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

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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.

The first week was devoted to rock-holes and to the streams in Northern Bugishu beginning from the Siroko river and crossing the ridges and valleys from Butandiga, 7,010 ft.* to Sipi (about 6,500 ft.) with its fine view from the camp overlooking the falls (Pl. IV., fig. 1) and the dense forest vegetation illustrated on Pl. 1, fig. 2. The second week was occupied by the ascent from Butandiga and our return through Budadiri to our headquarters, Kampala. Further material, including some interesting mosquitos, was collected in January, 1930, by Mr. Hargreaves (Government Entomologist), who has allowed us to include his records, and part of a collection made by Dr. G. D. H. Carpenter in December, 1928, has also been available for examination.

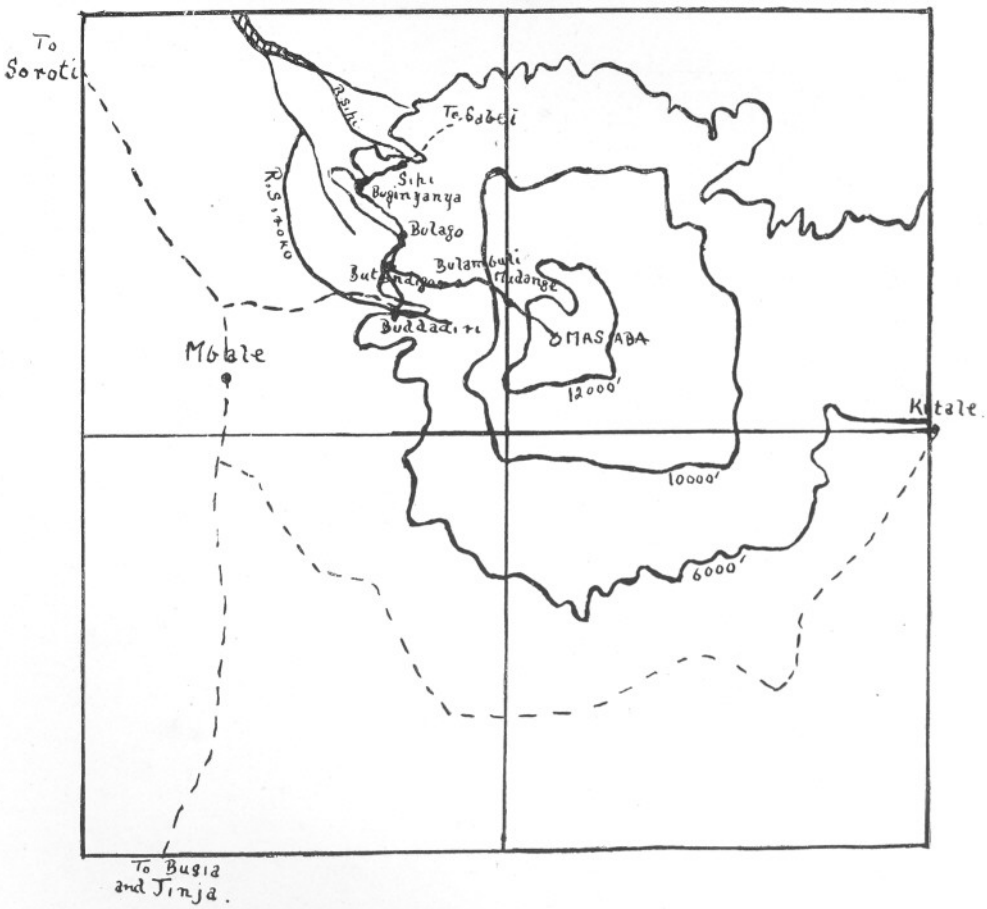
From Budadiri the hills appear covered with banana plantations and a wide grass path leads to within about 600 feet of Butandiga, reached finally by a steeper rocky ascent. Butandiga itself is situated at an altitude of 7,010 feet at the end of one of the many ridges (Pl. II., fig. 1) which radiate from the mountain, and along which runs the path to the summit. The wide paths of short turf, closely grazed, are characteristic of the mountain; goats, sheep and cattle being grazed even in the alpine zone. Patches of " bulo " (a small millet, *Eleusine* sp.), and small plots of healthy coffee (*C. arabica*) are seen at intervals among the banana cultivation and scattered in the herbaceous or shrubby vegetation in which many Labiates occur, including a fragrant leafed *Coleus* with a spike of dark blue flowers, and where later in the year the mauve flowers of a big *Vernonia* (COMPOSITAE), which stands about 15 feet high, dominate the vegetation. The slopes below Butandiga are also famous for onions which are grown in considerable quantities. Some of the plots indicate an attempt at terracing, although this appears to be due to weeds being pulled down hill and allowed to accumulate at the bottom of the plots. Nicholson (1930 (b), p. 11) mentions that bananas are also planted along the contours.

ROCK HOLES.

In pot holes in many of the rocks both near streams and higher up on the hillsides were collections of rain water and at Buginyanya camp (about 6,500 feet) water was found seeping out under the turf and flowing over rock into a tiny water hole. In very many of these were found larvae of the mosquitos, *Culex vansomereni*, Edw. var.†

* Mr. Gibson of the Survey has given us the heights of Budadiri, Butandiga, and Jackson's summit. Other heights were taken by boiling point and averaged an error of about 1° C. or 1,000 feet too low. After allowing for this it is probable that heights given are within 500 feet. The survey of the mountain will not be complete for some months.

† Mr. F. W. Edwards states that these specimens agree closely with *C. vansomereni*, Edw. Mr. G. H. E. Hopkins has not seen larvae of *C. vansomereni* from the type locality but finds the writers' material to differ but slightly from *C. draconis*, Ingram and de Meillon (= *vansomereni*, Edw.).



——— Track taken on the mountain.
. . . . Motor roads.

and *Culex andersoni*, Edw., usually accompanied by numbers of Chironomid larvae (blood-worms), and sometimes by small beetles (*Bidessus ovoideus*, Reg. and *Bidessus geminus*, Fabr., var. *capensis*, Reg.); in most cases the mosquitos were very abundant, but in the tiny water hole at Buginyanya there were only two or three specimens and in addition to eight small *Bidessus* two specimens of *Agabus raffrayi*, Shp. and three Hydrophilids of about the same size were taken. Mr. Hargreaves obtained larvae of *Anopheles garnhami*, Edw. from a rock pool at the edge of the stream at Sipi in dense forest shade. In a neighbouring rock pool deeply shaded by foliage and overhanging rock he obtained larvae of *Culex andersoni* and *Culex ? trifilatus*, Edw. In an open rock pool, bare of all vegetation, larvae of *Aedes vittatus** were collected. Near Bulago (about 7,000 feet) a number of small *Ostracod* Crustacea (at present unidentified) were found in one of these rock holes. In one hole at Butandiga a small water bug *?Anisops* sp. (very young) was found and many had a number of *Microvelia* sp. on their surface.

