered without undue ill effect in all cases, though where cobras and mambas are the species concerned, excessive stimulation will accelerate the fatal results induced by the neurotoxic or nerve-destroying venom they inject.

It should not be difficult to remember that alcohol does no harm in the case of viper bites, but is absolutely *deadly* as a remedy against those of the cobras and mambas. The prominent members of the two groups, the vipers represented by the massive species of the genus *Bitis*, ought not to be confused. But full instructions will be found with whichever anti-venom serum is used.

In regard to the anti-venoms previously mentioned, Fitzsimons' is polyvalent i.e. is both anti-neurotoxic and anti-hæmotoxic, and remedial in action against the bites of mambas, cobras and South African vipers. It is not guaranteed for so long a period as those from the Pasteur Institute which carry a four years' guarantee, though this great philanthropic Institute does not yet, as far as I am aware, produce a polyvalent serum applicable to Africa as a whole, but caters specifically for the several French-Colonial zones.

The sera procurable are:-

(a) *Afrique Nord*—Anti-elapine and anti-viperine;
(b) *Afrique Occidentale*—Anti-*Bitis* and *Cephedon;* and
(c) Anti-cobra.

Anti-venom, or "anti-venene" the modern rendering, is prepared by injecting a horse progressively with increasing doses of the venom of a certain species of deadly snake, until the animal is immune to many times the normal, lethal dose. The serum is then prepared from the fluid taken from the horse.

It takes two years to raise the immunity of a horse against the venom of species such as cobras, mambas and vipers.

The serum or vaccine obtained from such an animal is an absolute antidote against that particular snake.

In due course it is possible to immunize the same animal to the effects of several types of snake poison, and so produce a polyvalent serum.

Uses of Snake Venom.

For many years skilled scientists have been endeavouring to separate the several constituents of serpent venoms. These agents are known to be of incredible potency and it is believed that once separated they can be used in various stages of dilution to the very great benefit of pathology.

Recently, although individual separation of the constituents has not been achieved, it has been discovered that certain types of venom can be diluted to such an extent that one toxin only—a blood stimulant—remains effective. This has already proved of great benefit in the treatment of certain diseases.

The virulence of the specific toxin more or less isolated by this means is so great that the proportionate dilution has been compared to a drop of venom in the whole of the English Channel!

Certain snake venoms have been used as a cure for epilepsy.

Snake Farms.

Snakes are "farmed":—

(a) In order to obtain the venoms for the preparation of anti-venenes ; and

(b) To obtain the skins which are now valuable articles of commerce from which are made ladies' foot-wear and fancy goods.

There are numerous snake-farms scattered about the world primarily for (a). These include those at Bangkok, in Siam (Pasteur Institute); Parel near Bombay, in India; Port Elizabeth, in South Africa; and the Serotherapic Institute of Butantan, near Sao Paolo, in Brazil.

There are farms for (b) in North America, and there is no doubt that in the near future snake-farming for commercial purposes will greatly extend its activities

Industry.

The subject of snake-farms draws attention to the fact that snake skin has an appreciable commercial value, and recently the situation in regard to the collection of reptile skins for commercial purposes has been the subject of an exhaustive enquiry by the Advisory Committee on Hides and Skins, Imperial Institute.

The comprehensive and informative report issued draws attention to the fact "that reptiles whose skins are suitable for these purposes exist in considerable quantities in many parts of the Dominions and in a number of Colonies, and to suggest that the collection from new sources within the Empire and the further development of the industry in countries where it already exists should be undertaken."

At the same time a word of warning is uttered, and the Committee "strongly stress the danger which may result from any intensive or uncontrolled commercial exploitation, and recommend that where necessary the Governments of the countries concerned should consider the introduction of protective regulations."

Natural supplies cannot much longer bear the enormous wastage to which they are at present subject, though fortunately as yet there has been no undue destruction in Uganda, where the development of an industry is unlikely.

There is no doubt from first-hand evidence that an increasing interest in the potentialities of Africa is being taken by the leather industry, whose technical experts "are of the opinion that the use of reptile skins is no longer dependent upon fashion, but that these skins have now become definitely established as raw material for leather products".

The disquieting feature of the increasing interest evinced in Africa is the fact that it is not fostered through an abnormal demand for this type of leather but rather from the necessity that fresh localities must be exploited owing to the imminence of a shortage elsewhere.

The natural supply of snake and lizard skins is by no means inexhaustible.

The exploitation of Africa, therefore, can offer only a temporary solution of a possible pending shortage.

African species which have come to the notice of the "Trade" are:—

(i) African Python, supplied from Nigeria.
(ii) Royal Python, supplied from West Africa.
(iii) Spitting Cobra, supplied from West Africa, and
(iv) Puff Adder, supplied from West Africa.

Prices paid for well-prepared skins in good condition are:—

(i) 8 inches wide, up to 5 or 6 metres in length, about Shs. 13/-.
(ii) Shs. 1/9d. per skin.
(iii) About Sh. 1/- per skin.
(iv) 6d. per skin.

Details in connection with python farming are included in the individual notes on this species.

Collection of Live Snakes.

It is scarcely necessary in this treatise to give a lengthy description of how to collect snakes, though a few remarks on this subject will not be out of place.

First and foremost, snakes should always be handled with caution; even the expert makes mistakes in identification in the field. Never take liberties with deadly species, which may strike unexpectedly through nervousness or fright, or may deliberately "play possum".

When handling African cobras, goggles to protect the eyes and gauntlets to safeguard arms and hands should be worn as a rule. Venom from "spitting" which falls on the bare skin is innocuous so long as there are no abrasions through which the poison can enter.

Anyone interested in snakes soon becomes familiar with the conditions and localities most suitable for finding them.

When collecting snakes, a forked stick is often used behind the neck to pin the creature to the ground. It is not too satisfactory a method as the snake lashes about, and is apt to injure its cervical vertebræ.

