

*S. DILLON RIPLEY  
and GORMAN M. BOND*

*Systematic Notes on a  
Collection of Birds  
from Kenya*

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## ABSTRACT

Ripley, S. Dillon, and Gorman M. Bond. Systematic Notes on a Collection of Birds from Kenya. *Smithsonian Contributions to Zoology*, number 111, 21 pages, 1 map. 1971.—Large collections of birds made by A. D. Forbes-Watson in Kenya for the Smithsonian Institution from 1964 to 1966 contain many specimens that provide new information on the avifauna of that country. The populations of *Ciccaba woodfordi* and *Pogoniulus bilineatus* in the Sokoke Forest and *Francolinus jacksoni* in the Cherangani Mountains are believed to be distinct from neighboring races and are described as new subspecies in the text. Four species, previously unrecorded, from Kenya are listed. These are *Caprimulgus pectoralis*, *Neocossyphus poensis*, *Nectarinia chloropygia*, and *Nectarinia bouvieri*. Two species and one species that were thought, until recently, to have been extirpated or known only from the type are represented in the collection by *Turdus fischeri fischeri*, *Platysteira concreta graueri*, and *Ploceus golandi*. Taxonomic comments, including readjustments, revisions, and extensions of ranges are given for eight species and thirty subspecies. Birds recorded from two isolated forests of special interest, the Sokoke and Kakamega, are listed. The effects of human exploitation on the avifauna of these forests are given by A. D. Forbes-Watson in an appendix.

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# Systematic Notes on a Collection of Birds from Kenya

## Introduction

During the period November 1964 to February 1966, over 2,700 specimens of birds were collected in Kenya by A. D. Forbes-Watson for the Smithsonian Institution. Among the localities visited in the eastern coastal lowlands were the Sokoke Forest, Kilifi, and Mida Creek. A number of localities southwest of Mombasa were also visited. These include Gazi, Ukundu, the Shimba Hills, and the Muhaka, Buda, and Gogoni forests. In central and western Kenya collections were made in or near the Cherangani Mountains, Mount Elgon, and the western lowland forest at Kakamega. Smaller collections were made at Naivasha, Kitale, and the Taita Hills.

In view of our present knowledge of Kenya birds, a list of specimens from each of these localities would merely duplicate earlier data (Friedmann 1930, 1937; van Someren 1922, 1932; and Jackson 1938). On the other hand, lists of birds obtained from two isolated forests, the Sokoke and Kakamega, are of special interest because these localities are now being rapidly destroyed.

In addition to these lists, extended accounts are given for species which our studies have shown to be of taxonomic or distributional importance. These studies were based primarily on the specimens obtained by Forbes-Watson for the Smithsonian Institution in 1964–1966, which included material from both the Sokoke and Kakamega forests, as well as from several of the localities mentioned in the first paragraph.

Dr. Dale A. Zimmerman has undertaken an ecologically oriented study of the two forests and will

soon publish his results. Therefore, we have restricted our comments to matters of systematic and distributional importance.

The nomenclature used in this paper follows, in general, that of White (1960–1965). The sequence of families follows that of Mackworth-Praed and Grant (1952–1955).

## Acknowledgments

We would like to thank the authorities of the Los Angeles County Museum, the American Museum of Natural History, the Museum of Comparative Zoology, and the Yale Peabody Museum for the loan of comparative material while this study was in progress.

We would also like to acknowledge with gratitude the assistance of the following individuals who have been extremely helpful to us in a number of ways: Mrs. B. P. Hall, British Museum (Natural History); Mr. C. W. Benson, Cambridge; Dr. Herbert Friedmann, Los Angeles County Museum of Natural History; Mr. R. Meyer de Schauensee, Academy of Natural Sciences of Philadelphia; Dr. Dean Amadon, Dr. Charles T. Collins, and Mr. G. Stuart Keith, American Museum of Natural History; Dr. Raymond A. Paynter, Jr., Museum of Comparative Zoology; Dr. Dale A. Zimmerman, Western New Mexico University, Silver City; Mr. Gerd Heinrich, Dryden, Maine; and Mr. A. D. Forbes-Watson, The National Museum, Nairobi, Kenya.

## The Sokoke Forest

The Sokoke Forest is one of the larger of the low-altitude forests scattered along the east coast of Africa from Mozambique northward to Kenya. It lies about 35 miles north of Mombasa. This forest is composed

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Some of the more important localities (open circles) from which A. D. Forbes-Watson collected specimens in Kenya for the Smithsonian Institution from 1964 to 1966.

of two vegetational types: a relatively dry *Brachystegia* woodland, which occurs on white sandy soils nearest the coast and a moist closed-canopy evergreen "jungle" type, which replaces the *Brachystegia* on heavier red soils farther inland.

The Sokoke Forest is of special interest because it is one of the many areas of lowland forest that is undergoing significant changes in composition because of fires, lumbering, and agricultural practices. These changes will unquestionably affect the variety and abundance of some species of birds. In the short span of five years, *all* of the areas in the Sokoke Forest in which Forbes-Watson collected for the Smithsonian Institution in 1964–1966 have now been deforested.

In view of the rapid destruction of this unique habitat, we are presenting in the following pages a list of birds known to inhabit the Sokoke Forest, in order to provide a useful basis for comparison in any future inventories of the bird life of this area. The list is based on the following material and sources:

1. Specimens collected by Forbes-Watson for the Smithsonian Institution in 1964–1966. These are designated in the lists by the initials USNM.
2. A list of Sokoke Forest birds in the collection of the Los Angeles County Museum of Natural His-

tory collected on an expedition to that forest in January and February 1968, sponsored and led by Dr. Purvis L. Martin. The list, kindly furnished to us by Dr. Herbert Friedmann, also contains a few Sokoke specimens obtained by that museum from other sources. In the combined list, species which are represented only in the collection of the Los Angeles Museum of Natural History are designated by the initials LACM.

3. Specimen records from the works of V.G.L. van Someren (1922, 1932). Although not directly comparable with the previously mentioned two lists in terms of species presence or absence, due to the vagaries of collecting and to the fact that van Someren was concerned with the avifauna of a much larger area (Kenya, Tanzania, and Uganda), his list is, nevertheless, interesting in that it provides a sample of the bird population that existed in the Sokoke Forest almost half a century ago. The names of these birds are preceded by an asterisk in the lists. Most of these birds were either collected by Forbes-Watson in 1964–1966 for the Smithsonian Institution or have been recorded by him since that time. A few species that were recorded by van Someren, however, have not been reported upon in recent

years. These are designated by the initials VS in the lists.

4. Species collected or observed by Forbes-Watson subsequent to the Smithsonian expedition. Since we have not examined these specimens, only species names are listed with the notation FW.

The Sokoke Forest populations of *Ciccaba woodfordi* and *Pogoniulus bilineatus* are considered to be distinct from neighboring races and are described as new subspecies in this paper. Based on specimens obtained by Forbes-Watson, the range of *Caprimulgus pectoralis* is extended northward from Tanzania along the coast to the Sokoke. Data are given for two birds, *Turdus fischeri fischeri* and *Ploceus golandi*, which have only recently been rediscovered in the Sokoke Forest.

#### A List of Birds Recorded in the Sokoke Forest

*Ardea melanocephala* Vigors and Children FW  
*Ardea purpurea* Linnaeus FW  
*Egretta alba* (Linnaeus) FW  
*Polyboroides radiatus* (Scopoli) FW  
*Terathopius ecaudatus* (Daudin) FW  
*Circaetus fasciolatus* Kaup USNM  
*Accipiter melanoleucus* Smith FW  
*Accipiter tachiro sparsimfasciatus* (Reichenow) USNM  
*Accipiter minullus tropicalis* Reichenow USNM  
*Kaupifalco monogrammicus* (Temminck) USNM  
*Stephanoaetus coronatus* (Linnaeus) FW  
*Hieraaetus spilogaster* (Bonaparte) FW  
*Aquila wahlbergi* Sundevall FW  
*Milvus migrans* (Boddaert) FW  
*Pernis apivorus* (Linnaeus) LACM  
*Elanus caeruleus* (Desfontaines) FW  
*Falco peregrinus* Tunstall FW  
*Francolinus sephaena rovuma* Gray FW  
*Coturnix delegorguei* Delegorgue FW  
*Guttera pucherani* (Hartlaub) USNM  
*Streptopelia semitorquata* (Rüppell) FW  
*Streptopelia capicola elegans* (Zedlitz) LACM  
*Streptopelia capicola tropica* (Reichenow) USNM  
*Turtur tympanistria* (Temminck) USNM  
*Turtur chalcospilos zambesiensis* Roberts USNM  
*Treron australis wakefieldi* (Sharpe) USNM  
*Clamator jacobinus pica* (Hemprich and Ehrenberg) USNM  
*Clamator jacobinus serratus* (Sparrrman) LACM

