

# MOUNT KENYA: A CONTRIBUTION TO THE BIOLOGY AND BIBLIOGRAPHY.

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### 1. INTRODUCTION.

When recently I began to attempt some comparisons between Kilimanjaro and Mount Kenya, with especial reference to their biology, I quickly found that the information for Mount Kenya was excessively scrappy and uncoordinated. The solitary book devoted to the mountain (Dutton, 1930) makes no real attempt at a scientific description of the mountain as a whole and contains nothing for the zoologist. Like so many who have written about mountains, Dutton's attention was fixed upon the snow-peaks: the life-zones which intervene are little more than a nuisance. Half Vivienne de Wateville's book (1930) is devoted to Mount Kenya. She was vibrantly aware of the life around her on the upper slopes, but she is disappointingly and unnecessarily unspecific.

The present position is, so far as I can ascertain, that such information as exists about the biology of the mountain has not been collated and made accessible in any way. It is impossible to refer to any conspectus of its mammals or its birds. No climatic records exist above about 7,000 ft. (*teste* British East African Meteorological Service). No bibliography of the mountain has been published. The small amount of attention Mount Kenya has received in this *Journal* is altogether surprising: in fact nothing original at all about the mountain has been contributed since MacGregor Ross's four pages of notes over thirty years ago.

The present compilation has grown out of notes about the mammals and birds that I brought together for my own purposes. That I am able to include a certain amount of information not hitherto published is mainly thanks to Mr. Raymond Hook. He has put his unequalled knowledge of the Mount Kenya mammals at my disposal and also enabled me to see something of the upper slopes in June, 1943. On the principle that half a bibliography is better than none at all I append to this paper a list of the references I have come across. I most emphatically do not claim to have provided a complete bibliography. Several friends have been good enough to give me information and comments on my draft: I have especially to thank G. H. E. Hopkins, D. G. B. Leakey, D. G. MacInnes, R. W. Hayman (of the British Museum), the Kenya Game Department (Hugh Copley), and, for checking my statements about the vegetation, P. J. Greenway. Literature not available at Amani has been lent by G. H. E. Hopkins, the MacMillan Memorial Library and Natural History Society.

Such information as is available about the mountain is by no means evenly distributed around it. The early explorers, Teleki, Gregory and Mackinder, to whom so much honour is due, all attacked from the south-west. Most of the subsequently published references are based on journeys by the Chagoria route in the north-east. The development of pony-transport by Raymond Hook from Nanyuki, in the north-north-west, has led to an increasing number of ascents from that side in recent years (and there is even a wheel-track to 12,500 ft. further north still), but no published information has come from that quarter hitherto except for Meinertzhagen's paper on birds. It seems true that the whole south-eastern half of the mountain is excessively ill-documented. The reason is doubtless the greater width of the forest belt, the more difficult topography and the wetter climate, so feelingly described by Orde-Browne (1918). "Above the bamboo belt . . . this part of the mountain is at most times of the year more or less of a swamp" and "the gorges are deeper and rockier than on the west and north." However, a route from the Ragati had been opened by the Forest Department and by 1940 had been a good deal used. It is to be hoped that a proper description of this part of the mountain will be published.

As a background on which to set the mammals and birds it suffices to recall that on the west, Mount Kenya has a high-level connection (above 6,000 ft.) with the Aberdares and the rest of the (volcanic) Kenya Highlands. On the east it descends by very gradual slopes to the hot dry country of the Upper Tana, at less than 3,000 feet above sea-level. Its central snow-peaks rise about 2,000 ft. out of a relatively enormous base. The sub-alpine region above the timber line occupies nearly 300 square miles, about twenty-four of which are above 14,000 ft., as calculated from recent maps, and contains several small lakes. The forest itself covers about 600 square miles (Hutchins, 1909) in the form of a deep crescent, widest on the south-east, narrowing up the east and west sides on the mountain, until at the north end a treeless corridor connects the sub-alpine moorland with the open country that extends to the limitless Northern Frontier District.

It has been stated (Mearns in Roosevelt, 1910) that on the mountain mammals range up to 15,500 ft., frogs to at least 10,700 ft., chameleons to 11,000 ft., lizards to over 12,000 ft. Loveridge (*Bull. Mus. Comp. Zool. Harvard* 79 (9), 481-541, 1937), quotes Raymond Hook to the effect that lizards go as high as 15,000 ft., snakes to 13,000 ft. On further experience Hook (*in litt.*) reduces the altitudinal limit for snakes, which he states, are represented on the moorland only by *Vipera hindii*, to 12,000 ft., but extends the range of frogs to above that. Although, as Loveridge (*ibid.*, p. 501) remarks, Mount Kenya is "very little known from a herpetological point of view," the number of lower (cold-blooded) vertebrate species inhabiting the moorland is likely to be very small, both for physiological reasons and because the list he gives for all the East African alpine combined comprises only three species of lizard (skinks), one *Chamaeleon (bitaeniata)*, and one frog. Fish are represented at high altitudes on Mount Kenya only by brown trout, introduced in some of the moorland lakes and rivers above 10,000 ft.

## 2. VEGETATIONAL NOTES.

An important feature of the forest is the bamboo belt into which its upper edges everywhere merge. Naturally the levels of the vegetation zones and their specific composition vary somewhat with the aspect and climate. There is also some conflict of statement. According to Rammell

(in Watteville), on the Chagoria track bamboos begin at 7,500 ft., open moorlands at 9,000 ft. Jex-Blake (in Dutton) records bamboo on the same route up to 11,000 ft., but states that on the mountain generally it prevails from about 8,000 to 9,500 ft. Above Nanyuki, the bamboo does not begin till nearly 9,000 ft. and has at its upper edge a well-developed border of big *Hagenia* (*Brayera*) trees, which give place abruptly to moorland at about 10,500 ft. Probably there is a marked difference at the wet southern end of the mountain. Orde-Browne locates the bamboo belt there at 9,000 to 10,000 ft. and describes above that "a range of beautiful park-like country of coarse grass and heather with occasional clumps of fine wide-spreading trees." (This sounds like a description of the south-east of Kilimanjaro.)

Above the timber-line the moorland, which starts as a luxuriant heath well above head-height, extends for some four thousand feet, getting continually sparser and harsher. Jex-Blake's limit (in Dutton's book) of 14,000 ft. for phanerogams is evidently too low. Photographs in the references cited show plenty of vegetation, including, of course, Giant Groundsels (*Senecios*) and Giant Lobelias, up to at least 15,000 ft.; and Loring speaks of rodent-runs in the grass at that altitude. The Fries brothers (1922) quote 4,700 metres (15,400 ft.) as the limit of phanerogams, but Mackinder, who was so meticulous about his altitudes, records the highest flowering plant he saw, an everlasting, at no less than 16,500 ft.

Chapin (1933) has given a diagrammatic representation of the altitudinal zoning of vegetation on the east side of Mount Kenya, probably drawn largely on his personal observations on the Chagoria track. His version is: grass and scrub to about 5,800 ft.; then forest to 8,300 ft.; bamboos to 9,900 ft.; *Hagenia* to 10,500 ft.; "grassy slopes with heath bushes and proteas" to 13,500 ft. and in the upper-half of this Giant *Senecios*; Giant Lobelias and Giant *Senecios* 13,500 to 15,700 ft. In Appendix D of Roosevelt's book the timber-line is given at 13,000 ft. This must be read in conjunction with the later remark that bamboo and podo extend 8,500 to 10,700 ft., where the "true timber zone ends," though Giant Heath (up to 30 ft. high) persists to 13,000 ft.

Scientific botany certainly came late and slowly to the mountain. A few plants were described from the gatherings of the early explorers. Engler, in 1892, summarized the little then known. Hutchins (1907) described the forests from the forester's point of view. He was able to give hardly any specific names and he was then under serious misapprehensions. ("The Kenya Forest extends in a belt . . . eight miles broad entirely round the slopes of Mount Kenia." Above Embu "at about 8,500 feet the timber practically ceases. From here, up to the base of the cliffs and rocks of the snowy peak of Kenia, stretches a zone of dense, generally unbroken, bamboo.") Two years later his information was much more accurate. He recognized the existence of the gap on the north and gave the area of the "bare Alpine region" as 352 square miles (Hutchins, 1909), a figure not far divergent from that calculated from the latest maps. But he was still able to quote very few specific names. This being so, it is not surprising that when the Swedish Fries brothers botanized on the mountain in 1922, their collections yielded many "new" species. Apparently they published no general account of the flora of the mountain. Their results were included in a series of papers dealing with individual families. From these Engler (1925), with the help of Hutchins' description of the forests, pieced together a bald floristic account of the mountain. Dutton's book includes, as already mentioned, a floristic appendix by Jex-Blake but hardly a single specific name is mentioned therein. Wimbush's

contribution to the same book, like Rammell's to De Watteville's, is practically confined to the woody plants. It appears to be true that there have been no other published contributions on Mount Kenya plants for over twenty years except the few records by Chiovenda (1935). Certainly much material must be lying in herbaria, probably enough to allow a counterpart of the Elgon paper (*Kew Bull.*, 1933, 49-106) to be written. In the Coryndon Museum there are nearly one thousand specimens from Mount Kenya (P. R. O. Bally *in litt.*).

The Giant Lobelias and Giant Groundsels (*Senecios*) are by far the most striking features of the African sub-alpine moorlands and have caught the popular imagination. It may, therefore, be worth while to explain our present knowledge of the Kenya species, about which there has been some confusion. Five names have been applied to the Mount Kenya Giant Lobelias, seven to the Giant Groundsels. Actually there appear to be three species of the first and five of the second (Fries and Fries, 1922a and 1922b, Bruce, 1934). Gregory collected bits of a *Lobelia* and of a *Senecio*. Unfortunately at some stage the plant parts were mixed up: the *Lobelia* leaves were paired with the *Senecio* flowers and *vice versa*. As a result the descriptions written by Baker for his new species *Lobelia gregoriana* and *Senecio keniensis* were each composite, and no plants corresponding to them can be found in nature. There was nothing for it but to treat these names as inadmissible, as the Fries brothers did. The Giant Groundsels comprise:—

*Senecio keniodendron* R.E. & T.C.E. Fries, on the open moorlands 11,000 to 15,400 ft. This is the species with the great columnar "trunk" appearing in the high-altitude photographs

*S. battiscombei* R.E. & T.C.E. Fries. A more slender species, very local, in sheltered places from the upper edge of the forest at least 11,500 ft. I collected it in the deeply cut Ontolili valley at 10,500 ft. The reference to *S. johnstonii* on page 190 of Dutton's book is evidently a mistake for this: *S. johnstonii* is confined to Kilimanjaro.

