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MAMMALS OF THE ANGLO-EGYPTIAN SUDAN[1]

By Henry W. Setzer

Introduction

The discovery of factors of medical importance in mammals of the southern Anglo-Egyptian Sudan prompted this study of their taxonomy, distribution, and zoogeography.

The mammalian hosts obtained on a preliminary investigation in 1948 and subsequent studies in 1949–1950 form the basis of the present report. The material was obtained by personnel of U. S. Naval Medical Research Unit Number Three, and it currently bears Chicago Natural History Museum catalog numbers. This collection is to be divided equally between the Chicago Museum and the United States National Museum. Thus, unless otherwise indicated, specimens from localities bearing no museum abbreviation in the "specimens examined" sections of the accounts of species are in the above collection. Specimens from localities such as Bor, Gondokoro, Khartoum, Lake No, and Mongalla, which bear no museum designation, are in the U. S. National Museum from previous African explorations. Locali-

[1] This paper is based upon studies of the material collected by U. S. Naval Medical Research Unit Number Three. The author is a collaborator with this research group.

ties indicated by italics were either not to be found on any maps available, or would overlap locality dots on the distribution maps. Abbreviations designating other collections examined are: AMNH, American Museum of Natural History; BM, British Museum (Natural History); and MCZ, Museum of Comparative Zoology at Harvard College

Unless otherwise stated, all measurements are in millimeters and the capitalized color terms are from Ridgway, "Color Standards and Color Nomenclature," 1912. It will be noted that in some accounts total length is used and in others length of head and body. This has been dictated by the type of measurement recorded by the collector on the original label. No effort has been made to translate the total length into length of head and body and tail length, since it is probable that the two measurements would not be comparable.

I would like to express my sincere thanks to the many individuals who have aided in the preparation of this report; especially to the members of the Mammal Room of the British Museum and to Dr. H. W. Parker, its head keeper who so kindly allowed me to incorporate specimen records and to describe new forms in the mammal collection; to Miss Barbara Lawrence of the Museum of Comparative Zoology at Harvard for the privilege of describing new material in that collection; to Colin Campbell Sanborn and the officials of the Chicago Natural History Museum for making their Sudan collection available for study and for the privilege of describing new kinds; to the Office of Research, Medical Department, United States Navy, and to Naval Medical Research Unit Number Three, who made possible the collecting of the material and furnished transportation to England so that I might be able to study the material housed at the British Museum (Natural History); to the director of the United States National Museum and to my associates in the division of mammals who have aided in many ways, to Mrs. Aime Awl, staff artist of the department of zoology who so kindly prepared the maps, and to Mrs. Helen Gaylord who has typed the manuscript through its many drafts.

The Anglo-Egyptian Sudan lies roughly between 3° and 22° north latitude and between 23° and 37° east longitude. Its geographic boundaries encompass approximately 967,500 square miles of territory having quite diverse topography. Almost the entire northern half of the country is extreme desert, while the southern half is predominantly savanna interspersed with isolated mountain masses such as the Jebel Marra, the Nuba Mountains, Mount Baginzi, and the Imatong, Didinga, and Dongotona Mountains in the southeast.

The most conspicuous topographic feature of the Sudan is the Nile River with its tributaries—the Atbara, the Blue Nile, the Sobat, and the White Nile, each with a complex drainage system. In general, the

mammals of the Sudan are not limited in their distribution by the Nile. This is particularly so in the White Nile drainage where vast areas of sudd occur. The formation of sudd dams across channels allows for free interchange of mammal populations from bank to bank in certain areas in the south. The extent to which the Nile serves as a barrier in its more northern reaches is not clearly demonstrable since collections from either bank are not known north of Khartoum. From the scanty evidence available, it does seem that the Nile serves as a barrier to certain kinds of mammals in the more northern reaches but to a less appreciable degree in the south.

Africa has been divided into major biotic districts based on the distribution of plants and birds by Chapin (1932). Some of these districts, in the Sudan, do not seem to correspond to mammal distribution at any taxonomic level. The mammals of the Sudanese Arid District and the Sudanese Savanna District appear to be alike. Only the genus *Galago* seems to have a distribution that fits the general outlines of the Sudanese Savanna District, but this genus occurs also in areas that are referred to the Abyssinian Highland District. The geographic area assigned to the Ubangi-Uelle Savanna District appears to be too large, since no elements of this district have been found east of the Nile. The Abyssinian Highland District does not appear to be represented in the Sudan to any degree. The only element which possibly could be assigned to this district is *Praomys albipes*, whose main range is in the highland area of Ethiopia. The Somali Arid District was thought by Chapin to include the northeastern portion of the Sudan (bounded by Eritrea and the Red Sea) and the portion in the extreme southeast. The former area is probably correctly included in the Somali Arid District since the maned rat *Lophiomys* and the small dik-dik *Rhynchotragus* are found there. No mammals characteristic of the Somali Arid District have been found in the southeastern area, which may be included more properly in the East African Highland District. Otherwise, the bounds assigned by Chapin to the East African Highland District in the Sudan are satisfactory from the point of view of mammalian distribution, since the affinities of most of the mammals of this area are with those of Kenya Colony and East Africa.