STREAMS.

After passing the few streams which were examined near Budadiri there was one change which was striking. While specimens of the genus *Gerris* were common in these regions and specimens of *Velia* sp. or spp. occurred, no *Velia* and only a single *Gerris* were found at the higher levels. The genus *Metrocoris*, while represented at the lower levels, was very abundant in all streams in Bugishu. A single winged specimen of a *Metrocoris* was taken in a tiny stream after crossing the ravine from Buluganya on the road to Bulago. Specimens belonging to the genus *Anisops* occurred in the streams at low levels only; none were found in the streams at higher altitudes. Characteristic and dominant of all these streams were hosts of Ephemerid larvae which would appear to afford ample food for fish which, according to native report, do not occur in the Bugishu streams except near the edge of the plains. The frequent falls would preclude the possibility of any fish coming up from lower levels. A very large black Ephemerid larva (3.5-4.5 cm. long) occurred in mid-stream at Bulago and Sipi under rocks. With the exception of a single black species of which a solitary specimen was found resting near a tiny brook, it was only in one place that EPHEMERIDAE were noticed on the wing, despite the number of larvae in all the streams. It is therefore probable that the flights of these insects are seasonal. Stone-fly, dragon-fly, and Simuliid larvae occurred in moderate numbers. A fair number of GYRINIDAE ("whirligig-beetles ") were taken and these included *Aulonogyrus flaviventris*, Reg., *A caffer*, Aubé, *A. virescens*, Reg., and *Orectogyrus assimilis*,

* Mr. G. H. E. Hopkins informs us that these larvae are inseparable from the description of *A. vittatus*, but in view of the number of undescribed *Aedes* larvae these records should be considered as needing confirmation.

Reg. At the edges of the streams in slack water a large species of NOTONECTIDAE (*Enithares v-flavum*, Reut.)* occurred and often numbers of the little Dytiscid beetle *Yola* sp. near *Bicrista*, Shp., and some minute *Micronecta* (CORIXIDAE). Tadpoles abounded and sometimes fairly large crabs were seen. Mosquitos were very uncommon and with one exception, a stream below Buluganya, where two larvae (undescribed) of a *Culex* were found, none were encountered. Mr. Hargreaves obtained one *Culex annulioris*, Theo. from a larva collected at the edges of a stream near Bulago. In a small swamp near Butandiga with a little stream running through it were found larvae of *Anopheles kingi*, Christ. (adults were bred later from further material obtained in the same spot by Mr. Hargreaves). These larvae occurred in gently flowing water among the roots of *Cyperus dicroostachyrus*, Hochst. In this swamp water beetles were most unexpectedly rare, the following being captured after a thorough search: seven *Aulonogyrus virescens*, Reg.; three *Bidessus ovoideus*, Reg.; two small brown Hydrophilids and a larger black Hydrophilid; water bugs included two *Micronecta* and two *Metrocoris*.

Observations were made on the temperature of the streams. The Siroko river was 17°C. and the streams from Butandiga to Sipi varied from 12.8°C. to 14°C. Ground temperatures were also taken at sunset and about sunrise, the following records being made: Butandiga 14.7°C. (sunset), 9.7°C. (sunrise); Bulago, 18.5°C. (sunset), 11°C. (sunrise); Buginyanya, 14°C. and 15.2°C. (sunrise); Sipi, 14.8°C. (evening), 13.5°C. (morning); Buluganya, 12.8°C. (sunrise). At higher altitudes the records were: Bulambuli, 9.4°C. (sunset), 5.6°C. (sunrise); Mudange, 5.7°C. (sunset), 4.4°C. and −3°C. (sunrise) (white frost).

THE BAMBOO AND HIGHER FORESTS.

The walk from Butandiga to Bulambuli was very beautiful; the path follows the crest, which at times narrows almost to a knife edge from which very steep paths descend to the villages below, the roofs of which can be seen among the banana trees (c.f. Pl. II., fig. 2), which extend up the steep slopes of the valleys. After crossing the knife edge the path ascends steeply through a forest of large trees, which in some cases were heavy with a lichen resembling an *Usnea;* among the herbaceous vegetation was seen the large balsam (*Impatiens elegantissima*, Gil. Johnston, H.H., 1902, pp. 47 and 324 as *I. ehlersii*) found only in swampy places at the lower levels and the big dark blue mountain *Acanthus*, standing about 8 feet, and which, though possessing fewer flower spikes than the common pink species of Uganda illustrated by Johnston (1902, p. 46), is a grander plant.

* Det. by the writers *ex. descr.* Of eight examples none are less than 11.5 mm., most specimens being 12 mm. (c.f. Hutchinson, G. E. *Ann. S. Af. Mus.* XXV., p. 370, 1929.)

From the forest the path passes through bracken and then through an area dominated by a composite with an unpleasant aromatic leaf. The first tree heather and bamboo (*Arundinaria alpina*, K. Schum.) were here seen together at about 8,000 feet. Associations of bamboo and tree heather occur at the height of Bulambuli, 9,000 feet (Pl. II., fig. 2, and Pl. III., fig. 2); at 10,000 feet, after a final short steep climb, the forest gives way suddenly to open alpine country mostly dominated by various grasses and by tree heathers. All along the path below 10,000 feet may be seen violets (*Viola abyssinica*, Steud), an element reminiscent of Europe and contrasting sharply with a valley filled with tree ferns which was passed below Bulambuli just before entering the true bamboo forest zone.

The fauna of the bamboos was perhaps the most interesting element met. In open bamboos, where water had collected, larvae of *Culex hancocki*, Edw. (MS.) were found; if the top was broken and decayed with the weevil *Phloeophagus marginatus*, Mshl. (MS.) feeding, and the water smelling foul, no larvae occurred. Many of the bamboos had been bored and the larvae of *Conicofrontia* sp. (NOCTUDAE) were found feeding in the wood. If holes made by this larva were at some distance above a node, water and sap collected and formed a somewhat viscous, white, rather sweet-smelling habitat for the same mosquito. It was however found difficult to keep larvae alive as, on removal, the liquid rapidly became foul. Comparison by Mr. G. H. E. Hopkins (Medical Entomologist) between the larvae found in the open and bored bamboos showed no significant differences and it is interesting to note the wide range of habitat of the species. The long anal gills of *C. hancocki* described by Hopkins (1930, MS.)† were very conspicuous in the living larva. Temperatures taken at Bulambuli in open bamboos were 14°C., in the sap in bored bamboos 10°C.*

The boring *Conicofrontia* larva appears to be parasitised to some extent, small Braconid parasites being found in the bored stems and

† Mr. Hopkins' paper, which is appearing in the *Bull. Ent. Res.*, has not yet been received.