*Clamator levaillantii* (Swainson) USNM  
*Cuculus canorus canorus* Linnaeus USNM  
*Cuculus poliocephalus poliocephalus* Latham USNM  
*Pachycoccyx audeberti validus* (Reichenow) LACM  
*Chrysococcyx klaas* (Stephens) FW  
*Chrysococcyx caprius* (Boddaert) LACM  
*Ceuthmochares aereus australis* Sharpe USNM  
*\*Centropus toulou grillii* Hartlaub VS  
*Centropus superciliosus superciliosus* Hemprich and Ehrenberg USNM  
*\*Tauraco fischeri fischeri* (Reichenow) USNM  
*Poicephalus cryptoxanthus* (Peters) USNM  
*Eurystomus glaucurus suahelicus* Neumann USNM  
*Coracias caudata lortii* Shelley FW  
*Ceyx picta natalensis* (Smith) USNM  
*Halcyon senegaloides* Smith USNM  
*Halcyon chelicuti chelicuti* (Stanley) USNM  
*Halcyon albiventris orientalis* Peters USNM  
*Halcyon leucocephala* (Müller) FW  
*Merops apiaster* Linnaeus FW  
*Merops superciliosus* Linnaeus FW  
*Merops nubicus nubicus* Gmelin USNM  
*Merops albicollis* Vieillot USNM  
*Merops pusillus* Müller FW  
*Tockus alboterninatus suahelicus* (Neumann) LACM  
*Bycanistes bucinator* (Temminck) LACM  
*Bycanistes brevis* Friedmann FW  
*Phoeniculus purpureus marwitzi* (Reichenow) USNM  
*Phoeniculus cyanomelas schalowi* (Newmann) LACM  
*Otus ireneae* Ripley USNM  
*Otus scops nivosus* Twomey and Keith USNM  
*Bubo lacteus* (Temminck) USNM  
*Ciccaba woodfordi sokokensis* (new subspecies described on page 12).  
*Caprimulgus pectoralis fervidus* Sharpe USNM  
*Caprimulgus fraenatus* Salvadori LACM  
*Caprimulgus inornatus* Heuglin USNM  
*Caprimulgus fossii fossii* Hartlaub LACM  
*Colius striatus mombassicus* van Someren USNM  
*\*Apaloderma narina littorale* van Someren USNM  
*Lybius torquatus irroratus* (Cabanis) USNM  
*Buccanodon olivaceum olivaceum* Shelley USNM  
*Pogoniulus simplex* (Fischer and Reichenow) FW

- Pogoniulus bilineatus pallidus* (new subspecies described on page 13).
- \**Indicator variegatus* Lesson USNM  
*Indicator indicator* Sparrman USNM  
*Indicator minor minor* Stephens USNM  
*Prodotiscus zambesiae reichenowi* Madarász LACM  
*Prodotiscus regulus* Sundevall LACM  
*Campethera abingoni mombassica* (Fischer and Reichenow) USNM  
*Campethera cailliautii cailliautii* (Malherbe) USNM  
*Dendropicos fuscescens hemprichii* (Ehrenberg) USNM  
*Thripas namaquus namaquus* (Lichtenstein) USNM  
*Apus berliozii bensoni* Brooke USNM  
*Apus affinis* (Gray) FW  
*Cypsiurus parvus myochrous* Reichenow LACM  
*Chaetura ussheri* Sharpe FW  
*Chaetura boehmi* Schalow LACM  
*Pitta angolensis longipennis* Reichenow USNM  
 \**Mirafra rufocinnamomea fischeri* Reichenow VS  
 \**Anthus sokokensis* van Someren USNM  
*Tmetothylacus tenellus* (Cabanis) USNM  
*Turdoides squamulatus* (Shelley) FW  
*Turdoides rubiginosus* (Rüppell) FW  
*Pycnonotus barbatus dodsoni* Sharpe USNM  
*Andropadus importunus subalaris* Reichenow USNM  
*Andropadus virens zombensis* Shelley LACM  
*Chlorocichla flaviventris mombasae* Shelley USNM  
*Phyllastrephus strepitans* (Reichenow) USNM  
 \**Phyllastrephus terrestris suahelicus* Reichenow USNM  
*Phyllastrephus fischeri fischeri* (Reichenow) USNM  
*Phyllastrephus debilis rabai* Hartert and van Someren USNM  
*Nicator chloris gularis* Hartlaub and Finsch USNM  
*Muscicapa striata neumanni* Poche USNM  
*Muscicapa caerulescens cinereola* Finsch and Hartlaub USNM  
*Bradornis pallidus subalaris* Sharpe USNM  
*Batis capensis mixta* (Shelley) USNM  
*Batis soror* Reichenow USNM  
 \**Erythrocerus holochlorus* Erlanger USNM  
 \**Trochocercus cyanomelas bivittatus* Reichenow USNM  
*Terpsiphone viridis ferreti* (Guerin) USNM
- \**Terpsiphone viridis plumbeiceps* Reichenow VS  
*Monticola saxatilis* (Linnaeus) LACM  
*Cercotrichas quadrivirgata quadrivirgata* (Reichenow) USNM  
 \**Sheppardia gunningi sokokensis* (van Someren) USNM  
*Cossypha natalensis intensa* Mearns USNM  
*Cossypha heuglini intermedia* (Cabanis) LACM  
*Neocossyphus rufus rufus* (Fischer and Reichenow) USNM  
*Luscinia luscinia* (Linnaeus) LACM  
*Turdus tephronotus* Cabanis FW  
*Turdus fischeri fischeri* Hellmayr USNM  
*Cisticola chiniana* (Smith) FW  
*Prinia subflava* (Gmelin) FW  
*Apalis melanocephala melanocephala* (Fischer and Reichenow) USNM  
*Camaroptera brachyura erlangeri* Reichenow USNM  
*Hirundo rustica rustica* Linnaeus USNM  
*Hirundo aethiopica aethiopica* Blanford LACM  
*Hirundo senegalensis monteiri* Hartlaub LACM  
*Hirundo abyssinica unitatis* Sclater and Praed LACM  
*Psalidoprocne pristopectera holomelaena* (Sundevall) USNM  
*Campephaga phoenicea flava* Vieillot USNM  
*Dicrurus adsimilis adsimilis* (Bechstein) USNM  
*Prionops retzii graculina* Cabanis USNM  
*Prionops scopifrons kirki* (Sclater) USNM  
*Dryoscopus cubla affinis* (Gray) USNM  
*Tchagra australis minor* (Reichenow) LACM  
*Tchagra senegala senegala* (Linnaeus) USNM  
*Laniarius ferrugineus sublacteus* (Cassin) USNM  
*Malaconotus sulfureopectus similis* Smith LACM  
 \**Malaconotus viridis nigricauda* (Clarke) FW  
*Lanius collurio collurio* Linnaeus USNM  
*Lanius collurio phoenicuroides* (Schalow) USNM  
*Lanius collaris* Linnaeus FW  
*Oriolus oriolus oriolus* (Linnaeus) USNM  
*Oriolus auratus notatus* Peters USNM  
*Oriolus larvatus rolleti* Salvadori USNM  
*Corvus albus* Müller FW  
*Lamprotornis corruscus corruscus* Nordmann USNM  
*Lamprotornis chalybaeus sycobius* Hartlaub LACM  
 \**Cinnyricinclus leucogaster verreauxi* (Bocage) USNM  
*Spreo superbus* (Rüppell) LACM



\**Anthreptes reichenowi yokanae* Hartert USNM  
*Anthreptes pallidigaster* Sclater and Moreau USNM  
*Anthreptes collaris elachior* Mearns USNM  
*Nectarinia olivacea changamuensis* (Mearns) US-  
 NM  
*Nectarinia amethystina kalckreuthi* (Cabanis) US-  
 NM  
*Nectarinia senegalensis gutturalis* (Linnaeus) LA-  
 CM  
*Nectarinia bifasciata microrhyncha* (Shelley) LA-  
 CM  
*Nectarinia notata chalcomelas* (Reichenow) LACM  
*Nectarinia veroxii fischeri* (Reichenow) USNM  
*Serinus mozambicus mozambicus* (Müller) LACM  
*Serinus astrogularis* (Smith) FW  
*Amylospiza albifrons unicolor* (Fischer and Reich-  
 enow) USNM  
*Ploceus subaureus aureo flavus* Smith LACM  
*Ploceus bojeri* (Cabanis) LACM  
 \**Ploceus castaneiceps* (Sharpe) VS  
*Ploceus cucullatus nigriceps* (Layard) USNM  
*Ploceus golandi* (Clarke) USNM  
*Ploceus bicolor kersteni* Finsch and Hartlaub US-  
 NM  
*Ploceus ocularis* Smith FW  
*Quelea quelea aethiopica* (Sundevall) USNM  
 \**Euplectes albonotatus eques* (Hartlaub) VS  
*Euplectes nigroventris* Cassin FW  
*Vidua macroura* (Pallas) USNM  
*Hypargos niveoguttatus macrospilotus* Mearns US-  
 NM  
*Hypargos nitidula chubbi* (Ogilvie-Grant) USNM  
*Pytelia afra* (Gmelin) LACM  
*Estrilda astrild* (Linnaeus) FW  
*Estrilda bengala* (Linnaeus) FW  
*Lonchura bicolor nigriceps* (Cassin) USNM  
*Lonchura cucullata scutata* (Heuglin) USNM

### The Kakamega Forest

The Kakamega Forest is an evergreen forest of intermediate altitude (5,000 feet), located in western Kenya. It is the most easterly point of the West African-Congo type forest with western affinities not only in the plant kingdom but with birds, mammals, and insects. Human population pressure in this area is severe, and the changes in the composition of this unique forest could have a serious impact on our future understanding of the ecological problems

which still remain to be solved regarding the birds of Kenya and perhaps even Africa as a whole. Comments on the present status of the Kakamega Forest are presented in the appendix.

Forbes-Watson obtained 159 species in the Kakamega Forest, including *Platysteira concreta graueri*, previously thought to have been extirpated, and three species which are recorded for the first time in Kenya. These are *Neocossyphus poensis*, *Nectarinia bouvieri*, and *Nectarinia chloropygia*.

Van Someren (1922, 1932) lists a number of birds from "Kakamegoes" and the town of Kakamega, but only three from the Kakamega Forest itself. These are *Campephaga phoenicea*, *Linurgus olivaceus*, and *Sarothrura rufa*. All but the latter species were collected by Forbes-Watson in 1965.

The following list of Kakamega birds is based on Forbes-Watson's specimens (identified to subspecies) in the Smithsonian collections, as well as species observed or collected by him subsequently. These are designated by the initials USNM and FW respectively.

