nearly always near water. This makes things easy for the entomologist and collector, because with a single sweep of the net he can get up to three dozen stalk-eyed flies at once!

There is a lot of variation in the length of the eye-stalks, which even can be absent. Every rule has its exception and the "stalkless stalk-eyed fly" looks almost like a normal fly. However, the close observer will at once notice a series of other characters (wing venation, thorax, legs, etc.) which do not leave any doubt as to the identity of the fly in question. The stalkless species, *Centroncus prodiopsis*, occurs in the mountain forests in South and East Africa from Knysna in the Cape Province to the Sudan.

In the past there has been a considerable amount of speculation about the evolution and function of the eye-stalks. Very probably the species without or with short stalks are highly primitive, while the ones with longer eye-stalks are more recent and advanced. This is supported by evidence derived from the male genital organs and from some fossil records. Some scientists held the opinion that long eye-stalks offer a better binocular eyesight in connection with a predacious way of life. However, stalk-eyed flies are known to be peaceful nectar feeders, and, moreover, we are not sure yet whether insects really possess binocular and plastic vision. Another theory has been that in flight it is easier to keep the balance with the help of eye-stalks. Perfectly true, but why have all the other thousands of species of flies been so successful without stalked eyes? In my opinion the most acceptable supposition so far has been that the eye-stalks are simply what the Germans call "Luxusbildungen" or "Exzessivorgane" without any particular meaning. We could compare them with the horns of some beetles, the ridges and spines on some shells, the horns of certain chameleons, etc.

The area south of the Zambesi River features only about 25 species of Diopsids. Very little is known about the life cycle in Southern Africa; there is a strong suspicion that the maggots of many species are miners or borers in the stems of plants of the grass family (Gramineae).

The study of these unusual flies is fascinating and highly rewarding; there is ample opportunity for any amateur to contribute important observations.

Recordings of S.A. Bird Calls

THE first records of South African bird calls have been produced by Messrs. Gallo Africa Limited. They are 45 r.p.m. and the set of two plays for a total of 45 to 50 minutes. The recordings were made in the Kruger National Park by Mr. Clem Haagner and represent 28 different birds. The name of the bird is given before each call, and the recordings are particularly clear. If ordered through the Society the records may be purchased at the reduced price of R2.05 per set.

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Rinderpest and Faunal Distribution Patterns

By C. A. SPINAGE

VIRUS diseases play an important part in African wild life and without doubt the most important of all is Rinderpest which caused the great plague in Africa of 1889 to 1903, a plague which swept the length and breadth of the country exacting a fantastic toll upon both wild and domestic animal life, and starved to death many thousands of native herdsmen.

Probably since the isolation of Africa as a faunal unit over a hundred million years ago, Rinderpest had never been present. This would account for its extreme virulence when it was introduced by man's agency, for the animals attacked had no natural resistance to it.

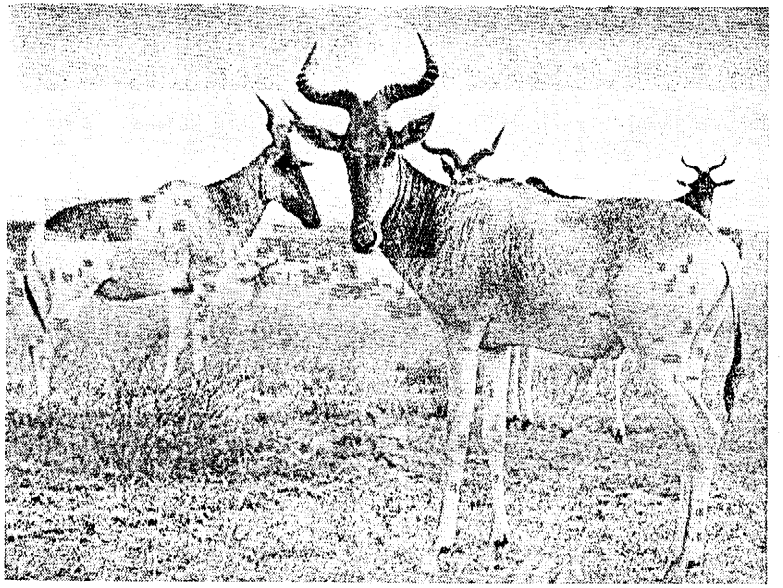
The disease, which characteristically attacks ruminant ungulates, originated in Asia and was spread throughout Europe in the ninth century by warring nomads. But as regards Africa, previous to 1864, it had never reached farther south than Egypt, whither it was repeatedly introduced with cattle from Turkey, Asia Minor, Russia and the Balkans.