The Zoological Society of London has devised a useful type of snake-catching stick, at the end of which there is a leather loop working against a soft pad. The loop is accordingly adjustable to the size of the neck around which it is placed, and can be slipped over the snake's head with one hand and drawn tight, leaving

the other free to deal with the body and tail. Big, heavy snakes, such as the massive vipers of the genus *Bitis*, however, should not be handled in this fashion, as one convulsive jerk of the weighty body is sufficient to dislocate the neck. For them is used an instrument on the lines of a shepherd's crook, the snake being picked up about the centre of the body which hangs freely either side of the metal loop.

Collection and Preservation of Museum Specimens.

Museum specimens, excepting the largest snakes, are usually preserved whole in spirit, and stored either in glass jars or in copper tanks of a few gallons capacity. According to the size of the specimen several deep incisions are made along the central line of the ventral scales. It is important that the preserving fluid has ready access to the region of the stomach and the vicinity of the vent. Stomach contents if of any magnitude should be removed.

For the first immersion the solution should be diluted with water, about half and half for small specimens, and one part water to two of spirit for the larger. After three days the snakes can be transferred to a stronger solution and finally stored in full strength spirit, which is locally manufactured in Uganda from sugar.

Particular care must be taken that no specimens go bad (or putrefy) during the process of preservation. One bad specimen can ruin all the others in the same container. Also, the spirit gets weaker with every specimen immersed in it, and has to be renewed frequently.

Specimens which have been preserved in undiluted spirit become so hard and rigid that they can only be examined with difficulty.

Spirit is apt to absorb the venom from deadly species, and when handling spirit specimens it is advisable to wear rubber gloves.

Spirit specimens are best packed for transport, wrapped in cotton wool or cloth soaked in spirit and squeezed out, in air-tight tins which when full are sealed with solder. Receptacles should be packed tight so that the contents do not get damaged by the shaking unavoidable during transit.

Some of the vivid green Colubrine snakes, particularly the tree-snakes of the genus *Chlorophis*, and some of the *Boiginæ*, especially the Boomslang, lose their natural colours and turn enamel-blue after immersion in spirit. The brilliant coloration can usually be retained by preservation in formalin, which unfortunately makes specimens so hard and brittle that they are useless for study purposes. Incidentally, formalin turns *black* the green snakes of the genus *Chlorophis*.

Each specimen must be carefully labelled with a parchment label, the details being written thereon with a soft pencil.

Skins can be removed from large specimens for dry preservation by making a cut along the whole median line of the belly and tail, and then carefully removing the skin, as in the case of an animal.

It should not be *peeled* off as this method, which is often adopted, is apt to damage the scales considerably. Salt or arsenic soap should be rubbed in well: alum hardens and spoils the skin. The head, if desired, can be left attached to the skin and the whole preserved in spirit.

Snake skins should be dried carefully *in the shade* and not unduly stretched. When nearly dry, though still supple, they should be rolled up lightly on a stick, the scaly side innermost.

Transport of Live Snakes.

There are naturally certain precautions to be taken in transporting live snakes. Boxes must be strong and adequate ventilation provided, as well as water tins. Boxes are apt to be damaged in the course of railway journeys, and timber will warp under varying climatic conditions. Termites have been known to damage travelling boxes dangerously and inconspicuously. Wood containing knots, which are apt to shrink and fall out, is unsuitable for making receptacles, for snakes are adepts at squeezing through the tiniest crevices.

During a voyage it is unnecessary and inadvisable to feed or handle snakes.

When poisonous snakes travel, the box should be covered outside with wire gauze, and where there is a wire gauze top this should be double, and the two layers at least one inch apart to prevent risk of bites. Spitting Cobras should be further covered (over any wiring) with sacking. *All should be labelled as to contents.* Owing to the snake's pugnacious tendencies towards its own species and kind it is often necessary to box specimens separately, thereby, adding considerably to the number of cases required.

Consignments of snakes should be kept in the shade as much as possible. High mortality is likely to result from undue exposure to the sun.

Snake Worship.

In Uganda records of snake worship appear to be conspicuously absent, though the Python is an object of veneration amongst several tribes. There is little doubt that the Baganda within comparatively recent times indulged in a form of python worship.

The Bagishu have a snake god, which functions as a rain-maker and in times of drought needs propitiation.

According to Sir Harry Johnston "The Masai (of Kenya) . . . . It is thought that some of their more notable ancestors return to earth in the shape of snakes—either pythons or cobras. The tribal snakes of the Masai must be black because they themselves are dark skinned. They believe that white snakes look after the welfare of Europeans. These snakes certainly live in a half-tamed state in the vicinity of large Masai villages, generally in holes or crevices. They are supposed never to bite a member of the clan which they protect; but they are ready to kill the enemies of that clan and their cattle. When a Masai marries, his wife has to be introduced to the tutelary snake of the clan and rigorously ordered to

recognise it and never to harm it. Even the children are taught to respect these reptiles. These snakes sometimes take up their abode near water-holes, which, it is supposed, they will defend against unlawful use on the part of strangers. The fetish snake is often consulted by people in perplexity, though what replies it is able to give must be left to the imagination. The snakes are, however, really regarded with implicit belief as being the form in which renowned ancestors have returned to this mundane existence."

From the W'kamba country in Kenya the following interesting anecdote has been contributed: "Near Masongaleni Railway Station on the Kenya and Uganda Railway there is a river of the same name which flows into the Athi river. At the head of this little river there lived a large python which the W'kamba undoubtedly worshipped. Some five or six years ago the python was shot by an European and the W'kamba were very upset about it and said for one thing 'that the river would cease to flow'. The river did cease to flow whereas the Kibwezi river near by continued to run. This is a true and well-known fact but something to do with the drying up of the springs was responsible for the failure".

* Folk Lore.

