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## AN ORNITHOLOGICAL SURVEY OF THE KIDEPO NATIONAL PARK, NORTHERN UGANDA

By

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### INTRODUCTION

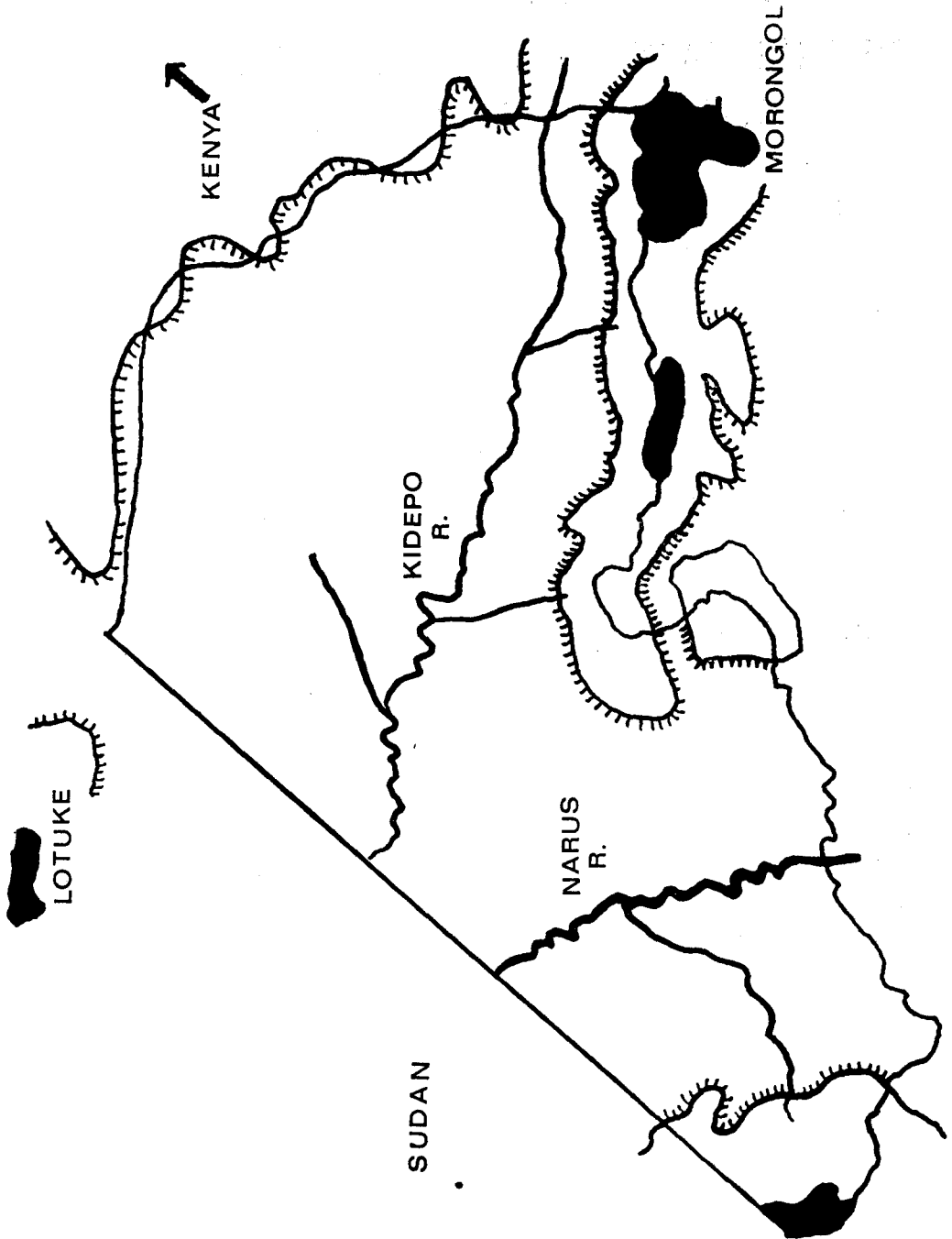
This paper summarises the results of the Oxford University expedition to the Kidepo Valley, in the long vacation of 1966 (July 20th–September 10th). The expedition was undertaken by the author and R. L. Rolfe (and, although this paper is the former's responsibility, the field work was a combined effort in which Rolfe did a lion's share).

The main aims of the expedition were to study the birds of this very unspoilt region and to satisfy the conditions laid down by Uganda National Parks, when permission was given to work in the Kidepo, by making a complete list of the species occurring in the park and preparing a small collection of skins sufficient for the identification purposes of future researchers and interested tourists. In the event, the previous provisional list of 200 species was increased to almost 400 and a collection of 240 skins of about 170 species was made. Most of the skins are now available at the Kidepo H.Q., while about 30 of the exceptional ones have been presented to the British Museum.

The main method used was to set strings of mist-nets in suitable trapping sites around each camping place. The surrounding country was then covered on foot by one man while the other operated the nets. Several species were never seen except when caught in the nets. Shooting was used to collect a few difficult species, such as the nightjars, for which nets were of no use.

The vegetation of the area was already well known from botanical surveys carried out principally by Thomas (1943) and Wilson (1962), the latter being the more detailed for the Kidepo. This, combined with the two weeks of assistance to our expedition by J. M. Lock, a botanist working for NUTAE at the Queen Elizabeth Park, provided a reasonable knowledge of at least the broader aspects of the vegetation. Thus, we were able to correlate the distribution of birds with the vegetation, as described in the first part of the paper. General observations and the collection of skins, the more difficult to identify being taken back to the U.K. for further study, produced some interesting records which are discussed below in the two sections—Distribution and Races, and Breeding and Moults.

A short survey was made on three species of *Tockus* (Hornbills) and results are given in the third section. The fourth (and last) includes incidental observations on the Park birds.



Map 1  
KIDEPO PARK, UGANDA  
—hatched line; ca. 5000' contour  
—solid black; forest  
—Scale 1" = 6 miles (1 cm : 3.8 km.)

LONYILI

Throughout this paper, nomenclature follows C. M. N. White (1960–1965), while the English names are those of Praed & Grant.

### General Description of the Park

The Kidepo Park occupies 500 sq. miles (1300 km<sup>2</sup>) in the north-east corner of Karamoja Province of Uganda (around 4°N). In the north, it borders the Sudan for 30 miles (50 km) and its eastern boundary is about 15 miles (25 km) from the Kenya border. It consists mainly of the basins of the rivers Narus and Kidepo which flow north-west to meet in the Sudan. Both flow only during the rains, being for most of the year dry, except for pools trapped behind rocky catchments. The Kidepo valley (average altitude 3200 ft (975 m) is surrounded on all sides (see Map I), except for the north-north-west, by mountain ranges (composed of rocks of the Basement complex), mostly about 5000 ft (1500 m) high, but rising to 9020 ft (2749 m) at Mt. Morongole and slightly lower at Mt. Lotuke, in the Sudan. The floor of the valley is almost flat, but is broken up by the numerous tributaries of the river and the occasional *kopje* (inselbergs) protruding a few hundred feet above the plains. The Narus valley is less open and flattens out only as it nears the Sudan border. The Narus river itself is about a quarter the width of the Kidepo at its widest, but has areas of flood-plain on either side, which have a thick growth of "elephant-grass" and acacia. The uplands west of the Narus rise to the 7400 ft (2250 m) mountain, Lonyili.

The Kidepo National Park was created in 1962, when it had for some years been a game reserve, in which shooting was allowed but controlled. The whole area is just north of a belt cleared of bush in the anti-tsetse campaign, but tsetse is rife in the Park itself. As a National Park, the Kidepo is quite different from the other two parks in Uganda, having plains species, like cheetah and Bright's Gazelle. The birdlife is also very varied, as indicated by the number of species, which is larger than that of Murchison Falls National Park and almost as large as that of the Queen Elizabeth National Park, both of which have large migrant populations attracted to their permanent water supplies.

### Climate

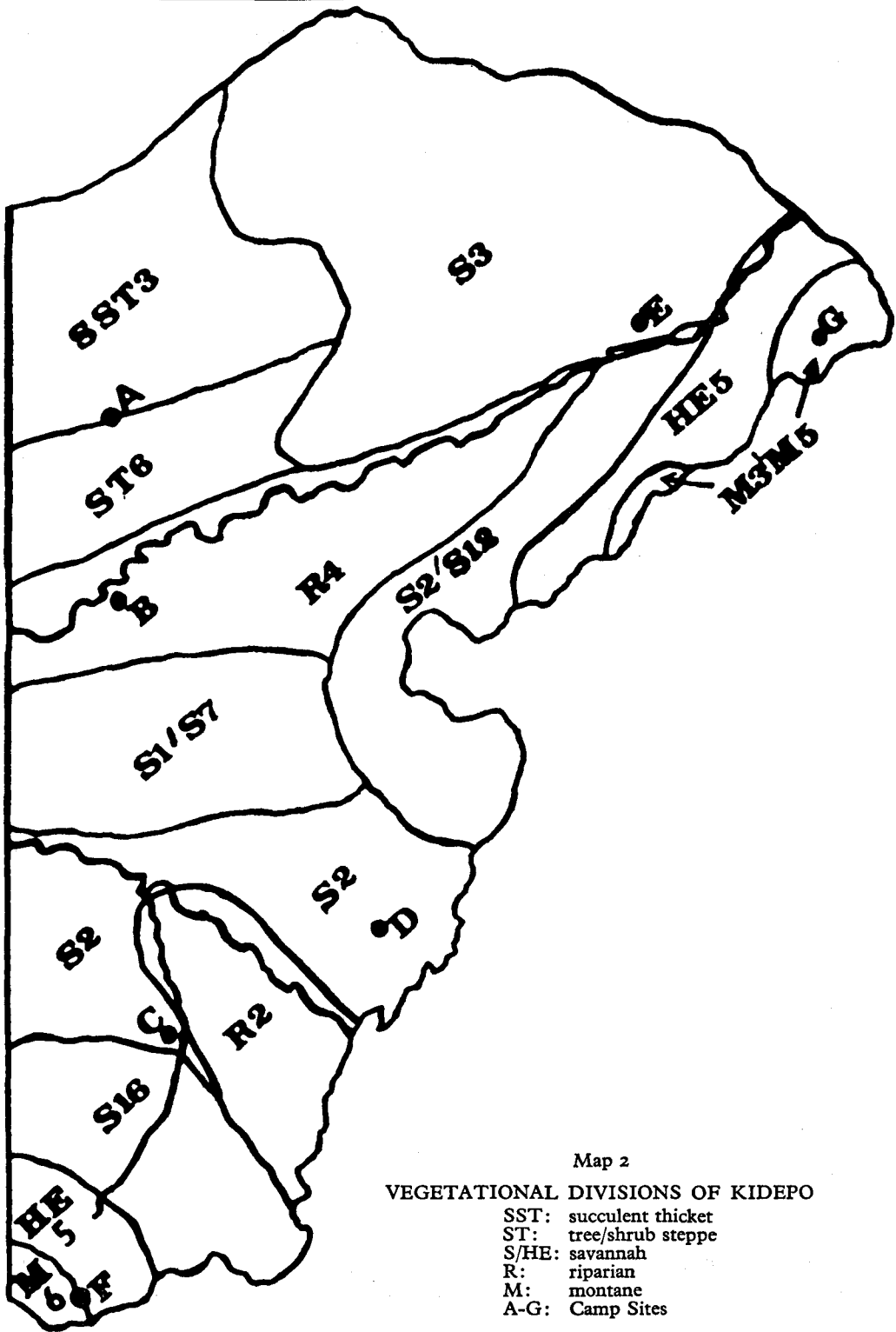
A rain-gauge has been operating only during the past few months in the Kidepo and then only at the Park headquarters. The records from Moroto station suggest that the average annual rainfall for most of the Park would be 30–35 ins (760–890 mm), precipitated in the months of May to October. An unbroken dry season of at least five months is usual and it may extend to eight months (e.g. 1965). The vegetation indicates that the driest area is in the extreme north-east corner of the Park, SST<sub>3</sub> (see Map II), the rainfall being as low as 15–20 ins (380–510 mm) per annum (Wilson, Lock). This may be due to its being in the rainshadow of Mt. Lotuke. The two montane forest areas are the wettest in the park, with an estimated rainfall of at least 45 in (1150 mm) per annum. (Wilson). On Morongole, in particular, this rainfall is due in part to precipitation from dank mists which periodically sweep over its upper slopes. The maximum temperatures occur during the dry season, December and January.