* Dr. A. Lutz of the Institute Oswaldo Cruz has most kindly given us some interesting information on the subject of the Brazilian forms and it was a previous suggestion of his which led to the above observations. He informs us that in Brazil five genera of mosquitoes breed in bored bamboos, viz. : *Megarhinus*, *Bancroftia* (=*Orthopodomyia*), *Culex* (*Corrollella*), *Tricoprosopon*, and *Wyeomyia* (=*Dendromyia*), and that the trees are bored by weevils of the family CHULIDAE, the mosquito larvae being found in what he terms a " pathological effusion " within the stems. The weevils often cause a ring of perforations round the bamboo which then breaks, larvae thus being sometimes found in open bamboos but not in collections of rain water; he considers the water in the open bamboos always to be the product of a reaction of the tree and to contain little or no rain water. The habitat of *C. hancooki* in bored bamboos could well be included in the term " pathological effusion." In the open bamboos, however, larvae were found in what appeared to be rain water.

investigating the openings made by the larvae. These openings were however often covered with sticky sap and may have attracted the parasites to feed. A pair of the Ichneumon, *Campoplex* sp. (OPHIONINAE)* was bred from two of the larvae which arrived safely at the laboratory in Kampala. Under the sheathing bracts at the nodes were found the red legged weevil *Amphitmetus planicollis*, Mshl. ssp. *elgonensis*, Auriv., perhaps feeding on the buds which grow out at this point as the trees grow older; these specimens closely resemble those from the type locality, Ruwenzori, but differ more from specimens colected on the plains of the Eastern Province. A specimen of *Pimpla spectabilis*, Szep., was taken in the bamboo region and these metallic Ichneumons seem to be associated with this altitude and vegetation; *P. calliphora*, Morl., occurs in the Bwamba pass, Ruwenzori, among the bamboos which flourish there. As few African ICHNEUMONIDAE other than those groups revised by Morley (Revision of the Ichneumonidae, I.-IV., British Museum, 1912-1915) have been even roughly classified, no attempt was made to collect this group, which, from Dr. Carpenter's collection of insects, appears comparatively more numerous in this region than in the plains.

Leaving Bulambuli the path continues through the bamboo forest to a stream (Pl. III., fig. 2), in which it was possible only to find specimens of the ubiquitous genus *Microvelia* and the usual may-fly larvae; a few adult may-flies were also taken. Around the stream were growing a large water hemlock, clumps of *Begonia* sp., *Epilobium cordifolium*, A. Rich., and the recently-described *Oenostachys dicroma*, Bullock, which resembles a gladiolus; beyond were tree heathers among which bright scarlet " red hot pokers " (*Kniphofia snowdenii*) grew and little white-flowered *Sysimbrium* and CRUCIFERAE, including the cuckoo flower *Cardamine pratense*, L. The abundant little fritillary butterfly, *Argynnis hanningtoni*, Elw., was the only butterfly seen here except a few Lycaenids *Cacyrius palemon fracta*, Grunb., an occasional *Terias* (*T. regularis*, Butl., and *T. zoe*, Hoppf.), and " painted lady " (*Pyrameis cardui*, L.). Mr. Hargreaves found *A. hanningtoni* below Bulambuli at about 8,000 feet, and one of us (G.L.R.H.) has taken it at about 6,500 feet on Mount Nkokonjeru. By the lake near the summit one Hesperid (? *Rhopalocampta* sp.) was seen but eluded capture. Passing up again from this isolated community of plants of the heather association through further bamboos, two little Balsams, one a small pink flowered species and higher up a

* Dr. A. Roman has most kindly examined the specimens which belong to an apparently undescribed species and draws attention to the fact that, with the exception of *C. binghami*, Morl. from India, no other species of the genus has the long ovipositor and suggests that this may be found to be correlated with the habitat of the host which is such that only a species with a long ovipositor could lay her eggs within the borings. He adds that these specimens would fall into the " genus " *Trophocampa* as defined by Schmiedeknecht.

little bright red species, were, with the forget-me-not (*Cynoglossum lanceolatum*), the little buttercup, *Ranunculus pinnatus*, Poir., and the bright pink Orchid, *Disa stairsii*, conspicuous objects beside the path which gradually passed into a different type of forest including *Polyscias kikuyuensis*, emerging at about 11,000 feet on to the true alpine plateau.*

The Alpine Zone.

A considerable amount of attention was given to this area up to and beyond Mudange camp (Pl. V., fig. 1) (12,000 feet) as far as Jackson's summit, 13,650 feet. A list of plants is given by Sir Harry Johnston (1 c., p. 327) and a complete list of species collected by us is given in appendix B.

This alpine zone contained a number of conspicuous plants; in the path just before leaving the forest were the yellow flowers of *Landtia Rueppellii*, Benth. and Hook (Compositae), the flowers becoming almost sessile in the alpine zone. In a little boggy patch were the minute bright blue flowers of *Lobelia inconspicua* lying on a green cushion of moss and these were found again near the lake (Pl. V., fig. 2) below the summit; a little further along the path were noted an Anemone (*A. thomsonii*, Oliv.) and the delicate pink pendulant flowers of *Dierama vagum*, N. E. Brown (Iridaceae). In this region too were the tiny common grey gentian *Swertia crassiuscula* (which occurred also on the patch of grass at Bulambuli camp), a flower like a crocus (*Romulea ramiflora*) and numbers of yellow and red *Kniphoffias*, presumably the same species (*K. Snowdenii*) as occurred near Bulambuli. In two places in boggy ground was an absolutely sessile buttercup, *Ranunculus oreophytus*, Delile. The giant groundsels (*Senecio Johnstoni* and *S. Elgonense*, F. Fries (Pl. V., fig. 2), the tree heathers, and the large lobelias were the most striking plants. According to Gregory (1921, p. 150) these plants were widely distributed in earlier ages when the climate of this part of Africa was more temperate; they have long survived on the mountains where isolation has in many cases been followed by the formation of distinct species. In discussing the mountain flora, Chipp (1930, p. 140) writes:—

> "It does not appear correct, in the light of our new knowledge to regard the areas occupied by this montane vegetation as a ' no man's land ' over which representatives from the north and south temperate regions have migrated. The connections which it establishes makes one almost hesitate to differentiate what is Mediterranean and what is South African when one sees so much which is common to both in the intervening area."

* Granvik (1923) distinguishes the heather zone as sub-alpine and the Senecio and Lobelia zone as Alpine. There is considerable overlapping on West Elgon and we include both these flora under the term alpine.