In certain areas mammals do not conform as well to the biotic districts of Chapin as do birds. The mammalian fauna of the Sudan is rather homogeneous and the major portion of the country may be assigned to what I would call the Sudanese Arid Savanna District. The remaining parts of the sudan have mammalian faunas which show some affinity to faunas of the Somali Arid District, the Ubangi-Uelle Savanna District, and the East African Highland District. The area lying along the Ethiopian border is somewhat distinct bo-

tanically but its mammals are poorly known. On the basis of the scant data that is available it seems unlikely that this area can be referred to the Abyssinian Highland District.

Certain areas of endemism are demonstrable. Perhaps the most striking is the Jebel Marra in Darfur Province where a large proportion of the resident mammals have differentiated at least subspecifically. Other places such as Mount Baginzi, the Nuba Mountains, and the Imatong Mountains also show a rather high degree of endemism. The mammalian fauna of the last-named region (with its

FIGURE 1.—Principal collecting localities in the Anglo-Egyptian Sudan. (Scale: 1 inch=250 miles.)

companion ranges, the Dongotonas and the Didingas) has a close affinity with the East African fauna but shows a high degree of *in situ* development. These mountain ranges of the southeastern Sudan need much further field work in order to evaluate properly their zoogeographic status and the degree of isolation of their faunas from those of East Africa and from each other. Of the three, only the Imatong Range is adequately represented by specimens. It is interesting that the mammals showing the greatest differentiation are those whose normal habitat is in a forest environment. In these mountains, the forest has become isolated from adjacent forested areas by large regions of arid savanna. This isolation is apparently the result of the dessication of central Africa after the last Pleistocene Pluvial period. Worthington (1937, p. 316) with regard to the great lakes of Africa and their fish faunas, says:

> It is yet premature to date the earlier changes involved—the time at which the main rivers of Africa became set in their courses, the formation of the rift valleys, the depression of the Lake Victoria basin, and the reversal of many of the rivers of Uganda. But the later changes, including the dessication of Lake Edward and probably of Lake Victoria can now be dated within reasonably certain limits by correlation with climatic change during the Pleistocene in other parts of Africa and with the glacial and inter-glacial periods in the northern hemisphere. The exact correlation of the individual pluvial and interpluvial periods is not yet fixed, but in general terms the climatic changes which were taking place soon after the beginning of the Pleistocene were responsible both for the glaciations in the north and the pluvials on the equator.
>
> In Europe well-known studies have led to the enumeration or estimation of the number of years since the ice receded from such localities as Stockholm or from certain lakes in Switzerland, and figures of the order of 9,000 to 14,000 years have resulted. If we take the last pluvial of Africa to have finished at about the same time as the last glacial in Europe and apply these figures, we conclude that Lake Rudolf was cut off from its connection with the Nile, say 12,000 years ago, and in that comparatively short time the fish isolated in that lake have changed into the endemic species and subspecies referred to above. Somewhat before this, say between 15,000 and 20,000 years ago, the plateau lakes at the main source of the Nile were dried up, and since they were refilled, adaptive radiation up to the present day has given rise in Lakes Edward and George to eighteen endemic species of Cichlid fish and four of non-Cichlids, and in Lakes Victoria and Kioga, with their more diverse environments and partial isolation from each other, to fifty-eight endemic Cichlids and twenty-seven non-Cichlids. The vast assortment of unique forms in Lake Nyasa and Lake Tanganyika has naturally taken much longer, and to date and understand these we must await the result of future geological and biological studies.

In substantiation of the dating of the end of the Pluvial in central Africa, a corollary may be drawn from the pocket gophers (*Thomomys*) of the Salt Lake Valley and environs in North America. In attempting to determine the time level at which habitat became available for pocket gophers, Durrant (1952, p. 497) says: "The Postpluvial, the last period of Lake Bonneville, has endured from the second

Provo Pluvial until the present. It is thought to be approximately 12,000 years in duration." Thus, in this period of about 12,000 years, differentiation has occurred in the pocket gophers to form the complex distributional pattern of subspecies known today. During a similar interval of time, the mountain forests of central Africa, together with their mammalian faunas, have been isolated by the encroachment of arid savannas. The distinction between the Salt Lake Valley and the isolated mountains of the Sudan is that the former was invaded, then isolated, whereas the latter is a relict of a former widespread habitat now isolated. In both cases, however, differentiation has progressed to the point where pronounced distinctions are evident.