### Avifauna

In the following descriptions of the vegetation areas, only those species restricted to a given area are mentioned. Greater detail is given in the section on riparian "forest" and the distribution of all species is included in the appendix to this paper.

### VEGETATION

From the forest of Lonyili and Morongole northwards, there is a decrease in rainfall and altitude accompanied by vegetation changes (Map II). The differences between the



two sets of contours can mostly be related to the initial differences in the heights of the two mountains and also to the much gentler decrease in altitude occurring in the more hilly Lonyili half than in the quite dramatic plunge to the flat plain of the Morongole half. The difficulty about such a broad physiognomic description, correct as it may be about the important aspects of the vegetation, is to relate the bird distribution to it. Each segment is broken up by atypical vegetation—whether, for example, it be riparian forest of varying thickness, or swamps fed by a sulphurous spring on the edge of the driest area of the Park.

It should be mentioned that this account is heavily based on Wilson (1962) for much of the vegetational description and his classification is used for vegetation divisions.

## Savannah

### I. Kananarok hot spring (A on map) SST<sub>3</sub> (2): ST6

To the north of Camp A is found the Park's driest part, classified as SST<sub>3</sub> (2) (Succulent Shrub Thicket) characterised by the occurrence of numerous succulent and woody shrubs, small trees and many succulent herbs, found in dense clumps 20–120 ft. (6–36 m.) in diameter, with intervals of bare ground.

SST<sub>3</sub> (2) was the only part of the Kidepo where is to be found the Lesser Kudu and where the duiker is at all common. Very little other game occurred in this habitat, except for that attracted by the hot spring.

At the campsite, a three-acre (1.2 ha) area of swamp, caused by a sulphurous hot spring, lies about 10 miles (16 km) from the nearest permanent water, a recently-constructed dam.

To the south of Camp A, the vegetation becomes more open and is classified as ST6—Tree and Shrub Steppe. It is characterised by an open-to-fairly-dense assemblage of small trees and shrubs 6–12 ft (2–4 m) high, with an aerial coverage of 40–70 per cent. The thickets are much smaller than those of SST<sub>3</sub>, shrubs are fairly common but the ground layer is poorly developed, with a preponderance of herbs over grasses.

The area was rich in bird species, including *Amadina fasciata* and *Passer iagoensis*, which were not found in any other zone.

### II. Kidepo River (B on map) R<sub>4</sub>; SI/S<sub>7</sub>

This is the largest area of *Borassus*—dominated riparian woodland in the Park, about three miles (4.8 km) at its widest. It is classified as R<sub>4</sub>.

The *Borassus* palms are often as high as 60 ft (18 m), with the result that a dense undergrowth of tall grasses, dominated by *Phragmites communis* Trin., can develop underneath. The shrubs *Lawsonia inermis* L. and *Pluchea dioscoridis* (L.) DC. are fairly common, right on the river banks and in the open areas of the community. Other than a herd of waterbuck and occasional visiting herds of elephants, no game was recorded within the *Borassus* woodland. Because these palms normally occur in Uganda in lines along river banks, it was suggested that a *Borassus* “forest” might have an unusual avifauna. This was not borne out by our observations, which showed that a few species were especially common in the area, but that none was restricted to it.

South of the area immediately affected by the Kidepo was a region of flat savannah shown as SI/S<sub>7</sub>, where the soil was heavy-clay type, rapidly softened by rain. The vegetation consisted of a mosaic of small trees 6 to 8 ft (1.8–2.4 m) high mixed with taller trees 15–20 ft (4.5–6 m). Shrubs are only occasional, these being *Cadaba farinosa* Forsk and *Harrisonia abyssinica* Oliv. Scattered *Balanites aegyptiaca* (L.) Del. are often associated with this community and a considerable variety of herbs is distributed among well-defined tufts of the dominant grass.

During our visit, the greatest concentration of game was found here. Lion, Bat-eared

Fox, and rhino were occasionally seen and plainsgame, such as zebra, hartebeeste, eland and Bright's Gazelle, were quite common.

### III. Lorupe camp (C) and Apoka Hq. (D) S2 & S2/S12

The area S2 was the most thoroughly-explored in the Park, since it included the base to which we returned after each week's sortie. Where S2 touched the Park's eastern and western boundaries, especially in S2/S12, the ground became much more hilly, and the riparian thickets along the dried-up streams contributed more to the vegetation. On the lower parts, the vegetation consisted of tree savannah and savannah woodland, interspersed with much better-defined riparian forest. The savannah trees were mostly deciduous, averaging about 15-20 ft (4.5-6 m) in height. The ground layer was dominated by perennial grasses such as *Setaria incrassata* (Hochst) Hack. Shrubs were rare. In the hilly areas, klipspringer, Rock Hyrax and, occasionally, Roan Antelope were seen. The savannah had a small population of hartebeeste, oribi and giraffe.

The thickly-distributed stands of trees and the well-developed ground layer contained many birds, some occupying the canopy (which often included multi-species bird parties) and others, chiefly ploceids, areas of grass. *Dendropicos obsoletus* (Wagler) found here, was the only species not found elsewhere.

### IV. Narus River (Worked from D) R2

Unlike the previous vegetation type, the Narus River riparian woodland contained few species of birds, mostly ploceid seedeaters. The area was swampy in places and had two small man-made dams, which encouraged water birds. The woodlands contained trees up to 25 ft (7.5 m) tall, with a lush, perennial grass layer from 5 to 8 ft (1.5 to 2.5 m) in height and sometimes more, giving ground cover up to 90 per cent. The whole area was liable to flooding.

In the dry season, this area is said to be full of game, but apart from occasional herds of buffalo and elephant passing through, the only large animals seen by us were two crocodiles in one of the dams.

The only birds not found elsewhere were aquatic species.

### V. Kopem Kopje (E on map). S3

This region was, next to SST3, perhaps the driest in the Park. The vegetation was classified as S3—a savannah woodland community of small trees, often regularly-spaced, with a dominantly perennial layer, mainly dominated by tufted grasses. Shrubs were rare, except where protection from fire existed such as in the crown of small rock outcrops.

Only a few days were spent at Kopem, from which most sorties were directed at the foothills of Morongole in order to get some idea of the altitude zonation of birds on that mountain.

## Conclusion

The two most impressive things about the Kidepo were the total number of savannah birds and the variety within each habitat. Various experts made "off-the-cuff" estimates of about 200 as the total number of species to be expected from the region, on the grounds of its semi-aridity and its geographical position. The final total reached nearly 330 (excluding forest, montane and palearctic birds) which, for so small an area, compares dramatically with the total of 418 for all West Africa and of 497 for the whole of the Sudan (Moreau, 1966).

Of the 16 species unrecorded in the Sudan, 14 were savannah species and included such birds as *Apalis karamojae*, *Vidua hypocherina*, *Turdoides jardinei*, *Mirafra africanoides* and *Pterocles gutturalis*. By comparing the lists of typical species for each area, it is

apparent that, although certain species occur throughout the savannah, the basic population changes considerably over comparatively short distances. This can be related to similarly-rapid changes in vegetation, of course.

### Forest and Upland

This section describes the vegetation in the Park above 5000 ft (1525 m), a region containing the two areas of montane forest and the surrounding upland vegetation, which has a bird population much influenced and overlapping with that of the forest. It then shows how the forest species extend their range down the tongues of riparian gallery forest, almost to the floor of the Kidepo valley.

#### VI. Lonyili Forest camp. (F on the map) M6 and HE5

In appearance, the relict forest of Lonyili, at 5000–6500 ft (1525–2000 m), was the only “real” forest in the whole Park. The community exists on deep soils and is perhaps best described by Macdonald & Cave’s term: bowl-forest. Although the rainfall is probably similar to that of Morongole, it is much more effective in producing lush vegetation, because water collects in the depression, or bowl, on the side of the mountain. The forest is only about three miles (5 km) long and about a mile (1.5 km) wide.

The botany of the forest is not really known. Wilson did not investigate it, though he points out that, in composition, it was unlike any other in Karamoja and that its closest affinity was probably with the flora of the Imatong and Dongotona mountains of the Sudan.

The last important point is that the bulk of the forest was at 5500–6500 ft (1700–2000 m) and therefore can be considered lowland forest—quite distinct from the montane forest on Morongole, which commenced above approximately 7000 ft (2100 m).

The vegetation is classified by Wilson as M6—Tree Savannah; but, as stated, this refers mainly to the open areas and not to the forest patches. He gives three species of *Acacia* which reach a height of 60 ft (18 m) and are relict survivors of forest, so may occur within the forest patches.

Lock, the expedition’s botanist, found the variety of trees in the forest of extreme interest and unlike the species in southern Uganda. He suggested that some of the larger trees may be a species of *Ficus*. They were over 100 ft (30 m) tall with broad buttressed trunks (often more than 20 ft (6 m) in diameter), some carrying fruit attractive to many species of birds.