It seems to have first appeared south of the Sahara in Italian Somaliland in 1889, following the importation of cattle from India and Aden, for provisioning the Italian army. Another line of infection just previous to this, in 1884-5, was down the Nile Valley as far as Khartoum, with the British campaigns that were provisioned with infected cattle obtained from Russian ports.

Some authors have suggested that as the Arabs were trading on the east coast since the twelfth century, it might have been introduced

Buffalo in the Queen Elizabeth National Park—buffalo are among the animals most susceptible to rinderpest.

16(1), 1962



Kongoni (Coke's Hartebeest) in the Nairobi National Park. These antelopes do not appear to be affected.

to the continent long before, but considering its virulence in 1889, this seem highly unlikely.

Once established it swept the country like wildfire, and, wherever it came from in the north, by 1890 it had reached Lake Tanganyika. By 1892 it was at the northern end of Lake Nyasa. By 1896 the Zambesi was passed and it was in Southern Rhodesia, eventually covering the whole of South Africa, despite extensive efforts to prevent it. But by 1903, South Africa was able to declare the Cape to be free of it.

The actual number of animals killed can never be assessed, although south of the Zambesi River it was estimated that five and a quarter million cattle were killed by it in two years. Mortality amongst cattle was over ninety per cent, and in places such as East Africa, where whole herds were wiped out overnight, nomadic tribesmen, e.g., the Masai, died of starvation, as they knew of no other means of subsistence. Natives could not turn to hunting, for the wild life suffered in great numbers.

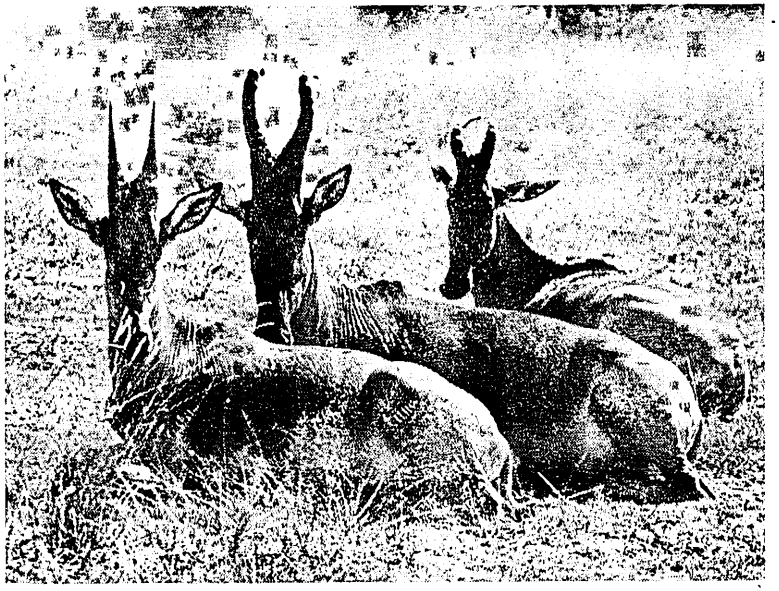
Buffalo, Eland, Warthog and Bush Pig were reported as the chief sufferers. At this time Lugard was travelling through East Africa and was able to report on the ravages caused by the disease.

Bushbuck, Reedbuck, Kob and Giraffe were affected to a lesser extent, but, strangely enough, he reported, "the Elephant, Hippo, Rhino, and, I think, all classes of Hartebeest, Wildebeest, and Waterbuck are exempt." Strange because Wildebeest are amongst the most susceptible of animals today, although Lugard himself

remarked that it was curious as he had observed that those wild animals which were most like cattle were the ones that suffered first. Great mortality amongst Zebra was noted in one district but although the two outbreaks occurred simultaneously, there is no evidence that the deaths amongst the Zebra were due to Rinderpest. Contamination by the dead carcasses that littered the countryside may well have led to bacterial diseases becoming prominent.

The specific susceptibility of wild ungulates to Rinderpest seems to vary considerably at different times and in different localities. We have referred to the apparent immunity of Wildebeest around the year 1890, yet in an outbreak in Tanganyika in 1957, the disease was at first largely restricted to Wildebeest, but eventually passed to Buffalo and then to Eland. In an outbreak in Uganda in 1918 there was a high mortality amongst Kob, yet in another outbreak in 1926 Buffalo were killed in large numbers and Kob were apparently unaffected. Reedbuck and Oribi were observed to be apparently unsusceptible in one of the Uganda outbreaks, and could be seen unconcernedly grazing in heavily infected areas, yet Reedbuck were readily killed in the Tanganyika outbreak in 1941.