Two lobelias were common, one a very hirsute species *L. telekei* appearing to have a woolly flower spike and above Mudange a larger and more glabrous form *L. Elgonense* (Pl. IV., fig. 2). A number of Umbellifers occurred, the blue flowered Scabious (*S. columbaria*), and a beautiful claret coloured *Swertia* (GENTIANACEAE); a green and a white species were found of the Orchid genus *Habenaria* (*H. decorata*, Hochst., and *H. splendens*) on some rocky ground which preceeded the descent immediately before the final ascent to Mudange, and one single flower was found on the bushes of St. John's wort, *Hypericum lanceolatum*, above Mudange camp. Mention is made by all travellers of the various species of *Helichrysum* (everlasting flowers). Comparatively few species were collected in flower, but it is clear that many others flower at a different season; Mr. Hargreaves noted large numbers in flower at and below Bulambuli in January, and three other species were collected by Mr. A. E. Wilson in December, 1929. The little sweet pea *Lathyrus imtricata* and *Arabidopsis thalianum* complete the list of the obvious plants other than the grasses and sedges though a number of minute or rarer plants were found besides the many COMPOSITAE.

Much valuable material has been collected from this area by Mr. J. D. Snowden, Agricultural Officer, and we are indebted to him for the names of many of the species seen; the rest have been named by the kind assistance of the Royal Botanic Gardens, Kew, and we wish especially to thank Messrs. Cotton and Bullock for the trouble they have taken with very scanty material. We can find no published account since the last given by Sir Harry Johnston and there is a great opportunity for any botanist to contribute an account of the plant ecology of this area. In his account of the flora of Kilimanjaro, some comparative notes are given by Cotton (1930).

At Mudange it was very cold, and it was necessary to sit by a roaring fire of heather logs in the evenings in order to obtain any measure of comfort; and it was as the logs burned that we were able to obtain specimens of an undescribed longicorn beetle driven out of them by the heat.

During the ascent a number of holes were noticed in the leaves of the arborescent Senecios and a large black weevil, *Seneciobius loveni*, Auriv. was found making these. Bryk (1927) refers to this species only from the flowers. Two smaller species, *Xestorrhinus brevirostris*, Auriv., and *Parasytates hancocki*, Mshll. (MS.), were abundant at the bases of the leaves but could not be associated with any definite damage.

Two saw-flies, *Athalia* spp. were also taken with these weevils; it was noticeable that the saw-flies were less rare in Bugishu than in most parts of Uganda.

It was only above 12,000 feet that *Lobelia Elgonense*, R. E. Fries, was found. The young plants were found full of a viscid liquid in

which pieces of ice were floating, and of which the temperature was −2°C. This water was inhabited by numbers of larvae of a Chironomid (*?Metriocnemus* sp.), and under the decaying leaves were numbers of *Xestorrhinus lobeliae*, Auriv. (CURCULIONIDAE) originally recorded from this habitat by Bryk; *Trogosipalia hancocki*, Bernh. (STAPHYLINIDAE) were also found in this habitat together with some caterpillars which could not be bred out, and of which some had fallen into the water; this water is an excellent trap for insects, as has been recorded previously by Bryk.

At about 12,500 feet a large pond or small lake (Pl. V., fig. 2) is situated which is apparently fed by a spring, and although a cold wind was blowing over it our temperature record showed it to be comparatively warm, 10°—11°C., whereas the temperature of a small stream just below was 8.2°C.

ALGAE and CRUSTACEA abounded in the water of this lake but no insects were to be found.

In this alpine region three species of CARABIDAE were found running on the path: *Calosoma alinderi*, Braun; *Scarites aberdarensis*, Allaud; and *Scarites* sp. near *hutchinsi*, Allaud. These have also been collected by Dr. G. D. H. Carpenter in another part of Bugishu in similar country. The little brachypterous grasshopper *Paracomacris elgonensis*, Uv., was also not uncommon in this area, but no other grasshoppers were noted.

On returning to camp we immediately got into as many clothes as we could and huddled round our fire of heather logs, and we were quite pleased to return to the cold and damp comforts of Bulambuli and Butandiga on the next day.

The conditions on the alpine region appeared to us to be drier than those at lower altitudes and the whole time storms could be seen and heard below (cf. Nicholson, 1930 (a), p. 21). A further very considerable influence which must affect the flora and fauna of this region is the annual burning of the grass which is carried out in the early months of each year.

It is remarkable that a locality of such interest and so easy of access has been almost entirely neglected by British biologists. It has been left to the Swedish Expedition to survey this area (Lovén, 1920 and 1921); and collections of insects have also been made by Allaud and of plants by Dummer (1919) and others. Granvik (1923) draws attention to the various faunistic elements which meet on this mountain. The western side no doubt contains more of the West African forms in the forest zone than are to be found on the eastern plateau.

A few remarks may be of help to any one who may be thinking of making a trip on the mountain and who may consider making Budadiri their starting point; the road to Budadiri is excellent and there is

room for two cars under the shelter at the foot of the ridge which one climbs to reach Butandiga. The cost of porters to Butandiga is 45 cents* per porter, and from Butandiga to the top and back 50 cents a day for each porter. The writers took 14 porters, but it would be advisable to increase this number to 20, in order that a tent and paraffin stove could be taken up in addition to one's everyday kit, as the cold is likely to be very unpleasant during the stay at Mudange.

Food is cheap and easily obtainable at Butandiga and can be taken on up to Mudange; eggs are 2 cents each, chickens 50 cents each, milk 10 cents a bottle, " matoke " 10 cents a bunch, and all sorts of European vegetables at similarly low cost.

It should be remembered that one is certain to meet with heavy rain at one time or another during the march and care should be taken to see that waterproofs are in good condition, and that changes of clothes are easily obtainable.

In conclusion we wish to express our indebtedness to Mr. J. Omer-Cooper, who stimulated us to undertake the excursion, and undertook the identification of many of the water beetles; also to Mr. G. H. E. Hopkins, Medical Entomologist, for investigating the mosquito material; and to the following specialists who have assisted by identifying specimens: Mrs. J. Omer-Cooper, Mr. F. W. Edwards, Mr. D. S. Wilkinson, Sir Guy A. K. Marshall, Mr. B. P. Uvarov, Dr. Banniger, Dr. Bernhauer, Dr. V. G. L. van Someren, Mr. A. D. Cotton, Mr. A. A. Bullock, Prof. R. E. Fries, and Dr. A. Roman.

* The East African shilling is equivalent to the English shilling and is divided into 100 cents; 10 cents therefore representing a little over a penny.

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PLATE I.

Fig. 1. Stream below Buluganya.
PHOTO : W. Soundy.

Fig. 2. *Lobelia Gibberoa* in forest above Sipi Falls.
PHOTO : J. M. Wallace.

PLATE II.