### A List of Birds Recorded in the Kakamega Forest

*Pelecanus rufescens* Gmelin FW  
*Ardea melanocephala* Vigors and Children FW  
*Scopus umbretta* Gmelin FW  
*Ciconia ciconia* (Linnaeus) FW  
*Ciconia abdimii* Lichtenstein FW  
*Leptoptilos crumeniferus* (Lesson) FW  
*Bostrychia hagedash* (Latham) FW  
*Neophron monachus* (Temminck) FW  
*Circus macrourus* (Gmelin) USNM  
*Polyboroides radiatus* (Scopoli) FW  
*Terathopius ecaudatus* (Daudin) FW  
*Circaetus cinerascens* Müller FW  
*Accipiter melanoleucus melanoleucus* Smith USNM  
*Accipiter tachiro sparsifasciatus* (Reichenow)  
 USNM  
*Accipiter badius* (Gmelin) FW  
*Accipiter minullus* (Daudin) FW  
*Kaupifalco monogrammicus* (Temminck) FW  
*Buteo rufofuscus* (Forster) FW  
*Buteo buteo* (Linnaeus) FW  
*Buteo oreophilus* Hartert and Neumann FW  
*Lophaetus occipitalis* (Daudin) FW  
*Stephanoaetus coronatus* (Linnaeus) FW  
*Hieraaetus spilogaster* (Bonaparte) FW

- Hieraaetus dubius* (Smith) FW  
*Aquila wahlbergi* Sundevall FW  
*Milvus migrans* (Boddaert) FW  
*Pernis apivorus* (Linnaeus) FW  
*Aviceda cuculoides* Swainson FW  
*Macheirhamphus alcinus* Bonaparte FW  
*Falco cuvieri* Smith FW  
*Falco subbuteo* Linnaeus FW  
*Falco ardosiaceus* Bonnaterre and Vieillot FW  
*Falco tinnunculus* Linnaeus FW  
*Francolinus squamatus* Cassin FW  
*Coturnix coturnix* (Linnaeus) FW  
*Coturnix delegorguei* Delegorgue FW  
*Guttera edouardi* (Hartlaub) FW  
*Sarothrura rufa* (Vieillot) VS  
*Sarothrura elegans* (Smith) USNM  
*Sarothrura pulchra* (Gray) FW  
*Balearica pavonina regulorum* (Bennet) FW  
*Tringa glareola* Linnaeus FW  
*Tringa ochropus* Linnaeus FW  
*Tringa hypoleucos* Linnaeus FW  
*Columba arquatrix* Temminck FW  
*Columba delegorguei* Delegorgue USNM  
*Streptopelia semitorquata* (Rüppell) FW  
*Streptopelia capicola* (Sundevall) FW  
*Turtur tympanistria* (Temminck) USNM  
*Turtur afer* (Linnaeus) USNM  
*Aplopelia larvata* (Temminck) FW  
*Trepon australis calva* (Temminck) FW  
*Clamator levaillantii* (Swainson) USNM  
*Cuculus solitarius solitarius* Stephens USNM  
*Cuculus clamosus* Latham FW  
*Chrysococcyx klaas* (Stephens) USNM  
*Chrysococcyx caprius* (Boddaert) FW  
*Chrysococcyx cupreus cupreus* (Shaw) USNM  
*Ceuthmochares aereus aereus*  $\cong$  *australis* USNM  
*Centropus toulou grillii* Hartlaub USNM  
*Centropus monachus monachus*  $\cong$  *fischeri* USNM  
*Centropus superciliosus* Hemprich and Ehrenberg FW  
*Tauraco schutti emini* Reichenow USNM  
*Musophaga rossae* Gould FW  
*Corythaeola cristata* (Vieillot) FW  
*Poicephalus meyeri* (Cretzschmar) FW  
*Pittacus erithacus* Linnaeus FW  
*Eurystomus glaucurus* (Müller) FW  
*Ceryle maxima* (Pallas) FW  
*Ceyx picta* (Boddaert) FW  
*Halcyon senegalensis* (Linnaeus) FW  
*Halcyon chelicuti* (Stanley) FW  
*Merops apiaster* Linnaeus FW  
*Merops superciliosus* Linnaeus FW  
*Merops albicollis* Vieillot FW  
*Merops pusillus meridionalis* (Sharpe) USNM  
*Merops lafresnayii oreobates* (Sharpe) USNM  
*Merops muelleri muelleri* (Cassin) USNM  
*Tockus alboterminatus* (Buttikofer) FW  
*Bycanistes subcylindricus subquadratus* Cabanis USNM  
*Phoeniculus bollei jacksoni* (Sharpe) USNM  
*Tyto capensis* (Smith) FW  
*Otus leucotis* (Temminck) FW  
*Bubo lacteus* (Temminck) FW  
*Glaucidium perlatum* (Vieillot) FW  
*Glaucidium tephronotum elgonense* Granvik USNM  
*Ciccaba woodfordi* (Smith) FW  
*Caprimulgus europaeus europaeus* Linnaeus USNM  
*Caprimulgus natalensis natalensis* Smith USNM  
*Colius striatus kiwuensis* Reichenow USNM  
*Apaloderma narina* (Stephens) FW  
*Apaloderma vittatum* (Shelley) USNM  
*Lybius hirsutus* (Swainson) FW  
*Gymnobucco bonapartei cinereiceps* Sharpe USNM  
*Buccanodon duchailui duchailui* (Cassin) USNM  
*Pogoniulus bilineatus jacksoni* (Sharpe) USNM  
*Trachyphonus purpuratus elgonensis* Sharpe USNM  
*Indicator variegatus* Lesson USNM  
*Indicator indicator* (Sparrman) FW  
*Indicator minor minor* Stephens USNM  
*Indicator conirostris conirostris* (Cassin) USNM  
*Indicator exilis pachyrhynchus* (Heuglin) USNM  
*Indicator pumilio* Chapin FW  
*Prodotiscus insignis* (Cassin) USNM  
*Campethera caroli* (Malherbe) USNM  
*Campethera nivosa herberti* (Alexander) USNM  
*Campethera tullbergi taeniolaema* Reichenow and Neumann USNM  
*Dendropicos lafresnayi lepidus* (Cabanis and Heine) USNM  
*Mesopicos goertae* (Müller) FW  
*Mesopicos xantholophus* (Hargitt) USNM  
*Apus aequatorialis* (von Müller) FW  
*Apus apus* (Linnaeus) FW  
*Apus barbatus* (Sclater) FW  
*Apus myioptilus* (Salvadori) USNM  
*Apus caffer* (Lichtenstein) FW  
*Apus affinis* (Gray) FW  
*Chaetura sabini* Gray USNM

- Smithornis capensis meinertzhageni* van Someren  
 USNM  
*Mirafra africana* Smith FW  
*Motacilla flava* Linnaeus FW  
*Motacilla cinerea cinerea* Tunstall USNM  
*Motacilla clara* Sharpe FW  
*Motacilla alba vidua* Sundevall FW  
*Anthus novaeseelandiae* (Gmelin) FW  
*Anthus leucophrys zenkeri*  $\cong$  *goodsoni* USNM  
*Anthus trivialis trivialis* Linnaeus USNM  
*Macronyx croceus* (Vieillot) FW  
*Macronyx ameliae* de Tarragon FW  
*Alcippe abyssinica* (Rüppell) FW  
*Trichastoma poliothorax* (Reichenow) USNM  
*Trichastoma fulvescens ugandae* (van Someren)  
 USNM  
*Trichastoma pyrrhoptera pyrrhoptera* (Reichenow  
 and Neumann) USNM  
*Trichastoma rufipennis rufipennis* Sharpe USNM  
*Trichastoma albipectus* (Reichenow) USNM  
*Pycnonotus barbatus tricolor* (Hartlaub) USNM  
*Andropadus curvirostris curvirostris* Cassin USNM  
*Andropadus gracilis ugandae* van Someren USNM  
*Andropadus ansorgei kavirondensis* (van Someren)  
 USNM  
*Andropadus gracilirostris congensis*  $\cong$  *percivali*  
 USNM  
*Andropadus virens holochlorus* (van Someren)  
 USNM  
*Andropadus latirostris eugenius* Reichenow USNM  
*Andropadus montanus kakamegae* (Sharpe) USNM  
*Baeopogon indicator indicator* (J. and E. Verreaux)  
 USNM  
*Chlorocichla laetissima laetissima* (Sharpe) USNM  
*Phyllastrephus baumanni hypochloris* (Jackson)  
 USNM  
*Phyllastrephus fischeri cabanisi* (Sharpe) USNM  
*Bleda syndactyla woosnami* Ogilvie-Grant USNM  
*Muscicapa adusta murina*  $\cong$  *marsabit* USNM  
*Muscicapa lendu lendu*  $\cong$  *itombwensis* USNM  
*Muscicapa caerulescens brevicauda* Ogilvie-Grant  
 USNM  
*Ficedula hypoleuca hypoleuca* (Pallas) USNM  
*Melaenornis chocolatina fischeri* (Reichenow)  
 USNM  
*Hyltiota australis slateni* Sassi USNM  
*Megabyas flammulata aequatorialis* Jackson USNM  
*Batis molitor* (Hahn and Kuster) FW  
*Platysteira cyanea* (Müller) FW  
*Platysteira peltata* Sundevall FW  
*Platysteira blissetti jamesoni* (Sharpe) USNM  
*Platysteira concreta graueri* (Hartert) USNM  
*Trochocercus longicauda teresitus* (Antinori)  
 USNM  
*Trochocercus nigromitratus* (Reichenow) USNM  
*Trochocercus albonotatus albonotatus* Sharpe  
 USNM  
*Terpsiphone rufiventer emini* Reichenow USNM  
*Terpsiphone viridis ferreti* (Guerin) USNM  
*Saxicola torquata axillaris* (Shelley) USNM  
*Myrmecocichla aethiops* Cabanis FW  
*Alethe poliocephala carruthersi* Ogilvie-Grant  
 USNM  
*Sheppardia aequatorialis aequatorialis* (Jackson)  
 USNM  
*Cossypha polioptera* Reichenow FW  
*Cossypha caffra* (Linnaeus) FW  
*Cossypha cyanocampter barteloti* Shelley USNM  
*Cossypha niveicapilla* (Lafresnaye) FW  
*Neocossyphus poensis praepectoralis* Jackson USNM  
*Turdus pelios* Bonaparte FW  
*Schoenicola platyura alexinae* (Heuglin) USNM  
*Chloropeta natalensis* Smith FW  
*Sphenoecus mentalis* (Fraser) FW  
*Sylvia borin* (Boddaert) FW  
*Sylvia atricapilla dammholzi* Stresemann USNM  
*Phylloscopus trochilus trochilus* (Linnaeus) USNM  
*Phylloscopus trochilus acredula* (Linnaeus) USNM  
*Phylloscopus collybita abietinus* (Nilsson) USNM  
*Phylloscopus sibilatrix* (Bechstein) USNM  
*Phylloscopus umbrovirens* (Rüppell) FW  
*Phylloscopus budongoensis* (Seth-Smith) USNM  
*Cisticola erythrops sylvia* Reichenow USNM  
*Cisticola lateralis* (Fraser) FW  
*Cisticola hunteri chubbi* Sharpe USNM  
*Cisticola chiniana* (Smith) FW  
*Cisticola galactotes* (Temminck) FW  
*Cisticola robusta* (Rüppell) FW  
*Cisticola natalensis* (Smith) FW  
*Prinia subflava melanorhyncha* (Jardine and Fraser)  
 USNM  
*Prinia leucopogon reichenowi* (Hartlaub) USNM  
*Prinia bairdii melanops* (Reichenow and Neumann)  
 USNM  
*Apalis pulchra pulchra* Sharpe USNM  
*Apalis jacksoni* Sharpe FW  
*Apalis cinerea* (Sharpe) FW  
*Apalis rufogularis nigrescens* (Jackson) USNM