One would expect the snake to figure frequently in local folk lore, but this is evidently not the case, and even Swahili aphorisms are rare. There is one indicating that a man once bitten by a snake will get a fright if he sees only the fibre of a palm-leaf, a very true adage, and equally referable to any one with an instinctive fear of serpents. Another concerns the Sand Boa which, wherever it occurs in Asia and Africa, is reputed to be doubled-headed. There are also sayings of which the interpretations are respectively "When you mention a snake, get hold of a cudgel", and "The snake is wont to bite where he has reached" (the latter from the "Nyika").

Most curious is the "Nyika" proverb---"You are the 'Love-tittle-tattle' snake", which refers to a snake, which is supposed to draw near to any spot where people are talking, from its fondness for listening to conversation, and indicates an inconvenient intruder on a private conversation.

In the Luganda there is an almost identical proverb in connection with the "Sekanyolya", the Black-crowned Heron, which not only listens but then spreads the news.

The Lango have a curious fable about "The Hare and the Python" which is detailed in Driberg's book on this tribe.

Snake-Eating Tribes.

Although there are several tribes, or certain sections thereof, which consume crocodile flesh with relish, snake-eating in Uganda appears to be confined to the Bwamba of the northern Ruwenzori region. The members of this tribe eat any kind of reptile.

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* *NOTE*—Additional references in connection with "Folk Lore" are quoted at the beginning of Part II. C. R. S. P.

Enemies.

It has already been mentioned that certain species of snakes readily devour their own kind. In addition, in nature the snake has numerous four-footed and feathered enemies which prey mainly on reptiles. Birds such as the snake-eating birds of prey, having the advantage of a wide field of vision from the air, can at times be particularly destructive. One of the most useful and persistent snake-destroyers is the magnificent Bateleur Eagle *(Terathopius ecaudatus)*: the Red-tailed or Augur Buzzard *(Buteo rufofuscus augur)* and the Harrier Eagle of the genus *Circaëtus* are also well-known as snake-eaters. These, having pounced on a snake, fly up into the air with their capture dangling, which is then manipulated so as to be powerless when the bird perches in a tree or comes to the ground. Four-feet and five-feet specimens are often carried off, but the bird does not invariably win, and I have seen many snakes dropped on account of their powerful contortions, and lost. Cases are also known in which a poisonous species has turned the tables and killed its captor.

Two other active killers in the bird world, both of which operate from *terra firma*, are the Ground Hornbill and the Secretary Bird, which disable and kill respectively with powerful blows of the huge bill and terrific stamps of the horny feet.

The Ground Hornbill when tackling a nasty customer like a large Puff Adder usually acts in concert. The Secretary Bird, literally dances its victim to death, and the sledge-hammer-like stamping is loud enough to be heard at a considerable distance. The blow struck is of such force that it would easily shatter a human hand.

The Secretary Bird, if necessary, uses its wings as a shield. The swiftness and accuracy of this bird's attack, coupled with its agility and power, are marvellous. A tame bird in action against a dead rat swung at the end of a string gives a wonderful display. Curiously enough a record of the examination of thirteen Secretary Birds killed in a snake-infested habitat reveals no remains of snakes in their food, which consisted of two young hares, lizards *(Agamidae)*, insects and egg-shells (species not determined).

Although there are many species of African mongooses, there is none which is such an implacable enemy of snakes as the well-known little Indian "Rikki-Tikki-Tavi."

The Python and the Crocodile occasionally come to grips with varying results but these encounters are rather by accident than design.

Perhaps the most wasteful enemies of snakes are the seasonal grass-fires in which undoubtedly numbers perish, while still more as they seek safety are eagerly snapped up by their ever-watchful avian foes.

Some instinct warns the snakes of the impending danger, and they move off with the wind as speedily as possible, while the flames may still be a full mile distant.

I have walked along several miles of a Kenya road in the Great Rift deep in dust, with a distant fire approaching, and seen the soft surface scored by the sinuous trails of countless fleeing snakes, while numerous Secretary Birds stalked up and down the high-way having a merry time.

Demonstrations.

It has been previously mentioned that certain harmless species of snakes are often the most aggressive. Displays of frightfulness are for protective purposes, and are indulged in as a warning. The hood expansion of some of the deadly cobras and blowing out of the neck in others, which are imitated by harmless species, is a form of intimidation which incidentally saves waste of poison. Allusion has already been made to the use of the tongue for "threatening."

Hissing, resorted to particularly by the big vipers, is primarily warning, though many serpents utter a sharp hiss from fright or anger.

The *Echis* viper which is furnished with lines of minute saw-like teeth on the scales, when possible danger threatens, grates its scales by rubbing its coils together and so produces a rasping sound. In America there are the well-known rattle-snakes. All these warning devices afford conclusive evidence that normally a snake is not aggressive.

Coloration.

The subject of coloration is discussed in connection with classification, as well as in the detail of individual species.

Albinism.

Albinism occurs in the Indian cobra, but is very rare. I am unaware of instances of albinism amongst African snakes.

Freaks.

Double-headed snakes are of not infrequent occurrence. These are accidents of birth when two developing embryos have failed to become individualised. Such freaks may live several months.

There are African records, and plenty from Asia, America and Europe.

Strange Use of Deadly Snakes.

Sir Harry Johnston quotes a strange story:-

"Mr. George Wilson, when collector in Unyoro, was assured by the Chiope *(Chopi)* hunters in the northern part of that district that expert hunters were accustomed to catch puff-adders in a noose. They then nailed the living snake by the tip of its tail in the middle of a buffalo track, so that the enraged reptile might strike at the bodies of the buffalo as they passed by. In this manner it was asserted that as many as ten buffaloes have been killed in one day by one puff-adder. The body of the first buffalo killed would be discarded as being poisoned, but the bodies of the other victims of the snake would be considered wholesome for eating."

Another interesting record from a Kenya correspondent is as follows: - "In Dahome, West Africa, the puff adder has an antelope sinew run through the tail, and this is pegged in a buffalo run. I have not come across this elsewhere in Africa."