*S. brassica* R.E. & T.C.E. Fries, on part of which the description of *S. keniensis* Baker fil. was based. It is well-named the "cabbage *Senecio*" for it is the comparatively lowly plant, with silvery, woolly undersides to its great leaves, that grows so abundantly on the moorlands, from the timber-line to at least 12,000 ft., as to form huge pale patches on the mountain sides. There is a fine coloured photograph of the plant in Mackinder's paper (1900), noteworthy for its early date, if for no other reason.

All three species are figured in Fries and Fries (1922b.).

The Giant Lobelias are:—

*L. gibberoa* Hemsl., the most widespread of all the Giant Lobelias, on mountains from South Tanganyika to Abyssinia: on Mount Kenya in open places in the forest from 7,000 ft. upwards.

*L. aberdarica* R.E. & T.C.E. Fries. Known from Elgon, Nandi, Mau, Aberdares as well as Mount Kenya, where it is recorded only from a swampy place in the forest at 7,000 ft.

*L. bambuseti* R.E. & T.C.E. Fries. An inhabitant of the upper part of the bamboo zone, recorded only from Mount Kenya and the Aberdares.

*L. keniensis* R.E. & T.C.E. Fries, known only from the Mount Kenya moorland. It was on the inflorescence of this plant that Baker wrote part of his description of *L. gregoriana*.

*L. telekii* Schweinfurth (synonym *L. fenniae* T.C.E. Fries). Also known from Elgon and the Aberdares. This is the species, so common on the Mount Kenya moorlands, that has the flowers deeply buried in a multitude of long narrow bracts.

It will be seen that only the last two species are inhabitants of the moorland. Meinertzhagen (1937) in referring to "the ostrich-plume *Lobelia*" as *keniensis* and the other as *telekii*, transposed the names. All the Mount Kenya species except *L. giberroa* are depicted by photographs in Fries and Fries (1922a).

### 3. THE MAMMALS.

Apart from descriptions of individual "new" forms, the greater part of the published information about the mammals of the mountain is due to the Americans. The early travellers obtained only a few specimens. In 1909-1912, Mearns and Loring collected well up on to the moorland in the Meru sector and Heller, approaching from the south-west, right to the edge of the snows. The altitude data and field-notes of Loring and Heller, especially on the small mammals, are of great value. Most of them appear in appendices to Roosevelt's book (1910). Subsequently Hollister (1919-1924) provided a most useful critical compendium of East African mammal specimens, from which more altitude data can be extracted. Lönnberg (1912) has recorded specimens collected in a short stay in 1911 round Meru Boma and in the forest above: but he spent only from 24th to 28th March in the main forest and his highest camp was at only 2,700 m. (8,800 ft.).

In the following list I have used the nomenclature of Allen's check-list,\* except that where Ellerman† has other views I have followed him.

Especially with such a mountain as Kenya, which has its base on one side much nearer to sea-level than on the other, it is difficult to decide on the geographical or altitudinal limits significant for a faunistic study. Mearns regarded "the mountain proper as beginning at an altitude of 7,500 ft." (Roosevelt, 1910, p. 499.) Orographically, at any rate on the west side, this is about right. For the sake of completeness I have included species with type locality Mount Kenya even where their altitude is lower than this. But on the other hand, I have excluded essentially "plains" species, such as the zebra, even though they penetrate the glades on the north to 8,000 or 9,000 ft., unless they have been reported on the moorland itself.

#### SHREWS.

*Crocidura allex alpina* Heller (a Pygmy Shrew).

A moorland form ranging up to 13,700 ft. The typical subspecies came from Naivasha. Specimens from high on the Aberdares are intermediate between *allex* and *alpina* (Hollister).

*Crocidura fumosa fumosa* Thomas (Dusky Shrew).

The type locality is at about 8,000 ft. on the western slope of Mount Kenya. Not altogether a high-altitude species, because it has also been recorded in "rush swamps and sedgy places" of Athi, Sotik and Rift Valley. But one subspecies, *C.f. montis* Thomas, came from 12,500 ft. on Ruwenzori, and *C. alchemillae* Heller, which Allen sinks in *C.f. fumosa*, came from the summit of the Aberdares. Possibly then *C.f. fumosa* is an inhabitant of the Mount Kenya moorland.

\*Allen G. M. A Check-list of African Mammals. *Bull. Mus. Comp. Zool. Harvard*, 83, 1-763, 1938. (A list of names, type localities and synonymy: not, unfortunately, of geographical ranges.)

†Ellerman, J. R. *The Families and Genera of Rodents*, two volumes, London, 1941.

*Crocidura turba zaodon* Osgood.

Recorded by Lönnberg and Heller for Mount Kenya without altitude details. It is not typically a montane species but has been recorded as high as 11,000 ft. on the Aberdares (type locality of *C.t. provocax* Thomas, sunk by Allen in *C.t. zaodon*).

*Crocidura occidentalis kijabae* Allen.

A comparatively large, fierce and predacious shrew that has been taken on the upper edge of the Mount Kenya forest, 10,700 ft. (and on the Aberdares). This is the animal for which Heller and also Loring use the name *Crocidura nyansae*.

*Sylvisorex granti mundus* Osgood.

A forest shrew collected from 7,000 to 10,000 ft. Probably not distinguishable from *S.g. granti* Thomas of Ruwenzori (type locality 10,000 ft.).

*Surdisorex polulus* Hollister.

Apparently known only from Mount Kenya, 9,000 to 12,100 ft.

#### HORSESHOE BAT.

*Rhinolophus geoffroyi keniensis* Hollister.

Type locality Mount Kenya, 7,000 ft. A member of a very widespread species and probably not montane.

#### BUSH-BABY.

*Galago crassicaudatus* subsp. presumably *kikuyuensis* Lönnberg.

A forest species and subspecies not typically highland.

#### MONKEYS.

*Colobus polykomos kikuyuensis* Lönnberg.

*Cercopithecus mitis kolbi* Neumann, "Blue" or Sykes' Monkey (Guenon).

Both are highland subspecies of species inhabiting evergreen forest wherever it occurs, and both go up to at least 10,000 ft. on Mount Kenya. According to Allen, Matschie described both *Colobus caudatus thikae* and *C.c. laticeps* from "west slope of Mount Kenya" and both are synonyms of *C.p. kikuyuensis*.

Pure white colobus, which are apparently not albinos, occur in some numbers on Mount Kenya. There is one skin in the Coryndon Museum without data. D. G. B. Leakey (*in litt.*) mentions that he knew of "many specimens on the Thego River and on the Burguret. The white colobus are believed to form at least one troop of their own and to breed true.

#### STRIPED-WEASEL (Zorilla; "African Skunk").

*Ictonyx striatus* subsp.

Occurs on the moorland up to 12,000 ft. (Raymond Hook).

#### JACKAL.

*Thos* sp.

Jackals occasionally come up through the gap to the northern moorlands (Raymond Hook).

#### GENET.

*Genetta tigrina stuhlmanni* Matschie.

Has been collected at 8,500 ft. on the west side of Mount Kenya. This is a widespread and ecologically most adaptable species.

MUNGOOSE (Black-tipped).

*Myonax sanguineus orestes* (Heller).

West slope of Mount Kenya 8,500 ft. The species is very wide-spread, not montane.

SERVAL.

*Felis serval hindei* Wroughton.

Occasionally goes on to the northern moorlands (Raymond Hook).

LION.

*Felis leo* subsp.

Dower (1935) writes of a "remarkable subspecies of lion, not yet known to science, living the life of a leopard in the thick bamboo and hagenia forests of the 10,000 ft. levels." Regarded as unproven. No one has ever been able to collect a specimen. Pitman (*A Game Warden Takes Stock*, 1942), however writes: "There is no reason to discredit the probability of a small race of lion occurring permanently at high altitudes . . . My own ideas support the claim that a small mountain race does exist in Kenya . . . It is evidently scarce, wary and extremely elusive."

It may be noted that as a rule greater, not smaller, size characterizes high-altitude races of vertebrates ("Bergmann's Rule").

LEOPARD.

*Felis pardus pardus* Linnaeus.

Leopards occur all up the slopes and "travel frequently" as far as the edge of the snows. On the moorlands they live on the abundant small rodents, as proved by examination of their dung (Raymond Hook). Mackinder saw a leopard at 14,400 ft., Stoneham (1932) one, actually on snow.

HARE.

*Lepus* sp.

Raymond Hook has twice seen their dung at 11,000 ft., but never a living hare on the moorland. It is rather surprising that they should not be abundant residents. Those which occur might be either *Lepus capensis crawshayi* De Winton, which has been recorded from as near as "plains west of Mount Kenya" (Hollister), or *L. raineyi* Heller, the "long-eared, buff and black hare, with a distinct greyish rump," known from the Mount Kenya side of the Northern Guasa Nyiro to Marsabit.

PORCUPINE.

*Hystrix galeata* subsp.

I picked up a quill at 11,500 ft. on the moorland above Nanyuki. The porcupine can only be a rare straggler there, since Raymond Hook has never met one so high, although he knows that they occur in the bamboos.

SQUIRRELS.

*Heliosciurus keniae* (Neumann).

Type locality 8,000 ft. on Mount Kenya. Allen treats this as a subspecies of *H. rufobrachium*, Ellerman as a subspecies of *H. gambianus*. Both are characteristically West African and low-altitude forest species. Does not ascend far into the Mount Kenya forests (Raymond Hook).

*Paraxerus ochraceus kahari* (Heller).

A forest species apparently nowhere reaching high altitudes. Lönnberg calls the Mount Kenya animal *P. jacksoni* (De Winton), but it should doubtless bear the name *P.o. kahari*, which was subsequently described from "Meru Boma" and also collected at 7,000 ft. on the west side of Mount Kenya. Mackinder got the species at 8,000 ft.

#### TREE DORMOUSE.

*Graphiurus (Claviglis) murinus raptor* (Dollman).

8,500 to 11,000 ft. (from which altitude the type came). Allen and Loveridge [*Bull. Mus. Comp. Zool. Harvard*, 75 (2), 123, 1933] expressed the view that this is a subspecies not of *murinus*, but of *soleatus* Thomas and Wroughton of Ruwenzori, which on ecological grounds would be reasonable, but Hollister has recorded intergrades with *G.m. griseus* near Meru. Hopkins (*in litt.*) suggests that the explanation of these divergent views may be that *murinus*, *soleatus*, *raptor* and *griseus* all belong to one species.

#### MANED RAT (Crested Rat).

*Lophiomys ibeanus hindei* Thomas.

A forest mammal, not, apparently, collected above about 8,500 ft. Mount Kenya specimens have been identified as *ibeanus hindei*, described from the Aberdares, but if this is distinguishable at all from the typical *ibeanus* (type locality Mau), it is only on size of (cf. Hollister). *L. ibeanus* may well be conspecific with *L. imhausii* of Abyssinia (Ellerman).