- Bathmocercus cerviventris vulpinus* Reichenow  
USNM
- Camaroptera chloronota toroensis* (Jackson) USNM
- Camaroptera brachyura abessinica*  $\cong$  *griseigula*  
USNM
- Eremomela turneri* van Someren USNM
- Sylvietta leucophrys leucophrys* Sharpe USNM
- Hylia prasina prasina* (Cassin) USNM
- Riparia paludicola* (Vieillot) FW
- Hirundo rustica* Linnaeus FW
- Hirundo angolensis* Bocage FW
- Hirundo smithi* Leach FW
- Hirundo semirufa* Sundevall FW
- Hirundo senegalensis* Linnaeus FW
- Hirundo daurica* Linnaeus FW
- Hirundo abyssinica* Guerin FW
- Hirundo griseopyga* Sundevall FW
- Psalidoprocne pristopectera* (Rüppell) FW
- Psalidoprocne albiceps albiceps* Sclater USNM
- Coracina caesia* (Lichtenstein) FW
- Campephaga quiscalina martini* Jackson USNM
- Campephaga phoenicia petiti* Oustalet USNM
- Dicrurus ludwigi sharpei* Oustalet USNM
- Dicrurus adsimilis coracinus* J. and E. Verreaux FW
- Dryoscopus gambensis malzacii* (Heuglin) USNM
- Dryoscopus angolensis nandensis* Sharpe USNM
- Tchagra minuta* (Hartlaub) FW
- Tchagra australis emini* (Reichenow) USNM
- Tchagra senegala* (Linnaeus) FW
- Laniarius luhderi luhderi* Reichenow USNM
- Laniarius ferrugineus major* (Hartlaub) USNM
- Malaconotus bocagei jacksoni* (Sharpe) USNM
- Lanius mackinnoni* Sharpe USNM
- Lanius excubitorius* Prevost and Des Murs FW
- Lanius collaris* Linnaeus FW
- Parus albiventris* Shelley FW
- Parus funereus funereus* (Verreaux) USNM
- Oriolus oriolus oriolus* (Linnaeus) USNM
- Oriolus auratus* Vieillot FW
- Oriolus brachyrhynchus lactior* Sharpe USNM
- Oriolus larvatus percivali* Ogilvie-Grant USNM
- Corvus albus* Müller FW
- Corvus capensis* Lichtenstein FW
- Poeoptera stuhlmanni stuhlmanni* (Reichenow)  
USNM
- Lamprotornis splendidus* (Vieillot) FW
- Cinnyricinclus leucogaster* (Gmelin) FW
- Buphagus erythrorhynchus* (Stanley) FW
- Zosterops senegalensis stuhlmanni*  $\cong$  *jacksoni*  
USNM
- Anthreptes rectirostris tephrolaema* (Jardine and Fraser)  
USNM
- Anthreptes collaris garguensis* Mearns USNM
- Nectarinia olivacea ragazzii* (Salvadori) USNM
- Nectarinia verticalis viridisplendens* (Reichenow)  
USNM
- Nectarinia rubescens rubescens* (Vieillot) USNM
- Nectarinia senegalensis lamperti* (Reichenow)  
USNM
- Nectarinia venusta falckensteini* (Fischer and Reichenow)  
USNM
- Nectarinia preussi kikuyuensis* (Mearns) USNM
- Nectarinia chloropygia orphogaster* (Reichenow)  
USNM
- Nectarinia bouvieri* (Shelley) USNM
- Nectarinia cuprea cuprea* (Shaw) USNM
- Nectarinia kilimensis kilimensis* Shelley USNM
- Serinus mozambicus barbatus* (Heuglin) USNM
- Serinus atrogularis* (Smith) FW
- Serinus sulphuratus sharpii* Neumann USNM
- Serinus citrinelloides brittoni* Traylor USNM
- Serinus burtoni tanganjicae* Granvik USNM
- Linurgus olivaceus elgonensis* van Someren USNM
- Amblyospiza albifrons melanota* (Heuglin) USNM
- Ploceus baglajecht reichenowi* (Fischer) USNM
- Ploceus xanthops* (Hartlaub) FW
- Ploceus cucullatus* (Müller) FW
- Ploceus nigerrimus nigerrimus* Vieillot USNM
- Ploceus melanocephalus* (Linnaeus) FW
- Ploceus jacksoni* Shelley FW
- Ploceus superciliosus* (Shelley) FW
- Ploceus bicolor mentalis* (Hartlaub) USNM
- Ploceus tricolor* (Hartlaub) FW
- Ploceus ocellularis* Smith FW
- Ploceus nigricollis nigricollis* (Vieillot) USNM
- Ploceus melanogaster stephanophorus* (Sharpe)  
USNM
- Ploceus insignis* (Sharpe) USNM
- Malimbus rubricollis rubricollis* (Swainson) USNM
- Quelea cardinalis* (Hartlaub) FW
- Quelea quelea* (Linnaeus) FW
- Euplectes albonotatus* (Cassin) FW
- Euplectes ardens suahelica* (van Someren) USNM
- Euplectes gierowii* Cabanis FW
- Euplectes hartlaubi humeralis* (Sharpe) USNM
- Euplectes macrourus macrourus* (Gmelin) USNM
- Passer griseus griseus* (Vieillot) USNM

*Vidua macroura* (Pallas) USNM  
*Hypargos nitidula chubbi*  $\cong$  *schlegeli* USNM  
*Nigrita canicapilla schistacea* Sharpe USNM  
*Nigrita fusconota fusconota* Fraser USNM  
*Spermophaga ruficapilla ruficapilla* (Shelley)  
 USNM  
*Estrilda melanotis* (Temminck) FW  
*Estrilda paludicola paludicola* Heuglin USNM  
*Estrilda nonnula* Hartlaub FW  
*Estrilda astrild peasei* Shelley USNM  
*Estrilda bengala* (Linnaeus) FW  
*Lagonosticta senegala ruberrima* Reichenow USNM  
*Lagonosticta rubricata ugandae* Salvadori USNM  
*Lonchura cucullata cucullata* (Swainson) USNM  
*Lonchura bicolor stigmatophora* (Reichenow)  
 USNM

#### Annotated List of Species

##### *Circaetus fasciolatus* Kaup

In 1966, Forbes-Watson obtained six specimens of the Southern Banded Harrier Eagle in the Sokoke Forest as follows: one male and two females, 14–19 January and one male and two females, 19–22 July.

This Harrier Eagle occurs in the coastal forests of eastern Africa from Natal north to Kenya. Mackworth-Praed and Grant (1952) give the wing measurements of this species, based, presumably, on specimens collected from Natal to Tanzania, as ranging from 362 to 372 mm. Our specimens measure 345 to 354 mm. These figures reflect a steep cline in the wing length of this species, considering its rather limited geographical range in eastern Africa.

Birds taken in July were in fresh plumage and were considerably darker both above and below than worn birds taken in January. Both January and July females had the ovary slightly enlarged.

Zimmerman and Mumford (1965) record a specimen of the Southern Banded Harrier Eagle, collected by the former in the Sokoke Forest, 16 August 1963, as representing the first specimen of this species to be obtained in Kenya. There is, however, an earlier specimen in the collection of the Museum of Comparative Zoology, Harvard University, taken at Ngatana, Tana River, Kenya, on 13 June 1934, by A. Loveridge, for which there appears to be no published record.

##### *Fringilla jacksoni patriciae*, new subspecies

HOLOTYPE.—USNM 519109. Adult male, Sondhang, central Cherangani Mountains, altitude 10,600 feet, western Kenya. 20 May 1965. Collected by A. D. Forbes-Watson. Original no. 1483.