It has also been asserted that tribes in the Kavirondo country of Kenya at one time made use of the mamba for a similar purpose.

(To be Continued).

NOTES.

A Strange Story About Elephants

By E. A. Temple Perkins

"Is it true that there are elephant cemeteries"?

This is one of the stock questions which one who has even a slight knowledge of Africa is so frequently asked by those less fortunate people who know nothing of her mysteries.

My answer has always been "No", with various reasons to substantiate my negative; but a curious experience which befell me last February might almost, to one more gifted with imagination, justify a change of opinion.

In the north east corner of Lake Edward, some 12 miles south of the equator as it bisects this Protectorate, is Katwe Bay which apparently derives its name from a small salt lake just inland to the north.

In the bay are three small islands and one minute island and on the southernmost of the three small ones, Rusuku, this story has its origin.

The whole of this area, including the coast line as far as the Congo border and the islands, is at present "closed", on account of the prevalence of sleeping sickness.

Rusuku for the most part is a small hill, steep on the south and west sides, which drop almost sheer to the lake, but sloping off to flattish ground on the north and east. The hill itself is arid, and bare except for a few small euphorbia trees, although the lower slopes even now possess a considerable amount of thorn bush in spite of the attentions of five elephants, and there is a huge array of fallen trees resembling heaps of firewood, which, at first sight, are the only indication that the island has been inhabited by beasts of any kind.

When camped at Katwe on 21st December, last year, I happened to see an elephant on Rusuku and on enquiring of the local chief I was told that there had been five there for some months and they had waded over from the mainland on the west—a distance of about a mile and a quarter.

I looked at the place through binoculars for some time that evening and again next morning but could see no more than one elephant. It did not seem worth while canoeing over to see it at close quarters, as it did not occur to me that there was

anything unusual about its presence; I assumed it had decided of its own free will to stay there in peaceful solitude after its companions had returned to the mainland. They might even have made a short excursion to the next island—which was closer than the mainland and covered with vegetation—but I could see no sign of them.

My next visit to Katwe was on 7th February, and to my surprise the elephant was again visible on Rusuku, and apparently still alone.

On this occasion my curiosity was roused and I went off next morning with some friends to see the lonely brute and find out more about it.

When half way to the island a gale suddenly sprung up and it was only after some heated words with the paddlers that I was able to persuade them to make for Rusuku instead of putting in to Izinga island on our port beam.

We eventually landed on a small beach strewn with dead elephant-grass on the extreme N.E. corner of the island, and once the canoe touched terra firma we lost no time in getting ashore with cameras and a gunbearer in attendance.

The first sign of life that I saw was an nswaswa lizard—about the usual 4 feet in length—as it silently slid into the water close by. At first glance I took it to be a small crocodile until I remembered that Lake Edward does not possess any—another of Africa's mysteries. * Incidentally, if it did, I should have a very different story to tell on this occasion.

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*There are several theories held by geologists and other scientists as to why there are no crocodiles in Lakes Edward and George although they abound in Lake Albert and all other lakes of Central Africa. Lake Edward, be it remembered, has direct communication with Lake Albert, appoximately 100 miles to the north, in the form of the Semliki river.

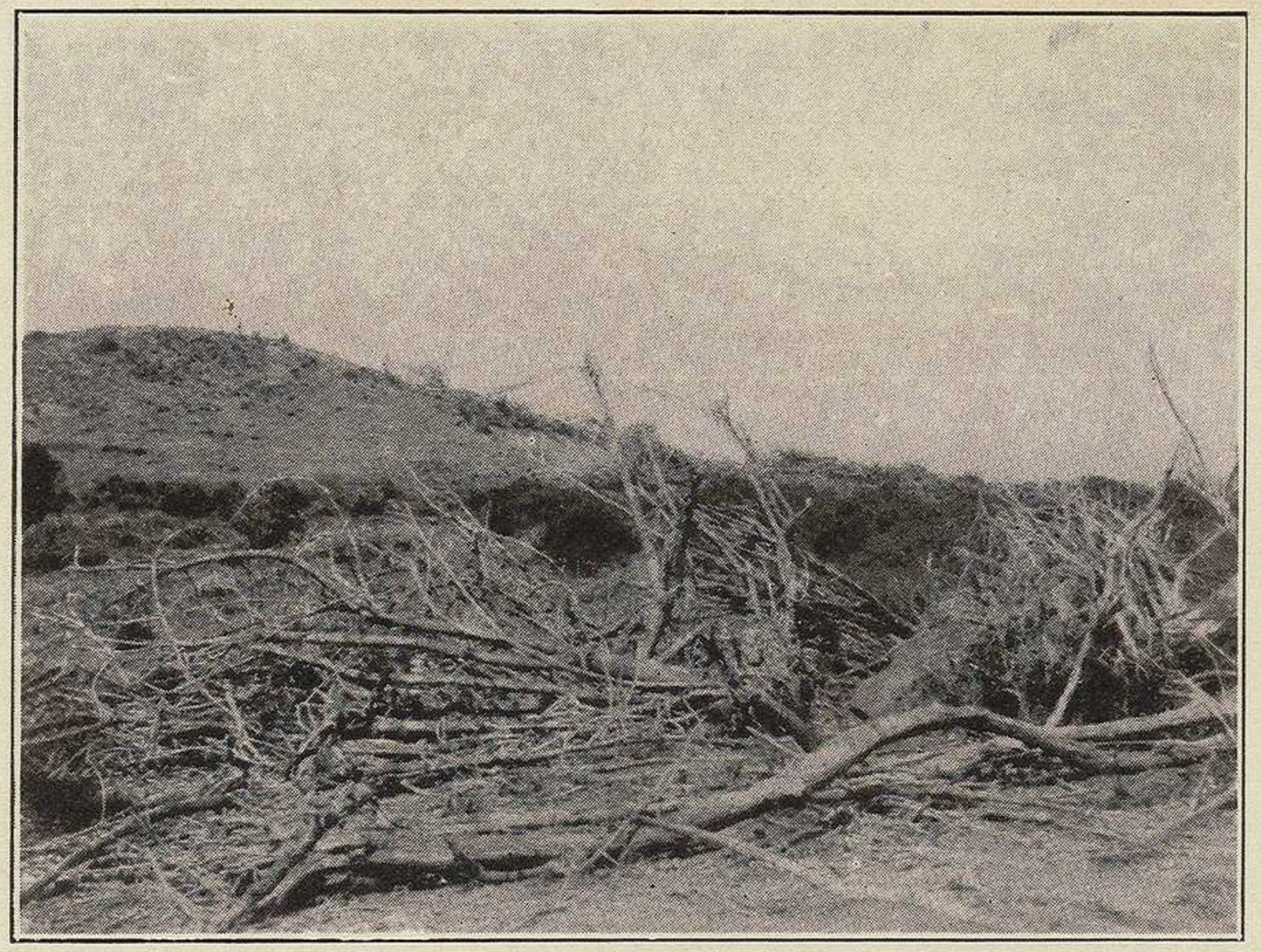
One of the two theories most acceptable to the layman is that a series of falls on the river (there is a difference of 1,000 ft. altitude between the two lakes) in the fastnesses of the vast Ituri forest, prevent the crocodiles from travelling up the whole length of the river from Lake Albert; the other is that the brackish nature of the water of Lakes Edward and George, owing to the abundance of salt deposits near their northern shores, is unpalatable to crocodiles.