It is worth emphasizing that, in the sense that it is not one of the family Muridae, this is not a "rat." Hollister records a statement that the animal is arboreal but thinks this is "probably a myth." Hollister's doubts were justified. According to Raymond Hook, "it is not arboreal. It lives in dead trees and walks about on the ground. It can climb well considering its non-athletic build." Ellerman (i, 635) thinks, from observations on captive specimens, that they are "the most perfect natural climbers," though slow-moving at all times.

#### THICKET RAT.

*Grammonys* (formerly *Thamnomys*) *gigas* (Dollman).

Type locality 9,000 ft. at "Solai, Mount Kenya." "Solai" may be the Olasurei marked as the spur on the north bank of the Rongai River (and hence not far from the West Kenya forest station) in the extreme top right-hand corner of the 1: 125,000 map (Nyeri sheet) South A-37/A II, 1913.

Hollister doubts whether the type represents more than an individual variation of *T. ibeanus ibeanus* Osgood (Molo, Naivasha, Aberdares). Ellerman accepts *G. gigas* as a species, without comment. The reason is, as R. W. Hayman has kindly informed me, that the British Museum possesses a second specimen from "Kasituka, west of Mt. Kenya" coll. J. L. Clarke. Raymond Hook identifies this as the Guaso Tuga, a stream just south-east of Nanyuki. The habitat of this animal remains uncertain, but from the localities it may well be forest.

#### RUFIOUS-NOSED RAT.

*Oenomys hypoxanthus bacchante* (Thomas).

Collected as high as 10,700 ft. on Mount Kenya and 11,000 ft. on Aberdares (Hollister). The reference by Heller (*in Roosevelt*, 1910) to the prevalence of *O.h. bacchante* in thorn country round Naivasha



is doubtless applicable really to *O.h. vallicola*, which he described four years later from that locality. *O. bacchante moerens* Thomas, from "Solai, west slope of Mount Kenya" is regarded by Hollister as a synonym of *O.h. bacchante*.

#### STRIPED GRASS-MOUSE.

*Lemniscomys striatus massaicus* (Pagenstecher).

Generally not montane but listed by Lönnberg for Mount Kenya, obtained by Heller at 7,000 ft., and actually ranging to 10,000 ft. (Raymond Hook).

#### FOUR-STRIPED GRASS-MOUSE.

*Rhabdomys pumilio diminutus* (Thomas).

A montane form of a species of immensely wide distribution often in dry country (e.g., Namaqualand), but ascending Mount Kenya to at least 10,700 ft. and the Aberdares to the top.

#### SHORT-HAIRED RAT ("White-footed Mouse").

*Rattus (Praomys) tullbergi* subsp.

In forest up to 10,700 ft. Heller recorded his field-notes under the subspecies *peromyscus* Heller (type locality Sotik). Hollister lists Heller's Mount Kenya specimens as *jacksoni* (De Winton), type locality Entebbe (probably erroneous—Hopkins *in litt.*). Lönnberg listed Mount Kenya specimens under the name *Praomys jacksoni*.

#### CLIMBING WOOD-MOUSE.

*Rattus (Hylomyscus) denniae denniae* (Thomas).

Collected by both Lönnberg and Loring, the former giving the habitat as mixed bamboo and forest at 2,700 m. (8,800 ft.).

#### PIGMY MICE.

*Mus (Leggada) grata grata* Thomas and Wroughton.

*L.g. sungaræ* Heller from West Kenya forest station 7,500 ft. is a synonym. A grass mouse general throughout Kenya (Heller); probably not montane.

*Mus (Leggada) triton triton* (Thomas).

Another grass mouse listed by Lönnberg and by Hollister. The former got it above Meru as high as he did any collecting, viz., at about 8,800 ft.

#### HARSH-FURRED MOUSE.

*Lophuromys aquilus aquilus* True.

Collected by Mackinder, 8,000 to 10,000 ft. "Up to the timber line but not in deep forest nor in grassy plains" (Heller). The type locality is Kilimanjaro. Nevertheless, not a typically montane species, for it is abundant in Kampala (Hopkins *in litt.*). Other subspecies from Eigon and from Aberdares (*L.a. zena Dollman*) were thought by Hollister not to be separable, but Osgood (*Zool. Ser. Field Mus. Nat. Hist.*, 20, 243, 1936) and Ellerman both maintain *L.a. zena*. This leaves Kilimanjaro, Eigon and Mount Kenya all with the subspecies *aquilus*, but *zena* on the geographically intervening Aberdares. An unsatisfactory distribution which makes it unlikely that Ellerman's subspecific arrangement is final.

## GIANT RAT.

*Cricetomys gambianus kenyensis* Osgood.

Type locality "south side of Mount Kenya." There seem to be no published records of these animals high up the mountain, but they are extremely common in the Upper Imenti forest, a few feet above Meru (D. G. B. Leakey *in litt.*), where they infest the camp.

## (MOUSE).

*Dendromus insignis percevali* Heller.

Notwithstanding its name, not, according to Heller, a tree-mouse but frequenting *Otomys* runs in the grass, 7,500 to 14,200 ft. (Hollister).

## GROOVE-TOOTHED RATS ("Veldt Rats" or "Vlei Rats").

*Otomys orestes orestes* Thomas.

Type locality, Teleki Valley at 13,000 ft. This is a most important inhabitant of the moorland, making runs in the rank grass which serve as highways for other small rodents and for shrews. Raymond Hook reports them so common round his 14,000 ft. camp that his dogs can live on them. Loring found them "numerous in the grass bordering the glacial lakes at 15,000 ft."

*Otomys tropicalis tropicalis* Thomas.

Apparently limited to Mount Kenya, where it has been collected, 7,500 to 13,700 ft., according to Hollister. This swamp-rat, as Hollister calls it, is the animal appearing in the Mackinder collection under the name *O. irroratus*. The much more widespread subspecies *O.t. elgonis* occupies, besides most of Uganda (Hopkins *in litt.*), the whole of the Aberdares, and extends to the western base of Mount Kenya (7,000 ft.).

## MOLE-RATS.

*Tachyoryctes rex* Heller.

West Kenya forest station and also 8,500 to 11,000 ft. "In all the open grassy plots in the bamboo belt and open timber." The foregoing statements by Loring in Roosevelt's book are not in exact accord with the information Heller gives elsewhere,\* viz.: "It inhabits a narrow zone at the upper edge of the bamboo forest where the moorland first makes its appearance. The species is not found immediately below this area in the bamboo or yew [*Podocarpus*] forests, but another species appears on the grassy plains at the base of the mountain." Raymond Hook regards the range of *T. rex* as typically moorland, 10,000 to 12,500 ft.

## TREE HYRAX.

*Dendrohyrax arboreus crawshayi* (Thomas).

Type locality 10,000 ft. west slope of Mount Kenya. The most obvious mammal—by its nocturnal voice—in the forest belt.

## LARGE-TOOTHED HYRAX (Rock Dassie).

*Procavia johnstoni mackinderi* Thomas.

A moorland subspecies (up to 15,500 ft., on the edge of the permanent snow) of a very widely distributed species often in hot dry country (e.g., Mwanza).

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\**Smithson Misc. Coll.*, 56 (9), 4, 1910.

#### ELEPHANT.

*Loxodonta africana* subsp.

Mackinder saw tracks up to 11,500 ft. "They do go right out on to the moors and up to 12,000 ft., but not to any extent" (Raymond Hook). "There is a broad elephant highway from above Timau to the top of the Kiringa River (South Kenya); then down the Kiringa River Ridge to the back of the Thiba River Camp and then just inside the forest line to the big salt licks by Chogoria. On the true mountain this path keeps in the sugar bush (*Protea*). This path is three feet wide and six inches deep below the surrounding soil-level, is at about 10,850 to 11,000 ft., and must have been used for years. There is another broad path joining up with this path on the moors right up between the Sagana and Ragati Rivers" (Copley *in litt.*).

#### GIANT FOREST HOG.

*Hylochoerus meinertzhageni meinertzhageni* Thomas.

It is curious that neither Hollister nor Roosevelt records this hog for the mountain. But Lydekker (1908) and Stigand (1913) have done so; Raymond Hook is familiar with them on the west side; and the Game Department regard them as "very common especially in the Ragati River and Sagana River headwaters," i.e., at the south end of the mountain. An account of the habits of the Giant Hog, which Raymond Hook is prepared to endorse from his own experience, appeared in *J. E. Afr. Nat. Hist. Soc.*, Vol. 3, No. 3, March, 1911, (C. W. Woodhouse). There seems no doubt that this animal is a browser, extremely fond of a single species of herb growing in the forest shade. A specimen sent by Raymond Hook has kindly been identified by the Conservator of Forests as *Mimulopsis thomsonii* C.B. Cl. (Kikuyu *sunguya* or *thunguya*). These hogs are sufficiently catholic in their tastes to raid the forest squatters' plots in the Ragati area, especially for sweet-potato tops (D. G. B. Leakey and H. Copley *in litt.*).

#### HARTEBEEBEE.

*Alcelaphus buselaphus* subsp.

Raymond Hook has found a skeleton on the northern moors at 13,000 ft. Evidently a rare straggler up through the northern gap.

#### HARVEY'S DUIKER.

*Cephalophus harveyi harveyi* Thomas.

A forest species not specially montane.

#### BLACK-FRONTED DUIKER.

*Cephalophus nigrifrons hooki* St. Leger.

A subspecies, known only from Mount Kenya and the Aberdares, of a rather widespread forest animal that has developed different forms on other mountain masses close to the Equator. On Mount Kenya it is "always in the bamboo or just above it, never away on the moors" (Raymond Hook).

#### COMMON DUIKER.

*Sylvicapra grimmia altivallis* Heller.

A moorland subspecies (described from the Aberdares) of an exceedingly widespread species. It ranges from 10,000 to 14,500 ft. on Mount Kenya (Raymond Hook). There is another subspecies, *S.g. lobeliarum* Lönnberg, peculiar to the Elgon moorlands.

KLIPSPRINGER is mentioned by Chapin (1934) at about 10,500 ft., but Raymond Hook believes this is a misidentification of the preceding species (Duikerbok).

SUNI (DWARF ANTELOPE).

*Nesotragus moschatus akeleyi* Heller.

Type locality south-east slope of Mount Kenya at 7,000 ft. A widespread species of thick bush, probably nowhere really montane. Not seen on Mount Kenya by Raymond Hook above 8,000 ft., but recorded by Lönnberg to 8,800 ft.

STEINBUCK.

*Raphicerus campestris neumanni* Matschie.

Another rare straggler to the northern moors (Raymond Hook).

BONGO.