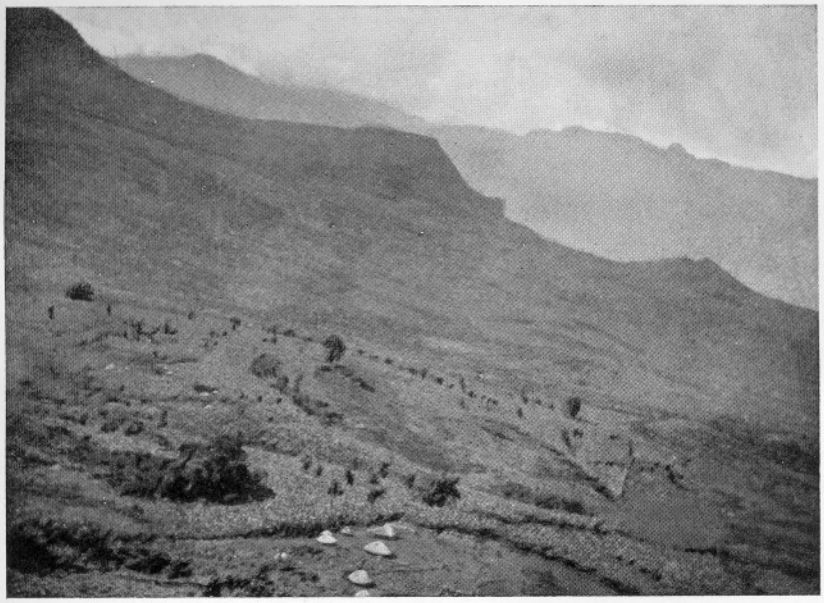

Fig. 1. Lower Slopes from below Butandiga.
PHOTO : W. Soundy.

Fig. 2. Two Tree Heathers at Bulambuli.
PHOTO : W. Soundy.

PLATE III.

Fig. 1. Tree Heather, *Erica arborea*, at Bulambuli.
PHOTO : W. Soundy.

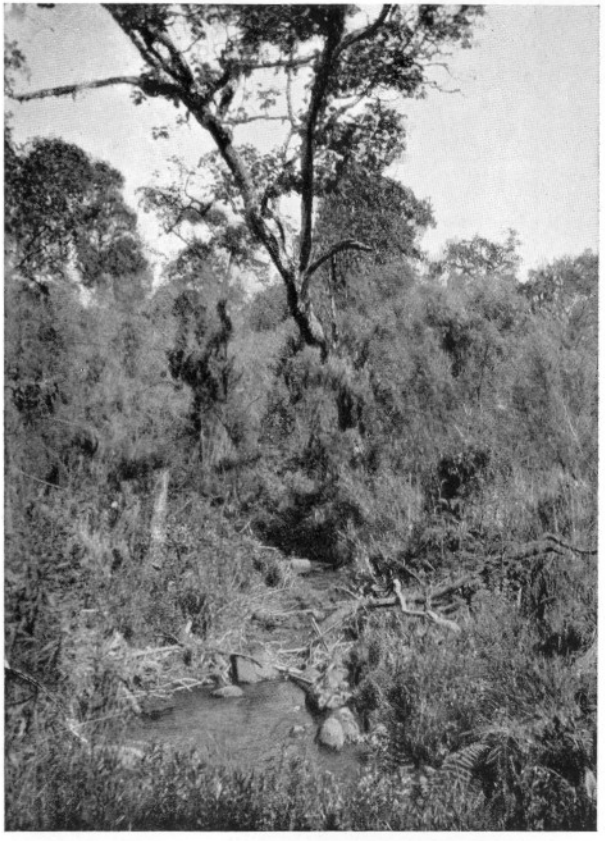

Fig. 2. The stream through the bamboo forest above Bulambuli.
PHOTO : W. Soundy.

PLATE IV.

Fig. 1. The Falls seen from Sipi Rest Camp.
PHOTO : W. Soundy.

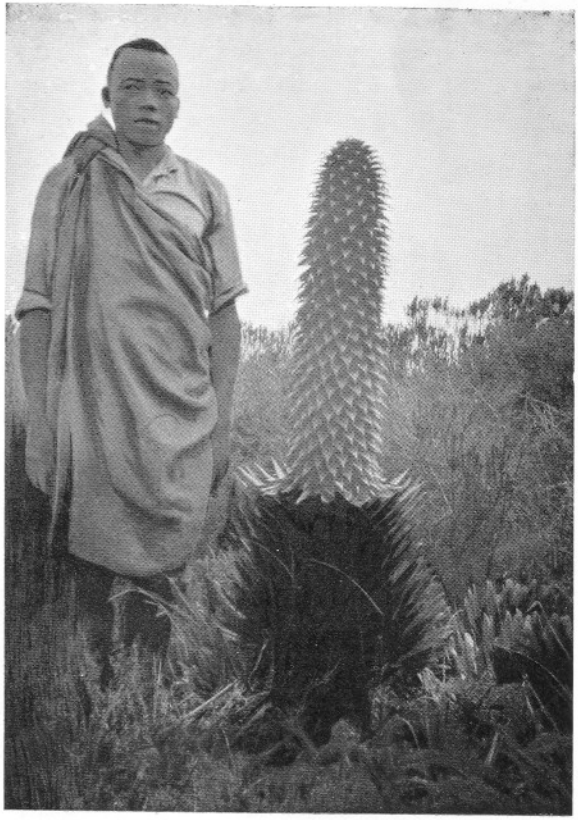

Fig. 2. A giant *Lobelia elgonensis*.
PHOTO : W. Soundy.

PLATE V.

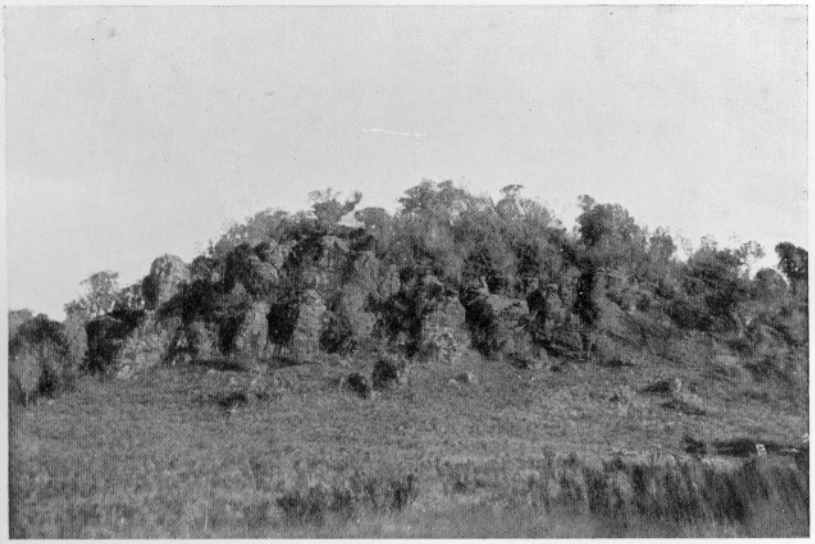

Fig. 1. Small hill of rocks with tree heathers, Mudange Camp.
PHOTO : W. Soundy.