A ferocious nettle, probably *Laportea alatipes* Hook f. grew in profusion in deep shade associated with the following:

Forest: <i>Acacia abyssinica</i> Hochst.	<i>Ficus</i> spp.
<i>A. lahai</i> Benth.	<i>Dracaena</i> spp.
<i>Albizia gummifera</i> (Gmel.) C.A. Sm.	<i>Impatiens</i> sp.
possibly a <i>Coffea</i> .	<i>Peperomia</i> sp.

Lock was unable to identify the tall 9–11 ft (2.7–3.3 m) plant of which the marsh in the centre of the forest was composed.

The forest had a population of about 25 Uganda blue monkeys and, during the dry season, it probably holds a small number of elephant and buffalo, of which there were many signs in the forest, such as well-worn paths. The tree savannah consisted of an open meadow extending from 6500 ft (1980 m) to the summit at 7400 ft (2255 m), in which the trees gradually became smaller and were more dominated by *Protea gagedi* Gmel. Areas of bare rock also became more frequent and the summit consisted of large boulders, with a steep cliff falling away into the Sudan, and the bowl-forest, beginning on one of the gentler slopes on the Uganda side. The lower vegetation merged into HE5 type, where little time was spent on birds. The latter also applies to ST6.

Birds found only in M6 were: *Accipiter tachiro*; *Cisticola brachyptera* and *C. aberrans*. Those found only in the forest were: *Columba delegorguei*; *Merops lafresnayi*; *Lybius leucocephalus*; *Lybius bidentatus*; *Phyllastrephus fischeri*; *Alethe poliocephala*; *Apalis cinerea*; *Camaroptera chloronota*; *Nectarinia verticalis*; *Anthreptes collaris* and *Ploceus ocularis*.

Bearing in mind the forest's small size and low altitude, it is interesting to compare Lonyili with its nearest equivalent in the Sudan. This is the Lotti forest (about 50 miles (80 km) to the north, in the Imatong mountains), which is at a lower altitude, much larger and well-developed. The Lonyili forest would be expected to have a very impoverished version of the bird population of the Lotti forest and the brevity of the list shows this. Of the 15 species recorded in the Kidepo and unrecorded in the Sudan, only one, *Camaroptera chloronota*, is a forest bird. More than 65 species are listed for the southern Sudan (excluding the dry country species) many of which are forest species recorded in the southern ranges like Lotti. Notable absences from the Lonyili forest are six species of Warbler including two *Apalis*; seven species of thrush including three *Cossypha*; five Muscicapinae; seven Pycnonotidae; and all *Trichastoma*.

#### VII. Morongole Mountain: Camps at 6500 ft (1980 m). M3, M5 and HE5 and 10,200 ft (2500 m). (G on the map).

The vegetation of Morongole consists of: (a) "mist" forest and forest on steep slopes, equivalent to M3, both above 7000 ft (2135 m); (b) Highland tree savannah (i.e. scattered trees) M5 7000 ft (2135 m) to the summit, 9020 ft (2749 m) replaced below 7000 ft by savannah woodland, with HE5 (closer tree clumping).

Wilson describes HE5 as a savannah woodland of deciduous and compound-leaved trees, with a well-developed perennial grass layer. The tree heights average 10–20 ft (3–6 m). Unlike the forest birds of M3, the savannah species had a wide altitudinal range and many species occurring in HE5, were also found at 9000 ft (2750 m). Found only in HE5 was the species *Parisoma lugens*.

Although the general nature of the vegetation above HE5 is clear enough, with two forms of forest and an upland grassland, there seems to be a difference of opinion between Thomas (1943) and Wilson, on the actual composition and even on such important matters as to which were the dominant trees.

Thomas describes the meadow as "shrubby moorland", passing into "grassy moorland" (he does mention *Erica* spp. as occurring), while Wilson makes a point of saying that it is not moorland at all (no *Erica*), but should be described as "tree savannah" passing into "grass savannah". Only four of the 79 species listed by Wilson are given amongst the 15 quoted by Thomas.

Thomas also draws attention to the affinities of the vegetation with that of the Imatongs. *Coleus grandicalyx* E.A. Bruce, with violet-coloured flowers, from the high meadow and the grass, *Setaria splendida* Stapf, are found only on the two ranges.

Birds found only in M5 (in which are included the summit cliffs) were: *Gypaetus barbatus*; *Columba unicincta*; *Caprimulgus poliocephala* and *Psalidoprocne pristoptera*.

Thomas gives no details in his description of the forest vegetation, except to mention that *Dombeya goetzenii* K. Schum. is the dominant tree in the forest and that *Cussonia specata* Thunb. is common. Neither species is mentioned by Wilson, who classifies the area as "M3—Dry Montane Forest." He describes it as being "evergreen forest with an intermittent canopy, usually in large clumps, but occasionally contiguous with a marginal shrub layer. Depending on the density of the canopy, a herb/grass layer occurs quite frequently on the forest floor".

Wilson goes on: "The forest margin shrub layer varies greatly according to the successional state of transition to forest or fire climax grassland. Under the forest canopy the shrubs are not common except for *Senecio petitianus* A. Rich. which is a common liane. Ferns, lichens, mosses are common, particularly on the branches of the largest forest trees and Bracken *Pteridium aquilinum* Kuhn, is an occasional constituent".



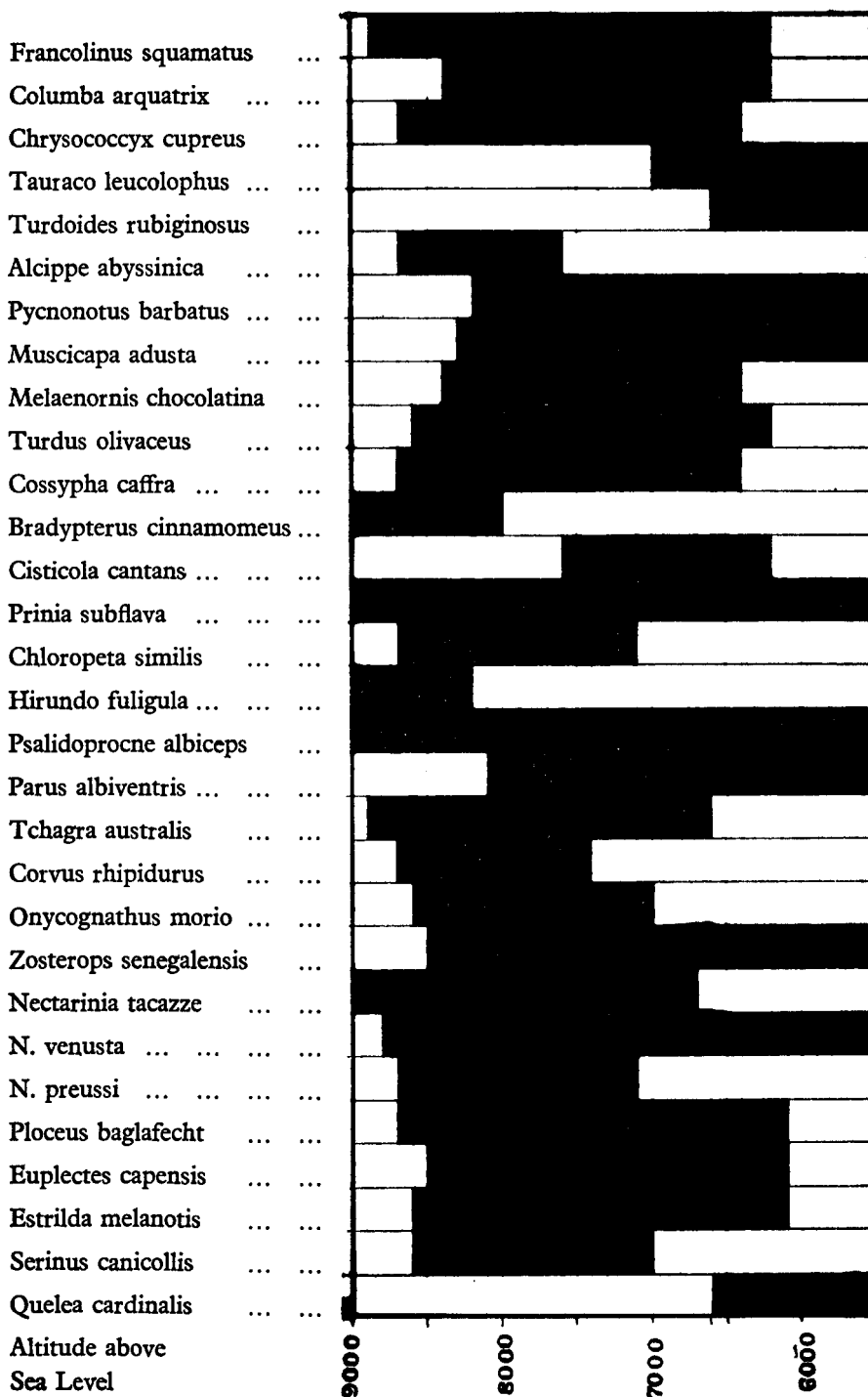


TABLE I  
ALTITUDINAL ZONATION OF BIRDS ON MORONGOLE MOUNTAIN

The M<sub>3</sub> community develops best on the deep soils of plateau sites. On the steeper slopes, the composition changes considerably with *Juniperus procera* A. Rich., *Olea hochstetterii* Baker, and *Teclea nobilis* Del., becoming the dominant trees. A quite large population of the Karamoja race of mountain bushbuck living on the mountain, was found browsing in the meadows at dusk and dawn. A few klipspringer haunted the summit rocks. Leopard was the chief predator and one frequently roared from a rock a few hundred feet below our camp.

Birds found only in the montane forest were:

*Accipiter melanoleucus*; *Columba arquatrix*; *Chrysococcyx cupreus*; *Musophaga rossae*; *Chloropeta similis*; *Phylloscopus umbrovirens* and *Cryptospiza salvadori*.

The division of bird populations between the meadow and forest was not great, because many of the small passerines like *Phylloscopus umbrovirens* fed in the forest margins, while others like the sunbirds, although feeding mostly in the grassland, also fed in the forest canopy and presumably nested amongst the trailing *Usnea* spp. Others, like the Red-wing Starlings, were usually visible doing noisy aerobatics above the grassland, but descended to fruit trees in the forest to feed.

The Morongole forest birds were remarkable for their extreme paucity. Whereas the Lonyili forest appeared noisy and full of barbets, turacos and blue monkeys, the Morongole forest was almost silent, except for the flapping of sunbird wings high in the canopy and the reedy singing of *Chloropeta similis*. In the highest forest, there were no turacos, except for the isolated record of *Musophaga rossae*.

Perhaps the most conspicuous absentees from both forest areas were the Casqued Hornbills (*Bycanistes* spp.). The difference in numbers of forest species (36 spp. for Lonyili, and 25 for Morongole) is probably due to the different type of forest, attributable (at least partly) to altitude.