*Boocercus eurycerus* subsp.

A species apparently found only in and near bamboo; but less common in the Mount Kenya belt than in the Aberdares. However they are not rare at the south end of Mount Kenya (Game Department) and Raymond Hook has evidence that they occur on the west side. Subspecies probably *isaaci* Thomas (type locality Eldama Ravine).

ELAND.

*Taurotragus oryx pattersonianus* Lydekker.

The eland of Mount Kenya are regarded by the Game Department as this subspecies (which inhabits Kenya generally), and as moving up and down the mountain seasonally. According to Raymond Hook several herds are resident on the moorland.

BUSHBUCK.

*Tragelaphus scriptus delamerei* Pocock.

The type of *T. haywoodi brunneus* Matschie, regarded as a synonym, came from 7,400 ft. on West Kenya, Bushbuck go up as far as the upper edge of the timber, i.e., about 10,700 ft. (Raymond Hook).

BUFFALO.

*Syncerus caffer caffer* (Sparrman).

Mackinder found a skeleton at 14,200 ft., tracks at 14,500 ft.; Ross found a carcass at 14,500 ft. (Both these remains are marked on the map in Dutton's book.) It is evidently unusual for buffalo to reach such heights. Raymond Hook has not seen a living one above 12,000 ft. They work up from the upper edge of the forest following the new growth on the moorland after a burn.

BLACK RHINO.

*Diceros bicornis bicornis* (Linnaeus).

At any rate towards the north end of the mountain, where the forest is comparatively dry and open, rhinos frequent its upper edge (ca. 10,500 ft.) but Raymond Hook has never seen them more than half a mile out of the moorland. Also on the wetter south side D. G. B. Leakey "can vouch for rhino occurring on the lower edge of the moorland on the southern slopes between Kiringa and Sagana Rivers, above the bamboo belt."

#### 4. THE BIRDS.

Mount Kenya was ornithologically practically unknown when Mackinder made his ascent and several new forms were described from specimens collected by his expedition. Moreover, he provided useful field-notes. Lönnberg about ten years later worked in the forest above Meru, apparently to about 8,800 ft., and reported his results in full. Mearns, Loring and Jackson obtained some specimens up as far as the moorland; those of the first two do not seem to have been listed, though Mearns described what he regarded as new forms; those of Jackson are presumably all included in his book (1938). In 1929, Bowen made an interesting collection in the forest round and above Meru, but unfortunately his account (1931) does not give altitudes. From "internal evidence" it seems probable that he, like Lönnberg, did not work above about 8,000 ft. Shortly afterwards Chapin made a brief trip by the Chagoria track to the moorland. He has written a spirited account (1934) containing valuable notes. The lists of van Someren (1922 and 1932) contain a number of records for "Kenia," understood to be Mount Kenya, though without more precise locality and without altitude.

The foregoing was the state of ornithological knowledge of Mount Kenya when Meinertzhagen and his party carried out three weeks' intensive collecting above Nanyuki at the beginning of 1936. Meinertzhagen's account (1937) is certainly the first consistent attempt to delineate the altitudinal zonation of the birds occurring on the mountain and he made notable additions to our knowledge of the moorland birds; but it will be seen from the foregoing paragraph that he hardly did justice to his predecessors in his statement (1937, p. 734): "Very little ornithological work has been done since that [Mackinder's] day to this on Mount Kenya."

Since Jackson's book was not published until 1938, it might be supposed that it would contain all the published records from the collectors named above and that the avifauna of Mount Kenya could be compiled by extracting the records for that locality from Jackson's book. But in fact, Meinertzhagen's records evidently became available too late for inclusion and many of Bowen's records of passerines have been omitted, apparently through inadvertence.

Some of these omissions are important from a zoo-geographical point of view because they give an incorrect view of the species' extension: and I take the opportunity of bringing the most notable of these cases to notice in List A. I would direct special attention to the first and the last.

##### List A.

Species.	Authority for Mount Kenya record.	Nearest localities cited by Jackson (1938).
<i>Buteo oreophilus</i> ... ..	Chapin ... ..	Eldoret.
<i>Pogoniulus bilineatus</i> ... ..	Bowen ... ..	Nairobi.
<i>Yungipicus obsoletus</i> ... ..	Bowen ... ..	Fort Hall.
<i>Alseonax minimus</i> ... ..	Bowen ... ..	Rumuruti; Machakos.
* <i>Chlorophoneus</i> near <i>rubiginosus</i> .	van Someren ... ..	(Omitted.)
<i>Lamprocolius corruscus</i> ... ..	Bowen ... ..	Jombeni Mountains.
<i>Estrilda atricapilla</i> ... ..	van Someren ... ..	Aberdares.
<i>Spermophaga ruficapilla</i> ... ..	Bowen ... ..	Kakamega.

In compiling the selected, montane, list, which is List C, I have followed the same principle as for the mammals, regarding the actual mountain as from about 7,000 ft. upwards and trying to select those

\*Presumably a mutant of *C. nigryrons* Rehw.

species which are really members of the montane forest and moorland communities respectively. The montane forest may conveniently be divided into the upper zone, comprising the bamboo and *Hagenia*, i.e., from about 9,000 to 10,700 ft., and the lower zone, below the bamboos. Below this lower zone again there is, of course, extensive forest on the east side. But for the present purpose I exclude those species recorded in the foothill forest of Meru and Embu and not also in the main mountain forest. Those species which I have excluded pending further information comprise List B which follows:—

*Accipiter melanoleucus* A. Sm., *Astur badius sphenurus* Rupp., *Gymnogenys typicus* (A. Sm.), *Francolinus squamatus maranensis* Mearns, *Tympanistria tympanistria fraseri* Bp., *Bycanistes buccinator* Temm., *Bubo lacteus* (Temm.), *Telecanthura ussheri stictilaema* (Rchw.), *Colius striatus* subsp., *Apaloderma narina narina* Steph., *Buccanodon leucotis keniae* Bowen, *Pogoniulus bilineatus alius* Friedm., *Thripas namaquus namaquus* (Licht.), *Yungipicus obsoletus ingens* Hartert, *Dendropicus lafresnayi lepidus* (Cab. & Heine), *Anthus leucophrys goodsoni* Meinertz., *Anthus richardi lacuum* Meinertz., *Pycnonotus barbatus fayi* Mearns.,\* *Phyllastrephus fischeri keniensis* Mearns (= *P.f. placidus* Shelley), *Chlorocichla flaviventris centralis* Rchw., *Stelgidillas gracilirostris percevali* (Neum.), *Stelgidocichla latirostris eugenia* (Rchw.), *Trochocercus bivittatus kikuyuensis* van Som., *Parisoma lugens jacksoni* Sharpe, *Batis molitor puella* Rchw., *Geokichla gurneyi chuka* van Som.,† *Erthropygia hartlaubi kenia* van Som., *Cossypha semirufa intercedens* Cab., *Alethe poliocephala akeleyae* Dearborn, *Apalis pulchra pulchra* Sharpe, *Apalis melanocephala nigrodorsalis* Granvik, *Sigmodus* (*Knestrometopon*) *scopifrons keniensis* van Som., *Lanius collaris humeralis* Stanley, *Parus albiventris albiventris* Shelley,‡ *Chlorophoneus nigrifrons nigrifrons* Rchw. (and mutants, *abbotti* Richmond, (?) *rubiginosus* subsp. — see van Som., 1932, p. 305), *Corvus capensis kordofanicus* Laubm.,¶ *Stilbopsar kenricki* (Shelley), *Pholia sharpii* Jacks., *Nectarinia kilimensis kilimensis* Shelley, *Buphagus erythrorhynchus* Stanl.,§ *Cinnyris reichenowi reichenowi* Sharpe, *Cyanomitra verticalis viridisplendens* Rchw., *Phormoplectes insignis ornatus* Granvik, *Mandingoa nitidula chubbi* O.-Grant; *Coccopygia melanotis kilimensis* Neum., *Hypargus niveoguttatus* Peters, *Linurgus kilimensis keniensis* van Som.

From records on other East African mountains I should expect that on further experience several of the above birds would be found to qualify for inclusion in the list for the main mountain forest (List C below), especially *Pholia sharpii* and *Linurgus*.

In the main montane list (List C), which follows, I have not thought it necessary to cite an authority where the information given is derived without significant change from Meinertzhagen (1937) or Jackson (1938). In a few species personal observations made when E. G. Rowe and I followed Meinertzhagen's route in June, 1943, modify the altitude ranges he found: and such modifications are indicated by our initials, E.G.R. and R.E.M.

\*Goes up to 8,200 ft., but I regard it as a bird of wooded, not forest country, that follows up the glades.

†Apparently only known from 7,000 ft., on the south-east side of the mountain. It is retained in this list pending further evidence of its altitudinal distribution.

‡Obtained by E.G.R. & R.E.M. just inside the forest edge at 8,200 ft., an unexpected record.

¶Common round Nanyuki up to about 7,200 ft. (E.G.R. & R.E.M.). There seems to be no published record east of the Rift nearer than the Kapiti Plains.

§Perhaps the ox-pecker straggles to the moorland (Meinertzhagen).

## STRAGGLERS.

It will, of course, be realized that, especially with creatures so potentially mobile as birds, observed altitude limits have no absolute validity. Utterly unexpected things may turn up right out of their normal zone. We had a startling example of this when we were camped at the lower edge of the moorland at about 10,700 ft. and on the same afternoon were visited there by a Hammerkop (*Scopus umbretta*) and a Crowned-Hornbill (*Lophoceros melanoleucus*). Another example has been provided by Raymond Hook, who recently saw a secretary bird (*Sagittarius serpentarius*) at 13,000 ft.—which is about as unlikely as the ostriches I have recorded elsewhere at 12,000 ft., on the top of Loolmalassin. Chapin's wryneck, *Iynx ruficollis*, on the moorland must be placed in the same category of astonishing wanderers.

The visits of itinerant water birds to the moorland lakes may not be unusual. Raymond Hook saw on one occasion five dabchicks (*Poliiocephalus ruficollis*) on Lake Ellis, and has one record of a coot, presumably *Fulica cristata*, at about the same altitude.

Because most African species that do not belong to evergreen forest wander a lot, or even have definite migrations during the non-breeding season, I should expect that in the course of time many species would be added to the moorland list. By the same token many Palaearctic migrants may be expected to turn up there from time to time, though so far only one species has been recorded.

## List C.

### IBIS.

*Lamprolaima olinacea akeleyorum* Chapman.

Occurs throughout the forest but commonest perhaps in the uppermost part.

### BLACK (MOUNTAIN) DUCK.

*Anas sparsa leucostigma* Rüppell.

Resident on the forest streams and at least visiting the moorland lakes, where they have been mentioned by most people who have written of the lakes, from Mackinder onwards.