Fig. 2. The lake below Jackson's Summit, with *Senecio elgonensis*.
PHOTO : W. Soundy.

PLATE VI.

Fig. 1. Jackson's Summit or Masaba.
PHOTO : W. Soundy.

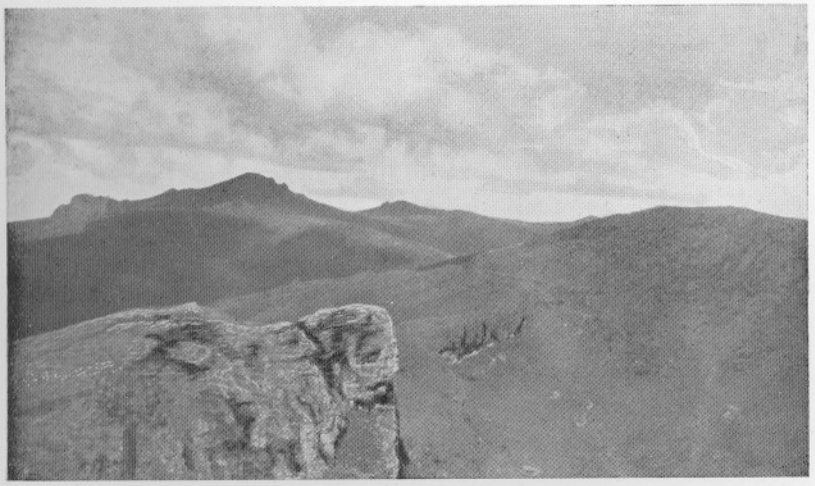

Fig. 2. Vihi Peak.
PHOTO : A. E. Wilson.

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APPENDIX A.

List of Insects Collected in Bugishu.

This is by no means a complete list, and in some groups no attempt has been made to obtain identifications.

Unless otherwise stated, insects were collected by the writers during August, 1929. Those marked H.H. were collected in Northern Bugishu in January, 1930, by Mr. H. Hargreaves, unless another locality is given; those marked G.D.H.C. were collected during December, 1928, and January, 1929, by Dr. G. D. H. Carpenter, between 6,500 and 9,000 feet. Insects marked "Nkoko" were collected on a neighbouring mountain Nkokonjeru, from 6,000 to 7,000 feet, by one of the writers (G.L.R.H.) during December, 1926.

Rhopalocera.

Papilonidae.

Papilio mackinnoni, E. M. Sharpe. Sipi.

Pieridae.

Catopsilia florella, F. Butandiga, Buginyanya, Budadiri; Buhugu (H.H.).
Pieris raffrayi, Oberth. Sipi; Nkoko.
Leptosia medusa ab immaculata, Auriv. Buginyanya.
Mylothris rueppeli, Kirby. Butandiga, Buluganya, Buginyanya; N. Bugishu (H.H.).
Mylothris yulei, Butl. Buginyanya. (det. Bryant.)
Mylothris sagala knutsoni, Auriv. (G.D.H.C.).
Belenois severina, Cram. Sipi.
Belenois victoria, Drury. Sipi, Bulago, Bulambuli; Nkoko.
Teracolus evenina, Wallgr. (dry season form). Butandiga.
Terias regularis, Butler. Butandiga, Buginyanya, Bulambuli, Sipi.
Terias zoë, Hoppffm. Bulambuli, Sipi, Buginyanya.
Terias senegalensis, Bdv. Below Butandiga.
Terias hapale, Mab. Buginyanya.
Colias electo, L. 8,500 feet (H.H.).
Coleas electo ab. aurivilius, Kef. Buginyanya.

Satyridae.

Ypthima albida, Btlr. (G.D.H.C.); Butandiga.
Mycalesis dentata, E. M. Sharpe. (G.D.H.C.); Nkoko.
Neocoenyra gregorii, Butler. Budadiri.

NYMPHALIDAE.

Danais chrysippus, L. Budadiri, Butandiga, Sipi.
Acraea oreas, E. Sharpe. (G.D.H.C.); Buginyanya.
Acraea zetes, L. Below Butandiga.
Acraea caecilia, F. Sipi, Buginyanya.
Acraea asboloplintha, Karsch. (G.D.H.C.); Nkoko.
Acraea sotikensis, E. Sharpe. (G.D.H.C.); Butandiga (H.H.); Nkoko.
Acraea melanoxantha, E. Sharpe. (H.H.); (G.D.H.C.).
Acraea bonasia, F. Butandiga (H.H.).
Acraea disjuncta, Gr. Sm. Nkoko.
Acraea ansorgei conjuncta, Gr. Sm. Nkoko.
Planema quadricolor, Rog. Nkoko.
Precis pelarga, F. Butandiga.
Precis archesia pelasgis, Godt. Below Butandiga.
Precis octavia sesamus, Trim. (wet season). Budadiri, Butandiga; Buhugu (H.H.).
Precis terea, Drury. Buginyanya.
Precis sophia infracta, Rog. Butandiga, Bulago; 6,000 ft. (H.H.).
Precis tugela aurorina, Butlr. Bulago.
Pyrameis cardui, L. Buginyanya.
Argynnis hanningtoni, Elw. Bulambuli; below Bulambuli, 8,500 feet (H.H.).
Byblia ilithyia badiata, Grunz. 8,500 feet (H.H.).
Antanartia hippomene, Hbn. Buluganya.
Antanartia schaeneia, Trim. Buginyanya.
Charaxes ansorgei, Roths. (G.D.H.C.).
Charaxes varanes vologenses, Mab. Budadiri.
Charaxes candiope, Godt. Below Butandiga.
Ergolis pagenstecheri, Suff. Buginyanya.
Neptis agatha, Stoll. Budadiri.
Neptis incongrua, Butlr. (G.D.H.C.).
Vanessula milca, Hew. Sipi (H.H.).

LYCAENIDAE.

Uranothauma delatorum, Heron. (G.D.H.C.); Buginyanya.
Cupido aequatorialis, Gr. Sm. (G.D.H.C.); Buginyanya.
Cupido crawshayinus, Auriv. (G.D.H.C.).
Cupido antinorii, Oberth. (G.D.H.C.).
Cacyrius palemon fracta, Grunb. (G.D.H.C.) Bulambuli.
Castalius margaritaceus, E. M. Sharpe (Uganda form). Butandiga.
Cyclyrius stellatus, Trim. (G.D.H.C.); Nkoko.
Cyclyrius sharpei, Butlr. Nkoko.
Zizera lysimon, Hubn. Nkoko.
Zizera gaika, *Trim*. Nkoko.

HESPERIDAE.

Acleros mackeni, Trim. Buluganya.
Serengesa lugens, Roth. Sipi, Buluganya.
Cyclopides midas, Butl. 6,000 feet (H.H.).
Celanorhinus galenus, Fabr. 6,000 feet (H.H.).
Eagris ochreana, Lathy. Elgon, 1924 (G.D.H.C.).