Macdonald & Cave point out that "bowl-forest" is the nearest approach to true rain forest, like those of the Congo, at this latitude; cloud-forest is much poorer and subject to cold dank mists, which are not generally conducive to the production of food-plants. It seems that the change from one type of forest to the other occurs at 7000 ft (2135 m) altitude. If we had had time to investigate the avifauna of some of the broad-gully gallery forest on Morongole at lower altitudes, we would probably have found a species composition much more like that of Lonyili. A similar paucity of birds was found by Tennent (1964) in the Kitui District mountains of Kenya which he explained not only by the poorness of a forest similar to Morongole, but also thought the effects of isolation important.

Isolation cannot be said to have played a part in reducing the number of species on Morongole. As indicated above, the forests of the southern Sudan (particularly the Imatongs) have a much richer forest avifauna although they are further from the presumed centre of dispersal of the forest species in the Kenya highlands.

Another point, which emerged from our observations, was the clear altitudinal zonation of certain birds on Morongole and Table I shows the altitude range of these 30 species.

Lastly, we come to the extensions of the forest species down to lower levels where these montane forest species (e.g., *Tauraco leucolophus*) met species typical of riparian forests (e.g., *Laniarius erythrogaster*) and those that feed in the surrounding savannah, seeking refuge back in the forest (e.g., *Turdoides jardinei*). I have tried to consider the riparian birds of four areas in the Park, i.e. the substantial gallery forest of the Lorupei (the branch of the Narus from Lonyili); the upper Kidepo; the narrower thicket/forest of the Kananarok rivers; and the minor branches of the Narus, the Kakel and Losigiria. The avifauna shows a gradation in the proportion of forest species as the distance from the forest increases.

The vegetation in these areas varies in size, is similar in appearance, but is of extremely varied constitution. Lock (pers. comm.) describes the Narus branches as being nearest Wilson's T<sub>2</sub> and T<sub>3</sub>. But in places, particularly Lorupei, the vegetation is more developed than these (T<sub>2</sub>/T<sub>3</sub>) would indicate, with many large trees draped with lianas, including species of *Ficus* which attract the forest barbets and turacos.

In the following lists of birds, those also recorded in the two montane forests are marked *F*. Only 10 species were recorded in all or three out of four of the areas. Next, a list is given of the species occurring in two of the four areas, most of which are typical of riparian vegetation. Last is given a list of the species, individual to the riparian vegetation of each area, which begins to suggest that the bird population becomes impoverished the further it recedes from a forest source. Lorupei is the nearest (to Lonyili), Kidepo next (to Morongole), while Kananarok (to Lotuke) and Narus (to Morongole) are about the same distance from forest. The Kananarok species are, however, all thicket species.

Birds common to three or four areas:

<i>Turtur tympanistria</i> F	<i>Terpsiphone viridis</i>
<i>Tauraco leucolophus</i> F	<i>Cichladusa guttata</i>
<i>Tockus erythrorhynchus</i>	<i>Cossypha heuglini</i> F
<i>Indicator indicator</i> F	<i>Camaroptera brachyura</i>
<i>Campethera nubica</i>	<i>Tchagra senegala</i>
<i>Glaucidium perlatum</i>	<i>Laniarius barbatus</i>
<i>Oriolus monacha</i>	<i>Turdoides rubiginosus</i>
<i>Pycnonotus barbatus</i>	

Birds common to two areas:

<i>Streptopelia semitorquata</i> F	<i>Colius striatus</i>
<i>Chrysococcyx caprius</i>	<i>Lybius lacrymosus</i>
<i>Psittacula krameri</i>	<i>Thripias namaquus</i>
<i>Poicephalus meyeri</i>	<i>Batis molitor</i>
<i>Halcyon senegalensis</i>	<i>Sylvietta whytii</i>
<i>Corythaixoides leucogaster</i>	<i>Prionops plumata</i>
<i>Otus scops</i>	<i>Nectarinia mariquensis</i>

Birds individual to each area:

**Lorupei:**

*Francolinus squamatus* F  
*Turtur abyssinicus*  
*T. afer*  
*Centropus superciliosus*  
*Crinifer zonurus*  
*Merops lafresnayii* F  
*Indicator variegatus*  
*Turdoides jardinei*  
*Platysteira cyanea* F  
*Turdus pelios*  
*Hypargos nitidulus* F  
*Coracina pectoralis*  
*Laniarius ferrugineus* F  
*Malaconotus sul* *ureopectus*  
*Zosterops senegalensis* F  
*Z. virens*

**Kidepo:**

*Treron waalia* F  
*Halcyon chelicuti*  
*Phoeniculus purpureus*  
*Bubo lacteus*  
*Lybius rolleti*  
*Apalis pulchella*  
*Eremomela icteropygialis*

**Kananarok:**

*Numida meleagris*  
*Tockus deckeni*  
*Bradornis pallidus*  
*Phoeniculus minor*  
*Pogoniulus minor*  
*Laniarius funebris*  
*Nectarinia senegalensis*  
*Estrilda erythronotos*  
*Petronia xanthocollis*  
*Pytelia melba*  
*Ploceus luteolus*

**Narus:**

*Pytelia afra*  
*Cuculus clamosus*

*Dicrurus adsimilis*  
*Emberiza forbesi* (only high alt.)  
*Serinus dorsostriatus*

Compare the avifauna of the four riparian types by Jaffard's Coefficient of Community (C.C.) or Simpson's Coefficient (S.C.), Hagmeier & Stults (1964). If two populations of equal size have a C.C. of 68.5, 75 per cent of the species is common to both; or if when the S.C. value is 75, more than 75 per cent of the smaller of the two is found in the larger, then in either case the populations are considered faunistically identical. Using these methods, the only two populations shown to be faunistically identical are those of the Lorupei and Narus. Since one is a branch of the other, this would be expected.

Below, (Table II), are the other S.C. values. They reinforce the point that the avifauna of the Kidepo does change substantially over a very small area (Kidepo 48 ←→ Kananarok, a distance of only about 10 miles).

TABLE II

	Lorupei	Narus	Kidepo	Kananarok
Lorupei	—	91	58	55
Narus	91	—	67	67
Kidepo	58	67	—	48
Kananarok	55	67	48	—

### BREEDING AND MOULT.

The semi-arid climate of the Kidepo means that the whole Park, except for the small areas of the two mountain ranges above about 6500 ft (1980 m) is subject to great but irregular seasonal variation. In such circumstances, the ultimate factor controlling breeding seasons is the occurrence of the rains, with the insectivores mostly breeding at the start and the seed-eaters towards the end. Each thereby feeds its young during a food abundance.

The breeding season of a species can be determined from (i) observation of nests, eggs or recently-fledged young; (ii) the condition of the gonads; (iii) extrapolation from moult, which in most species at this latitude follows breeding.

The assumption is made that food is short during about eight months of most years and that this is not countered by the migration of relatively few birds. The deduction is less valid for species that live in deep forest or high mountains, where seasonal variation is less marked and the rigours of moult can be spread over a greater length of time.

However, only three species on which we have data fall into this category, namely *Cisticola cantans*, *Phylloscopus umbrovirens* and *Cossypha caffra*, for which we did not obtain support from either of the other lines of evidence (i.e., observation or gonads).

But in no case is the breeding of any species deduced from moult, contrary to what might have been expected from previous knowledge.

The 40 species breeding during the seven weeks of our visit are listed below, with the abbreviations: O=Observation; G=Gonads; M=Moult.

<i>Aegyptius tracheliotus</i>	O.	<i>Prinia subflava</i>	M.
<i>Coturnix delegorguei</i>	O.G.M.	<i>Cisticola chiniana</i>	O.
<i>Streptopelia capicola</i>	G.	<i>C. cantans</i>	M.
<i>Streptopelia senegalensis</i>	O.G.M.	<i>Sphenoeacus mentalis</i>	G.
<i>Streptopelia decipiens</i>	O.	<i>Prionops plumata</i>	O.
<i>Ceyx picta</i>	M.	<i>Eurocephalus anguitimens</i>	M.
<i>Lybius leucomelas</i>	M.	<i>Lanius excubitorius</i>	M.
<i>Indicator indicator</i>	O.M.	<i>Anthreptes collaris</i>	G.
<i>Indicator variegatus</i>	M.	<i>Nectarinia venusta</i>	G.
<i>Campethera nubica</i>	M.	<i>Bubalornis albirostris</i>	O.G.
<i>Turdoides jardinei</i>	G.	<i>Ploceus cucullatus</i>	O.G.M.
<i>Turdoides rubiginosus</i>	M.	<i>P. jacksoni</i>	G.
<i>Alcippe abyssinica</i>	O.M.	<i>P. baglafecht emini</i>	O.G.M.

<i>Platysteira cyanea</i>	G.	<i>P. luteolus</i>	M.
<i>Batis molitor</i>	M.	<i>Euplectes gierowii</i>	G.
<i>Terpsiphone viridis</i>	M.	<i>E. hordeaceus</i>	G.
<i>Cossypha caffra</i>	M.	<i>E. albonotatus</i>	G.
<i>Sylvietta whytii</i>	O.G.	<i>Quelea quelea</i>	G.
<i>Camaroptera brachyura</i>	O.G.	<i>Q. cardinalis</i>	O.
<i>Phylloscopus umbrovirens</i>	M.	<i>Petronia xanthocollis</i>	M.

By far the most conspicuous and numerous of the 40 breeding species were the seedeaters, the large areas of long grass in the Narus valley being alive with breeding *Quelea*, *Euplectes* and some other ploceids. The area around Kananarok hot spring was also full of nests of *Coturnix delegorguei* and *Streptopelia senegalensis* in various stages of development.

On the one hand, only five of the 15 seed-eating species were found in moult, indicating that most were still breeding during August and September, whilst of the 22 insectivorous/carnivorous species, 17 were either moulting or (those marked O) recently-fledged chicks or juveniles were seen, suggesting breeding in June or July. Thus, the evidence supports the presumption that the insectivorous species breed before the seedeaters.

## DISTRIBUTION AND RACES

The Kidepo is interesting geographically, because it is only about 50 miles (80 km) from the Imatong and Dongotona and about 10 miles (16 km) from the Didinga ranges in the southern Sudan. These three massifs, with Morongole, are only 200 miles (320 km) from the Ethiopian highlands, with the Boma hills as an intermediate stepping stone.

Nevertheless, although some of the races of our species were the Ethiopian ones, the montane birds, at least, are very much those of the Kenya highlands (Moreau, 1966), the rich avifauna of the Imatong-Lotti forest being a particularly good example.

The proximity of the Kidepo to the Sudan and Ethiopia, however, combined with the past distribution of ornithologists (especially the fact that the nearest thorough collecting expedition south of the Kidepo has been on Mt. Elgon), produced some interesting records. These are given below under the categories of species and races new to Uganda, undescribed races and extensions of known range. Where races are mentioned, these are based on skins.