The present report recognizes 91 genera and 224 species and subspecies of mammals other than bats. Of the 224 kinds known from the Sudan, 39.5 percent have been described from localities outside its present geographic boundaries. Of the remaining 60.5 percent, described from within the boundaries of the Sudan, 11 percent have been described from the Imatong Mountains and environs, 8.6 percent from the Jebel Marra and environs, 4.5 percent from the Nuba Mountains area, and the remaining 36.4 percent from many other localities.

It is apparent that the Sudan has been populated by a mammal fauna coming from several directions. The period which apparently has had the most effect on the distribution of present-day mammals is the time immediately after the last Pleistocene Pluvial and up to the present. Most of the mammals occurring in the Sudan today apparently have invaded from the south. Characteristic genera which may be noted in this category are: aard vaark (*Orycteropus*), swamp rats (*Otomys*), tree mice (*Dendromus*), giant rats (*Cricetomys*), multimammate mice (*Mastomys*), mole rats (*Cryptomys*), cane rats (*Thryonomys*), and elephant (*Loxodonta*).

Mammals which apparently have derived from a northern palaearctic stock and which reach the southernmost limits of their distribution are: gerbils (subgenus *Dipodillus*), sand rats (*Psammomys*), jerboas (*Jaculus*), and the ibex (*Capra*).

Two West African genera which reach an eastern limit of distribution in the Sudan are African striped squirrels (*Tamiscus*) and red-legged ground squirrel (*Euxerus*).

The grass hare (*Poelagus*) appears to be found only in the southern Sudan and extreme northern Uganda. This is apparently the only genus endemic to the region. Another genus (*Desmodilliscus*) is found only in northern Nigeria and the central Sudan; its origin is not determinable at this time.

As may be noted in the following accounts, there are vast gaps in the distributional patterns of practically every species. It is recognized that this report is at best only preliminary and that many of the kinds treated here as species will probably be shown in the future to be related as subspecies. It is hoped, though, that this work will find its way into the hands of interested amateurs and professional zoologists and epidemiologists who will have the opportunity to fill in some of the annoying gaps in the distributional patterns. Much field work remains to be done in the Sudan in order to understand more completely the effects of isolation and the barrier effect of the Nile if such exists.

Order INSECTIVORA

Family Erinaceidae

***Atelerix pruneri lowei*, new subspecies**

Figure 2,*a*

Type: BM No. 23.1.1.35, adult male, skin and skull, from Umm Keddada, Darfur Province, Anglo-Egyptian Sudan. Obtained March 15, 1922, by Lynes and Lowe, original No. 1159.

Specimens Examined: Four, all in BM, from: Umm Keddada, 2; 32 miles east of El Fasher, 1 (skull only); El Obeid, Kordofan Province, 1 (skull only).

Diagnosis: A small extremely pale hedgehog in which the white subterminal band of the spine is broad and the terminal black band is minute. Entire underparts, brow band, hands, and feet white. Skull small, zygomatic arches not widely flaring, interorbital region relatively narrow, postpalatal ridge well developed, mesopterygoid region relatively narrow, upper molars relatively large.

Measurements of the Type Specimen: Length of head and body 167; length of tail 16; length of hind foot 25; length of ear 26; condylobasal length of skull 37.4; length of palate 21.4; width of rostrum at level of antorbital foramen 9.6; length of nasals 14.1; least postorbital width 9.9; width across zygomatic arches 23.6.

Comparisons: From *Atelerix pruneri pruneri* as known by a specimen from Singa, Blue Nile, *A. p. lowei* differs in markedly lighter color and a smaller skull in all measurements taken.

From *A. p. oweni*, *A. p. lowei* may be distinguished by its markedly lighter color and smaller skull in all measurements taken.

Remarks: This small hedgehog bears out the pale coloration of most of the other mammals obtained by Lynes and Lowe at lower elevations in Darfur and Kordofan. The extreme amount of white on the spines and the narrowness of the black bands create a strikingly light colored animal.

The type specimen was trapped in a hedgerow of "guffle."

Atelerix pruneri oweni (Setzer)

FIGURE 2,*a*

Erinaceus (*Atelerix*) *pruneri oweni* Setzer, Journ. Washington Acad. Sci., vol. 43, No. 7, p. 237. July 23, 1953. (Torit, Anglo-Egyptian Sudan.)

SPECIMENS EXAMINED: Nineteen, from: Torit, 9 (2, MCZ); Terangole, 20 miles east of Torit; 4 (1, MCZ); Malek, 1 (BM); Moru District, 2 (BM); Gogrial, 3.

MEASUREMENTS: Averages and extremes of four males and two females are as follows: Total length 173 (127–201), 186.5 (152–215); length of tail 12 (10–13), 16 (8–24); length of hind foot 30.5 (28–32); length of ear 24 (16–28), 26.5 (24–29); condylobasal length of skull 41.5 (38.8–45.3), 41.2 (40.2–43.9); length of palate 23.9 (22.3–26.1), 24.2 (23.2–25.2); width of rostrum 11.5 (10.6–11.2), 11.1 (10.6–11.6); length of nasals 13.2 (12.0–14.2), 12.3 (11.5–13.1); least interorbital width 11.0 (10.5–11.5), 11.2 (11.1–11.4); width across zygomatic arches 25.5 (24.2–26.6), 25.8 (25.1–26.7).