DIAGNOSIS.—Similar in general coloration to *Fringilla jacksoni jacksoni* Ogilvie-Grant, but differs in having the brown markings on the underparts paler and reduced to narrow, elongated, tear-shaped streaks surrounding the central shaft of each feather, tending toward an oval shape on the upper breast and becoming more elongated ventrally. The broad creamy white edgings are wider than the brown central streaks and occupy an area more than half the width of the feather from the shaft to the edge. This is in contrast to the narrow white edgings on the underparts of *F. j. jacksoni*, which occupy less than half the width of the feather. This new subspecies differs further from *F. j. jacksoni* in having the top of the head paler and more tawny, less brown, and in having the gray mantle of the upperparts paler and more extensive caudally. The lower abdomen and under tail-coverts are grayer, less brownish than typical *jacksoni*. The colors of the unfeathered parts are as follows: iris clear brown, eyelid orange red, bare patch behind eyes dull yellow, bill dark red, feet dark orange red, toes dusky, and spurs blackish.

In addition to the type, which has a wing measurement of 227 mm, two other males, collected on the same day, have the wing 230 and 233 mm. Each male has a single pair of spurs ranging in length from 9.5 to 15 mm. The type specimen has an additional pair of undeveloped spurs, indicated by swollen knobs on the upper rear of the tarso-metatarsus. Hall (1963:133) makes the comment that males of *jacksoni* usually have two spurs, although the upper one is poorly developed.

SPECIMENS EXAMINED (all in USNM collection).—*F.j. patriciae*: Cherangani Mountains, three males (including type). *F.j. jacksoni*: Aberdares Mountains, three males and three females; Mount Kenya, one female.

RANGE.—Restricted to the central Cherangani Mountains above 10,000 feet. The nominate race occurs on Mount Kenya, the Aberdares Mountains, Mau, and other suitably high areas of central Kenya in montane forests, bamboo, or grassy slopes, at alti-

tudes ranging from 7–10,000 feet.

This new subspecies is named in honor of Mrs. B.P. Hall, of the British Museum (Natural History), in recognition of her contribution to our knowledge of speciation in the Francolins.

### *Sarothrura elegans* (Smith)

This species is represented in the Forbes-Watson collection by a single immature female collected in the Kakamega Forest on 14 December 1965. As this appears to be the first specimen in juvenal plumage obtained by collectors, we give the following description: The upperparts are dark rufous brown, with occasional feathers of the scapulars having subterminal black bars spotted with tawny. On the secondary coverts, these tawny areas are broader and give the effect of bars. The primaries are black, with incomplete bars of pale creamy white on the outer webs. The tail and under tail coverts are black, barred with rufous. The breast is gray, suffused with rufous, there being some faint indication of barring along the sides. The rest of the underparts are grayish brown, with the center of the lower breast suffused with white and barred dusky. Unfortunately, the skin about the head and neck was eaten by ants before the specimen could be prepared.

MEASUREMENTS.—Wing 91, middle toe with claw 28, tarsus 25, and culmen 14 mm.

### \**Capella gallinago nigripennis* (Bonaparte)

Two adult males with testes enlarged were collected at Kimilili on the southeastern slopes of Mount Elgon on 24 June 1965.

Although White (1965) and most recent authors treat the African Snipe as a species distinct from its Palearctic congener, we believe that the proposal set forth by Meinertzhagen (1951) that *nigripennis* should be considered as a race of *Gallinago* [= *Capella*] *gallinago* is merited. In our view, many—perhaps most—of the Palearctic species which had been pushed south during the Glacial periods returned to their old homes after the retreat of the ice. With in some species, however, a residual population may have become well established in suitable areas of the

tropics and remained behind. From such a population as this, *nigripennis* presumably evolved. Meinertzhagen comments that regardless of the gap in their present distributional ranges, both the Palearctic and African populations originated from the same stock and should therefore be treated as geographical representatives of the same species.

### Geographical Variation in *Turtur chalcospilos* (Wagler)

After a careful study of sixty specimens of *Turtur chalcospilos* in the collection of the National Museum of Natural History, including one female from the Sokoke Forest and another male from the same locality, kindly loaned to us by the Los Angeles County Museum of Natural History, we have been able to discern certain trends and patterns in the geographical variation of this species which seem worthy of putting on record.

In eastern Africa, this species exhibits two clines in the coloration of the upperparts. One cline occurs along the coast from Somalia to South Africa and another inland from Ethiopia to Rhodesia. Birds resident along the coast become generally darker toward the south. The dark coastal population reaches its highest expression in southeastern Africa from Natal to the Cape. This is the area (Eastern Cape Province) from which Wagler described *Columba chalcospilos* and which now delimits the range of the nominate race. The name *zambesiensis* Roberts (Zimbiti, Beira District, Mozambique) has been resurrected by Lawson (1961) for the slightly paler birds occurring north of *T. c. chalcospilos*. The specimens which we have examined from the Sokoke Forest are closest to *zambesiensis* in coloration, although the wing measurements are slightly smaller (male 109, female 103 mm) than the averages of any of those given by Lawson for his series of *zambesiensis*, which he lists (in mm) as follows: male (10) 110.5–114.5 (112.4); female (10) 106.0–113.0 (109.0).

Lawson also mentions a specimen examined by him from Sokoke, Kenya, which had a small wing measurement (sex? 106 mm). He suggested that this might be interpreted as an extension of range of the short-winged west African race *erlangeri* eastward to the Kenya coast. We are inclined to believe that the short-winged Sokoke birds are a

\* For the use of the generic name *Capella*, see Wetmore (1958:125–127).

reflection of a size cline in the coastal population from southeast Africa northward along the coast to Somalia. Nine specimens which we consider to be identical to *zambesiensis* in the coloration of the upperparts, from coastal Mozambique, Tanzania, and Kenya, including two from the Sokoke Forest, have the following wing lengths: male (2) 105, 109 mm; female (7) 100–106 mm.

Two pale sandy specimens from Somalia (*T. c. patetus* Peters) have the wing 102 and 104 mm.

Birds taken in the interior of east Africa (including those taken immediately west of the coast) have the upperparts colored differently than those described above and exhibit a color cline that is the reverse of that shown by the coastal birds. From the dark population in Ethiopia, the series becomes progressively paler southward to Rhodesia and South-West Africa. This pale population of the semidesertic regions of southern Africa has been named *T. c. volkmanni* by Reichenow. The following data illustrate the difference in wing measurements (in mm) between this form (as given by Lawson) and twenty-four specimens in the collection of the National Museum of Natural History from interior Ethiopia, Kenya, and Tanzania. *T. c. volkmanni* (from National Museum of Natural History): male (13) 108–113 (109.6), female (11) 101–107 (105.5); *T. c. volkmanni* (from Lawson): male (11) 110.5–117.0 (113.2), female (3) 107–109 (108.3).

These figures indicate a general increase in wing length toward the south, and in this respect the clinal gradient is similar to that demonstrated for the coastal populations of eastern and southern Africa.

In those portions of west Africa where this species occurs, size and color differences are somewhat parallel to those occurring farther east in the interior of Africa. Here, the darker and smaller Angolan race *erlangeri* (wing 96–105 mm) is replaced immediately to the south by the western extension of the range of the larger and paler form *volkmanni* (wing 107–117 mm).

Thus we believe that the following generalizations may be made about the geographic variation of *Turtur chalcospilos* in Africa. There is a general increase in wing size from north to south for both interior and coastal populations. In the color of the upperparts, there are two clines running in opposite directions: coastal birds are darkest in the southern part of their range, while interior birds are darkest in the northern

part. To a certain extent, these color variations may be correlated with environment following Gloger's rule. The darkest populations occur in areas of increased humidity: i.e., the mountains of Ethiopia and the eastern and southern coasts. The palest birds occur in Somalia and on the periphery of the southwest African xeric regions. Populations that occur between these extremes of humidity and aridity are generally intermediate in color.

Although we have presented evidence that the inland populations reflect both color and size differences that are clinal in nature, the extensive range over which these birds occur may justify the reinstatement of certain subspecific names that have been proposed in the past. As mentioned above, the pale southern population is presently known as *volkmanni*. For the dark Ethiopian population the name *intensa* Mearns, type locality Howash River, Ethiopia, may be used. Birds from east-central Africa, which are intermediate in color, may be called *acanthina* Oberholser, type locality, Mount Kilimanjaro.

Although we have examined only two specimens from Somalia, they suggest to us that *T. c. patetus* Peters may be a valid race, as these birds appear to represent a pale, short-winged population bounded on the west by the dark, long-winged *intensa* and on the south by the dark, short-winged *zambesiensis*.

The short-winged Angolan form *erlangeri* should be retained, as it is demonstrably smaller than its neighboring races.

#### *Clamator jacobinus pica* (Hemprich and Ehrenberg)

White (1965) records this subspecies as breeding between March and August. A female collected on 9 December 1964, in the Sokoke Forest, had the ovary enlarged.

#### *Ceyx picta natalensis* (Smith)

Two male and three female Pigmy Kingfishers were collected in the Sokoke Forest on 18–24 July 1965.

These birds were not in breeding condition, so we are unable to determine whether they are residents of the Sokoke Forest or migrants from northeastern Tanzania. If resident, they extend the breeding range of *natalensis* northward to the Kenya coast.

*Ciccaba woodfordi sokokensis*, new subspecies

**HOLOTYPE.**—Adult male. USNM 519141. Sokoke Forest, near Kilifi, altitude about 200 feet, coastal Kenya. 22 July 1965. Collected by A. D. Forbes-Watson. Original no. 2043.

**DIAGNOSIS.**—Similar in size to *Ciccaba woodfordi nigricantior* (Sharpe) of central and east Africa, but paler in coloration both above and below. Compared with *nigricantior*, plumage coloration and markings of the Sokoke specimens may be described as follows: Feathers of the occiput and nape are more liberally sprinkled with white wedge-shaped markings. The pale bars of the primaries, secondaries, and tail tend to be pale Mummy Brown rather than pale Cinnamon Brown. Feathers of the upperparts are closest to Mummy Brown rather than Chestnut Brown, and the tips and bars of the feathers of the underparts, particularly those of the breast and sides, are edged and barred with Mummy Brown rather than with Cinnamon Brown as in *nigricantior*. (Capitalized color names are from Ridgway, 1912.)

