themselves from attack. Small pellet-like globular forms make globular pellets exactly like themselves. Others make pellets to serve as decoys. Others use cocoons, others, bits of bark, others, bundles of packeted insects, all with the same definite object of putting in the snare artificial materials which as closely as possible resemble themselves. The others of a more elongated structure make bands of different kinds and hide themselves by becoming part of these bands. Others add different kinds of confusing devices, such as circular ribbons or spiral threads, which serve to disperse the enemy's attack. Then others make sheets against which they blend, others, bands behind which they hide, others, a strange variety of zigzags with which their silvery colours harmonise and destroy their spider-like shape.

When we consider all the peculiar variety of these contrivances, all the labour that is involved in their manufacture, all the expenditure of precious silk, all the wonderful elaboration of instinct that has been developed, we can get some dim idea of the struggle that these little creatures have to face in order to survive in the battle of life.

NOTES ON THE MANGROVE SWAMPS OF KENYA.

By R. M. Graham.

It is estimated that the Mangrove Swamps in Kenya cover an area of about 180 square miles. All have been gazetted as Forest Reserves. Since only four creek systems have been surveyed, it is obvious that the area given is only approximate, but the composition of the gazetted areas does not vary very much.

Judging by the four swamps that have been surveyed, it seems probable that only about two-thirds of the total area can be classed as merchantable forest. The remainder consists of scrub mchu, lilana and undersized mkandaa. Of the merchantable forest, probably 70% consists of well-grown mkoko, with scattered muia and mkandaa, and 30% of badly-shaped mkandaa which, however, finds a market as fuel.

The Flora.

Few species are recognised in the Kenya swamps. Whether this is because only a few species are actually represented, or because no one has worked over the area systematically, I do not know, but I imagine that (a) there are more species in Malay and the Philippines than there are in Kenya, and (b) some of the Kenya species still remain to be identified. It is unfortunate that botanical specimens from the swamps are almost always very difficult to preserve, owing to their somewhat succulent nature. Atmospheric conditions also are usually against quick drying out, in the swamps.

The following are the principal species recognised:—

	Native Name.
1. Rhizophoraceæ.	
Rhizophora mucronata, Lam.	Mkoko (Swa.).
Bruguiera gymnorhiza, Lam.	Muia (Swa.).
	Msindi (Swa.).
	Mrifu (Swa. Lamu).
	Mchofi (Swa. Gazi).
Ceriops candolleana, Arn.	Mkandaa (Swa.).
2. Sonneratiaceæ.	
Sonneratia acida, Linn.	Mlilana (Swa.).
	Mpia (Swa.).
3. Verbenaceæ.	
Avicennia officinalis, L.	Mchu (Swa.).
	Mtu (Swa. Vanga).
	Mutu (Bajun).

but neither can it be included in the description of any of the inland forests. It is straight-growing, and if it were more plentiful, it would be a useful species. It appears to be spreading, and may be a comparatively recent arrival in Kenya.

Economic Aspects.

The most important item produced in the swamps is poles. In 1929, about 470,000 were sold, and about 40,000 issued free to natives for housebuilding. About 30,000 headloads of withies also came from the swamps. Of the poles, nearly 300,000 were exported to Arabia and India.

Mangroves seed very freely, but blank areas are treated by the Forest Department, and in 1929, about 1,300,000 embryos of Mkoko were planted out. The vast majority of poles and withies are obtained from Mkoko, though Muia and Mkandaa supply a few. The Government royalty on poles is from cents 73 to Shs. 1/50 per 20, according to size, and for withies, cents 10 for 20 (one headload). It costs about Shs. 3/50 to plant an acre of Mkoko (*i.e.*, 1,120 embryos).

The most important item is firewood, of which 446,000 stacked cubic feet were sold in 1929. Of the *Rhizophoraceæ*, Mkandaa provides the most popular household fuel, followed by Mkoko, and then Muia. Mchu is not used as a household fuel at all, but on the other hand, it is always used in the manufacture of lime from coral.