### LONG-CRESTED HAWK-EAGLE.

*Lophaëtus occipitalis* (Daud.).

To 8,500 ft.

### CROWNED HAWK-EAGLE.

*Stephanoaëtus coronatus* (Linn).

A true forest bird observed to about 8,600 ft. (E.G.R. & R.E.M.). It may well go much higher.

### AUGUR BUZZARD.

*Buteo rufofuscus augur* (Rüpp.).

A common bird at all altitudes up to 16,000 ft. (Chapin). The birds ranging the moorland may actually nest in the trees on its lower edge, but there can be no doubt that this buzzard is a very important factor in the life (and death) of the small rodents above the timber line.

#### MOUNTAIN BUZZARD.

*Buteo oreophilus* Hart. & Neum.

A species about which very little has been written. Apparently not uncommon in the forest of the east side, where Chapin regarded them as specializing on chameleons. Raymond Hook describes a hunting pair as sailing along very slowly and majestically—just not stationary—about a hundred feet above the ground. Most of those he has seen have been over trees near the timber line, but others were over the moorland, up to about 11,500 ft., where there is plenty of bushy vegetation. Copley informs me that three were collected for the Coryndon Museum in the *Hagenia* at 10,500 ft.

#### LAMMERGEYER.

*Gypaëtus barbatus*.

Occasionally seen on the moorland north-west of the peaks by Raymond Hook as well as by Meinertzhagen. Conceivably a resident in very small numbers. The subspecies is presumably *meridionalis* Keys. & Blas.

#### JACKSON'S FRANCOLIN.

*Francolinus jacksoni pollenorum* Meinertzhagen. *Bull. Brit. Orn. Club*, 57, 67, 1937.

A subspecies confined to Mount Kenya forest belt where it is commonest in the upper part.

#### SHELLEY'S FRANCOLIN.

*Francolinus shelleyi theresae* Meinertzhagen. *Bull. Brit. Orn. Club*, 57, 68, 1937.

A subspecies confined to the Aberdares and to Mount Kenya up to 12,700 ft. It is typically a bird of the moorlands but evidently it moves down some distance through the northern gap in the Mount Kenya forest ring, as is shown by Jackson's record at 7,700 ft. there. [This appears in Jackson's book under the name *Francolinus elgonensis*, i.e., as a full species. Both earlier, in Sclater's *Systema Avium Aethiopicarum* (1930) and later, by Meinertzhagen (1937), *F. elgonensis* has been regarded as a subspecies of *F. shelleyi*.]

#### BUFF-SPOTTED PIGMY CRAKE.

*Sarothrura elegans elegans* (A.Sm.).

Probably a resident in the bamboos. The type of *S.e. lorongi*, regarded as a synonym, came from the west side at 8,500 ft.

#### (PIGMY CRAKE).

*Sarothrura lineata antonii* Mad. & Neum.

Apparently a resident in swamps on the moorland up to at least 12,100 ft. [The altitude 14,000 ft. quoted by Jackson (i, 297, footnote) seems unwarranted.]

#### ETHIOPIAN SNIPE.

*Capella nigripennis* (Bp).

Possibly resident on the moorland, where it has been collected as high as 12,500 ft. (Mearns).

#### OLIVE PIGEON.

*Columba arquatrix arquatrix* Temm. & Knip.

Throughout the forest.



BRONZE-NAPED PIGEON.

*Turturoena delegorguei sharpei* Salvad.

A forest species perhaps not going into the upper belt.

LEMON DOVE.

*Aplopelia larvata larvata* (Temm. & Knip).

As for *Turturoena*.

HARTLAUB'S LOURIE.

*Turacus hartlaubi* (Fschr. & Rchw.).

Throughout the forest.

RED-HEADED PARROT.

*Poicephalus gulielmi massaicus* (Fschr. & Rchw.).

Flighting most conspicuously over the fringing forests below the main belt but actually ascending to the timber-line (Mearns).

GIANT KINGFISHER.

*Megaceryle m. maxima* Pallas.

No published record, but Copley (*in litt.*) reports them "at a good 8,000 to 9,000 ft." on the Thiba, Rupengazi, Kiringa, Gazita and Thingishu Rivers.

MOUNTAIN BEE-EATER.

*Melittophagus lafresnayii oreobates* Sharpe.

A forest species but apparently not in the uppermost belt.

SILVERY-CHEEKED HORNBILL.

*Bycanistes cristatus* (Rüpp.).

As preceding.

WHITE-HEADED WOOD-HOOPOE.

*Phoeniculus bollei jacksoni* (Sharpe).

As preceding, but up to at least 8,800 ft. (Lönnerberg).

MACKINDER'S OWL.

*Bubo capensis mackinderi* Sharpe.

A resident on the moorland, where it is certainly an important member of the fauna. Meinertzhagen records their food as "small rodents": Mackinder regarded the rock-hyraxes as their staple.

In stating that this owl has "never been obtained away from the moorland of Mount Kenya" Meinertzhagen overlooked the specimen collected by Lynes six hundred miles to the south, in Iringa (*J. Orn.*, **82**, Sonderh., 1934). Since then it has been reported from three other localities in the Kenya Highlands (Leakey, *J. E. Afr. Nat. Hist. Soc.*, **17**, 284, 1943).

WOOD-OWL,

*Ciccaba woodfordii* subsp.

Until lately kept in the genus *Strix*. Lönnerberg recorded it on the "east flank": it was noisy above Nanyuki at 8,300 ft. (E.G.R. & R.E.M.) and may go higher.

NIGHTJARS.

*Caprimulgus pectoralis frenatus* (Salvad.).

This is the bird hitherto known as *C. rufigena frenatus* (see *U.S. Nat. Mus. Bull.*, 153, p. 307 and *Bull. Brit. Orn. Club.*, **58**, 34, for name change). Obtained in the bamboos at 10,300 ft. Status uncertain.

*Caprimulgus poliocephalus poliocephalus* Rüpp.

Collected by Mackinder and by Hook up to 11,000 ft. Quite likely to be a resident on the lower edge of the moorland.

[*Caprimulgus keniensis* van Som., type locality "first camp north of Kenia," also quoted as "north of Mount Kenya," is probably not a montane bird.]

SWIFTS.

Alpine Swifts almost certainly breed up to 14,000 ft. and there may be another resident species as well (see Meinertzhagen, 1937, p. 745). The Alpine Swifts may be *M. melba africanus* (Temm.) as recorded by Jackson, but are more likely to be *M.m. striatus* Meinertz. (*Bull. Brit. Orn. Club*, 57, 69).

BAR-TAILED TROGON.

*Heterotrogon vittatum vittatum* (Shelley).

A forest bird apparently of the lower zone only. (*H.v. keniensis* Bowen regarded as a synonym.)

LITTLE GREEN BARBET.

*Viridibucco simplex leucomystax* (Sharpe).

Habitat as preceding.

SCALY-THROATED HONEY-GUIDE.

*Indicator variegatus variegatus* Lesson.

A forest bird collected up to at least 10,000 ft. Since this species is parasitic on woodpeckers and barbets either the individual taken at 10,000 ft. was merely a straggler from lower levels or one of its hosts nests at higher elevations than we know at present.

FINE-BANDED WOODPECKER.

*Campethera taeniolaema hausburgi* Sharpe.

Apparently the only woodpecker in the mountain forest and only in the lower zone of that.

SHARPE'S LONG-CLAW PIPIT.

*Macronyx sharpei* Jackson.

Occurs in small numbers on the moorlands up to at least 13,000 ft. (Raymond Hook), where it is probably resident (as well as on the grassland below the forest belt).

HILL-BABBLER.

*Pseudoalcippe abyssinicus abyssinicus* (Rüpp.).

A forest bird not recorded above the lower zone.

MOUSTACHED BULBUL.

*Stelgidocichla latirostris eugenia* Rchw.

Range as preceding.

GREY-THROATED GREENBUL.

*Arizelocichla tephrolaema kikuyuensis* (Sharpe).

Up through the forests to the timber-line.

PYGMY FLYCATCHER.

*Alseonax adustus (minimus) interpositus* van Som.

Through the forest belt practically to the top. (This subspecies has been regarded as indistinguishable from *pumilus* Rchw. by Grant and Mackworth-Praed *Ibis*, 1940, page 327: Bowen recorded his specimens from the Meru forest as *A.m. murinus* Fschr. & Rchw.)

WHITE-EYED SLATY FLYCATCHER.

*Dioptrornis fischeri fischeri* Rchw.

Up to the timber-line, 10,700 ft. (E.G.R. & R.E.M.). Not a bird of deep forest.

WHITE-TAILED CRESTED FLYCATCHER.

*Trochocercus albonotatus albonotatus* Sharpe.

A bird of forest, up to timber-line.

MOUNTAIN YELLOW FLYCATCHER.

*Chloropeta similis* Richmond.

A bird of forest glades to at least 10,000 ft., but not apparently venturing into the open moorlands. It has usually been regarded in the past as a subspecies of *C. natalensis*, but this is incorrect. *C. similis* has only twelve tail-feathers; *C. natalensis* has fourteen (see Granvik, *Rev. Zool. Bot. Afr.*, **25**, 73, 1934; Macdonald, *Bull. Brit. Orn. Club*, **60**, 82, 1940).

OLIVE THRUSH.

*Turdus olivaceus elgonensis* (Sharpe).

Common in the forest up to 8,400 ft. (Meinertzhagen) and occurring to the timber line (E.G.R. & R.E.M.).

ORANGE THRUSH.

*Geokichla piaggiae kilimensis* Neum.

Also extending through the forest to its upper edge. (The type of *G.p. keniensis* Mearns, regarded as a synonym, came from 10,000 ft.)

HILL CHAT.

*Pinarochroa sordida ernesti* Sharpe.

From the upper edge of the timber to the upper edge of the moorland (at least 15,000 ft.). Raymond Hook found a nest with two eggs at the end of August.

ROBIN CHAT.

*Cossypha caffra iolaema* Rchw.

In glades up to at least 8,500 ft. (E.G.R. & R.E.M.) and it may go much higher, as it does on Aberdares (10,000 ft.).

STONE CHAT.

*Saxicola torquata axillaris* (Shelley).

In glades, apparently not up to the higher zone of the forest.

WHITE-STARRED BUSH-ROBIN.

*Pogonocichla stellata guttifer* Rchw. & Neum.

Inhabiting forest to the upper edge. The type of *P.s. keniensis* Mearns, regarded as a synonym by Grant and Mackworth Praed (*Bull. Brit. Orn. Club*, **61**, 20, 1941), came from 10,700 ft.

BROWN FLYCATCHER-WARBLER.

*Seicercus umbrovirens mackenzianus* Sharpe.