The colors of the unfeathered parts are given on the label as follows: iris dark brown, bill pale creamy yellow, feet pale yellow.

**SPECIMENS EXAMINED** (all in USNM collection).—*C. w. sokokensis*: KENYA. Sokoke Forest, 2 males, 2 females. *C. w. nigricantior*: KENYA. Mount Kenya, 1 male; Tsavo, 1 male; Kiptogot Forest Station, Mount Elgon, 2 males; Taita Hills, 1 male; Mount Lololokui, 1 male; Voi, 1 female.

**STOMACH CONTENTS.**—Fragments of rodents, beetles, and crickets.

**WEIGHT.**—One female weighed 243 grams.

**DISTRIBUTION.**—Presently known only from the Sokoke Forest, coastal Kenya.

*Otus ireneae* Ripley

Mrs. Morden's Owlet, recently described by the senior author (Ripley 1966), has previously been known only from the unique type. Three males recently obtained in the Sokoke Forest by Forbes-Watson and another male collected by Dr. Purvis L. Martin for the Los Angeles County Museum provide additional data on this rare owlet.

Two of the specimens collected by Forbes-Watson are indistinguishable from the type in their tawny grayish-brown coloration, but the third specimen is

a clear bright rufous, both above and below, and has the belly and mantle sparsely sprinkled with small blackish spots.

The stomachs contained mostly fragments of medium-sized saltatorial Orthoptera, e.g., crickets, katydids, and a walkingstick. All of these insects are arboreal leaf-feeding types likely to occur in vegetation off the ground.

On a tape recording of the call of this owlet, Forbes-Watson provides the comment that the bird produces eight "toots" in five seconds, corresponding in pitch to B flat on the treble cleff.

Individual weights of three males were 46, 50, and 55 grams.

*Glaucidium perlatum licua* (Lichtenstein)

An adult male, collected at Naivasha, Rift Valley, altitude 6,400 feet, on 30 November 1965, is considerably paler and more umber above than are other specimens in the USNM collection and may represent the pale phase alluded to by Friedmann (1930), who considers this species to be dichromatic. The wing measured 107 mm.

*Glaucidium tephronotum elgonense* Granvik

This rare owl has been taken in scattered localities from Ghana to Mount Elgon. Each population has been found to be somewhat different from the other, and new names have been proposed in recognition of these differences. Although we have not seen the type of *elgonense*, a single female from the Kakamega Forest, collected on 22 March 1965, agrees rather well with Granvik's (1934) description of his bird from Mount Elgon, and we are referring our specimen from Kakamega, at least tentatively, to that subspecies. Measurements of our bird are as follows: wing 121, tail 85 (worn), culmen 12, and tarsus 25 mm.

This specimen appears to be only the second known example of *Glaucidium tephronotum* from Kenya.

*Bubo capensis mackinderi* Sharpe

An adult female with ovary enlarged, collected on Mount Elgon, 27 April 1965, agrees in the general markings of the underparts with a male from Mount



Kenya in the USNM collection. The Mount Elgon bird, however, has a somewhat more rufous wash across the breast and along the flanks than the Mount Kenya specimen. This color also pervades the feathering of the toes and under tail coverts, which are creamy white in the Mount Kenya bird.

The wing length of *mackinderi* is given by Mackworth-Praed and Grant (1952) as 369 to 410 mm. Our specimen from Mount Elgon has a somewhat longer wing (420 mm).

This appears to be the first record for this species from Mount Elgon.

#### *Caprimulgus pectoralis fervidus* Sharpe

A single female with ovaries containing large yolks was taken in the Sokoke Forest on 26 November 1964. This specimen marks an extension of the breeding range of this species from Tanzania north-eastward to coastal Kenya.

#### *Caprimulgus fossii fossii* Hartlaub

Our six birds from Mida Creek, Kilifi, and the Sokoke Forest, collected in January 1966, are somewhat different in color from *C. f. clarus* (Reichenow) of the Kenya interior. These specimens from coastal Kenya are indistinguishable from a series of nominate *fossii* from Gabon. On geographic grounds, this is a rather puzzling distributional arrangement and suggests the possibility that the views expressed by van Someren (1922) and Grant and Mackworth-Praed (1937) that *clarus* and *fossii* are specifically distinct may be merited, particularly in view of the fact that *fossii* and *clarus* have different call notes.

#### *Pogoniulus bilineatus* (Sundevall)

The Golden-rumped Tinker-Bird ranges widely over Africa south of the Sahara, and eight subspecies are presently recognized by White (1965). An examination of our series from the Sokoke Forest indicates that yet another subspecies may be recognized and the name we propose to call it is in the heading below.

#### *Pogoniulus bilineatus pallidus*, new subspecies

HOLOTYPE.—Adult male. USNM 519413. Collected on 4 December 1964, by A. D. Forbes-Watson in the Sokoke Forest, near Kilifi, altitude about 200 feet, coastal Kenya. Original no. 324.

DIAGNOSIS.—Similar to *P. b. fischeri* (Reichenow) of eastern Tanzania and southeastern Kenya in size and general appearance, but differing in having the white of the throat extending farther downward over the chest and in having the remainder of the underparts creamy white, suffused with pale yellow. Compared with two specimens of *fischeri* from the Muhaka Forest and one from Changamwe, which have yellow superciliary stripes, the Sokoke specimens have this character colored white. The yellow coloration on the outer edge of the secondaries, secondary coverts, and tertials is duller, less bright yellow, in *pallidus* than in *fischeri*.

SPECIMENS EXAMINED.—*P. b. pallidus*: KENYA. Sokoke Forest, one male, two females (both with ovaries enlarged). *P. b. fischeri*: KENYA. Muhaka Forest, one male, one female. CHANGAMWE. One male.

STOMACH CONTENTS.—Insect fragments.

WEIGHT.—Male, 11 grams. Females, 10.2, 11 grams.

DISTRIBUTION.—Presently known only from the Sokoke Forest, coastal Kenya.

#### *Indicator minor minor* Stephens

A large series of Lesser Honey-Guides were collected by Forbes-Watson from the following localities: One male, Sokoke Forest, near Kilifi, altitude about 200 feet, 28 November 1964; two males, Gogoni Forest, near Msambweni, 26, 28 December 1964; one female (ovary slightly enlarged), Giriama Point, Shimba Hills, near Kwale, 13 December 1964; one male, Ngangao Forest, Taita Hills, 21 August 1965; one male, Karen, near Nairobi, 8 January 1966; one male and one female (ovary enlarged), 12 June and 4 December 1965, Kakamega Forest Station.

The stomachs contained white wax and insect fragments, including black ants. One distended stomach contained fine hairlike threads and very fine insect fragments imbedded in wax. One male from the Gogoni Forest appears to be somewhat aberrant in plumage, having the throat finely spotted with dark olive and the belly faintly barred with dusky gray.

***Indicator conirostris conirostris* (Cassin)**

Two males, two females, and one juvenile female were collected in the Kakamega Forest on 6–14 June 1965. The underparts of the young bird are considerably darker and greener than are those of the adults; otherwise it appears to be in fully adult plumage although the tail is only partly grown. Forbes-Watson reports that this bird was taken from the nest hole of *Gymnobucco bonapartei cinereiceps*, where it was being fed by at least seven foster parents. The stomach contained fruit pulp (including figs) and fragments of green beetles. It had great deposits of fat on the throat, sides of chest, and abdomen. The young bird weighed 50 grams. The adults weighed 30–35 grams.

Dr. Herbert Friedmann informs us (personal communication) that although *Indicator conirostris conirostris* has been known to parasitize *Gymnobucco bonapartei bonapartei* in West Africa, it has not previously been reported to do so to *G. b. cinereiceps*.

***Pitta angolensis longipennis* Reichenow**

The African Pitta has not previously been found to breed in Kenya. It is therefore noteworthy that two females, collected in the Sokoke Forest on 19 and 25 July 1965, had enlarged ovaries.

***Calandrella cinerea longipennis* (Eversmann)**

One specimen of this Palearctic migrant was collected on the airstrip at Ukundu on 19 December 1964. The wing measured 99 mm.

Forbes-Watson informs us (personal communication) that this appears to be the second known specimen from Kenya.

***Chlorocichla flaviventris mombasae* Shelley**

Our series of Yellow-bellied Greenbuls from coastal Kenya are represented by the following specimens: One male and five females, Sokoke Forest, 24–29 November 1964; four males and five females, Sokoke Forest, 1–8 December 1964; three males and one female, Gogoni Forest, 26–28 December 1964; one male and two females, Buda Forest, 21 December 1964; one male, Sokoke Forest, 25 July 1965.

Recent authors (Rand 1958, White 1962) have

called the birds from the Kenya coast *Chlorocichla flaviventris centralis*, based on *Chlorocichla centralis* Reichenow, 1887, with type locality Loeru, Tanzania. Although we have not seen examples of *centralis* from Loeru, we have examined near-topotypical material from Iringa, Dodoma, and Lake Manyera, east-central Tanzania. Besides the Sokoke specimens, coastal birds are represented in our series by examples from Dar-es-Salaam and Pugu Hills, Tanzania. A careful examination of these specimens reveals that our specimens from the coast are considerably darker above (more brownish, less olive) than are specimens from the interior (*centralis*), and we recommend that the name *mombasae* be applied to the coastal population from the Sokoke Forest, Kenya, to the Pugu Hills, Tanzania. By this action, the race *centralis* is restricted to an area extending from the foothills of Mount Kenya southward to east-central Tanzania. Racial allocation of coastal birds north of the Sokoke Forest (to Jubaland) and south of the Pugu Hills (to northern Mozambique) remains to be determined.