### 1. Species new to Uganda

*Merops orientalis*, Little Green Bee-eater. Most probably, it is of the race *cleopatra* as this has been identified as far south as Torit in the Sudan. The Kidepo is probably the southernmost limit of the species. Typical habitat: S1/S7. *Cercotrichas leucophrys leucoptera*, White-winged Scrub Robin. The record represents the western limit of the species in East Africa. The typical habitat: SST3 and S3.

### 2. Races new to Uganda

*Caprimulgus poliocephalus poliocephalus*, Abyssinian Nightjar. Extension from western Uganda (Jackson), or 50 miles (80 km) south from Imatongs (White).

*Dendropicos fuscescens hemprichii*, Cardinal Woodpecker. An extension of range from the east bank of Lake Rudolf (150 miles (240 km) west) between areas of *D.f. lepidus* (30 miles (48 km), north) in the Sudan and 100 miles (160 km) south in Moroto. Habitat: 6500 ft (1980 m) HE5. *Cisticola aberrans petrophila*, Rock-loving Cisticola. A small extension, 40 miles (64 km) south from the Dongotona Mts. brings this into Uganda. Habitat: 6500 ft. (1980 m). M6.

*Cisticola chiniana bodessa*, Rattling Cisticola. Cave & MacDonald, and White, record

*C. c. simplex* for the southern Sudan and Karamoja respectively. *C. c. bodessa* is the Ethiopian race, previously with its southern limit on the Boma hills. Habitat: R4.

*Tchagra senegala habessinica*, Black-headed Bush Shrike. An extension, 50 miles (80 km) south across the border from the Imatongs. Widespread below 5500 ft (1675 m).

*Corvus rhipidurus*, Fantail Raven. This is mentioned neither by Praed & Grant, nor by White for Uganda, despite having been collected near Morongole by Stoneham (1926).  
*Kopje* above 3000 ft (900 m).

*Estrilda melanotis quartinia*, Yellow-bellied Waxbill. An extension across the border from the Imatongs. 8300 ft (2525 m). Meadow M5.

*Estrilda erythronotos charmosygna*, Black-cheeked Waxbill. An extension of the Ethiopian race 250 miles (400 km) west. *E. e. delamerei* is found only in southern Uganda.

### 3. Extensions of Range within Uganda

These include interesting records of species which previously have been found only in the large areas of forest on the Congo border.

*Larus fuscus fuscus*, Lesser Black-backed Gull. Praed & Grant say that it visits larger inland lakes, but is rarely seen far from the coast. Lake Rudolf is the nearest large lake 190 miles (300 km) east and the nearest coast is 700 miles (1125 m) S.E. The condition of the bird was poor enough to elicit attack from a Nubian Vulture, *Aegyptius tracheliotus*, and a Bateleur, *Terathopius ecaudatus*, before being rescued by us (to die two days later).  
*Musophaga rossae*, Ross's Turaco. The consensus of opinion (Jackson, White, Cave) is that this Turaco occurs all over Uganda and not only south of the Lango swamp, 150 miles (240 km) south-east as indicated by Praed & Grant.

*Eurystomus glaucurus suahelicus*, Broad-billed Roller. The expected race for the Kidepo would be *E. g. aethiopicus*. Our specimen indicates an extension 250 miles (400 km) north from Elgon.

*Camaroptera chloronota*, Olive-green Camaroptera. Forest species; well outside its normal range of south-western Uganda forests.

*Apalis karamojae*, Karamoja Apalis. This record extends the peculiar distribution (the isolated areas of northern Uganda (near Moroto) and Nzega in Tanzania) 100 miles (160 km) northwards from the Mt. Moroto region. Little is known of its habits. Our single record was of a party of five birds, feeding low in dwarf *Acacias*, mostly *A. drepanolobium* and small *Combretum* stands.

*Hypargos nitidulus schlegeli*, Green-backed Twinspot. Previously recorded only from the forests and adjacent areas to the Congo forests. Macdonald & Cave found *H. n. chubbi* in the nearby Dongotonas. Typical habitat: gallery forest within S16, where very difficult to see; only recorded after capture in mist-nets.

### 4. Possible New Races

Three species, collected above 8000 ft (2440 m) on Morongole, are represented there by birds that appeared to differ subspecifically from other populations and might be worthy of formal description.

*Bradypterus cinnamomeus*, Cinnamon Bracken Warbler. Four collected. Closest to *B. c. cavei* from the Imatongs, but differ in being whiter on the chest and belly and dingey-brown on the upper surfaces instead of a rich chestnut. They are also, on average, a little smaller than the Imatong race.

*Phylloscopus umbrovirens*, Brown Woodland Warbler. Three collected. The Morongole birds appear to be intermediate between *mackenziana* and *omoensis* in that it is mainly whitish on the underside, like the former, and yet more greenish-brown above, like the latter.

*Turdus abyssinicus*, Olive Thrush. Two collected. Nearest to *T. a. abyssinicus*, particularly those from the Imatongs and those from Elgon, previously known as *elgonensis*. It is,

however, much greyer on the chest and paler tawny on the flanks than any of the typical *abyssinicus* birds in the British Museum, including specimens from Elgon.

### FEEDING HABITS OF HORNBILLS

Of the four species of the genus *Tockus* which inhabit the park, only three, *T. nasutus*, Grey Hornbill; *T. erythrorhynchus*, Red-billed Hornbill; and *T. deckeni*, Jackson's Hornbill were more or less common. All are about the same size and shape (beak differences are not initially striking) and all have been recorded in the literature as occupying the same sort of habitat and as feeding on the same kinds of food, with no hint of ecological separation.

Our observations were directed to seeing if there was any habitat or food preference. The records necessarily apply only to the seven weeks of the expedition; but, since very little has yet been published on the subject, it seems worth while to give tentative conclusions based on some 300 records.

(a) *T. erythrorhynchus* (191 records) had a strong association with substantial riparian vegetation and was only occasionally found in dryer, open-plain areas of S3 and SST3. 55 per cent of the records were in area R4 (*Borassus* woodland).

(b) *T. nasutus* (52 records) was the widest-ranging of the three species, with 60 per cent of the records almost equally divided between areas A1/S7, S3 and S2. The birds were not permanently-based in any of these areas except S3, but tended to occupy one of them for about 10 days before vacating it for one of the other two. S3 savannah was the only area which exclusively contained *nasutus*.

(c) *T. deckeni* (28 records) was the least common of the three and was found typically in dense riparian thickets of smaller rivers and gullies. One pair always to be found in a single place, at the edge of R4.

Food: Nine *erythrorhynchus*, three *deckeni* and one *nasutus* stomachs analysed, showed, not surprisingly, that *erythrorhynchus* eat the greatest variety of food classified as follows:

*T. erythrorhynchus*: Yellow seeds, 1-3 mm. greatest diameter; Black seeds, 2-5 mm. g.d.; Orthoptera, grasshoppers; Isoptera, termites; Formicoidae, black ants; Lepidoptera, green/yellow caterpillars; *Quelea cardinalis* eggs; *Commelina* fruit (creeping monocot. herb); and Capparidaceae fruit (Shrub).

Common to all the stomachs were the yellow seeds; all but two stomachs contained black ants, and half contained termites. Opportunity had obviously been taken by the bird whose stomach contained 25 caterpillars. Egg-eating must be common; apart from the above record of *Q. cardinalis* eggs being eaten, *T. nasutus* was seen raiding a *Bubalornis albirostris/Plocepasser mahali* colony. Nesting ploceids were very hostile to both *T. erythrorhynchus* and *T. nasutus*.

*T. deckeni*: In general appearance, the stomach contents were very similar to those of *erythrorhynchus*, except for the absence of several items of animal food. One stomach contained only about 100 small snails:

Yellow seeds 1-7 mm. g.d.; Black ants; Coleoptera. Beetle *elytra*; Snails, 2-4 mm. g.d.; Small green fruit.

*T. nasutus*: The one stomach examined contained a base of yellow seeds, 1-3 mm., g.d., together with a higher proportion of pieces of stout beetle cuticle than was found in *deckeni*.

From the foregoing, it may be concluded that there is no sharp difference between the species in the habitats at the time of year encountered, although there was some preference by *erythrorhynchus* for R4, *deckeni* for ST6/S16 and *nasutus* for S3. But on at least four occasions, mixed flocks of *nasutus* and *erythrorhynchus* and, on one occasion, all three, were observed together. It is possible that the time of observation in the Kidepo was one of superabundant food being just after the end of the rains when there should be plenty, at least, of animal food.

That each species showed some preference for a particular habitat may indicate the

habitat in which the species more or less confines itself at other times of the year when food shortage occurs (Cain, pers. comm.). It is nevertheless very probable that the coexistence of the three species is accounted for by food differences. This, though unproven by available data, is suggested by differences in physical structure, particularly that of bill shape. While the bill of *erythrorhynchus* is slender and long, that of *nasutus* is about the same length, with a slightly greater depth, but has tooth-like ridges on the outer edges; that of *T. deckeni* is shorter and much deeper than either of the other two.

The *nasutus* ridges are probably adapted for holding and crushing and may possibly be specialised for heavily-armoured insects and hard-shelled fruit. The food of *erythrorhynchus* was shown to be very varied. Its long sharp bill suggests a more insectivorous or carnivorous diet than that of *deckeni* which, with its blunter shorter bill is possibly chiefly frugivorous.

Since the above was completed, A. Kemp (pers. comm.), working nearly 2000 miles (3200 km.) south in the Kruger National Park in South Africa, has informed me of his studies on the three hornbills *T. erythrorhynchus*, *T. flavirostris* and *T. nasutus*. His results so far make an interesting comparison with mine and he has kindly allowed me to quote them.

On habitat, his results are almost diametrically opposed to mine, as he finds that the typical habitat of *nasutus* is mainly riparian and secondarily tall-tree *Acacia nigrescens* woodland and that of *erythrorhynchus* is open—usually overgrazed—grassland. He correlates this with local behaviour, *nasutus* feeding in the trees, *erythrorhynchus* mostly on the ground, digging the earth and sifting piles of dung for insects.

He does, however, suggest that the foraging behaviour becomes generalised in the wet season and that *erythrorhynchus* in particular becomes a more active forager, often pursuing free-moving insects such as Orthoptera. This discrepancy between our ideas on habitat, at least for *erythrorhynchus*, may perhaps be due to the fact that observations in the Kidepo were made only in the wet season. It does seem odd, however, that on no occasion in seven weeks in the Kidepo did I see *nasutus* feeding in riparian vegetation, although *erythrorhynchus* was common there. Kemp mentions no change in the behaviour of *nasutus* in the wet season.