Highland Bohor Reedbuck on the Serengeti Plains.



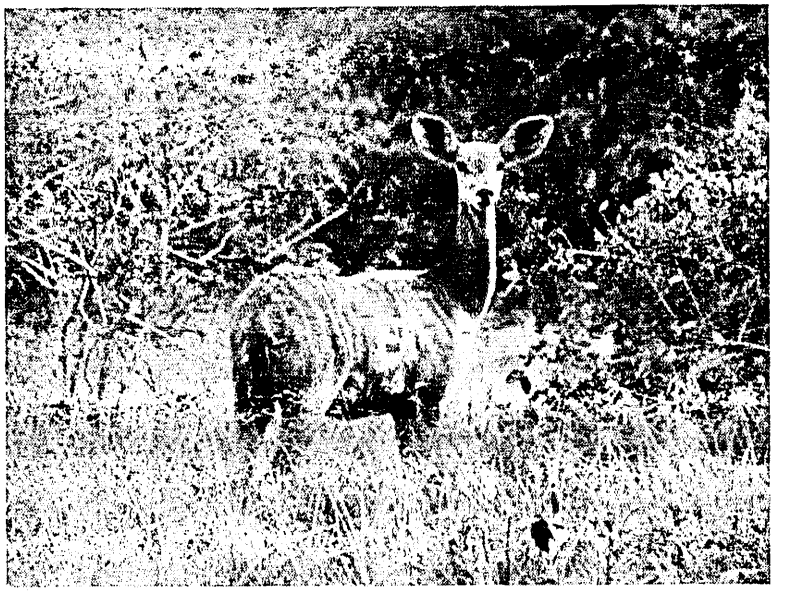
Lelwel Hartebeest in the Murchison Falls National Park.

Waterbuck may show mild to severe symptoms, but appear to trek away from an infected area, although the reports of such occurrences do not take into account the fact that the movement may have been a normal migration uninfluenced by the disease. But it does seem as if some animals possess a reaction to it; Buffalo herds in particular are reported to split up and disperse into the forest. On account of this habit the general consensus of farming and veterinary opinion classifies the Buffalo as the most important potential spreader of the disease, but nevertheless the further dispersal of the disease is doubtlessly limited by the fact that the Buffalo tends to avoid contact with other animals.

The greatest danger of Rinderpest today is to the wild animal populations, for domestic cattle can be cheaply and rapidly immunised against an outbreak, an impossibility with the former. Farmers, however, always fear a breakthrough into an unimmunised area, a breakthrough which they might not be able to control, with the possibility of a repetition of the disastrous 1890 episode.

In some areas the disease is frequently suppressed only to break out again suddenly; it is these unexpected and unexplained recurrences which are given as the reason for considering wild game as the reservoir of the disease; outbreaks confined to wild animals have been known to occur. No outbreaks of the disease have occurred in cattle south of Tanganyika since 1903, even though there are large numbers of susceptible wild animals along with the cattle.

When Lugard witnessed the effects of the great plague he stated that the Buffalo and the Eland were almost all gone; subsequent



Female Lesser Kudu in Amboseli National Reserve. This is a rare spectacle as kudu never seem to have recovered from the plague.

travellers likewise declared that East Africa was hardly worth visiting for big game hunting, there being nothing but acre upon acre of bleached skulls bearing grim testimony to the ravages of the disease.

However, no species of animal seems to have become extinct, although this is something which we do not know. The Buffalo, allegedly the worst affected, seems to have made a rapid recovery, an estimation having been made that the population regained its numbers in about thirty years. The Greater and Lesser Kudu, which also suffered heavily, for some reason have never regained their former densities in East Africa, although in 1925 in Northern Rhodesia, they were numbered amongst the commonest of antelopes. In Kenya, in 1918, their recovery was reported as extremely slow, and from their distribution today it would appear to have remained so.

Reference is not infrequently made in the literature to the strange anomalies of distribution amongst African ungulates but they are probably due to the Rinderpest plague which has completely modified the former distribution, the present pattern being in some respects an artificial one. Examples of species left in isolation by the plague are probably provided by the small herd of Thomas' Kob in Kenya. The Kob, although thriving elsewhere, in Kenya is restricted to one small herd. Giraffe in Uganda are confined to an area north of the Victoria Nile but in this instance the isolation may have been brought about by poaching.