Formerly, large quantities of Mkoko bark were sold for the sake of its tannin, but since trees under 6 ins. in diameter produce bark of no value, and since practically all stands of large Mkoko have been cut out, very little revenue is obtained from this source nowadays. Bark from Muia and Mkandaa is rich in tannin, but finds no sale.

The timber of the three species of *Rhizophoraceæ* is hard, heavy, and dark-brown in colour. A small quantity of timber from Muia and Mkoko is still used for dhow-building, chiefly at Lamu, but otherwise there is no sale for it as timber.

Mlilana produces a few poles in the Vanga area, and occasionally a tree is cut for timber. Mkomafi has a pinkish timber, easily worked, which is used a little. It would be more popular if large trees were commoner. Msikundazi timber is said to be very good, but large trees are few and scattered. Poles of this species are much used for dhow masts. Poles of Mvinji are also used for dhow masts, but the timber is not used.

General Characteristics.

Except during heavy rains, the water in the swamps is quite clear. When travelling by boat up the creeks, one is almost invariably faced by a fringe of Mchu or Mlilana where the soil is sandy.

Where there is good mud, however, Mkoko grows right down to the edge of the channels. In among the Mkoko are scattered Muia and Mkandaa, but the Mkoko are the commonest trees and hold the eye more because of their tangled stilt-roots. Dense patches of young seedlings are normally present under the parent trees. In places usually far up the creeks, one notices a few Mkomafi, and still further up, one may find Msikundazi.

On the landward side, there are frequently fringes of palms—*Hyphaene*, or south of Mombasa, *Borassus sp.*, mixed with the "toothbrush tree" (*Salvadora persica*—Msuaki) and *Sideroxylon diospyroides* (Mkoko-bara), etc., etc. These come down to within a yard or so of high-water mark. Next, if the ground is level, there will be a strip varying from 10 yards to half a mile in width, of scrubby Mchu, and finally one reaches the *Rhizophoraceæ* in the swamps proper. Normally the Mkoko are separated from the Mchu by a belt of small Mkandaa.

Fauna.

In the creeks, many birds, such as Kingfishers white and blue Herons, Kites, Curlew, Sandpipers of different sizes, Fish-eagles, etc., are common. Oriels and a few other land-birds are also found, and in the wide shallow sandy-bottomed reaches at the mouths of many creeks, one meets with pelicans, flamingoes, ducks and large stork-like birds. Stone-curlew (Dikkop) and several species of francolins live just on the edges of the swamps in some places, and provide fair sport.

On the landward side countless small crabs, each with one disproportionately large red or blue claw, seem to do the work normally done by earthworms. Another larger crab, up to 6in. to 7in. across, with bright red claws, is common. This is the species which is responsible for some damage to Mkoko seedlings. It feeds on green vegetation, and is particularly fond of Mchu leaves. The small variety mentioned above seems to feed on decaying organic matter. The large edible crab is found in fairly deep holes in good mud which is covered by the tide daily, and can be caught by means of a hooked stick which is thrust down into the hole, and quickly withdrawn. Many fine fish enter the creeks and large edible prawns are common. The natives catch these, and the fish, by means of nets, fishtraps of various sorts, as well as by using the ordinary hook and line. Sometimes pools are poisoned with the juices extracted from various plants, and the fish are taken as they float away in a stupified condition.

Manitu ("Mermaids") probably occur in most creeks, and are sometimes caught. Amphibious mudfish are common, and two or three Chinamen make their living in the creeks by catching and exporting bêche-de-mer. Stilt-roots of Mkoko and pneumatophores of Mlilana are often found with small oysters which, however, the

natives do not eat, though in Vanga they collect quantities of " tiger-shells " and eat the occupants.

Small green tree snakes are often seen well inside the swamps, and jackals, genets, civets, mongoose spp. and probably cats come down at night and hunt for crabs and fish.