As regards the former theory, there is another factor in the argument, however, which I have not yet heard discussed; that is the curious fact that, except for a narrow watershed of about half a mile—a distance of no consequence to a crocodile, one would think, if it wished to traverse it on foot—there is another waterway connecting the two lakes, to the east of the Ruwenzori range.

The Wasa river which flows north to Lake Albert has its source near Kichwamba, 9 miles to the west of Fort Portal, and the Mpanga river which flows south to Lake George rises only half a mile to the south of the Wasa.

In this case I think it is probably the low temperature of the water on the escarpment as compared with that of Lake Albert which deters the crocodile from further migration.

E. A. T. P.



(Photo : A. G. Ellis).

A general view of the island showing the fallen trees.

(Photo: A. G. Ellis).

The surviving elephant standing by the corpse of her mate with view of the small island in the back-ground.

(Photo: A. G. Ellis).

The surviving elephant standing by itself on the lake shore.

(Photo: A. G. Ellis).

The corpse of the largest bull lying on the beach.

Our first procedure was to climb the hill to enable us to locate the elephant, and from the top one could see most of the island except the steep slopes to the west and south. I judged the place to be approximately 500 yards from east to west and 300 yards from north to south.

The elephant was standing browsing at some thorn bushes in amongst a mass of the fallen trees I have already mentioned. After a few minutes "she" moved off and we followed her to the beach and took her photograph. While doing so and manoeuvring for position, the wind shifted and a most unpleasant smell was wafted our way—and there was no mistaking it. Her dead mate was lying on the beach.

The corpse as seen from a distance presented a weird spectacle and closely resembled an old tarpaulin thrown over some furniture. Owing to the absence of large carnivorous beasts the skin was almost intact and no skeleton was visible; only the tusks emerged from the unsavoury heap.

Within half an hour we found another bull lying dead in the middle of a patch of thorn bushes—and then it was that one's interest became really roused. We decided to examine the island yard by yard and thereupon set out to explore the shingle beaches to the east and the steep slope to the south. On our travels we came upon yet another corpse, again a bull, lying only 150 yards or so from the last one. We then had only one more to complete the story.

It was not on the island, however, and owing to the stupidity of the paddlers we had no canoe to take us to the very small island, only 30 or 40 yards to the north west, to find out whether that small piece of land held the secret.

The paddlers had foolishly omitted to make fast the canoes when we landed and, owing to the high wind, one had drifted away towards the east mainland. Then, without consulting me, they had taken away the remaining canoe to go and retrieve the first !

They were a mile away when I first realised the situation, and I saw them draw level with the empty canoe and, after manning it, attempt to paddle both back to us; but the wind was far too strong and they gave it up.

We were consequently marooned on this unpleasant island of death and, incidentally, with precious little to eat.

One might with some justification go so far as to say that we had proved the theory of the existence of elephant cemeteries !—for, small as the island was, I should think it certainly contained proportionately more dead elephant than most parts of Africa.

After further examination of the corpses we came to the conclusion that the three elephants had died within a very short period, and had died the same death ; they were all lying on their right sides with their legs drawn up and their mouths wide open—obviously, it seemed, killed by some form of poisoning.

I do not think that there is the least possibility that they died of starvation; if they had felt the lack of suitable food they would surely have returned to the mainland. The remaining cow was by no means emaciated; in fact she looked surprisingly fit, far more so than many individuals of some of the herds I know quite intimately.

I incline to the theory that they met a fairly sudden death and succumbed either to some poisonous plant or to some internal complaint due to a prolonged overdose of brackish water. Katwe Bay is always somewhat saline, and probably more so at certain times of the year.

Unfortunately I had no means of ascertaining the cause of their tragic decease; anyway the corpses were too far gone to be of any use even had I had the necessary implements and knowledge to cut them up; they were probably 4 to 6 months old and although, as I have said before, the skins were almost intact the birds had entirely consumed the organs.

I remembered too on further contemplation of the mystery that a great many hippopotamuses had died of some unknown disease in the same locality two or three years before, and no doubt the elephants had died of the same cause.

Towards sunset, as I saw the lonely cow have her evening drink and bath and, on her way from the water, pass the body of the largest bull, I resolved that I could not leave her to wait death in such morbid surroundings and therefore decided that it would be a kindness to put her out of her apparent misery.

I should have liked to attempt to drive her off the island, but unfortunately I had not the necessary number of men to do it and, as the wind was very strong and the lake very rough, my chances of making her wade beyond her customary bathing beach were remote.