REMARKS: There is some variation in color of these specimens but this is probably owing to the manner in which the skins have been prepared. If the spines are laid flat in preparation the general tone, as observed from above, is a smoky color; if the spines are semierect the color is darker. Another contributing factor is the amount of pigment on the tip of the spines. If this is slight the general effect is lighter, and, conversely, if there is a relatively wide band at the tip the color appears darker. The only immature specimen in the series is decidedly darker in color than any of the adults. In all specimens except one, the maxillary bone touches the nasal on each side for at least 1.5 mm.

The specimens from Malek and the Moru District are much darker than typical *oweni* or *pruneri*, but the cranial characters seem to refer them to the former.

All the specimens were obtained in savanna-type country between January 7 and April 9.

Atelerix pruneri pruneri (Wagner)

FIGURE 2,*a*

E(*rinaceus*) *pruneri* Wagner, Schreber's Säugethiere, Suppl., vol. 2, p. 23, 1841. (Upper Nile, taken at Sennaar, where Pruner traveled.)

Erinaceus heterodactylus Sundevall, Kongl. Svenska Vet.-Akad. Handl., Stockholm (1841), p. 227, 1842. (Bahr-el-Abiad.)

Erinaceus dimidiatus Fitzinger, Sitzb. K. Akad. Wiss. Wien, vol. 56, sect. 1, p. 853, 1867. (Sennaar and Kordofan.)

SPECIMENS EXAMINED: Five, all in BM, from: Singa, Blue Nile Province, 1; Gebel Auli (near Khartoum), 3; White Nile, near Khartoum, 1.

Measurements: No external measurements have been available but the skull of the specimen from Singa, which is unsexed, measures as follows: Condylobasal length 40.9; length of palate 23.6; width of rostrum at level of antorbital foramen 11.4; length of nasals 12.2; least interorbital width 11.8.

Remarks: The nominate race is darker and, in certain measurements of the skull, smaller than *A. p. oweni*. The outstanding difference in the skulls of these two subspecies is in the width of the postorbital constriction. In *A. p. oweni* the constriction is more pronounced and is uniformly so in all specimens seen.

The specimen from the White Nile, near Khartoum, shows intergrading characters in color and in the size and shape of the upper molar teeth between *A. p. pruneri* and *A. p. lowei*. In substance, these characters are more like those in *A. p. pruneri*, to which the specimen is referred.

Paraechinus aethiopicus (Hemprich and Ehrenberg)

Erinaceus aethiopicus Hemprich and Ehrenberg, Symbolae physicae, Mamm., dec. 2, sheet k, footnote, Sept. 1832. (Deserts of Dongola, Anglo-Egyptian Sudan.)

Erinaceus senaariensis Hedenborg, Oken's Isis, p. 8, 1839. (Nomen nudum.)

[*Erinaceus*] *brachydactylus* Wagner, Schreber's Säugethiere, Suppl., vol. 2, p. 24, 1841. (Egypt.)

Hemiechinus pallidus Fitzinger, Sitzb. K. Akad. Wiss. Wien, vol. 54, sect. 1, p. 565, 1866 (nomen nudum); vol. 56, sect. 1, p. 866, 1867. (Sennaar.)

Specimens Examined: Sixteen, all in BM, from: Port Sudan, 4; Shendi, 4; Khartoum, 4; Sennaar, 2; Sinkat, 2.

Measurements: Measurements of an adult male from Sinkat, Red Sea Province, are as follows: Length of head and body 140; length of tail 20; length of hind foot 26; length of ear 30; condylobasal length of skull 43.2; length of palate 22.5; width of rostrum 9.9; length of nasals 13.9; least postorbital width 10.3; greatest width across zygomatic arches 26.2.

Remarks: This genus might easily be mistaken for *Atelerix* in the field. However, the hairs of the underside of the body are longer and softer and in general show some blotching of brownish or brownish black in the white. On the head the blackish face mask is present in both genera as well as the white band across the forehead. In all specimens of *Paraechinus* examined there was always an indication of a blackish band at the beginning of the spines which is not present in *Atelerix*. In general, the spines of *Paraechinus* are much softer, thinner, and more densely placed than in *Atelerix*. There can be no confusion as to identity when the skulls are examined. In *Paraechinus* the maxillaries do not touch the nasals, and the pterygoid region as well as the auditory region is markedly inflated.

Family Macroscelididae

Elephantulus fuscipes (Thomas)

Macroscelides fuscipes Thomas, Ann. Mag. Nat. Hist., ser. 6, vol. 13, p. 68, January 1894. (N'doruma, Niam-Niam country, lat. 5° N., long. 27°30′E.)