HETEROCERA.

Tortrix endopyrrha, Meyr. (TORTRICIDAE). Bamboo forest.
Trisophista doctissima, Meyr. (HYPONOMENTIDAE). Butandiga, Buhugu, Nkoko.
Hyponomeuta strigillata, Zell. (HYPONOMEUTIDAE). N. Bugishu, 7,900 ft. (G.D.H.C.).
Platyptila molopia, Meyr. (PTEROPHORIDAE). Bugishu, 7-9,000 ft. (G.D.H.C.).
Trichoptilus wahlbergi, Zell. (PTEROPHORIDAE). Bugishu, 7-9,000 ft. (G.D.H.C.).
Catolbistis thrasymedes, Meyr. (LAMPRONIADAE). Elgon, 11,000 ft.

COLOEPTERA.

CURCULIONIDAE.

Amphitmetus planicollis, Mshll., sub. sp. *elgonensis*, Auriv. Bulambuli.
Phleophagus marginatus, Mshll. (MS.). Bulambuli.
Seneciobius loveni, Auriv. 11-13,000 feet.
Xestorhinus lobeliae, Auriv. 12,500-13,000 feet.
Xestorhinus costatus, Mshll. (MS.). Bulambuli.
Xestorhinus brevirostris, Auriv. 11-?13,000 feet.
Parasystates hancocki, Mshll. (MS.). 11-?13,000 feet.

GYRINIDAE.

Aulonogyrus flavirentris, Reg. Sipi.
Aulonogyrus caffer, Aube. Sipi.
Aulonogyrus virescens, Reg. Butandiga.
Orectogyrus assimilis, Reg. Sipi, Bulago, Budadiri.
Orectogyrus bicostatus, Boh (=*suturalis*, Reg). Budadiri.

DYTISCIDAE.

Hydaticus galla, Guerin. Bulago.
Hydaticus flavolineatus, Boh. Budadiri.
Agabus raffrayi, Shp. Buginyanya.
Yola sp. near *bicrista*, Shp. Bulago, Buginyanya, Sipi.
Bidessus ovoideus, Reg. Bulago, Buginyanya, Sipi, Butandiga.
Bidessus geminodes, Reg. Between Budadiri and Butandiga.
Bidessus geminus, Fabr. var. *capensis*, Reg. Buginyanya.

Scarites oberdarensis, Allaud. (CARBIDAE). 11,000 feet.
Scarites sp. near *Hutchinsi*, Allaud. (CARABIDAE). 11,000 feet.
Calosoma alinderi, Braun. (CARABIDAE). 11,000 feet.
Trogosipalia hancocki, Bernhauer (STAPHILINDAE). 12,500-13,00 ft.
Anthicus quadrillum, Laf. var. (ANTHICIDAE). Butandiga.
Anthicus bottegoi, Pic. (ANTHICIDAE). Butandiga.
Dorcasomus gigas, Auriv. (CERAMBYCIDAE). Bulago (H.H.), N. Bugishu, 6,000 feet (G.D.H.C.), Nkoko.
Monolepta haematura, Fairm. (GALERUCIDAE). Bugishu (G.D.H.C.), 7-9,000 feet.
Ceralces natalensis, Baly. *ab sansibarensis*, Wise (CHRYSOMELIDAE). Bugishu, 7-9,000 feet.
Haltica pyritosa, Ex. (HALTICIDAE). Bugishu, 6,000 feet. (G.D.H.C).
(Determinations of COLEOPTERA and HETEROCERA incomplete.)

DIPTERA.

Mosquitoes.

(Specimens collected by the writers and Mr. Hargreaves are included here with the approximate altitude observed. The mountain records (a) are separated from the low level records (b).)

(a) MOUNTAIN.
Anopheles garnhami, Edw. 6,500 feet.
Anopheles kingi, Chr. 7,000 feet.
Culex andersoni, Edw. 6,500-7,500 feet.
Culex vansomereni, Edw. var. 6,500-7,500 feet.
Culex trifilatus, Edw. 6,500-7,000 feet. Butandiga.
Culex annulioris, Theo. 6,500 feet.
Culex hancocki, Edw. 9,000 feet.
Aedes ? dentatus, Theo. 6,500 feet.
Aedes ? vittatus, Big. 6,500 feet.

(b) FOOT HILLS (about 4,000 feet).
Anopheles gambiae, Giles (*costalis*, Loew.) Budadiri.
Anopheles funestus, Giles. Bulicheki.
Anopheles mauritianus, Grp. Bulicheki.
Culex annulioris, Theo. Bulicheki.
Taeniorhynchus fuscopennatus, Theo. Bulicheki.
Mimomyia plumosa, Theo. Bulicheki.

APPENDIX B.

List of plants collected during August by the writers, except where otherwise stated. The numbers placed after the names refer to the writers' numbers in the Kew Herbarium. The list does not include plants which were noted but not collected. Special attention was paid to the bamboo forest zone and to the alpine zone where, with the exception of grasses, only the very conspicuous plants were omitted from the collections. The specimens were named by the Royal Botanical Gardens, Kew, and by Mr. J. D. Snowden—when by the latter, his initials are added in brackets.

Ranunculus pinnatus, Poir. 9,500-11,000 feet (det. J.D.S.).
Ranunculus oreophytus, Del. Marshy ground, 11,000-13,000 ft. No. 20.
Thalictrum rhynchocarpum, Dill. & Rich. Above Bulambuli. No. 42.
Anemone Thomsonii, Oliv., 11,000-12,000 feet. No. 72.
Fumaria Abyssinica, Hum. Above Bulambuli. No. 76.
Arabidopsis Thalianum, Hegnh. 11,000-12,000 feet. No. 39.
Brassica leptopetala, *Sond* (or very near). Bulambuli. No. 47.
Sisymbrium falcatum, Fourn. Bulambuli, beyond stream. No. 51.
Nasturtium officinale, R. Br. ?Bulambuli. No. 53.
Nasturtium indicum, D.C. ?Bulambuli. No. 54 and 55.
Cardamine hirsuta, L. ?Bulambuli. No. 56.
Cardamine obliqua, Hochst. ?10,000 or 11,000. No. 97.
Viola Abyssinica, Steud. Butandiga to below Bulambuli.
Tillaea aquatica, L. Mudange. No. 86.
Cerastium africanum, Oliv. Bulambuli. No. 7.
Cerastium glomeratum, Thuill. 9,000-12,000 feet. Nos. 64 and 65.
Rumex nepalensis, Spreng. Bulambuli. No. 58.
Polygonum near *glabrum*, Wild. Bulambuli.
Geraninum simense, Hochst. Forest 10,000 feet (det. J.D.S.).
Geranium aculeolatum, Oliv. Sipi (coll. J. M. Wallace).
Impatiens papillionaceae, Warb. Forest above 10,000 feet. No. 101.
Impatiens near *hochstetteri*, Warb. Sipi falls (coll. J. M. Wallace).
Epilobium cordifolium, A. Rich. Bulambuli stream. No. 15.
Begonia Annobonensis, A.DC. Sipi (coll. J. M. Wallace).
Begonia sp. Bulambuli stream. No. 106.
Hypericum peplidifolium, Rich. Bulambuli. No. 60.
Hypericum lanceolatum. Lam. Above Mudange (det. J.D.S.).
Sparmannia Abyssinica, Hochst. Bulambuli (det. J.D.S.).
Malvastrum spicatum, A. Gray. Bulambuli. No. 8.
Cluytia robusta, Pax. Bulambuli stream (det. J.D.S.).
Euphorbia Wellbyi, N.E.Br. 11,000 feet. No. 17.
Alchemilla argyrophylla, Oliv. 11,000-13,000 feet. No. 69.
Rubus Steudneri, Schw. (det. *ex Descr.*). Bulambuli. No. 103.
Rubus Volkensii, Engl. Bulambuli. No. 105.