The most unaccountable thing to my mind is why the animals stayed so long on such an unattractive island, and why, if they started to feel unwell, they did not move to the next island or the mainland without delay.

This apparent lack of intelligence in such sagacious animals, I think, confirms my theory that death was fairly rapid in each case and that the three died within a very short period.

I very much regret that nobody had the opportunity of conducting a post mortem on the one I shot, but, in view of the fact that nothing, so far as I know, was ever discovered in respect of the hippo mortality years ago, there is consolation in the thought that it is unlikely that investigation in this case would have been any more successful.

Recovery of Ringed White Storks

By C.R.S. PITMAN.

1. Bugishu.

A European White Stork—*Ciconia ciconia ciconia*, was picked up on 8th April, 1935, at a place called KILAI in a forest region on the west of Mt. Elgon in Bugishu, Uganda, Eastern Africa, at an altitude of about 4,500 ft.

The bird was only seen when it was falling. It was found dead and its right wing was smashed. It is suggested that it had been attacked by some bird of prey. Except for the damaged wing it was in good condition.

It carried *two* rings with different numbers. Both rings were marked ROSSITTEN GERMANIA, but one had what was obviously a full address. Unfortunately the rest of it was illegible. The local District Officer sent both rings to the Editor of the "Field".

2. Lango.

A European White Stork—*Ciconia ciconia ciconia*, was found dead in the OGUR Gombolola in the Lango District of the Northern Province of Uganda during April (precise date not specified). The Lango call this species "GOKOLINGA".

On the bird's leg was a ring marked as follows:

"VOGELWARTE urgent
ROSSITTEN retour
GERMANIA B 40772"

This ring has been forwarded to the bird-marking station at ROSSITTEN in Germany.

I am indebted to the District Commissioner, Lango, for sending me this ring together with full particulars.

Note.

In connexion with the above, Capt. Pitman has supplied the following extract from the "East African Standard" which explains the presence of the ringed Storks.

He also asks us to state that the Game Warden's Department, Entebbe, would be grateful to receive details of all ringed birds which may be recovered in Uganda. (EDITOR)

BIRD MIGRATION

Experiments by German Observatories.

(From "East African Standard" of 3. 5. 35)

An announcement issued by the German Consul in Nairobi states that in order to further research, two German Bird Migration Observatories ring 16,000 birds every year. The rings are inscribed and in the past it has been possible to obtain

information of the migration of the birds to such places as South Africa and Iceland. It has been found that this practice has been of great importance in increasing the knowledge of bird life and migratory habits.

Both the German observatories, the "Vogelwarte der Staatlichen Biologischen Anstalt, Heligoland" and the "Vogelwarte Rossitten," would be grateful if anyone finding ringed birds would communicate with them, giving particulars when and where the bird or birds were found. If the person finding ringed birds is interested, the above-mentioned observatories would be willing to send pamphlets on their work, and also with special reference to the bird or birds found. They would furthermore be interested to receive communications from, and would be willing to help, other bodies interested in this work.

If anyone should hear that a ringed bird has been found and the fact is queried, it is requested that such information be forwarded to the above-named observatories, or the German Consul, Nairobi.

Kibo

By Dr. R. Y. Stones

A chill blast pierced our little over-heated hut as Samwiri, the guide, opened the door to rouse us at midnight. It was cold and stark at 17,000 feet in the middle of the night and we had been glad of a good fire in the stove and the windows securely fastened as we lay from dusk to midnight, resting as best we could. Hearts thump and breathing is rather difficult at that height so that sleep is hard to woo.

After a scanty meal of soup, bread and coffee we lay down for another hour preparatory to our start for the summit, when the moon rose at one o'clock. Soon we were ready, dressed in balaclava helmets, jerseys, coats and Burberries,–no shorts for this trip but warm flannel slacks worn inside puttees,—carrying our sun helmets, goggles and alpenstocks. A small waning moon had risen in the starlit sky showing us our faint track.

My wife had accompanied me as far as Pieter's Hut, half way up Kilima Njaro, but had returned to the base from that point, so that for the final ascent there were four of us, apart from the porters; myself and Samwiri the guide, and two Germans, carrying their complete equipment on their backs, who had come up from the base by a different route from the one we had taken and had joined up with us at the hut.

As I was the senior member of the party I set the pace, which I decided should be slow and steady. The gradient was an easy one at first but there was much loose sand and gravel which made the going difficult and frequent stops for rest necessary. After about two hours of this we came to the hardest part of the ascent, loose scree which gave way under our feet, adding immensely to the labour of climbing.

In the hut the motto "If at first you don't succeed, try, try again" was inscribed on the wall to cheer up those descending, who had not reached the summit, but I took as my motto "Dogged does it". Certainly its encouragement was needed now. I had to abandon my resolution to proceed slowly, as this was no longer effective. A sharp rush of a few steps, then a long pause to recover breath was apparently the only method of travelling over this scree. In the dim light some boulder loomed a few yards ahead, and this became the goal at which to aim. In how many rushes could one reach it? Arrived there one promised oneself a rest long enough to recover breath and still one's pumping heart. This landmark attained, on again to reach another. So we struggled on, hour by hour, with the dawn at last gradually lighting up the mountain side until as the sun touched the horizon, making Mawenzi stand out massive and forbidding, we achieved our first objective, the snow line.

Here we really rested, looking down over the ascent up which we had laboured, and out beyond to the saddle connecting Kibo with its twin peak, Mawenzi, and over the spreading plains far, far below. Satisfied with our progress, we again moved on and up. Our course now led over rocks and jutting crags and by eight o'clock we had reached Gilman's Point, a cleft in the rim of the crater with a sheer ice wall several score feet in height. On the other side was a steep ascent over snow-topped boulders. These we climbed and so found our way to the rim. Words cannot express the view that met our eyes as we passed along the edge of the crater. Beneath us to the south untrodden snow sloped downwards mile upon mile without a flaw on its surface. Glistening in the brilliant sunshine, this illimitable snowfield blended far below in a billowy sea of clouds lying over the base of the mountain, blotting out all evidence of the world below. Up here we were in a realm of our own, on the very top of Africa. Somewhere down there in the mist and rain the workaday world was to be found but we seemed to be transfigured and alone with Divinity Itself, so awful, so lonely and quiet was all around us. No birds! No insects! Even vegetable life was unable to live here, and we ourselves must bestir or we would become stiff with cold.