Specimens Examined: Two, the type and one other from Obbo.

Measurements: The measurements of specimen CNHM No. 67242, an adult female from Obbo, are as follows: Length of hind foot, 29.0; length of ear from notch 23.0; length of nasals 12.2; least interorbital breadth 6.0; greatest width across zygomatic arches 16.7.

Remarks: These are the sole examples of elephant shrews from this section of the Anglo-Egyptian Sudan. They are readily distinguished from *E. rufescens* by the darker dorsal color, the dark colored feet, and by the plumbeous base of the hairs of the belly.

The type specimen is preserved in alcohol so that any color comparison between specimens is useless. However, the skulls agree in all respects.

Elephantulus rufescens hoogstraali, new subspecies

Type: CNHM No. 66704, adult male, skin and skull, from Ikoto (lat. 4°5′ N., long. 33°4′ E.), Equatoria Province, Anglo-Egyptian Sudan. Obtained Dec. 20, 1949, by Harry Hoogstraal, original No. 4995.

Specimens Examined: Forty, from: Ikoto, 31; Torit 9 (1, MCZ).

Diagnosis: Upper parts between Tawny and Russet with a generous admixture of blackish hairs and all hairs with a minute black tip; dorsal color rather abruptly giving way on the sides to Warm Buff strongly intermixed with black; color of side abruptly terminating in the white of the belly; postauricular spots Warm Buff. Underparts, hands, feet, and supra- and subocular spots white; not all of the hairs white to the base, those of the chin, inside of forelegs and hindlegs and a midventral area pure white to base, others plumbeous at base. Tail dark blackish brown above, lighter below. Braincase relatively well inflated, zygomatic arches broad, rostrum relatively short and massive, toothrow relatively short and the bullae well inflated.

Measurements of the Type Specimen: Total length 258; length of tail 130; length of hind foot 36; length of ear from notch 25; greatest length of skull 36.2; length of nasals 13.5; least interorbital width 6.1; greatest width across zygomatic arches 19.6; breadth across external auditory meatus 16.8; width across M^2–M^2 11.6; length of upper toothrow entire 17.3; length of auditory bullae 6.3; width of bullae 3.9; condyloincisive length 33.3.

Comparisons: From the type specimen of *Elephantulus rufescens dundasi*, this new subspecies differs in: Belly white instead of buffy,

tail generally longer, hind foot longer, more pronounced postauricular spots, and the general dorsal color is darker. The skull has a wider, blunter rostrum, a wider interorbital region, braincase more inflated, zygomatic arches more widely flaring, upper toothrow shorter and the auditory bullae more inflated.

E. r. hoogstraali differs from the type and two topotypes of *E. r. delicatus* in: Color darker; the hairs of the belly white and not washed with buff; in both kinds the hairs of the median line are white to the base instead of being plumbeous. The skull is somewhat larger in over-all measurements, bullae are markedly more inflated, wings of mesopterygoid more concave than convex, and the rostrum is generally wider.

From the type of *E. r. mariakanae*, *E. r. hoogstraali* differs in: Color lighter, postauricular spots markedly lighter in color, white hairs of belly white to base in midventral line and not plumbeous. In the skull the rostrum is narrower, nasals narrower, and the zygomatic arches more rounded and less angular.

E. r. hoogstraali differs from *E. r. phaeus* in: Lighter dorsal color, hairs of belly white to base and not plumbeous. The skull has the rostrum shorter and wider, zygomatic arches less angular, and the upper toothrow is less crowded.

Remarks: This series of 40 specimens from the Sudan is remarkably uniform in color and in cranial characters when the sexes are separated and animals of like age are studied. The series was obtained between the middle of November and the end of March. All of the specimens were taken in a savanna habitat of tall grass.

It is apparent when studying the types of the various kinds of *Elephantulus* from eastern Africa that the species referred to as *E. dundasi* is in reality only a subspecies of the earlier *E. rufescens*. There are no characters by which this species can be dintinguished, either cranially or from the skin, from specimens of *rufescens* from any part of its range. The characters by which it can be distinguished are no greater than exist between any of the known subspecies. Therefore, although no actual intergradation can be demonstrated, the name should stand as *Elephantulus rufescens dundasi*.

Family Soricidae

Genus *Crocidura* Wagler

From examining specimens of *Crocidura*, especially the types, in the British Museum and in the U. S. National Museum, I am led to believe that the species groups of Dollman (1915 a–f, 1916) are no more than races of the oldest name in each group. There are, certainly, exceptions to the above statement, such as the case of *Crocidura*

butleri which does not fit in the group called *fischeri* on any cranial or morphological feature.

Without examining all of the specimens extant and the references to all the types available, this hypothesis is at best a mere suggestion. Where specimens have been studied and found to agree in what appear to be specific characters they have been placed as a subspecies of that particular species.

Again, this arrangement is based only on the shrews from the Sudan and on specimens immediately adjacent geographically, so that the suppositions and allocations may not be the best, but certainly it shows the relationships of these mammals better than Dollman's revision.