A bird of the forest to its upper edge.

"SCRUB-WARBLEDERS."

*Sathrocercus cinnamomeus cinnamomeus* (Rüpp.).

Ascending to practically the top of the forest belt: a species of rank vegetation but not deep forest.

*Sathrocercus mariaae mariaae* (Mad.).

As a rule a species of thick forest undergrowth. Meinertzhagen's remark (*Ibis*, 1937, 750) that his "discovery of this bird on Mount Kenya is interesting, for it was known previously only from Kili-manjaro" is due to a misapprehension. Under the name *Bradypterus altumi* it had already been recorded by van Someren from "Highlands of British East Africa, 8,000 to 10,000 ft., Molo District and Mount Kenia" (*Bull. Brit. Orn. Club*, 40, 22, 1919), and from "near Meru" (*Nov. Zool.*, 37, 373, 1932).

**BROWN-HEADED FOREST WARBLER.**

*Apalis cinerea cinerea* Sharpe.

A bird of the lower belt of the forest, mainly in the tree-tops.

**WHITE-BROWED CROMBEC.**

*Sylvietta leucophrys leucophrys* Sharpe.

A forest bird apparently not extending into the upper belt. The only record for Mount Kenya appears to be the type of *S.l. keniensis* Mearns (regarded as a synonym), which was obtained by him at 8,500 ft.

**HIGHLAND GRASS-WARBLER.**

*Cisticola hunteri prinioides* Neum.

A bird with an altitude range and adaptability that are hardly surpassed. It inhabits glades all through the forest belt and extends up across the moorland practically to the edge of the snows. In the forest above Nanyuki, I was surprised to see it not only in glades but also under big trees where the undergrowth was rank herbage.

**BANDED SAND-MARTIN.**

*Riparia paludicola ducis* Rchw.

Chapin recorded these on the moorland and Raymond Hook saw them "frequently" in twos and fours in August. There is as yet no evidence whether they breed at those high altitudes.

"Swallows" in the neighbourhood of the moorland tarns are mentioned by both Dutton and Watteville. Dutton speaks of swallows circling over Lake Michaelson (12,700 ft). Watteville found a cave "the home of the Hall Tarn Swallows, and the ledges were buried under old droppings and feathers" (p. 280). The place was evidently at about 14,000 ft. and much more likely to be used by Alpine Swifts than by any member of the Swallow family.

**ROUGH-WING BANK-MARTIN.**

*Psaldoprocne holomelaena massaica* Neum.

Not recorded as breeding above 7,100 ft., but foraging not only the forest glades at all altitudes but far out over the moorland to 13,500 ft. (Meinertzhagen). Owing to its dependence on *Usnea* (Beard Lichen) for nesting it is not likely to breed above the timber line.

**PURPLE-THROATED CUCKOO-SHRIKE.**

*Campephaga quisqualina martini* Jacks.

A forest bird, probably of the lower belt only. Meinertzhagen regarded his specimens as marking "a considerable eastward extension of the known range"; but the bird had already been recorded for both the Aberdares and Mount Kenya by van Someren.

GREY CUCKOO-SHRIKE.

*Coracina caesia pura* (Sharpe).

A forest species ranging to the timber line.

BOUBOU

*Laniarius ferrugineus ambiguus* Mad.

Noted by Meinertzhagen in February to about 8,300 ft., but heard repeatedly by Chapin and by E.G.R. & R.E.M. just inside the upper edge of the forest in June.

BLACK-TAILED ORIOLE.

*Oriolus (monacha) percevali* O.-Grant.

A forest bird recorded up to 8,500 ft.

WHITE-NECKED RAVEN.

*Corvultur albicollis* (Lath.).

Occasionally observed at all altitudes in the forest and well up on the moorland (12,000 ft.).

WALLER'S CHESTNUT-WING (Starling; Grackle).

*Onychognathus walleri keniensis* van Som.

A forest bird apparently not reaching the upper belt. The highest record is Lönnerberg's at 8,800 ft. Meinertzhagen recorded his Mount Kenya specimens as *O.w. elgonis*: but this is, he tells me, through his having overlooked van Someren's separation of the Mount Kenya subspecies.

SLENDER-BILLED CHESTNUT-WING.

*Onychognathus tenuirostris raymondi* Meinertz.

Mackinder found these interesting birds breeding in August, in the rocks in Höhnel Valley at about 12,000 ft. and Raymond Hook has seen them entering holes at similar elevations. Meinertzhagen recorded the birds only on the open rocky moorland above 13,000 ft. and regarded this form as "a true alpina bird, never coming down to tree-level."

Chapin's observations were at variance with this. He encountered them nearly to 15,000 ft., but found also that they "would perch awhile on high trees up and down the mountain. They seemed to 'commute' between the lower mountain forest where they could find fruit and the rocks up near 14,000 ft." E.G.R. & R.E.M. certainly saw a party of four on topmost *Hagenia* trees at sunset.

The question of how far these Mount Kenya birds travel, that is, to what extent their range is restricted and isolated, is of especial interest because Meinertzhagen described them as a separate subspecies, *raymondi*, distinct not only from Abyssinian birds, but also from those inhabiting the Aberdares moorlands. Moreover, Meinertzhagen's evidence was that while the Mount Kenya birds found their food on the moorlands, especially snails in the Giant Lobelias, the Aberdares birds fed on the olives of the forest. But Chapin's observations (1934) on the Mount Kenya birds would indicate that their feeding habits are not, at any rate consistently, at variance with those of the Aberdares birds.

A series of specimens from the Aberdares and Mount Kenya have recently been compared in the American Museum of Natural History. The conclusion is that birds from the two mountains cannot be distinguished and it is doubtful whether they merit a different name from the Abyssinian birds (J. P. Chapin *in litt.*).

WHITE-EYE.

*Zosterops virens kikuyuensis* Sharpe.

Through the forests practically to the timber-line, but apparently commonest in the upper belt.

SCARLET-TUFTED MALACHITE SUNBIRD.

*Nectarinia johnstoni* Shelley.

A true moorland bird, ranging as high as the Giant Groundsels and Lobelias on which it primarily depends. I did, however, see it feeding on Protea at 10,000 ft., above Timau, and Chapin made a similar observation on the east side of the mountain. Mearns made a specimen from 14,000 ft., the type of his *N.j. idius* but the consensus of opinion is that the Mount Kenya birds cannot be distinguished from those of Kilimanjaro.

Mackinder found nestlings in August.

MALACHITE SUNBIRD.

*Nectarinia famosa aenigularis* Sharpe.

Observed on the mountain only by Meinertzhagen and only between 10,000 to 10,500 ft.

TACAZZE SUNBIRD.

*Nectarinia tacazze* Stanl.

To at least 10,000 ft. (Mackinder; Chapin).

GOLDEN-WINGED SUNBIRD.

*Drepanorhynchus reichenowi* Fschr.

Up to the bamboos.

This species, like *N. famosa* and *N. tacazze*, is doubtless subject to seasonal movements which must be taken into account: but apparently none of these three sunbirds, though at home in the glades, ventures out on the moorland.

DOUBLE-COLLARED SUNBIRD.

*Cinnyris mediocris keniensis* Mearns.

Up to 10,000 ft. (Mackinder, Chapin). Jackson omits any mention of this form, described from Mount Kenya, and tacitly sinks it as a synonym of *C.m. mediocris* Shelley. van Someren (1932, 355) admits it and so does Meinertzhagen (1937, 754), but gives different reasons. Whether it is distinguishable or not, it seems from van Someren's remarks not to be confined to Mount Kenya.

OLIVE SUNBIRD.

*Cyanomitra olivacea neglecta* Neum.

A forest species not definitely recorded above 8,000 ft.

REICHENOW'S WEAVER.

*Othyphantes reichenowi reichenowi* Fschr.

A bird of forest edges, reaching the timber-line, where E.G.R. & R.E.M. saw nests as well as birds.

NEGRO FINCH.

*Nigrita canicapilla diabolica* Rchw. & Neum.

A bird of the forest undergrowth practically to the timber line. Meinertzhagen's record was not, as he thought, the first for the mountain: Bowen had reported it previously from above Meru.

#### CRIMSON WING.

*Cryptospiza salvadorii ruwenzori* W. Scl.

Another bird of the forest undergrowth. So far not recorded above 8,400 ft.

#### BLACK-HEADED WAXBILL.

*Estrilda atricapilla* subsp.

van Someren (1922) recorded *E.a. keniensis* Mearns, which was described from 8,500 ft. in the Aberdares, also for "Kenia." The birds are doubtfully distinguishable from *E.a. kandti* Rchw. of Kivu, and Chapin (1934) has applied this name to the Mount Kenya birds.

Meinertzhagen has recorded specimens of his from Mount Kenya and the Aberdares as *E. nonnula nonnula* Hartlaub, but Chapin, who has recently examined one of them, tells me that this is an erroneous identification.

#### YELLOW-CROWNED CANARY.

*Serinus flavivertex flavivertex* Blanf.

Meinertzhagen's statement is: "only met with at fairly high elevations on Kenya, where they were common in glades between 8,200 and 10,300 ft." This implies that they do not frequent the moorlands and was astonishing to me because on the great mountains of northern Tanganyika the species ascends to the limits of vegetation and beyond. Moreover, Orde-Browne (1918) almost certainly refers to this species when he mentions "a small shy bird somewhat resembling a canary, but with black patches" on the south-eastern moorland at 12,000 ft. I, therefore, asked Raymond Hook his experience and he writes: "In my opinion on both Kenya and Aberdares, they go as high as the Compositae go. I would have said that they ate practically every kind of Compositae seed, including Giant Groundsel."

#### STREAKY SEED-EATER.

*Polospiza striolata striolata* Rüpp.

A bird of scrub country with an astonishing altitudinal range, from about 5,000 ft. upwards. Meinertzhagen collected them up to 14,000 ft. on the moorland and it is of the greatest interest that he found birds from the higher elevations "slightly brighter and richer in colour" than those from the lower. Dr. Chapin, who has independently examined other specimens of this species from the Mount Kenya moorland notes (*in litt.*) that they have a stronger wash of yellow on the head and the throat than birds from elsewhere in the Kenya Highlands. In fact, in colour they closely resemble Kilimanjaro birds (not from such high altitudes as the Mount Kenya ones).

It is interesting to note that on the Mount Elgon moorland, the Seed-eaters have differentiated from those of the lower slopes, sufficiently, in fact, to be named *P.s. ugandae* by van Someren. But their trend of variation is different from that in the Mount Kenya moorland birds. *P.s. ugandae* have virtually no tinge of yellow about the face, but show a tendency towards the dull brown coloration of the Ruwenzori birds (*P.s. graueri*).

#### GROSBEAK SEED-EATER.

*Polospiza burtoni albifrons* Sharpe.