So on, round the ridge we went, looking into the mighty crater of Kibo, its snow bed broken with snow clad rocks and crevasses, though the rocks showed black in places where the wind had swept the snow from their sides. We looked down upon precipices with sheer ice walls which sparkled and scintillated, reflecting the unsullied sunlight. So brilliant was the scene that, like Moses of old admitted into the presence of the Deity, we dared not look with uncovered face but could only gaze upon it with eyes veiled because of the exceeding brightness of the vision before us.

On the rim the snow lay firm and hard, making the going excellent that morning. Often the traveller's feet sink in the snow many inches but we were fortunate as our steps sank but little. After another two hours we reached the point where a spear marks the summit. As on the tableland of snow it was difficult to recognise differences in levels of a few feet, we consulted our guide to find if this really were the top. He declared that we were indeed at the summit and the book we found in the snow at the foot of the spear confirmed this and we therefore inscribed our names among those who had conquered Kibo and replaced the book under the stone where we found it amid the virgin snow, otherwise unprotected but perfectly preserved in an atmosphere that is always cold and dry.

At last we could enjoy a glorious, all-too-brief rest, a sandwich and a drink of hot coffee from a thermos laboriously carried with us. Clouds continued to blot out the landscape below though we ourselves were bathed in sparkling sunlight. As it was now after ten o'clock and storm and mist might drive up, we decided to begin our long descent. We would have liked to continue on round the crater but Samwiri forbad this, and so we retraced our steps; past Stella Point to Gilman's Point, down over the boulders to Leopard's Point. This is where an unlucky leopard, which by some mischance found its way to this altitude of nearly 19,000 feet, lies embalmed in the snow, but owing to a recent fall of snow, we failed to see the corpse which is said to be perfectly preserved.

Then down we went, over the boulders and scree, proceeding now at a run where but shortly before we had won our way step by step. Sliding and slipping, leaping downwards, our bones seemingly rattling like castanets, we completed our descent to the hut where we had a meal and a rest. Then on again down to Pieter's Hut, where my mule awaited me, reaching it late in the evening. There we slept soundly that night.

Next morning, after saying farewell to my fellow travellers, who were taking another route to the foot of the mountain, I set off early on my long descent through the rain forest and open plains dotted with wonderful heaths and flowers. Passing Bismarck Hut I arrived at the hotel at Marangu to be greeted by my German host with congratulations and enquiries.

"Did you enjoy the experience?"

"Did you reach the rim ?"

"Did you pass the spear to the next rise? No! Then you didn't reach the summit, alas."

No matter! Had I not been "where the toppling crags are close upon the shining tablelands to which our God Himself is moon and sun"—and had I not this memory of Kibo to carry with me always?

CORRESPONDENCE

Medals and Decorations

To The Editor, "The Uganda Journal."

SIR,

With regard to the excellent article on Uganda Medals and Decorations by Mr. Twining appearing in No. 2 of Volume II, may I, in the interests of accuracy, correct one or two statements regarding the 1914 and the 1914-15 Stars.

The Author stated " . . . . . it was decided to issue a star to those who had served in 1914. Later it was decided that those who had been in a theatre of war in 1914 or 1915 should also receive it *and the official title was changed to 1914-1915 Star*" (Italics mine). Then in a footnote he stated "Commonly called the 'Mons Star' and carries a bar on the ribbon to differentiate it from the 1914-15 Star".

Actually there are two distinct stars with distinct official designations, though with similar ribbons. The stars themselves are quite distinct, the 1914 Star having on a long scroll intertwined about the two crossed swords the inscription: "Aug. 1914 Nov." in three lines, whilst the 1914-1915 Star has on a short scroll the inscription "1914-1915" in one line only.

The latter star was never called the "Mons Star" as it was not issued for services in France and Belgium till subsequently to November 1914, though for earlier services overseas. The former is the "Mons Star", so called.

Again, the bar carried on the ribbon of the 1914 Star bearing the inscription "5th Aug.—22nd Nov. 1914" was only issued to officers and men of the original expeditionary force who were in the battle zones, and those who served at bases or on the Lines of Communications, although they were awarded the 1914 or "Mons Star", did not receive the bar and are not entitled to it. The bar therefore does not differentiate between the 1914 and the 1914-15 stars, as only those who were under fire are eligible for the bar.

Thus to make the foregoing clear, we have three distinct awards to chronicle:—

1. The 1914 Star, inscribed "Aug. 1914 Nov.", with bar, issued to those under fire, popularly known as the "Mons Star".

2. The 1914 Star, inscribed "Aug. 1914 Nov.", without bar, issued to those on the L. of C. or at the base.

3. The 1914-15 Star, inscribed "1914-15", without bar, issued for services in France or Belgium after 22nd Nov. 1914 and in other theatres of war after 20th Aug. 1914.

The foregoing can be verified by references to the various Army Orders concerned.

Yours etc.,
H. F. STONEHAM,
Lieut.-Colonel,
late The 1st Bn. E. Surrey Regt. &
4th Bn. KA.R.

Kitale,
Kenya Colony, 19/2/35.

An Interesting Hybrid

To The Editor, "The Uganda Journal."

DEAR SIR,

Might I venture to correct a slip in the article by my old friedd Dr. Duke on "An interesting hybrid" (P. 154 of the October issue.)

Page 161 line 9 should read "Red Kangaroo x Doe Wallaby = Wallaroo".