There are three names from the Sudan in this genus that are not, at this time, certainly identifiable. They are *C. ferruginea* Heuglin 1865, from "Lande der Ridj-Neger," *C. fulvastra* Sundevall 1843, from Bahr-el-Abiad, and *C. fusco-murina* Heuglin 1865, from Meshra-el-Req. Dollman, in his revision of the African members of the genus, is not sure of what they are or to what they may be related. For the purpose of this paper these names are considered as unidentifiable.

One specimen, CNHM 73890, is, at this time, not identifiable. It is far darker than anything known from the general region but has a skull which in many ways resembles that of *C. turba*. Since there is only the one specimen I prefer leaving it as indeterminate until more material from the Lokwi region is obtained.

Crocidura bicolor tephragaster, new subspecies

Type: Museum of Comparative Zoology, No. 44773, adult male, skin and skull, from Torit, Anglo-Egyptian Sudan. Obtained Apr. 25, 1950, by J. S. Owen, original number 1158.

Specimens Examined: Eighteen, from Torit (8, MCZ).

Diagnosis: General over-all dorsal color near Mummy Brown, shading over sides to Light Mouse Gray of the belly; hands and feet lighter than the dorsal color; tail dark brownish black well covered with bristle hairs. Skull large for the species, relatively wide across the maxillaries, upper teeth relatively massive, rostrum relatively short and broad.

Measurements of the Type Specimen: Total length 112; length of tail 47; length of hind foot 11; length of ear 4; condyloincisive length of skull 17.4; greatest breadth of braincase 7.2; greatest maxillary breadth 5.2; length of palate 6.1; length of upper toothrow 7.3; least interorbital width 3.5.

Comparisons: From the type of *C. b. cunninghamei*, *C. b. tephragaster* differs in: Color lighter, that is, there is more gray and less

brown. The skull has a wider braincase, generally shorter palate, shorter upper toothrow and a narrower interorbital region.

C. b. tephragaster differs from the type of *C. b. woosnami* in the skull being larger in all measurements taken. No color can be compared inasmuch as the body of the type of *woosnami* is preserved in alcohol.

From the type of *C. b. elgonius*, *C. b. tephragaster* differs in: Color about the same but slightly paler in the new form. Hind foot longer; skull larger in all measurements taken.

From the type of *C. b. planiceps*, *C. b. tephragaster* differs in generally lighter color, grayer belly and shorter tail. The skull is shorter, narrower across the braincase, wider interorbitally, and the upper toothrow is shorter.

Remarks: This is an example among the white toothed shrews of the Nile apparently acting as a barrier to their distribution. Certainly the specimen of *planiceps* from Rhino Camp is a *bicolor* and differs from the new subspecies from Torit in the manner set forth under comparisons.

Crocidura butleri Thomas

Crocidura butleri Thomas, Ann. Mag. Nat. Hist., ser. 8, vol. 8, p. 375, September 1911. (Between Chak Chak and Deim Zubeir, Bahr-el-Ghazal.)

Specimen Examined: The type.

Measurements: The measurements of the type, as given by Thomas (1911, p. 375), are as follows: Length of head and body 78; length of tail 34; length of hind foot 13; condyloincisive length of skull 24.0; least interorbital width 4.5; length of upper toothrow 10.5.

Remarks: The type and only specimen available is unique in that the tail is so much shorter and heavier in comparison to other members of the genus. The extremely pale color of this species is approached by shrews of the Sudan, only by *Crocidura pasha* to which it is in no way related.

Crocidura hedenborgiana fuscosa Thomas

Figure 2,*b*

Crocidura doriana fuscosa Thomas, Ann. Mag. Nat. Hist., ser. 8, vol. 12, p. 90, July 1913. (Kaka, White Nile.)

Specimens Examined: Two, both in BM, from: Kaka, White Nile, 1; Malakal, Upper Nile Province, 1.

Measurements: An adult female from Malakal, Upper Nile Province, has the following measurements: Length of head and body 110; length of tail 75; length of hind foot 20; length of ear 11; condyloincisive length of skull 30.7; greatest breadth of skull 12.7; least interorbital width 6.0; length of palate 13.9; greatest maxillary breadth 9.3; length of upper toothrow 14.0.

Remarks: Thomas described *fuscosa* as a subspecies of *doriana*, and Dollman, in his revision of the genus, elevated it to specific status and commented that it was quite distinct from *doriana* and that its nearest relative was *hedenborgiana*, from which it was distinguished by its smaller size and somewhat lighter color. I agree with Dollman that *fuscosa* is in no way related to *doriana*, but on critical examination conclude that it is a subspecies of *hedenborgiana*. The proportions of the skulls of the two kinds are identical, which thus leaves only size and color. The size and color differences are not so great that they warrant a separate species for *fuscosa*.