***Andropadus importunus subalaris* Reichenow**

The Sombre Greenbul was collected by Forbes-Watson in several localities as follows: Two adult males, Kilifi, 30 January 1966; two adult females, Kilifi, 25, 26 January 1966; one adult unsexed, Sokoke Forest, 26 January 1966; three immature males, Kilifi, 25–30 January 1966; one immature female, Kilifi, 27 January 1966.

These birds were compared with four adult specimens of *A. i. insularis* from Dar-es-Salaam, Tanzania. The Sokoke and Kilifi birds are decidedly paler, less bright yellow below than are those from the Tanzanian coast. We believe, therefore, that the name *subalaris* (type locality Malindi) should continue to be used for the birds from the Kenyan coast rather than lumped with *insularis* Hartlaub (type locality Zanzibar) as proposed by White (1962).

**The Yellow Eye-ring as a Subspecific Character in Differentiating the Races of *Andropadus importunus***

In addition to the four specimens of *Andropadus importunus insularis* from Dar-es-Salaam mentioned in the previous account, six other specimens in the Yale Peabody Museum collection from Same, Pugu

Hills, and the Uluguru Mountains, Tanzania, are supplied with data regarding age and eye color. Birds marked "imm." have brown irides and a yellow eye ring. Adults lack the eye rings and have white irides. From these data, it seems evident that the yellow eye ring is an age character and not a racial one, and that this character can no longer be used to separate *A. i. fricki* Mearns and *A. i. kitungensis* Mearns from the coastal races of *Andropadus importunus*. It appears then that yellow eye rings are associated with immaturity in at least four of the races of *Andropadus importunus*. These are *A. i. fricki*, *kitungensis*, *subalaris*, and *insularis*. We have seen no material which would allow us to make this judgment for the more southerly races *oleaginus* or *hypoxanthus*. In series, immature birds of the four northern races may be separated from adults by their yellow eye rings, brown irides, pale lower mandibles, and dark upperparts. Adults have the eye ring absent, white irides, black lower mandibles, and paler upperparts. As might be expected, immature birds usually have smaller measurements, and occasionally exhibit pale buffy tips to the middle secondary coverts. Females of both age groups are occasionally, but not invariably, darker above than males.

Although we can no longer consider the yellow eye ring as a useful tool in separating the races of *A. importunus*, other criteria suggest that Mearns' two races may be valid. *A. i. kitungensis* is at once separable from the coastal form *subalaris* by larger measurements and by its darker and more ochraceous underparts. The problem is more difficult in separating *kitungensis* from *fricki*. The latter is represented only by the unique type, and the wing measurement of 87 mm may not reflect the average wing measurement for males of the mountain population, as it is an immature bird. This leaves the question of color as the only basis for separation. When compared with an immature specimen of *kitungensis*, the type of *fricki* is found to be considerably darker above. It seems, then, that *fricki* should be maintained, although based on slim evidence, at least until adult specimens can be obtained to settle the matter once and for all.

An adult male and an immature female from Morogoro, Tanzania, in the Yale Peabody collection, have large measurements and suggest that the race *kitungensis* may extend from the south-central interior of Kenya to the northern interior of Tanzania.

The following measurements are given for comparison:

*Andropadus importunus fricki* (type). Male imm.: Wing 86; tail 7.5; culmen 15 mm.

*Andropadus importunus kitungensis*. Male ad. (2, including type): Wing 93, 95; tail 83, 85; culmen 15, 15.5. Male imm.: Wing 92; tail 83; culmen 14.5. Female ad.: Wing 87; tail 78.5; culmen 15.5 mm.

#### *Andropodus virens holochlorus* (van Someren)

Seven males and two females collected in March, June, and December 1965, in the Kakamega Forest, represent an extension of the range of this subspecies from Uganda into western Kenya.

#### *Muscicapa lendu lendu* $\cong$ *itombwensis*

From the Kakamega Forest, Forbes-Watson collected one male and two females on 18–19 March, and a female with ovary enlarged on 2 June 1965.

These specimens and one collected by Forbes-Watson in 1963 for the National Museum, Nairobi, are the first records of this species for Kenya.

We are indebted to Mr. Stuart Keith and Dr. Charles Vaurie for their following comments on the four specimens which we sent to them for examination:

Together with Dr. Vaurie I have compared them with the type of *lendu* and with a specimen of *itombwensis* which Prigogine sent us. With regard to the wing formula they are almost identical to *lendu*. As to bill size they are intermediate between *lendu* and *itombwensis*. One specimen is quite close to *itombwensis*, the bills of the others are a little closer to *lendu*. With regard to color, your four birds vary as much within themselves as do *lendu* and *itombwensis*, so we do not think color is a useful criterion on this species.

Taking the above into consideration, I now think it more useful to regard *lendu* and *itombwensis* as conspecific in spite of my remarks in the enclosed paper (Keith and Twomey 1968:542–543).

#### *Muscicapa caerulescens brevicauda* Ogilvie-Grant

Four females collected in March and June in the Kakamega Forest have the small wing (68–72 mm) and the dark upperparts of *brevicauda* and apparently represent the Kenyan population west of the Rift, which is not explicitly stated in White (1963).

*Ficedula hypoleuca hypoleuca* (Pallas)

A single young male was taken in the Kakamega Forest on 8 December 1965. This appears to be the first record for Kenya for this rare straggler from Europe. The brown coloration of the upperparts (versus gray), the lack of white bases to the feathers of the hindneck, and the wing formula (fifth primary longer than the second) separate it from the allied and hardly distinguishable White Collared Flycatcher (*Ficedula albicollis*), in which the reverse is the case. The bird weighed 12 grams.

*Platysteira concreta graueri* (Hartert)

White (1963) says: "Recorded from Kakamega in west Kenya where perhaps now extirpated." The single female collected by Forbes-Watson in the Kakamega Forest in December 1965 indicates that a small population, at least, still exists in that area.

*Turdus fischeri fischeri* Hellmayr

Specimens of this race from the coastal forests of southeastern Kenya have not been collected since the original series was taken by Fischer before 1885, all of which were destroyed in World War II. In their account of *T. f. fischeri*, Mackworth-Praed and Grant (1955) say "probably now extinct." Although there have been several sight records since 1885, the status of this race was not confirmed until 1964, when Twomey collected a specimen in the Sokoke Forest. Subsequently, Forbes-Watson collected four additional specimens, one in 1965 (now in the USNM collection) and three others in 1966, which are in the National Museum, Nairobi. Mr. C. W. Benson has kindly compared these birds with ten specimens of *T. f. natalicus* and *T. f. belcheri*, and the results of his findings are incorporated in a recent paper on east African birds by Keith and Twomey (1968).

*Neocossyphus poensis praepectoralis* Jackson

This West African species has been recorded as far east as western Uganda. The following specimens from the Kakamega Forest represent an extension of its range into western Kenya, its previous easternmost locality having been the Malabigambo Forest, Buddu County, Uganda (Friedmann and Williams

1969): One male, 13 March 1965; two males and one female, 6–9 June 1965; one female, 12 December 1965.

*Phylloscopus trochilus trochilus* (Linnaeus)*Phylloscopus trochilus acredula* (Linnaeus)*Phylloscopus collybita abietinus* (Nilsson)*Phylloscopus sibilatrix* (Bechstein)

Seven specimens of wintering *Phylloscopi* from the Palaearctic regions, representing three species, were taken in the Kakamega Forest in March and December 1965. With the exception of *P. t. trochilus*, which is a common winter visitor throughout east Africa, the remaining forms are difficult to observe and are represented by only a few specimens from Kenya. All stomachs contained insects. The following weights are recorded. *P. t. trochilus*: 3 females, 7, 8, 9; *P. t. acredula*: 2 females, 7, 8; *P. collybita*: 1 female, 7; *P. sibilatrix*: 1 male, 7 grams.

*Phylloscopus budongoensis* (Seth-Smith)

This species has been known from only a few specimens from west Kenya. In 1965, Forbes-Watson obtained 5 males and 2 females in March, and in June he obtained 2 males and 1 juvenile bird in the Kakamega Forest. The young bird has the upperparts more brownish green than the adults and has the throat and chest washed with greenish yellow. The iris is gray, compared with brown as noted for the older birds.

Weights for both males and females ranged from 7 to 10 grams. The young bird weighed 8 grams. All stomachs contained insect fragments.

*Psalidoprocne pristopectera holomelaena* (Sundevall)

Two males and two females collected in the Sokoke Forest on 1 December 1964 have the small wing measurements (95–106 mm) of the Mozambique race *holomelaena*. Since they are not in breeding condition, it is impossible to determine whether they are migrants from the southeastern coast or residents of the Sokoke Forest.

*Nectarinia bouvieri* (Shelley)

From the Kakamega Forest, Forbes-Watson collected seven males and two females in December 1965. The females had the ovaries enlarged. These specimens represent an extension of the range of the Orange-tufted Sunbird from southern Uganda into western Kenya.

*Nectarinia chloropygia orphogaster* (Reichenow)

A male collected on 12 June 1965 and two others taken 6 and 13 December 1965, in the Kakamega, are the first examples of the species taken in Kenya.

*Ploceus golandi* (Clarke)

The type of the Black-headed Weaver described in 1913 from the Sokoke Forest remained unique until it was rediscovered there in 1955. Further collecting provided several more specimens in 1958 (Clancey and Williams 1959). To these records may be added five males collected by Forbes-Watson between 22 and 25 November 1964. The birds weighed 24–26 grams.

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## Appendix

### The Status of the Sokoke and Kakamega Forests, Kenya

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National Museum, Nairobi, Kenya.

From the zoological point of view, the Sokoke and Kakamega forests are undoubtedly the most important in Kenya at the present time. Unfortunately, both are being reduced at an alarming rate, and unless something drastic is done very soon, Kenya may lose two of her greatest scientific assets.