In the diet, we agree. He finds that *nasutus* is the main fruit-eater, especially on species with tough skins (*Diospyros* and *Pseudocadia*), and its main animal items are large hard *Coleoptera* and tree frogs. *T. erythrorhynchus* is confirmed as mostly carnivorous, 87 per cent of its food items being animal, but he includes a particular liking for *Coprina* beetles found in dung. Egg-eating has not been recorded, but opportunism occurs in all three species. For example, *nasutus* was recorded taking mice during a recent plague.

In both diet and habitat, Kemp found *flavirostris* less specialised than the other two species, as I found with *T. deckeni* in the Kidepo.

### MISCELLANEOUS OBSERVATIONS

(a) On one occasion, the following mixed concourse of birds was observed feeding on a flying-ant swarm, Formicoidea:

*Halcyon helicuti*  
*Merops bulocki*  
 \**Campethera nubica*  
*Apus caffer*  
*Apus aequatorialis*  
*Cypsiurus parvus*  
 \**Terpsiphone viridis*  
*Hirundo aethiopica*

*Hirundo senegalensis*  
*Psalidoprocne albiceps*  
*Coracina pectoralis*  
 \**Dicrurus adsimilis*  
*Corvinella corvina*  
 \**Oriolus monacha*  
*Cinnyricinclus leucogaster*  
*Euplectes hordeaceus*

Also present, but not actually observed feeding:

*Quelea cardinalis*; *Streptopelia capicola*



Of the 18 species recorded, only four (marked with \*) are at all typical of mixed bird flocks of the area. These could be called "nucleus" species, while the others remain "circumference" species (Winterbottom, 1949), but it seems much more likely that they were just a chance collection of birds taking advantage of an obvious food supply.

(b) On another occasion, a Black Kite, *Milvus migrans*, was seen to fly into a tree where it was attacked with great commotion by three shrikes, *Eurocephalus anguithimens*. One clung to the kite's mantle with both claws and bill as the kite flew away 200 yds. (180 m.) before it released its grip. I imagine that this ferocious attack by the much smaller bird was more territorial than anti-predator, since there were no shrikes nesting in the area.

(c) On several occasions, Broad-billed Rollers, *Eurystomus glaucurus*, were seen hawking insects until nearly dark, in open woodland, and then collecting in a roost of 20 or 30 birds in one large tree. Roosting behaviour does not seem to have been recorded before.

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#### SUMMARY

The results of an ornithological survey of the Kidepo National Park, northern Uganda, carried out by an Oxford expedition in the long vacation of 1966, are recorded. The bird-plant communities of five principal types of lowland savannah, of two areas of upland forest and savannah, and of the riverine areas within the Park are described, details being given in the Appendix at the end. The 40 species breeding and the details of the form of the information are given. The more interesting records of species new to Uganda, undescribed races, races new to Uganda and extension of range within Uganda, are described. The problems of speciation of three closely similar species of the genus *Tockus* (Hornbills) are discussed. It is thought that the differences in the physical structure of the beaks of the birds allows different food and feeding habits which, in turn, allows considerable overlap and coexistence within the same general habitat. Incidental observations made by the expedition are recorded at the end.

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#### APPENDIX I

##### Birds recorded in the Kidepo National Park, Uganda with an indication of their habitat preference

In the above descriptions of the vegetational areas of the Kidepo, only the bird species restricted to each area have been mentioned. Below is a summary of all records made from 20.7.66 to 10.9.66. This serves as a check-list of the Kidepo National Park but it should be remembered that only a small part of the annual cycle was covered and observations at other times of the year may give wider distributions for some birds. Some species were recorded in the very incomplete list of birds existing before our arrival, and were not seen by us. These have almost all been included and where the distribution was recorded, it has been marked in, where not, it has been left blank. The zone marked as SW refers to the hot spring swamp at Kananarok, which formed an oasis in the middle of the otherwise uniform regions SST<sub>3</sub> and ST<sub>6</sub>.

Key to vegetation zones:

- |   |   |
|---|---|
| Savannah: SST <sub>3</sub> = dry shrub/thicket        | Upland: HE <sub>5</sub> = savannah woodland             |
| SW = swamp  | M <sub>6</sub> = tree savannah including Lonyili forest |
| ST <sub>6</sub> = dry shrub/thicket                   |   |
| S <sub>1</sub> /S <sub>7</sub> = open plain           | M <sub>5</sub> = highland tree savannah                 |
| S <sub>2</sub> /S <sub>12</sub> = long grass/woodland | M <sub>3</sub> = dry montane forest                     |
| S <sub>3</sub> = dry woodland                         |   |
| Riparian: R <sub>4</sub> = Kidepo R. area             |   |
| R <sub>2</sub> = Narus R. area                        |   |
| T <sub>2</sub> /T <sub>3</sub> = Upper Narus branches |   |

SPECIES	SAVANNAH					RIPARIAN			UPLAND				
	SST3	SW	ST6	S1/S7	S2/S12	S3	R4	R2	T2/T3	HE5	M6	M5	M3
<i>Struthio camelus</i> Linnaeus													
Ostrich	X		X	X	X	X							
<i>Phalacrocorax africanus</i> (Gmelin)													
Long-tailed Cormorant								X					
<i>Anhinga rufa</i> (Daudin)													
Darter								X					
<i>Pelecanus onocrotalus</i> Linnaeus													
White Pelican								X					
<i>P. rufescens</i> Gmelin								X					
Pink-backed Pelican								X					
<i>Ardea cinerea</i> Linnaeus													
Grey Heron								X					
<i>A. melanocephala</i> Vigors & Children								X					
Black-headed Heron					X			X					
<i>Egretta alba</i> (Linnaeus)								X					
Great White Egret								X					
<i>E. intermedia</i> (Wagler)								X					
Yellow-billed Egret								X					
<i>E. garzetta</i> (Linnaeus)								X					
Little Egret								X					
<i>Ardeola ibis</i> (Linnaeus)								X					
Buff-backed Heron								X					
<i>A. ralloides</i> (Scopoli)								X					
Squacco Heron								X					
<i>Butorides striatus</i> (Linnaeus)								X					
Green-backed Heron								X					
<i>Scopus umbretta</i> Gmelin								X					
Hamerkop								X					
<i>Ciconia ciconia</i> (Linnaeus)		X						X					
White Stork								X					
<i>C. abdimii</i> Lichtenstein								X					
Abdim's Stork								X					
<i>C. episcopus</i> (Boddaert)								X					
Bishop Stork								X					
<i>Anastomus lamelligerus</i> Temminck								X					
Openbill								X					
<i>Leptoptilos crumeniferus</i> (Lesson)								X					
Marabou	X		X	X	X	X	X						
<i>Ibis ibis</i> (Linnaeus)								X					
Wood Ibis								X					
<i>Threskiornis aethiopica</i> (Latham)								X					
Sacred Ibis								X					
<i>Sarkidiornis melanotos</i> (Pennant)								X					
Knob-billed Goose					X		X						
<i>Dendrocygna viduata</i> (Linnaeus)								X					
White-faced Tree-Duck								X					
<i>D. bicolor</i> (Vieillot)								X					
Fulvous Tree-Duck								X					
<i>Sagittarius serpentarius</i> (Miller)								X					
Secretary Bird			X	X	X	X							
<i>Gyps ruppellii</i> (Brehm)			X	X	X	X							
Rüppell's Griffon			X	X	X	X							
<i>G. bengalensis</i> (Gmelin)			X	X	X	X							
White-backed Vulture			X	X	X	X							
<i>Trigonoceps occipitalis</i> (Burchell)			X	X	X	X							
White-headed Vulture			X	X	X	X				X	X		
<i>Aegyptus tracheliotus</i> (Forster)			X	X	X	X							
Lappet-faced Vulture			X	X	X	X							
<i>Neophron monachus</i> (Temminck)			X	X	X	X							
Hooded Vulture			X	X	X	X							



SPECIES	SAVANNAH					RIPARIAN			UPLAND				
	SST3	SW	ST6	SI/S7	S2/S12	S3	R4	R2	T2/T3	HE5	M6	M5	M3
<i>A. badius</i> (Gmelin)													
Shikra									X				
<i>A. nisus</i> Linnaeus													
Sparrowhawk					X			X	X				
<i>A. mimulus</i> (Daudin)													
Little Sparrowhawk									X				
<i>Melierax gabar</i> (Daudin)													
Gabar Goshawk	X					X							
<i>M. poliopterus</i> Cabanis													
Pale Chanting Goshawk	X		X	X	X	X							
<i>M. metabates</i> Heuglin													
Dark Chanting Goshawk				X	X								
<i>Circus macrourus</i> (Gmelin)													
Pallid Harrier				X	X								
<i>C. aeruginosus</i> (Linnaeus)													
Marsh Harrier								X					
<i>Polyboroides typus</i> (Scopoli)										X	X	X	
Harrier-Hawk													
<i>Francolinus squamatus</i> Cassin													
Scaly Francolin									X	X	X	X	X
<i>F. clappertoni</i> Children													
Clapperton's Francolin			X	X	X								
<i>F. sephaena</i> (Smith)													
Crested Francolin	X		X	X	X	X							
<i>F. leucoscepus</i> Gray													
Yellow-necked Spurfowl	X		X			X							
<i>F. icterorhynchus</i> Heuglin													
Heuglin's Francolin			X	X	X								
<i>F. afer</i> (Müller)													
Grey-wing					X								
<i>Coturnix delegorguei</i> Delegorgue													
Harlequin Quail	X		X	X	X	X	X	X	X				
<i>C. chinensis</i> (J. & E. Verreaux)													
Blue Quail	X												
<i>Ptilopachus petrosus</i> (Gmelin)													
Stone Partridge										X			
<i>Numida meleagris</i> (Linnaeus)													
Tufted Guinea-fowl	X		X		X				X				
<i>Gallinula chloropus</i> (Linnaeus)													
Moorhen		X											
<i>Crex egregia</i> (Peters)													
African Crake													
<i>Limnecorax flavirostra</i> (Swainson)													
Black Crake		X											
<i>Eupodotis senegalensis</i> (Vieillot)													
White-bellied Bustard			X		X								
<i>E. melanogaster</i> (Rüppell)													
Black-bellied Bustard					X	X							
<i>E. hartlaubii</i> Heuglin													
Hartlaub's Bustard													
<i>Oris kori</i> Burchell													
Kori Bustard						X							
<i>Neotis denhami</i> (Children)													
Denham's Bustard			X	X									
<i>Burhinus capensis</i> (Lichtenstein)													
Spotted Thick-knee					X								
<i>Actophilornis africanus</i> (Gmelin)													
Jacana								X					
<i>Vanellus senegallus</i> (Linnaeus)													
Wattled Plover		X			X			X					