Also I presume he did not really intend to include amongst the "Ungulates" such beasts as the dog, lion, leopard, etc.

Yours faithfully,
R. VAN SOMEREN.

33 Mount Vernon Road,
Liberton,
Edinburgh, 14/4/35.

The Uganda Society

MINUTES OF A SPECIAL GENERAL MEETING HELD AT THE KAMPALA CLUB ON WEDNESDAY 27TH FEBRUARY, 1935, AT 7 P.M.

IN THE CHAIR. The President, Mr. E. J. Wayland.

MEMBERS OF COMMITTEE PRESENT. Mesdames Hunter and Moody, Messrs. Mark Wilson, Schofield, Sykes and Twining.

MEMBERS PRESENT. Mrs. Mark Wilson, Messrs. Guilbride, Nason, Priestly, A. D. Jones, Tillbrook, McElroy, W. A. Hunter, Boase, Scarlett Smout and Devas Jones.

1. Minutes.

The business of the meeting began with the reading of the minutes of the Annual General Meeting of the Uganda Literary and Scientific Society held at the Kampala Club on Friday, 10th August, 1934; these were confirmed by the meeting and signed by the Chairman.

2. Change of Name and New Rules.

The Chairman then addressed the meeting and stated that the principal business that evening was to discuss the new rules of the Society and formally to record approval of the majority vote of the members, as declared by the recent ballot, for the change in name of the original Society to *The Uganda Society*.

Mr. Wayland went on to point out the Society was greatly indebted to Mr. Mark Wilson, in conjunction with other members of the Committee, for the compilation of the new rules—copies of which were circulated at the meeting.

Mr. Wayland called upon Mr. Mark Wilson who briefly explained that the alteration and amendments to the old rules as now embodied in the new rules were mainly designed.

(a) to bring the old rules up to date and make them more in consonance with the present objects of the Society.

(b) to give wider executive powers to the Committee, whilst retaining in the hands of the general body of members full control of major questions of policy.

(c) to authorise and continue the regular publication of the Society's "*Journal*."

The Chairman then invited questions on the new rules as now presented to the meeting and drew the attention of the meeting to the important point of the change of the Society's name. Several members put questions which were satisfactorily answered, whereupon Mr. J. Sykes proposed and Mr. Mark Wilson seconded a resolution that the Society should in future be known as *The Uganda Society* and that the rules should be adopted. The resolution was carried *nem. con.*

3. Future Organisation Arrangements.

The Chairman and President then addressed the meeting on the subject of the future working of the Society, recording the fact that the Society's Honorary Secretary, Treasurer and Editor, Mr. E. F. Twining, was about to proceed on home leave. He paid a sincere tribute to the magnificent work that Mr. Twining had done in the reconstruction and continuance of the original Society and stated that his committee had had the question of his successor *pro tem* under consideration for some time. The meeting would appreciate that there was a very considerable amount of work entailed in connection with the Society, more especially in view of the most satisfactory increase in membership which now totalled over five hundred. His Committee had decided that the time was not yet ripe for appointing a full time paid Secretary and after much thought it was decided to put forward a proposition that, beginning with the July issue, the Journal should accept advertisements in order to provide additional revenue for administrative purposes. He pointed out that there was a precedent for this in the cases of the "Sudan Notes and Records" and the "Southern Rhodesia Journal", both of which were supplemented by advertisments. At a later point the President said he proposed to ask this meeting's sanction to accept the advertising scheme.

4. Editorship And Business Management.

With regard to the arrangement for the Editorship the President was happy to inform the meeting that after discussion with the Director of Education, Mr. Jowitt, they had been fortunate in securing the honorary services of Mr. John Sykes for a period of two years on the distinct understanding that this offer was to be looked upon as entirely unofficial and that the Department of Education was not in any way officially concerned in either the appointment or the work attached thereto. In accepting the office of Honorary Editor, Mr. Sykes had stipulated that he could only combine that duty with the offices of Honorary Secretary and Treasurer provided that he could be relieved of the actual work in connection with the latter. The Committee had approached firms and individuals with a view to the appointment of a remunerated person or firm who would undertake the work, and in addition make the necessary arrangements which would defray the cost of the appointment. After enquiries had been made the President stated that the Committee now suggested that Mr. A. W. Devas Jones should be appointed as Business Manager and that his remuneration should be on the following scale:—

A Minimum payment of Shs. 50/- per month; *or*, Fifty per cent of the nett Advertising revenue. The Business Manager was further to undertake the duties of Secretary and Treasurer though he would not sign any documents as one or both.

The President particularly stressed the point that all Advertisements offered to the Journal would have first to receive the sanction of the Committee before insertion. One of the other objects of appointing a "Business Manager" was to assure that the future financial conduct of the Society should be placed on a sound basis. The proposal to appoint Mr. A. W. Devas Jones as Business Manager was then made by Mr. T. P. Priestly and seconded by Mr. Mark Wilson and carried *nem. con.*

5. Hon Editor, Treasurer and Secretary.

Mr. John Sykes was then unanimously elected Honorary Editor, Secretary and Treasurer.

6. New Committee Member.

Mr. E. F. Twining informed the meeting that Mr. H. Jowitt, the Director of Education, had been asked to become a member of the Committee in place of Mr. R. A. Snoxall who had temporarily left Uganda. Mr. Twining added that Mr. Jowitt had agreed to arrange for continuity of Editorship on the expiry of Mr. Sykes' term of office if he should be required so to do. Mr. Jowitt was then unanimously elected a Member of the Committee.

7. Vice-Presidents.

It was proposed by Capt. F. L. Guilbride and seconded by Dr. A. T. Schofield that Sir Albert Cook and Bishop Michaud be invited to accept office as Honorary Vice-Presidents. This was carried *nem. con.*

8. Conclusion.

In conclusion the President again referred to Mr. E. F. Twining's magnificent work and Mr. Twining suitably and humorously replied. The proceedings then terminated.