A forest bird not recorded above 8,400 ft.

## CITRIL.

*Spinus citrinelloides kikuyuensis* Neum.

To the timber-line. Not a bird of deep forest.

## 5. THE MOORLAND COMMUNITY.

It is now possible, perhaps for the first time, to obtain a clear general view of the higher vertebrates of the upper slopes of Mount Kenya. Setting aside doubtful occurrences, probable occurrences, and stragglers, it can be said with confidence that the animals comprising the bulk of the fauna are those given in this and the next sections. In the birds, the species are practically all immediately allocable to moorland or forest-belt communities respectively. In the mammals, the distinction is not so clear-cut, because of those grass-haunting species which inhabit the upper forest glades and also extend into the moorland.

In the list that follows, those species reaching the upper, less bushy, half of the moorland are marked with an asterisk:—

Two shrews, *Crocidura allea alpina*\* and *Surdisorex polulus*.

Two mole-rats, *Otomys orestes orestes*\*, and *O.t. tropicalis*.

A "mouse" *Dendromys insignis percevali*\*.

A Groove-toothed Rat, *Tachyoryctes rex*.

The rock-hyrax, *Procavia johnstoni mackinderi*\*.

The duikerbok, *Sylvicapra grimmia altivallis*\*.

The eland, *Taurotragus oryx pattersonianus*\*.

Feeding wholly or partly upon the foregoing population, and especially the small rodents, there are the following:—

The leopard, *Felis pardus*\*.

The striped weasel, *Ictonyx striatus*.

An owl, *Bubo capensis mackinderi*\*.

Two buzzards, *Buteo rufofuscus augur*\* and perhaps also to some small extent *B. oreophilus*.

Other birds are:—

(a) Dependent on wet places, the snipe, *Capella nigripennis*, and the pigmy crakes *Sarothrura lineata antonii*.

(b) Dependent on rocks, the starling, *Onychognathus tenuirostris raymondi*\*, and the swift, *Apus melba* (? *striatus*)\*

(c) Others: the francolin, *F. shelleyi theresae*; the chat, *Pinarochroa sordida ernesti*\*; the pipit, *Macronyx sharpei*; the warbler, *Cisticola hunteri prinioides*\*; the seed-eater,

*Polioptila striolata*\*; the canary, *Serinus flavivertex*\*; the sunbird *Nectarinia j. johnstoni*\*; and the raven *Corvultur albicollis*.

It may be added that the swifts probably find by no means all their food over the moorland, while on the other hand, two martins, *Psaldiprocne* and *Riparia*, forage through the moorland air in appreciable numbers, though probably resident lower down the mountain.

Meinertzhagen in his list of birds "breeding on the moorland of Mount Kenya" (*Ibis*, 1937, 734) distinguished by brackets those species which "have spread up the mountain from the plains and need not be considered." The distinction is not a satisfactory one. For example, he does not bracket *Macronyx sharpei*, which occurs below the forest belt at about 7,000 ft. at least on the west side of the mountain, and elsewhere in Kenya



below 8,000 ft.; nor *Francolinus shelleyi*, which as a species is not a high-altitude bird—it occurs as low as 4,000 ft. in Northern Tanganyika—although the Kenya localities for it are all so high; nor *Onychognathus tenuirostris*, which has been collected at Nairobi, Kyambu and Fort Hall (as well as at low altitudes in Tanganyika and Kivu).

On the whole it would seem most satisfactory to distinguish those species which, so far as we know, practically everywhere in their range nest above the timber line. By that criterion we should select three birds, the swift, *Apus melba*, the chat, *Pinarochroa*, and the sunbird, *Nectarinia johnstoni*, as truly alpine species. The rest of the thirteen birds that we regard as forming the resident moorland population, belong to more widely spread, opportunist, species that have the necessary tolerance of high altitude and low temperature. As discussed in section 7, some of them have succeeded in colonising the great heights without undergoing any perceptible change: others have not.

Applying the same criterion to the mammals of the moorland, it may be concluded that only two out of the eleven, both shrews, are truly alpine species. *Otomys orestes* would rank as a third but for the fact that *O.o. dollmani* Heller inhabits Mount Garguess at only 7,000 ft.

I doubt whether any attempt has been made to compare the vertebrate community of the African moorlands with those of similar country elsewhere. In their chapter on "Alpine Animals" Hesse, Allee and Schmidt (*Ecological Animal Geography*, 1937) make practically no mention of the African areas. A major difference between the African and the temperate-zone alpine is, of course, the absence of a winter in Africa. Hence the African alpine species have no need for the expedients of hibernation (among the mammals) or of migration (among the birds).

The high-altitude shrews and rats of Mount Kenya have their counterpart in the Alps: and the rock-hyrax is in many ways the counterpart of the marmot, though not, of course, a relative. The chamois and the other rock-hopping ungulates do not have their representative on Mount Kenya. It is rather surprising that the steinbuck or the klipspringer have not occupied the high altitudes. On the better vegetated sub-alpines and high moors of the temperate zones hares are altogether more common than they appear to be on Mount Kenya; and it may be that the duikerbok (*Sylvicapra*) helps to fill this ecological niche.

Among birds the chough, accentor, wall-creeper (*Tichodroma*), snow finch (*Montifringilla*), swift, lammergeier and a gallinaceous bird (e.g., Ptarmigan) may be expected in the alpine regions of the temperate zones. Meinertzhagen found at 9,800 ft. in Afghanistan also horned lark and rock-sparrow (*Ibis*, 1938, 484). On Mount Kenya there is the self-same species of swift and of lammergeyer (probably); *Onychognathus tenuirostris* may in some respects be taken as the ecological counterpart of the chough; against snow-finch, wall-creeper, lark, rock-sparrow and accentor we have only the *Cisticola*, the chat (*Pinarochroa*), the canary and the seed-eater (*Poliospiza*). But the African sunbird is, of course, a unique contribution.

The Kenya moorland gallinaceous bird belongs to the lower, bushy, zone and hence corresponds fairly to the grouse of the northern moors. The snipe has an even closer parallel. Our *Bubo c. mackinderi* is a noble off-set to the moorland owls of the north. The great and amazing gaps in the birds of the African moorlands are in the plovers, larks and pipits, the scanty *macronyx* being an insignificant element compared with the numerous *Anthus* of higher altitudes. The pipit population is, however, supplemented during the northern winter by some *Anthus rufogularis*, a species that, significantly, is a bird of the tundra.

It is surprising that the stonechat, which has shown such enterprise in extending its geographical range—even to the islands in the Indian Ocean—should not have been able to adapt itself to the Mount Kenya moorland. Also no falcon seems to have found it worth while to colonize this area.

## 6. THE FOREST BELT COMMUNITIES.

I use “forest belt” advisedly, rather than “forest” because a distinction can readily be drawn between those species which belong to the full deep forest, with or without bamboo, dependent, that is, on shade or on big trees, and those frequenting the glades and the forest edges. The species that appear to form the bulk of the fauna are given below, those ascending to the upper part being marked with an asterisk.

### Mammals of full forest:—

- Shrew, *Sylvisorex granti*\*
- Bush-baby, *Galago crassicaudatus*.
- Two monkeys, *Cercopithecus mitis*\* and *Colobus polykomos*\*
- Two squirrels, *Heliosciurus* sp. and *Paraxerus ochraceus*.
- Dormouse, *Graphiurus murinus*\*
- Crested “rat,” *Lophiomys ibeanus*.
- Tree-mouse, *Rattus (Hylomyscus) denniae*\*
- Rat, *Rattus tullbergi*\*
- Tree-hyrax, *Dendrohyrax arboreus*\*
- Giant forest-hog, *Hylochoerus meinertzhageni*.
- Two duikers, *Cephalophus harveyi* and *C. nigrifrons*\*
- Bongo, *Boocercus eurycerus*\*

This gives as the purely arboreal community one galago, two monkeys, two squirrels, one tree-mouse and one tree-hyrax, of which the galago and the two squirrels drop out before the upper zone of the forest.

### Other mammals:—

- Three shrews, *Crocidura f. fumosa*, *C. occidentalis* and *C. turba zaodon*\*
- A mongoose, *Myonax sanguineus*.
- A genet, *Genetta tigrina*.
- The leopard, *Felis pardus*\*
- Six rats and mice, *Lemnicomys striatus*\*, *Lophuromys aquilus*\*, *Oenomys hypoxanthus*\*, *Rhabdomys pumilio*\* and *Mus (Leggada)* spp.
- The bush-buck\*.
- The rhino\*.
- The buffalo\*.
- The elephant\*.

### The birds dependent on full forest:—

- Crowned Hawk-eagle, *Stephanoaëtus*.
- Fringin, *F. jacksoni pollenorum*\*
- Two pigeons, *Columba a. arquatrix*\* and *Turturoena*.
- (Ground) Dove, *Aplopelia l. larvata*.
- Lourie, *Turacus hartlaubi*\*
- Parrot, *Poicephalus gulielmi massaicus*\*
- Hornbill, *Bycanistes cristatus*.
- Wood-hoopoe, *Phoeniculus bollei jacksoni*.

Wood-owl, *Ciccaba woodfordii*.  
 Trogon, *Heterotrogon v. vittatum*.  
 Barbet, *Viridibucco simplex leucomystax*.  
 Honey-guide, *Indicator v. variegatus\**.  
 Woodpecker, *Campethera taeniolaenia hausburgi*.  
 Hill-babbler, *Pseudoalcippe a. abyssinicus*.  
 Two bulbuls, *Stelgidocichla latirostris eugenia* and *Arizelocichla tephrolaema kikuyuensis\**.  
 Flycatcher, *Trochocerus a. albonotatus\**.  
 Two thrushes, *Turdus olivaceus elgonensis\** and *Geokichla piaggiae kilimensis\**.  
 Bush-robin, *Pogonocichla stellata guttifer\**.  
 Four "warblers", *Seicercus umbrovirens mackenzianus\**, *Sathrocercus m. mariae\**, *Apalis c. cinerea* and *Sylvietta l. leucophrys*.  
 Two cuckoo-shrikes, *Campephaga quiscalina martini* and *Coracina caesia pura\**.  
 Oriole, *Oriolus percevali*.  
 Starling, *Onychognathus walleri keniensis*.  
 White-eye, *Zosterops virens kikuyuensis\**.  
 Sunbird, *Cyanomitra olivacea neglecta*.  
 Three small weavers, *Nigrita canicapilla diabolica\**, *Cryptospiza salvadorii ruwenzori* and *Estrilda atricapilla*.  
 "Seed-eater," *Poliospiza burtoni albifrons* subsp.