Ltathyrus intricatus, Baker. 11,000-12,000 feet (det. J.D.S.).
Indigofera arrecta, Hochst. Butandiga. No. 3.
Trifolium Johnstonii, Oliv. Above Bulambuli, 11,000 ft. (det. J.D.S.)
Rhyacophila repens, Hochst. Sipi falls (coll. J. M. Wallace).
Tristicha sp. Sipi falls (coll. J. M. Wallace).
Gymnosporia gracillipes, Welw. Buluganya (det. J.D.S.).
Ferula Erythraeae, Schweinf. Bulambuli. No. 6.
Peucedanum near *altum*, Hiern. Bulambuli stream. Nos. 28A & 52.
Anthriscus sylvestris, Hoffn.
Umbelliferae. 11,000-13,000 feet. Nos. 27 and 31.
Erica arborea, L. Below Bulambuli to 12,000 feet. No. 4.
Philippia Johnstoni, Engl. Mudange. No. 63.
Galium stenophyllum, Baker? Bulambuli, No. 10.
Galium sp. (Dowson 587, Stolz 2282). No. 81.
Dipsacus pinnatifidus, Steud. 11,000-12,000 feet. No. 26.
Scabiosa Columbaria, L. 11,000 feet to Mudange.
Cineraria Kilimandscharica, Engl. 11,000 feet (det. J.D.S.).
Sonchus probably *Schweinfurthii*, O. & H. Bulambuli. No. 18.
Conyza Sp. No. 21.
Helichrysum Hochnelii, Schweinf. (coll. A. E. Wilson).
Helichrysum adenocarpum, DC. var. *alpinum*. (det. J.D.S.) 11,000-12,000 feet.
Helichrysum near *Volkensii*, O. Hoffm. (coll. A. E. Wilson).
Helichrysum elegantissimum, DC. 11,000-12,000 feet (det. J.D.S.).
Helichrysum sp. (coll. A. E. Wilson).
Helichrysum globosum, Sch. Bip. 11,000-12,000 feet. No. 33.
Anthemis cotula, L. 10,000-13,000 feet (det. J.D.S.).
Coreopsis sp. 11,000-13,000 feet. No. 29.
Senecio caryophyllus, Mattf. 11,000-13,000 feet. No. 30.
Senecio Snowdenii, Hutch. 11,000-12,000 feet. No. 35.
Senecio rhamnotophyllus, Mattf. 11,000 feet. No. 57.
Senecio sp. (J.D.S. considers same as his 482 of 1916). No. 36.
Echinops Hochnelii, Schweinf. Bulambuli stream (det. J.D.S.).
Landtia Rueppellii, B. & H. 11,000-13,000 feet (det. J.D.S.).
Synara amplexicaulis, O. & H.
Swertia crassiuscula, Gilg. Bulambuli to 13,000 feet. No. 78.
Swertia Sp. near *crassiuscula*, Gilg. Butandiga. No. 90.
Swertia sp. 12,500 feet. No. 100.
Plantago palmata, Hook. f. Sipi. (coll. J. M. Wallace).
Canarina Eminii, Aschers. Buginyanya and below Bulambuli (det. J.D.S.).
Wahlenbergia arabidifolia, Brehun. Near Mudange. No. 85.
Lobelia inconspicua, A. Rich. *ex descr.* 11,000-13,000 feet. No. 87.
Lobelia Schimperi, Hochst. Sipi (coll. J. M. Wallace).
Lobelia gibberoa, Hemsl. Sipi (coll. J. M. Wallace).
Cynoglossum sp. 11,000 feet. No. 11.

Cynogloseum sp. Butandiga to Bulambuli. No. 95.
Cynoglossum sp. Bulambuli. No. 98.
Solanum sp. Bulambuli. No. 14.
Hebenstretia dentata, L. 11,000 feet.
Bartsia decurva, Hochst. 13,600 feet. No. 37.
Bartsia Kilimandscharica, Engler. 11,000-13,000 feet (det. J.D.S.).
Bartsia Petitiana, Hemsl. 11,000-12,000 feet. No. 70.
Celsia scrophulariaefolia, Hochst. Bulambuli. No. 50.
Veronica abyssinica, Hook. f. (det. J.D.S. his 238 and his 427).
Clerodendron Ugandense, Prain (det. J.D.S.).
Stachys aculeolata, Hook. f. Bulambuli. No. 12.
Near *Wurmbea tenella*, Benth. Mudange. No. 83.
Commelina near *triangulispatha*, Mildbr. Butandiga to Bulambuli. No. 96.
Oenostachys dichroma, Bullock. Bulambuli stream. No. 34.
Dierama vagum, N. C. Brown. (det. J.D.S. as *cupuliflorum* but name on his material in Kew Herbarium altered to *vagum* by Brown). 11,000-12,000 feet.
Dierama sp. near *cupuliflorum*, Klatt (but a much smaller, erect species). Bulambuli Camp. No. 99.
Romulea ramiflora, Ten. 12,000-13,000 feet. No. 82.
Habenaria decorata, Hochst. 11,000 feet. No. 22.
Habenaria splendens, Rend. 11,000 feet. (det. J.D.S.).
Habenaria probably *bractiosa*, Hochst. Bulambuli. No. 104.
Disa Stairsii, Kraenzl. Forest 10,000 feet. No. 102.
? RESTIONACEAE. No. 77. Clumps round little lake below Jackson's summit.
Cyperus dicroostachyrus, Hochst. Butandiga. No. 1.
Mariscus Kerstenii, C.B. Cl. No. 9.
Koeleria convoluta. Hochst. 10,000-12,000 feet.
Luzula spicata, D.C. var. *simensis*, 10,000-12,000 feet.
Osmunda regalis. Sipi (coll. J. M. Wallace).