***Crocidura hedenborgiana hedenborgiana* (Sundevall)**

Figure 2,*b*

Sorex hedenborgiana Sundevall, Kongl. Svenska Vet.-Akad. Handl., Stockholm, p. 171, 1843. (Sennaar.)

Specimen Examined: Roseires, Blue Nile Province, 1 (BM).

Measurements: No external measurements other than for the type are available, but the cranial measurements of the specimen above, an adult female, are as follows: Condyloincisive length 32.9; greatest breadth 13.5; least interorbital width 6.0; length of palate 15.3; greatest maxillary breadth 10.2; length of upper toothrow 15.0.

Remarks: This very dark shrew, of which one specimen is in the British Museum, is difficult to distinguish from *C. nyansae* cranially, but it is readily separated on the basis of color. In general, this species is larger, more robust cranially than is *nyansae*, with which it appears to coexist.

It may be that if more were known about its natural history and if more specimens were available, it would prove to be a synonym, or at best a subspecies, of *nyansae*. However, owing to the lack of material and information, I feel that it is best to leave the status of the two kinds as they are.

This lone specimen has been compared to Sundevall's type of *hedenborgiana* in Stockholm and agrees very closely with it.

***Crocidura hildegardeae phaios*, new subspecies**

Figure 2,*b*

Type: MCZ No. 45855, adult female, skin and skull, from Gilo, Imatong Mountains, Equatoria Province, Anglo-Egyptian Sudan. Obtained June 12, 1950, by J. S. Owen, original No. 1266.

Specimens Examined: Four, from: Gilo, 2 (MCZ); Ikoto, 1; Torit, 1.

Diagnosis: General over-all color of upper parts near Bister shading over the sides onto the lighter belly which is gray strongly

washed with Buffy Brown; hands, feet, and tail dark brown. Skull relatively large and robust, upper toothrow short and broad, interorbital region wide, braincase wide, rostrum short and relatively narrow, posterior choanae not constricted, third upper unicuspids slightly larger than second.

Measurements of the Type Specimen: Total length 116; length of tail 51; length of hind foot 13; length of ear 4; condyloincisive length of the skull 18.7; greatest breadth of the braincase 8.4; greatest maxillary breadth 5.9; length of palate 7.6; length of upper toothrow 7.9; least interorbital width 4.1.

Comparisons: *C. h. phaios* differs from *C. h. hildegardeae* in generally darker color, wider braincase, and generally wider interorbitum.

From *C. h. altae*, *C. h. phaios* differs in darker dorsal coloration, lighter belly, shorter tail, and smaller skull in all measurements taken.

Remarks: *C. h. phaios* has been compared only with *hildegardeae* and *altae* since they are the closest geographically. The three specimens available are all remarkably alike in both skin and cranial characters, more so than in any of the other *Crocidura* studied from the Sudan.

Crocidura marita Thomas and Hinton

Figure 2,*b*

Crocidura marita Thomas and Hinton, Proc. Zool. Soc. London, p. 253, July 6, 1923. (Southeast Downs, Jebel Marra, Darfur Province.)

Specimen Examined: The type.

Measurements of the Type Specimen: Length of head and body 56; length of tail 38; length of hind foot 10; length of ear 7; condyloincisive length of the skull 16.6; breadth of braincase 7.5; least interorbital breadth 3.4; length of upper toothrow 7.3.

Remarks: This species is similar in many respects to *C. pasha* but is darker and somewhat larger. It is possible that there exists a close relationship between these two species but until additional material is available it is best to consider them as distinct species.

Crocidura nyansae darfurea Thomas and Hinton

Figure 2,*c*

Crocidura darfurea Thomas and Hinton, Proc. Zool. Soc. London, p. 251, July 6, 1923. (Zalingei, Darfur.)

Specimens Examined: Eighteen, all in BM, from: Zalingei, Darfur Province, 12; Kulme, Wadi Aribo, 6.

Measurements: An adult male and an adult female, from Zalingei, respectively measure as follows: Length of head and body 127, 123;

length of tail 61, 61; length of hind foot 17, 17; length of ear 12, 13; condyloincisive length of the skull 29.1, 28.0; greatest breadth of skull 12.7, 11.7; greatest maxillary breadth 9.2, 9.1; length of palate 12.6, 12.1; length of upper toothrow 12.3, 12.6; least interorbital width 5.2, 5.2.

REMARKS: *Crocidura darfurea* is a lighter colored form of *C. nyansae*. There is no criterion on the skull or skin to warrant the recognition of *C. darfurea* as a full species. It is in all respects another *nyansae*. It is larger and somewhat paler than *C. n. sururae* and larger and decidedly paler than typical *C. nyansae*.

***Crocidura nyansae sururae* Heller**

FIGURE 2,*c*

Crocidura sururae Heller, Smithsonian Misc. Coll., vol. 56, No. 15, p. 2, Dec. 23, 1910. (Rhino Camp, Lado Enclave.)