#### Zoogeographic Importance

The Sokoke Forest is the northernmost block of the eastern coastal forests which extend southward to South Africa, but it is slightly different faunistically from the rest of these forests. The Kakamega Forest is the only remaining patch in Kenya of what was presumably a greater extent of West African type lowland forest. Thus, the Sokoke Forest is probably unique, whereas the Kakamega Forest is only unique so far as Kenya is concerned. Destruction of other forests in Kenya, however deplorable, would not exterminate a particular type of forest with its associated fauna, as they would survive elsewhere, but destruction of the Sokoke and Kakamega forests would be a total and irrevocable loss to the country.

Although far less separated from the nearest similar forests than is Kakamega, the Sokoke Forest (also called the Arabuko-Sokoke Forest) has a fauna far more distinct than might be suspected. There are two endemic species of birds (the recently discovered owl *Otus ireneae* and the weaver *Ploceus golandi*) and two of mammals (the elephant shrew *Rhynchocyon chrysophygus* and the antelope *Cephalophus adersi*). Although the avifauna is impoverished when compared with western forests, there is a tenuous link with them (Carcasson 1964: 136, Moreau 1966: 166–168), which makes it a particularly rewarding

locality for the study of zoogeographic relationships and the past history of Africa. Both the endemic birds are thought to have their nearest relatives in the western forests, and have been tentatively treated as members of the same superspecies, with *Otus icterorhynchus* and *Ploceus weynsi* respectively (Ripley 1966, Hall and Moreau 1970: Map 334).

The Kakamega Forest is generally considered to be the easternmost outlier of the great equatorial lowland forest belt which stretches almost right across Africa (Carcasson 1964: 136, Lucas 1968: 158). The affinities of the forest birds lie with the West African lowland avifauna, and many are found nowhere else in Kenya. Although now a small isolated relict, its connection with similar forests to the west must have been very recent, as there is no endemism recognized in birds, even at the subspecific level. Three species (a turaco *Corythaeola cristata*, a bee-eater *Merops muelleri*, and a flycatcher *Platysteira concreta*) were once considered to have endemic races, but these are no longer generally recognized as differing from the Uganda forms.

#### Exploitation

In the past, fairly extensive logging for commercial timbers was practiced in Kakamega. This has now virtually stopped—besides, the logging had relatively little effect on the forest. The Forest Department is now deforesting parts of the indigenous areas, which will be made into softwood plantations for the proposed pulpmill to be established not far away at Broderick Falls. Indigenous commercial hardwoods are also being planted, but as cultivated plantations, so that much of the natural forest is being lost.

The danger lies in the future, when much of the area might still be "forested," but solely with plantations. Similarly, timber exploitation in the Sokoke Forest has now ceased, apparently because the two indigenous species of commercial importance—*Brachylaena hutchinsii* and *Manilkara sansibariensis*—are now not present in sufficient numbers to be an economic proposition (Moomaw 1960: 28; K. Hansen and R.B. Faden, personal communication). As in Kakamega, this commercial logging has had little effect on the forest as a whole. Again, however, the Forest Department is cutting out natural forest and replacing it with softwood (conifer) plantations. A further drain on the indigenous forest is the gathering of firewood for the requirements of the forest station. In 1970 I encountered woodcutting gangs at least five miles from the station, who said that they had already collected all the dead wood nearer at hand. The effects on the fauna are incalculable, especially on insects, but also on such hole-nesting birds as barbets (Capitonidae) and woodpeckers (Picidae), which utilize dead trees.

### Population Pressures

Human population pressures on the periphery of both forests have been very heavy in the past, and the forest edges now generally abut onto cultivation very abruptly, with no intermediate zone—this is particularly noticeable at Kakamega. Without this natural buffer, the risk of fire damage to the forest near the edge is obvious. The Kakamega Forest has undoubtedly been much reduced by man, but probably not nearly to such an extent as has Sokoke. *About half of the Sokoke Forest has been destroyed by man in the last ten years.* This is because the Forest Department never protected the southern portion, as it was privately owned. After Independence, squatters moved into this part of the untouched forest, which had never been "improved" by the owners, and cleared it for the planting of maize and cashews, but with the poor soil and lack of water they can only expect a subminimal subsistence on the former and a hypothetical return on the latter. *All the areas in which I collected in the Sokoke for the Smithsonian in 1964–1966 are now no longer forest, but desolate areas of sandy soil and straggly crops.*

### Forest Department Policy

On the other hand, both forests are protected within their present limits by the Forest Department. As has been seen, however, this is a dubious protection as the Forest Department policy seems to consider forests on their "economic" merits alone, which means that their natural assets have to be related in terms of hard cash. Despite the Department's avowed intention to preserve forest areas, it seems immaterial whether they are plantations or the natural primeval forest. Unfortunately, as is so often the case, the former seems to take precedence. In the case of the Sokoke, even this protection may be removed if the idea of settling landless Africans there materializes (apparently this has already been suggested). This unique habitat would then be surely doomed.

### Future Protection

What, then, can be done to preserve these two areas? Both were discussed at a symposium on conservation of vegetation in Africa south of the Sahara in Uppsala in September 1966, the proceedings of which were edited by I. and O. Hedberg (for Kenya, see Lucas 1968). Both were included in "proposed areas for protection by National Park status."

Lucas says of the Kakamega Forest: "The population pressure in this region is particularly severe but the need for this remarkable forest to be conserved in its entirety so that it may remain a viable unit is of prime importance for the future understanding of plant populations in Kenya and even Africa as a whole." It was suggested that the recently created Marine Park at Watamu might be an ideal base from which to include the natural vegetation of the Sokoke Forest under National Park protection. The forest is basically of two kinds: "a lowland evergreen dry forest, dominated by *Cynometra webberi*, *Manilkara sulcata* and *Brachylaena hutchinsii*" (Lucas 1968: 157) on the reddish Magarini sand of the Pliocene, and *Brachystegia/Afzelia* woodland on the white sand of the Pleistocene. Lucas would also like to include the "poor and rather patchy rain forest dominated by *Sterculia* and *Chlorophora*" adjacent to the nearby Mida Creek, and also to include the mangrove swamps bordering Mida Creek.

Dr. Kai Curry-Lindahl, the well-known conserva-



tionist, tells me that both forests must have strict total protection, preferably and ideally as national parks. If this status is unobtainable for the whole of each area, then at least a central part should be made a national park, with a surrounding area of reserve, followed by a peripheral area controlled by the Forest Department. A botanical survey should be instigated to ensure that adequate areas of the habitat in each are fully protected. He is doing all in his power to encourage the Kenya government to legislate for the complete protection of both localities.

Although much depleted, there is still sufficient forest left in both areas to ensure the survival of the

habitat and the associated fauna—there are no known extinctions in either area as yet. It must be repeated, however, that unless something is done very soon both areas may be lost completely.

#### Acknowledgments

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*Copy* must be typewritten, double-spaced, on one side of standard white bond paper, with 1½" top and left margins, submitted in ribbon copy with a carbon or duplicate, and accompanied by the original artwork. Duplicate copies of all material, including illustrations, should be retained by the author. There may be several paragraphs to a page, but each page should begin with a new paragraph. Number consecutively all pages, including title page, abstract, text, literature cited, legends, and tables. The minimum length is 30 pages, including typescript and illustrations.

The *title* should be complete and clear for easy indexing by abstracting services. Taxonomic titles will carry a final line indicating the higher categories to which the taxon is referable: "(Hymenoptera: Sphecidae)." Include an *abstract* as an introductory part of the text. Identify the *author* on the first page of text with an unnumbered footnote that includes his professional mailing address. A *table of contents* is optional. An *index*, if required, may be supplied by the author when he returns page proof.

Two *headings* are used: (1) text heads (boldface in print) for major sections and chapters and (2) paragraph sideheads (caps and small caps in print) for subdivisions. Further headings may be worked out with the editor.

In *taxonomic keys*, number only the first item of each couplet; if there is only one couplet, omit the number. For easy reference, number also the taxa and their corresponding headings throughout the text; do not incorporate page references in the key.

In *synonymy*, use the short form (taxon, author, date:page) with a full reference at the end of the paper under "Literature Cited." Begin each taxon at the left margin with subsequent lines indented about three spaces. Within an entry, use a period-dash (.—) to separate each reference. Enclose with square brackets any annotation in, or at the end of, the entry. For *references within the text*, use the author-date system: "(Jones 1910)" and "Jones (1910)." If the reference is expanded, abbreviate the data: "Jones (1910:122, pl. 20: fig. 1)."

Simple *tabulations* in the text (e.g., columns of data) may carry headings or not, but they should not contain rules. Formal *tables* must be submitted as pages separate from the text, and each table, no matter how large, should be pasted up as a single sheet of copy.

Use the *metric system* instead of, or in addition to, the English system.

*Illustrations* (line drawings, maps, photographs, shaded drawings) can be intermixed throughout the printed text. They will be termed *Figures* and should be numbered consecutively; however, if a group of figures is treated as a single figure, the components should be indicated by lowercase italic letters on the illustration, in the legend, and in text references: "Figure 9b." If illustrations (usually tone photographs) are printed separately from the text as full pages on a different stock of paper, they will be termed *Plates*, and individual components should be lettered (Plate 9b) but may be numbered (Plate 9: figure 2). Never combine the numbering system of text illustrations with that of plate illustrations. Submit all legends on pages separate from the text and not attached to the artwork. An instruction booklet for the preparation of illustrations is available from the Press on request.

In the *bibliography* (usually called "Literature Cited"), spell out book, journal, and article titles, using initial caps with all words except minor terms such as "and, of, the." For capitalization of titles in foreign languages, follow the national practice of each language. Underscore (for italics) book and journal titles. Use the colon-parentheses system for volume, number, and page citations: "10(2):5-9." Spell out such words as "figures," "plates," "pages."

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