Many species of buck, such as topi, a gazelle-like Granti (probably Petersi), waterbuck, lesser kudu, greater kudu (north of Malindi), roan antelope, duiker spp., sable antelope (Vanga), bushbuck, etc., come down at night to eat salt earth, or to browse on Mchu leaves, which contain much salt. They do not venture into the mud, but stay on the mchu-covered sand-ghats. Zebra, elephant, rhino, leopard and lion also come down to these flats at night, while troops of baboons are commonly found there by day. At the mouths of the creeks there are often small islands covered with Mvinji and scrubby growth, and on these live many dik-dik. They feed on succulent leaves, and do entirely without fresh water.

Crocodiles are found in many of the creeks, living in salt water, though they are more plentiful higher up where there is often a slight flow of fresh water as well.

Very few insects seem to eat the leaves of the swamp trees, but mosquitos are numerous, commonly living in crab-holes at low tide, and retiring to the leaves of Mchu, etc., at high tide. Fire flies are present, but are not very numerous.

Special Features of Swamp Trees.

Most swamp trees differ from the land-flora in two respects:

(a) The seeds of some, *i.e.*, the *Rhizophoraceæ* and *Mchu* germinate on the trees, so that they waste no time in taking root once they fall.

(b) Their roots (with the exception of *Mvinji* and *Pemphis* which do not grow in mud) have special adaptations in order to secure aeration.

i.e., Mkoko keeps a great part of its roots out of the mud altogether.
Muia, Mkandaa, and Lumnitzera have knee-roots.
Mlilana and Mchu have pneumatophores.
Mkomafi and Msikundazi have ribbon-roots.

NOTES ON THE FAUNA AND FLORA OF NORTHERN BUGISHU AND MASABA (ELGON).

By G. L. R. Hancock, M.A., F.E.S., F.Z.S.
Assistant Entomologist, Department of Agriculture;
and
W. W. Soundy, B.A., *Science Tutor, Makerere College, Uganda.*

Description of the Country.

Northern Bugishu is the hill country lying north-west of Mount Elgon latitude 1.1°N. long. 34.5°E., and of the peaks of this mountain the easiest to reach is Jackson's summit, or Masaba (Pl. VI., fig. 1), which latter peak gives its name to the whole mountain, the majority of Africans in Uganda being completely ignorant of the name Elgon. Stanley (1875), p. 185, uses the name Marsawa, and Hobley (1897, p. 185) writes:—

> " Curiously enough none of the tribes on or surrounding the mountain have any knowledge of the popular name for the mountain (Elgon), and I believe this to have been derived in some confused manner from the name of the tribe on the south side, the El-Gonyi. The Wa-Kitosh call the mountain Masawa; the Wa-Lako Masawa Tukul; and the tribes on the west side use the name Ruteka. Masawa is the name which is the most widely known."

Thomson (1887, p. 274) writes " Elgon or Masawa," but on p. 298 calls the mountain Elgon and states that Masawa is Kitosh of the Masai. On his map he places the district Masawa south of Elgon. The Uganda Protectorate lies for the most part nearly 4,000 feet above sea level; the highest point of Elgon is Somi, 14,120 feet, Jackson's summit being 13,650 feet, and a third peak Vihi (Pl. VI., fig. 2) being 13,800 feet. A good road runs to an excellent rest camp at Budadiri in the Siroko Valley, 4,120 feet, and it is an easy walk through forest, bracken, and heath to the mountain top.

The Makerere holidays and a fortnight's local leave enabled us to make a number of observations on the entomology of the district during the month of August. The main object of the tour was to collect freshwater insects; to note whether the prevalence of mosquitos in these regions showed any indication of being controlled by any biological factors; to ascertain what limits altitude puts to mosquito breeding; and to investigate the fauna of the bamboo forest and of the alpine zone, including the small lake near Jackson's summit. In such a short time it was obviously impossible to reach any final conclusions, but the notes accumulated may not be without interest.