*Other birds:—*

Ibis, *Lampribus olivacea akeleyorum\**.  
 Duck, *Anas sparsa leucostigma\**.  
 Long-crested hawk-eagle, *Lophoaëtus*.  
 Mountain Buzzard, *Buteo oreophilus*.  
 Pygmy Crake, *Sarothrura e. elegans*.  
 Bee-eater, *Melittophagus lafresnayi oreobates*.  
 Kingfisher, *Megaceryle n. maxima*.  
 Three flycatchers, *Alseonax adustus interpositus\**, *Dioptrornis f. fischeri\** and *Chloropeta similis\**.  
 Two chats, *Cossypha caffra iolaema* and *Saxicola torquata axillaris*.  
 Two "warblers," *Sathrocercus c. cinnamomeus\** and *Cisticola hunteri prinioides\**.  
 Martin, *Psalidoprocne holomelaena massaica\**.  
 Boubou shrike, *Laniarius ferrugineus ambiguus\**.  
 Four sunbirds, of which three, *Drepanorhynchus* and *Nectarinia* spp., apparently come and go in the glades, while *Cinnyris mediocris keniensis\** is probably more stationary.  
 Weaver, *Othyphantes r. reichenowi\**.

## 7. ENDEMISM AND VARIATION ON THE MOUNTAIN.

For this discussion it may be recalled that Mount Kenya stands at the north-eastern edge of the central Kenya Highlands, joined to them by a bridge of country above 6,500 ft. and of a nature that would not be expected to form a barrier to the dispersal of mountain forest animals. The moorland again, although separated in a direct line from the nearest country of that kind, on the Aberdares, by the forest belts on both Mount Kenya and the Aberdares, has its ecological isolation mitigated by the existence of the gap through the forest at its northern end. This gap certainly accounts for the appearance of more stragglers, both mammals

and birds, than would otherwise reach the moorland, and is a factor by which the residents on the moorland tend to be augmented in both individuals and species. The incursion of individuals through the gap from populations below would retard the development of a moorland population showing recognizable characters.

*Endemism on the moorland.*—Of the eleven species recognized in the preceding section as forming the bulk of the moorland population:—

Three, the eland, the leopard and the striped weasel belong; so far as is known, to relatively widespread forms.

One, the mouse *Dendromys insignis percevali*, is a subspecies shared by Mount Kenya with Mount Garguess (Urageess), and represented on the Aberdares by *D.i. elgonis*.

One, the duikerbok, *Sylvicapra grimmia altivallis*, is the subspecies of the Aberdares moorlands as well as Mount Kenya.

One, the shrew, *Crocidura allea alpina*, is regarded as typically present only on Mount Kenya: individuals from the Aberdares are intermediate between those from Mount Kenya and those from mountains further west (typical *C.a. allea*).

One, the rock-hyrax, *Procavia johnstoni mackinderi*, is a high-altitude subspecies, developed on Mount Kenya from a widespread species. It is curious that, so far as present information goes, no member of this species inhabits the moorland of the Aberdares.

Two, the rats *Otomys orestes orestes* and *Otomys tropicalis tropicalis*, are subspecies known only from Mount Kenya. The first species does not seem to occur on the Aberdares, where its place is taken by *O. thomasi squalus*; the second is represented on the Aberdares by the western form *O.t. elgonis*, which actually comes east practically to Nyeri.

Two, the mole-rat *Tachyoryctes rex*, and the shrew, *Surdisorex polulus*, are regarded as full species confined to Mount Kenya: but it is very noteworthy that each has a close counterpart, *T. audax* and *S. norae* respectively, confined to the Aberdares. It must be suspected that these four endemic species represent two pairs of subspecies. Hollister, while keeping *T. rex* and *T. audax* as species, remarks that they are "obviously closely related": Ellerman thinks that all the East African *Tachyoryctes* are of one species.

It is interesting to compare the degree of endemism in the resident moorland bird fauna.

Five, the buzzard *Buteo r. augur*, the snipe, the crane, the pipit and the grass-warbler, are subspecies at home at altitudes much lower than the moorland, presumably derived from those lower altitudes and showing no differences with altitude.

One, the owl, *Bubo c. mackinderi*, is a subspecies recently recorded in several localities from 5,500 ft. upwards in the Eastern Kenya Highlands and also from grassland at 7,000 ft. in South Tanganyika.

One, the seed-eater, *Polioptila striolata*, is regarded as belonging to a very widespread subspecies, but is showing a tendency to develop peculiarities on the heights of Mount Kenya—as the species already has, to an obvious degree, on Elgon.

One, the chat, *Pinarochroa sordida*, is a subspecies, occurring on several other moorlands, of a species everywhere alpine.

One, the sunbird, *Nectarinia johnstoni*, has been described as a distinct subspecies, but most ornithologists cannot recognize it. Not recorded from the Aberdares.

One, the swift, may be an endemic subspecies of a bird everywhere alpine.

One, the starling, belongs to a species, the variations of which are obscure, that breeds in many parts of eastern Africa from about 6,000 ft. upwards.

One, the francolin, may be a true endemic Mount Kenya subspecies, distinct from that on the Aberdares and derived from a species with a wide, though discontinuous, range at lower altitudes.

Comparing the endemism in the mammal and the bird fauna we find that among the eleven mammals we have, at the lowest assessment, five endemic subspecies, at the highest, four endemic subspecies and two endemic species: among the birds there are apparently two endemic subspecies.

*Endemism in the forest belt.*—Among the mammals there is, apart from the doubtful *Grammomys gigas*, only a single form, the *Graphiurus*, which is at best an endemic subspecies intergrading with *G. murinus griseus* on the slopes of the mountain.

So far as is known, no species is represented by authentically different forms in the Mount Kenya and the Aberdares forests respectively.

Among the birds of the forest belt there is only one that, by balance of taxonomic opinion, has a claim to be regarded as an endemic subspecies, namely, the starling, *Onychognathus walleri keniensis*. van Someren described this on larger size and longer, stouter, bill and it has been admitted by Jackson (1938). It is unfortunate that no one seems to have recorded or discussed material of this species from the Aberdares. It may be found that the Mount Kenya form represents the culmination of a trend of variation ("cline") eastwards through the Aberdares. The likelihood of this is actually greater than in the established case of *Crocidura allex*, because the range of *O. walleri* through the Kenya Highlands is more continuous.

Summing up, it is clear that endemism in the mammal and the bird fauna of the forest-belt is low and indefinite, in contrast to the endemism in the moorland fauna: and that conclusion is in accord with the relatively slight ecological and geographical isolation of the forest-belt.

*Variation.*—In considering variation on the mountain it is necessary to keep those cases of differentiation which may be ascribable merely to geographical isolation separate from those in which it may be argued that the peculiar conditions of high altitudes may be the sole, or the main, factor.

Among the endemic birds of Mount Kenya, the Alpine swift (if further experience does prove it to be an endemic) and the francolin are best placed in the first category. For both of them the Mount Kenya moorland is a station that is isolated geographically but is not ecologically without parallel. The Mount Kenya subspecies of the starling, *Onychognathus walleri*, is likely, when more is known, to reveal itself as the end-point of a geographical cline, like the shrew, *Crocidura allex alpina*.

The one bird in which differentiation induced by high altitude seems to be taking place is *Poliospiza striolata*: and it is the more surprising that there should be no other unequivocal case among the birds because on Kilimanjaro, within the same range of altitude, variation is very marked in the same species of *Cisticola* as that inhabiting Mount Kenya.

In the mammals, individually so much less mobile than the birds, there is more evidence of high altitude as a factor in evolution. The rock-hyrax can certainly be cited as an example, from both its circumstances

and its characters: so can the tree dormouse, *Graphiurus raptor*, if its intergradation with *griseus* towards the base of mountain be accepted. *Otomys tropicalis tropicalis* can also be included in this category with some confidence; since the widespread *O.t. elgonis* comes to 7,000 ft. at the western base of Mount Kenya, it would seem that only an active differentiation on the higher slopes can be responsible for the maintenance of the localized *O.t. tropicalis*.

It is tempting to claim the two endemic "species," *Tachyoryctes rex* and *Surdisorex polulus* as due to the evolutionary effects of high altitude but a true estimation could only be made following more conclusive work on their taxonomic relations.

#### 8. SOME OF THE OUTSTANDING QUESTIONS.

It will be seen from the foregoing sections that when the scattered sources are collated a good deal of information is available about the fauna of Mount Kenya. Among the questions that merit investigation are the following:—

- (a) Does the fauna of the south-eastern segment of the mountain, about which hardly anything definite has been recorded above about 5,000 ft., differ appreciably from the comparatively well-known fauna of the northern, drier, half of the mountain?
- (b) What are the breeding-seasons, especially on the moorland? Mackinder found the moorland sunbird and grackle breeding in August. Raymond Hook, the moorland chat in the same month. If it is confirmed that the breeding-season is a restricted one, as from the available evidence it may be, what reason, climatic or other, can be suggested for this choice?
- (c) Are the forest and the moorland as devoid of bats as the absence of specific records appears to show?
- (d) What are the "Hall Tarn Swallows" that breed in the cave described by Watteville?
- (e) Do any of the birds move up and down the mountain with the seasons and should any of the species included in my List B (Section 4) be transferred to List C as truly inhabitants of the main forest belt above 7,000 ft.? (It is, of course clear, especially from the several cases in which E.G.R. & R.E.M. on the same route as Meinertzhagen found species a good deal higher than he did, that prolonged accumulation of records would be needed before these questions can be answered definitely.) Certain of the species in List B, e.g., *Pholia sharpii*, are almost certain to qualify for List C when more is known.
- (f) What is the status of the thicket rat *Thamnomys gigas*? If it is not merely an individual variation of *T. ibeanus* a series should be obtainable.
- (g) Do the two Orange Thrushes, *Geokichla gurneyi* and *Geokichla piaggiae*, occur together anywhere on Mount Kenya?
- (h) What is the status of several of the species that have been recorded from the moorland, especially the Lammergeyer, the White-necked Raven and the Snipe?
- (i) Does the gorgeous *Chlorophoneus doherty* not reach Mount Kenya? It is recorded from as far east as the Aberdares and Nyeri.

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\*This reference is included mainly because the chapter on Mount Kenya was commended in a review in *Geog. J.*, **80**, 160. The opening of paragraph of the chapter is:—

“In the early days of Kenya's history a Government official stationed at Naivasha climbed to the top of the Aberdare Range and, looking out to the north-east over ninety miles of forest and plain, saw a lofty, snow-capped mountain. When he talked of this he was held to have been the victim of a particularly bad attack of malaria, but very soon Krapf, the German missionary, had walked through the Kikuyu country, armed only with an umbrella, and had made a nearer acquaintance with Mount Kenia.”

It is fair to say, however, that this level is not maintained consistently throughout the chapter.

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