SPECIES	SAVANNAH						RIPARIAN			UPLAND			
	SST3	SW	ST6	S1/S7	S2/S12	S3	R4	R2	T2/T3	HE5	M6	M5	M3
<i>V. armatus</i> (Burchell)					X								
Blacksmith Plover					X								
<i>V. tectus</i> (Boddaert)				X	X								
Blackhead Plover				X	X								
<i>V. coronatus</i> (Boddaert)				X	X								
Crowned Plover				X	X								
<i>Charadrius pecuarius</i> Temminck					X			X					
Kittlitz Sand-Plover					X			X					
<i>C. tricoloris</i> Vieillot					X			X					
Three-banded Plover					X			X					
<i>C. hiaticula</i> Linnaeus								X					
Ringed Plover								X					
<i>Rostratula benghalensis</i> (Linnaeus)		X						X					
Painted Snipe		X						X					
<i>Calidris temminckii</i> (Leisler)								X					
Temminck's Stint								X					
<i>Tringa hypoleucos</i> Linnaeus								X					
Common Sandpiper								X					
<i>T. ochropus</i> Linnaeus								X					
Green Sandpiper							X	X					
<i>T. glareola</i> Linnaeus							X	X					
Wood Sandpiper							X	X	X				
<i>T. nebularia</i> (Gunnerus)							X	X					
Greenshank							X	X					
<i>Cursorius temminckii</i> Swainson								X					
Temminck's Courser	X		X					X					
<i>C. cinctus</i> (Heuglin)	X		X					X					
Heuglin's Courser	X		X					X					
<i>Larus fuscus</i> Linnaeus							X	X					
Lesser Black-backed Gull							X	X					
<i>Sterna nilotica</i> Gmelin							X	X					
Gull-billed Tern							X	X					
<i>Turnix sylvatica</i> (Desfontaines)								X					
Button Quail	X		X					X		X			
<i>Pterocles quadricinctus</i> Temminck			X	X				X					
Four-banded Sandgrouse			X	X				X					
<i>P. gutturalis</i> Smith				X				X					
Yellow-throated Sandgrouse				X				X					
<i>Columba arquatrix</i> Temminck								X					X
Olive Pigeon								X					X
<i>C. guinea</i> Linnaeus								X			X		
Speckled Pigeon								X			X		
<i>C. uncinata</i> Cassin								X			X		
Afep Pigeon								X			X		
<i>C. delegorguei</i> Delegorgue								X		X	X		
Bronze-naped Pigeon								X		X	X		
<i>Treron waalia</i> (Meyer)								X	X	X	X		
Bruce's Green Pigeon					X		X	X	X	X	X		
<i>Oena capensis</i> (Linnaeus)								X			X		
Namaqua Dove	X		X			X		X			X		
<i>Streptopelia lugens</i> (Rüppell)								X		X	X		
Pink-breasted Dove								X		X	X		
<i>S. semitorquata</i> (Rüppell)	X		X	X			X	X	X		X		
Red-eyed Dove	X		X	X			X	X	X		X		
<i>S. decipiens</i> (Hartlaub & Finsch)		X	X					X			X		
Mourning Dove		X	X					X			X		
<i>S. senegalensis</i> (Linnaeus)		X	X	X	X	X	X	X			X		
Laughing Dove	X	X	X	X	X	X	X	X			X		
<i>S. vinacea</i> (Gmelin)	X		X	X	X			X			X		
Vinaceous Dove	X		X	X	X			X			X		

SPECIES	SAVANNAH						RIPARIAN			UPLAND			
	SST3	SW	ST6	S1/S7	S2/S12	S3	R4	R2	T2/T3	HE5	M6	M5	M3
<i>S. capicola</i> (Gmelin)													
Ring-necked Dove	X		X	X	X								
<i>Turtur tympanistria</i> (Temminck)													
Tambourine Dove							X		X				
<i>T. chalcospilos</i> (Wagler)													
Emerald-spotted Wood Dove				X	X								
<i>T. afer</i> (Linnaeus)									X	X			
Blue-spotted Wood Dove									X				
<i>T. abyssinicus</i> (Sharpe)									X				
Black-billed Blue-spotted Wood Dove									X				
<i>Cuculus clamosus</i> Latham									X				
Black Cuckoo									X				
<i>C. canorus</i> Linnaeus									X				
African Cuckoo	X												
<i>C. solitarius</i> Stephens													
Red-chested Cuckoo											X		
<i>Clamator jacobinus</i> (Boddaert)													
Black & White Cuckoo	X		X										
<i>C. levaillantii</i> Swainson													
Levaillant's Cuckoo							X						
<i>Chrysococcyx cupreus</i> (Shaw)													
Emerald Cuckoo													X
<i>C. caprius</i> (Boddaert)													
Didric Cuckoo									X		X		
<i>C. klaas</i> (Stephens)									X		X		
Klaas's Cuckoo					X				X		X		
<i>Centropus toulou</i> Müller													
Black Coucal								X					
<i>C. superciliosus</i> Hemprich & Ehrenberg													
White-browed Coucal			X	X	X		X						
<i>C. senegalensis</i> Linnaeus													
Senegal Coucal					X								
<i>Crimifer zonurus</i> (Rüppell)													
Eastern Grey Plantain-eater	X								X				
<i>Corythaixoides leucogaster</i> (Rüppell)													
White-bellied Go-away Bird	X				X	X							
<i>Musophaga rossae</i> (Gould)													
Ross's Turaco													X
<i>Tauraco leucolophus</i> (Heuglin)													
White-crested Turaco									X				X
<i>Poicephalus meyeri</i> Cretzschmar													
Brown Parrot			X		X				X				
<i>Psittacula krameri</i> (Scopoli)													
Rose-ringed Parrakeet							X		X				
<i>Coracias naevia</i> Daudin													
Rufous-crowned Roller	X			X	X								
<i>C. abyssinica</i> Hermann													
Abyssinian Roller	X		X		X	X							
<i>Eurystomus glaucurus</i> (Müller)													
Broad-billed Roller				X	X								
<i>Ceryle rudis</i> (Linnaeus)													
Pied Kingfisher								X					
<i>Alcedo cristata</i> Pallas													
Malachite Kingfisher								X					
<i>Ceyx picta</i> (Boddaert)													
Pygmy Kingfisher	X		X										
<i>Halcyon chelicuti</i> (Stanley)													
Striped Kingfisher	X				X				X				
<i>H. senegalensis</i> (Linnaeus)													
Woodland Kingfisher							X		X				

SPECIES	SAVANNAH						RIPARIAN			UPLAND			
	SST3	SW	ST6	SI/S7	S2/S12	S3	R4	R2	T2/T3	HE5	M6	M5	M3
<i>H. leucocephala</i> (Müller) Grey-headed Kingfisher	X	X											
<i>Merops pusillus</i> Müller Little Bee-eater			X		X								
<i>M. orientalis</i> Latham Little Green Bee-eater				X			X						
<i>M. bulocki</i> Vieillot White-fronted Bee-eater					X							X	
<i>M. lafresnayii</i> Guerin Cinnamon-chested Bee-eater												X	
<i>M. hirundineus</i> Lichtenstein Swallow-tailed Bee-eater					X			X					
<i>M. variegatus</i> Vieillot Blue-breasted Bee-eater					X			X					
<i>M. apiaster</i> Linnaeus European Bee-eater					X					X			
<i>Tockus nasutus</i> (Linnaeus) Grey Hornbill	X		X	X	X	X		X					
<i>T. erythrorhynchus</i> (Temminck) Red-billed Hornbill	X		X	X	X		X	X	X				
<i>T. deckeni</i> (Grant) Jackson's Hornbill			X	X			X		X				
<i>T. flavirostris</i> (Rüppell) Yellow-billed Hornbill			X				X						
<i>Bucorvus abyssinicus</i> (Boddaert) Abyssinian Ground Hornbill			X	X	X	X							
<i>Phoeniculus purpureus</i> (Miller) Kakelaar					X	X	X		X				
<i>P. minor</i> (Rüppell) Abyssinian Scimitar-bill			X		X				X				
<i>P. aterrimus</i> (Stephens) Black Wood-Hoopoe								X	X				
<i>Otus scops</i> (Linnaeus) African Scops Owl					X		X		X				
<i>O. leucotis</i> (Temminck) White-faced Scops Owl				X	X								
<i>Bubo lacteus</i> (Temminck) Verreaux's Eagle Owl							X		X				
<i>Glaucidium perlatum</i> (Vieillot) Pearl-spotted Owllet									X				
<i>Caprimulgus climacurus</i> (Vieillot) Long-tailed Nightjar			X	X									
<i>C. poliocephalus</i> Rüppell Abyssinian Nightjar												X	
<i>C. tristigma</i> Rüppell Freckled Nightjar						X							
<i>Macrodipteryx longipennis</i> (Shaw) Standard-wing Nightjar			X		X								
<i>M. vexillarius</i> (Gould) Pennant-wing Nightjar				X	X								
<i>Colius striatus</i> Gmelin Speckled Mousebird				X	X		X		X	X	X		
<i>C. macrourus</i> (Linnaeus) Blue-naped Mousebird	X				X	X							
<i>Lybius lacrymosus</i> (Cabanis) Spotted-flanked Barbet	X				X	X			X				
<i>L. leucomelas</i> (Boddaert) Red-fronted Barbet			X										
<i>L. leucocephalus</i> (Defilippi) White-headed Barbet											X		