Fossil deposits of the Upper Pleistocene show the previous existence of the Mountain Bushbuck or Mountain Nyala in northern Tanganyika, a species now only known to occur in a small area in Abyssinia; and of Hunter's Antelope, now restricted to a small area in south-east Kenya. Fossils of such animals as the Situtunga, Greater and Lesser Kudu, Roan and Sable Antelopes show that these had a wider distribution than they have today.

What then caused the change in distribution of the ungulates? Leaving some affected and not others? The Rinderpest plague would provide an answer, but unfortunately we have no good records of their distribution in the period immediately preceding the plague in East Africa. Sub-fossil remains of animals are extremely rare, even the bones of the many thousands or millions of Buffalo that have died seem to have disappeared. It might yet be possible to find horns and skins amongst native tribal paraphernalia.

However, even if the Rinderpest does not account for the discontinuity in the present day distribution of some of the bovidae it does provide us with a lesson in how far large animal populations can be reduced in the course of a few years, and how much natural catastrophes may have repeatedly modified the faunal picture throughout geological times.

Elephant stands after being shot dead

On 9th January, 1960, I received a report of elephant raiders at Mphyanakunda village of Chief Lundu.

There were 9 bull elephants and 20 cows in this herd. I fired at one of the bulls with 3 rounds, and it was wounded and moved into a very thick bush. After the elephant was wounded I followed it, and found it standing quite still at one place without moving. I thought that the elephant was still alive. Then I fired again 5 rounds at the elephant, but it could not move at all. I waited for a while thinking that perhaps it would fall down but it was still standing. When I approached nearer I noticed that the elephant had already died while standing.

I told my Chilongozis to come near me and to see the elephant which was shot. But all the Chilongozis refused, stating that they were unable to come nearer, as they thought that the animal was still alive. They realised that it was shot when I touched the elephant with my own fingers.

I went to the village concerned to bring some people for cutting the meat. The villagers and I tried to tie up the elephant's trunk and tail with some ropes in order to pull the body down, but we entirely failed to do so. The tusks and the trunk did not reach the ground but were just in the air. Then in order to cut the meat properly, we decided to cut the left-side legs both fore and hind legs. Then the body dropped down and we started cutting the meat.

This is a report of what I saw at Mphyanakunda's village.

(*Report of Timothy Nyirenda, Elephant Control Guard, N. Rhodesia.*)

Nesting Habits and Mounds of the Termites of Northern Rhodesia

By W. G. H. COATON

Division of Entomology, Pretoria.

(*Sketches by the author; photographs by E. N. Cooling, Forest Department, Northern Rhodesia*).

AT the invitation of the Forest Department, during January 1957 the writer carried out a survey of the termite fauna present on selected areas of Northern Rhodesia, in an attempt to determine which of the species were responsible for the heavy destruction of young trees recorded in new plantations of *Eucalyptus* species, and to prescribe counter-measures by means of which such damage could be reduced to economic proportions. Intensive spot collecting was carried out over an area stretching from Choma and Magoye in the Southern Province, Lusaka in the Central Province, the Ndola-Kitwe-Luanshya triangle of the Western Province, to Samfya on the shores of Lake Bangueulu in the Northern Province. The vegetation-soil types to which particular attention was paid included mainly Southern, Central and Northern *Brachystegia-Isoberlinia* woodland types on Plateau soils, High Grass-Woodland on Upper Valley soils, and "Chipya" on Lake Basin and allied soils.

During the course of the survey 719 vials of termites were collected and extensive notes were taken of the nesting habits of the species involved. In this article we are concerned only with termite nesting habits, hence no mention at all will be made of the conclusions drawn and recommendations made with regard to the economic importance and control of the tree-destroying species.

Brief notes on the nesting habits of species of the 32 genera of Isoptera collected in Northern Rhodesia during the course of this survey will be given below, together with illustrations of typical modern mounds constructed by some of them.

Family Kalotermitidae: Sub-Family Kalotermitinae.

Genera represented: *Neotermes* (Holmg.) and *Bifiditermes* (Krishna). The species of these two genera inhabited nests, consisting of groups of inter-connected cells excavated in wood as a result of feeding activity, situated within dead branches and stubs on standing living trees in the woodland. No contact between the nests in the trees and the soil below was needed or established by the colonies.

Family Rhinotermitidae: Sub-Family Rhinotermitinae.

Genus represented: *Schedorhinotermes* (Silv.). The single species involved nested in cavities within the heartwood of trunks of standding, living trees, filling these with a honey-combed mass of brownish carton-walled cells and reticulations. Runways, roofed over with dark carton, led downwards on the exterior of the trunks of the trees involved to establish contact between the nests and the soil. No food material was stored in the nests, nor were fungus-gardens cultivated therein.