SPECIES	SAVANNAH						RIPARIAN			UPLAND			
	SST3	SW	ST6	SI/S7	S2/S12	S3	R4	R2	T2/T3	HE5	M6	M5	M3
<i>Macronyx croceus</i> (Vieillot)													
Yellow-throated Longclaw			X	X	X								
<i>Turdoides jardineii</i> (Smith)													
Arrow-marked Babbler					X		X		X				
<i>T. plebejus</i> (Cretzschmar)													
Brown Babbler									X				
<i>T. rubiginosus</i> (Rüppell)													
Rufous Chatterer					X		X	X	X	X			
<i>Alcippe abyssinica</i> (Rüppell)													
Abyssinian Hill-babbler											X		X
<i>Pycnonotus barbatus</i> (Desfontaines)													
Dark-capped Bulbul					X		X		X		X		
<i>Phyllastrephus fischeri</i> (Reichenow)											X		
Fischer's Greenbul											X		
<i>Platysteira cyanea</i> (Müller)									X		X		
Wattle-eye									X		X		
<i>Bradornis pallidus</i> (Müller)													
Pale Flycatcher	X		X	X		X							
<i>B. microhynchus</i> Reichenow													
Grey Flycatcher			X		X								
<i>Empidonax semipartitus</i> (Rüppell)													
Silver Bird				X	X		X						
<i>Meleanornis edoloides</i> (Swainson)													
Black Flycatcher				X	X								
<i>M. chocolatina</i> (Rüppell)													
White-eyed Slaty Flycatcher									X	X	X	X	X
<i>Batis molitor</i> (Hahn & Küster)													
Chin-spot Puff-back Flycatcher					X				X	X	X		
<i>Muscipapa adusta</i> (Boie)													
Dusky Flycatcher										X		X	X
<i>Terpsiphone viridis</i> (Müller)													
Paradise Flycatcher			X		X				X	X	X		X
<i>Turdus abyssinicus</i> Gmelin													
Olive Thrush											X		X
<i>T. pelios</i> (Bonaparte)													
African Thrush									X				
<i>Oenanthe oenanthe</i> (Linnaeus)													
Wheatear					X	X							
<i>O. isabellina</i> (Temminck)													
Isabelline Wheatear						X							
<i>Cossypha caffra</i> (Linnaeus)													
Robin-Chat											X		X
<i>C. heuglini</i> (Hartlaub)													
White-browed Robin-Chat									X		X		
<i>Cercomela familiaris</i> (Stephens)													
Familiar Chat					X	X							
<i>Myrmecocichla albifrons</i> (Rüppell)													
White-fronted Black Chat										X			
<i>M. cinnamomeiventris</i> (Lafresnaye)										X			
Cliff Chat										X	X		
<i>Saxicola rubetra</i> , (Linnaeus)													
Whinchat						X							
<i>S. torquata</i> (Linnaeus)													
Stonechat					X	X	X						
<i>Alethe poliocephala</i> (Bonaparte)													
Brown-chested Aethe											X		
<i>Cichladusa guttata</i> (Heuglin)													
Spotted Morning Warbler							X		X				
<i>Cercotrichas leucophrys</i> (Rüppell)													
White-winged Scrub Robin	X					X							





SPECIES	SAVANNAH						RIPARIAN			UPLAND			
	SST3	SW	ST6	S1/S7	S2/S12	S3	R4	R2	T2/T3	HE5	M6	M5	M3
<i>Corvus rhipidurus</i> Hartert													
Fan-tailed Raven . . . . .										X	X	X	
<i>Ptilostomus afer</i> (Linnaeus)													
Piapiac . . . . .				X	X								
<i>Onycognathus morio</i> Linnaeus													
Redwing Starling . . . . .												X	X
<i>Lamprotornis chalcurus</i> (Nordmann)													
Bronze-tailed Starling . . . . .			X		X								
<i>L. chloropterus</i> Swainson													
Lesser Blue-eared Glossy Starling . . . . .					X		X						
<i>L. caudatus</i> (Müller)													
Rüppell's Long-tailed Glossy Starling . . . . .			X	X	X								
<i>L. chalybaeus</i> Hemprich & Ehrenberg													
Blue-eared Glossy Starling . . . . .													
<i>Cinnyricinthus sharpii</i> (Jackson)												X	
Sharpe's Starling . . . . .													
<i>C. leucogaster</i> (Gmelin)													
Violet-backed Starling . . . . .			X		X								
<i>Spreo superbus</i> (Rüppell)													
Superb Starling . . . . .				X		X							
<i>Creatophora cinerea</i> (Menschen)													
Wattled Starling . . . . .	X												
<i>Buphagus africanus</i> (Linnaeus)													
Yellow-billed Oxpecker . . . . .					X	X							
<i>B. erythrorhynchus</i> (Stanley)													
Red-billed Oxpecker . . . . .				X	X	X							
<i>Zosterops virens</i> Sundevall													
Green White-eye . . . . .									X				
<i>Z. senegalensis</i> Bonaparte													
Yellow White-eye . . . . .									X	X			X
<i>Nectarinia tacazze</i> (Stanley)													
Tacazze Sunbird . . . . .											X	X	
<i>N. mariquensis</i> (Smith)													
Mariqua Sunbird . . . . .							X		X				
<i>N. olivacea</i> (Smith)													
Olive Sunbird . . . . .	X												
<i>N. pulchella</i> (Linnaeus)													
Beautiful Sunbird . . . . .			X	X			X						
<i>N. venusta</i> (Shaw & Nodder)													
Variable Sunbird . . . . .			X		X					X	X	X	
<i>N. famosa</i> (Linnaeus)													
Malachite Sunbird . . . . .										X	X		
<i>N. senegalensis</i> (Linnaeus)													
Scarlet-chested Sunbird . . . . .									X	X	X		
<i>N. amethystina</i> (Shaw)										X	X		
Amethyst Sunbird . . . . .													
<i>N. verticalis</i> (Latham)													
Green-headed Sunbird . . . . .											X		
<i>N. preussi</i> (Reichenow)													
Northern Double-collared Sunbird . . . . .												X	
<i>Anthreptes collaris</i> (Vieillot)													
Collared Sunbird . . . . .											X		
<i>A. longuemarei</i> (Lesson)													
Violet-backed Sunbird . . . . .	X		X										
<i>Dinemellia dinemelli</i> (Rüppell)													
White-headed Buffalo Weaver . . . . .			X	X	X	X							
<i>Bubalornis albirostris</i> (Vieillot)													
Buffalo Weaver . . . . .	X		X	X	X	X							
<i>Plocepasser mahali</i> Smith													
White-browed Sparrow Weaver . . . . .	X	X	X	X			X						

SPECIES	SAVANNAH						RIPARIAN			UPLAND			
	SST3	SW	ST6	S1/S7	S2/S12	S3	R4	R2	T2/T3	HES	M6	M5	M3
<i>P. superciliosus</i> (Cretzschmar) Chestnut-crowned Sparrow-weaver .	X					X							
<i>Pseudonigrita arnaudi</i> (Bonaparte) Grey-headed Social Weaver .						X							
<i>Passer emimibey</i> (Hartlaub) Chestnut Sparrow . . . . .	X		X										
<i>P. iagoensis</i> (Gould) Rufous Sparrow . . . . .			X										
<i>P. griseus</i> (Vieillot) Grey Sparrow . . . . .				X	X								
<i>Sporopipes frontalis</i> (Daudin) Speckled-fronted Weaver . . . . .	X			X	X		X						
<i>Petronia xanthocollis</i> (Burton) Yellow-spotted Petronia . . . . .					X				X				
<i>Ploceus velatus</i> Vieillot Masked Weaver . . . . .	X		X				X						
<i>P. rubiginosus</i> Rüppell Chestnut Weaver . . . . .	X	X											
<i>P. cucullatus</i> (Müller) Black-headed Weaver . . . . .		X	X					X					
<i>P. jacksoni</i> Shelley Golden-backed Weaver . . . . .							X	X					
<i>P. baglafecht</i> (Daudin) Emin's Weaver . . . . .											X		X
<i>P. ocularis</i> Smith Spectacled Weaver . . . . .											X		
<i>P. luteolus</i> (Lichtenstein) Little Weaver . . . . .			X				X		X				
<i>P. intermedius</i> Rüppell Masked Weaver . . . . .													
<i>Malimbus rubriceps</i> (Sundevall) Red-headed Weaver . . . . .										X			
<i>Quelea quelea</i> (Linnaeus) Red-billed Quelea . . . . .								X		X			
<i>Q. cardinalis</i> (Hartlaub) Cardinal Quelea . . . . .		X	X	X	X		X	X		X			
<i>Amadina fasciata</i> (Gmelin) Cut-throat . . . . .			X										
<i>Euplectes orix</i> (Linnaeus) Red-Bishop . . . . .					X		X	X					
<i>E. albonotatus</i> (Cassin) White-winged Widow Bird . . . . .	X			X	X			X					
<i>E. capensis</i> (Linnaeus) Yellow Bishop . . . . .									X	X	X		
<i>E. hordeaceus</i> (Linnaeus) Black-winged Red Bishop . . . . .					X			X					
<i>E. gierowii</i> Cabanis Black Bishop . . . . .								X					
<i>Lonchura cucullata</i> (Swainson) Bronze Mannikin . . . . .								X					
<i>Cryptospiza salvadori</i> Riechenow Abyssinian Crimson-Wing . . . . .													X
<i>Pytelia melba</i> (Linnaeus) Green-winged Pytelia . . . . .									X				
<i>P. afra</i> (Gmelin) Orange-winged Pytelia . . . . .									X				
<i>P. phoenicoptera</i> Swainson Red-winged Pytelia . . . . .									X				
<i>Hypargos nitidulus</i> (Hartlaub) Green-backed Twinspot . . . . .									X				

SPECIES	SAVANNAH					RIPARIAN			UPLAND				
	SST3	SW	ST6	S1/S7	S2/S12	S3	R4	R2	T2/T3	HES	M6	M5	M3
<i>Lagonosticta rubricata</i> (Lichtenstein)													
African Fire Finch . . . . .										X	X		X
<i>L. senegala</i> (Linnaeus)													
Red-billed Fire Finch . . . . .													
<i>Estrilda astrild</i> (Linnaeus)													
Waxbill . . . . .				X	X								
<i>E. bengala</i> (Linnaeus)													
Red-checked Cordon-bleu . . . . .	X			X	X		X						
<i>E. erythronotos</i> (Vieillot)													
Black-checked Waxbill . . . . .	X		X			X	X		X				
<i>E. melanotis</i> (Temminck)													
Yellow-bellied Waxbill . . . . .										X	X	X	
<i>E. rhodopyga</i> Sundevall													
Crimson-rumped Waxbill . . . . .					X					X	X		
<i>E. troglodytes</i> (Lichtenstein)													
Black-rumped Waxbill . . . . .										X			
<i>E. paludicola</i> (Heuglin)													
Fawn-breasted Waxbill . . . . .										X	X		
<i>Lagonosticta rara</i> (Antinori)													
Black-bellied Waxbill . . . . .													
<i>Vidua macroura</i> (Pallas)													
Pin-tailed Whydah . . . . .					X		X						
<i>V. hypocherina</i> Verreaux													
Steel-blue Whydah . . . . .	X		X										
<i>V. paradisea</i> (Linnaeus)													
Paradise Whydah . . . . .	X			X									
<i>Serinus dorsostriatus</i> (Reichenow)													
White-bellied Canary . . . . .	X		X				X						
<i>S. atrogularis</i> (Smith)													
Yellow-rumped Seed-eater . . . . .				X	X								
<i>S. canicollis</i> (Swainson)													
Yellow-crowned Canary . . . . .										X	X	X	
<i>S. sulphuratus</i> (Linnaeus)													
Brimstone Canary . . . . .										X			
<i>S. mozambicus</i> (Müller)													
Yellow-fronted Canary . . . . .													
<i>Emberiza flaviventris</i> Stephens													
Golden-breasted Bunting . . . . .										X			
<i>E. forbesi</i> (Hartlaub)													
Brown-rumped Bunting . . . . .									X				
<i>E. tahapisi</i> Smith													
Cinnamon-breasted Rock Bunting . . . . .									X	X			