SPECIMENS EXAMINED: Eleven, from: Bor, 2 (BM); Mongalla, 1 (BM); *Malek*, 3 (BM); *Upper Nile*, 1 (BM); *Loa, 18 miles north of Nimule*, 3 (MCZ); Nimule, 1 (MCZ).

MEASUREMENTS: The measurements of the type, an adult male, are as follows: Length of head and body 111; length of tail 64; length of hind foot 17; condyloincisive length of skull 28.5; breadth of braincase 12.0; length of upper toothrow 13.0.

REMARKS: All of the above specimens are darker than in the original series from Rhino Camp. The skulls, however, show no variation from the type series.

There are no characters of either the skin or the skull in this series which warrant the separation of *sururae* as a full species. There is a specimen from Butiaba, Uganda, which shows rather intermediate characters between *nyansae* and the present form, so it is considered best to refer the above specimens as subspecies of the previously named *nyansae*.

This is a case in which it is possible that Loring collected on the east bank of the Nile. The type locality for *sururae* is at Rhino Camp, which is on the west bank, yet specimens there are found to be identical from Mongalla and Malek.

***Crocidura nyansae toritensis*, new subspecies**

FIGURE 2,*c*

TYPE: CNHM No. 66713, adult female, skin and skull, from Torit, Equatoria Province, Anglo-Egyptian Sudan. Obtained November 29, 1949, by Harry Hoogstraal, original No. 4862.

SPECIMENS EXAMINED: Twenty-six, from: Torit, 19 (3 MCZ); Gilo, Imatong Mountains, 2; *Lotti Forest, Imatong Mountains*, 2; Katire, 2 (MCZ); Issore, Imatong Mountains, 1 (BM).

DIAGNOSIS: Hairs of upper parts near Bister, shading over the sides into the somewhat lighter color of the belly; belly silvery gray with a heavy wash of dark buff; hands, feet, and tail all darker brown than the back. Tail clothed with bristle hairs for almost its entire length. Skull large, teeth heavy, upper toothrow long, braincase wide and relatively flat, posterior choanae relatively wide open, but little constricted, postmandibular processes of skull relatively large, palate wide and long, least interorbital width relatively small.

MEASUREMENTS OF THE TYPE SPECIMEN: Total length 190; length of tail 66; length of hind foot 19; length of ear 8; condyloincisive length of skull 29.5; greatest breadth of braincase 11.6; greatest maxillary breadth 9.3; length of palate 12.6; length of upper toothrow 13.4; least interorbital width 5.0.

COMPARISONS: *C. n. toritensis* differs from *C. n. sururae* in darker dorsal coloration and larger general size. The skull differs in that it is larger in all measurements taken with the exception of the least interorbital width which is less; the postmandibular processes are larger in the former than they are in *sururae* and the palate is wider and longer.

From *C. n. nyansae*, *C. n. toritensis* differs in somewhat smaller size and lighter color. The skull is smaller in all measurements taken, but the postmandibular processes are of approximately the same size.

REMARKS: The type series of the new kind is quite remarkable for its diversity of color. The series from Torit was taken over most of a 1-year period and this color difference is apparently due to fading and molt. The type appears to be in the new fresh pelage. A peculiar kind of fading occurs in which the reddish brown pigment seems to undergo reduction to a yellowish brown which is quite splotched with newer, more gray pelage coming in. This molt takes place in February and March and there is apparently another molt in October and November.

Crocidura pasha Dollman

Crocidura pasha Dollman, Ann. Mag. Nat. Hist., ser. 8, vol. 17, p. 195, February 1916. (Atbara River, Anglo-Egyptian Sudan.)

SPECIMENS EXAMINED: Five, from: Atbara River, 1 (BM); Khartoum, 1 (skull, skin in alcohol, BM); Torit, 3.

MEASUREMENTS: Respectively, the external measurements of an adult male and female from Torit are as follows: Total length 87, 91; length of tail 35, 37; length of hind foot 9, 9; length of ear 8, ?. Since the skulls are so badly broken no cranial measurements can be taken.

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REMARKS: Even though Torit is quite some distance removed from both the Atbara River and Khartoum, the three specimens from there are identical in color with the type from Atbara. Unfortunately, the skulls of both of the Torit specimens are badly broken, but what is left of them agrees very well with the type of *C. pasha*.

Crocidura sericea lutrella Heller

FIGURE 2,*d*

Crocidura lutrella Heller, Smithsonian Misc. Coll., vol. 56, No. 15, p. 4, Dec. 23, 1919. (Rhino Camp, Lado Enclave.)

SPECIMENS EXAMINED: Three, from: Mongalla, 2 (BM); *Rhino Camp*, 1.

MEASUREMENTS: An adult male from Mongalla measures as follows: Length of head and body 75; length of tail 41; length of hind foot 11; length of ear 10; condyloincisive length of skull 20.9; greatest breadth of cranium 8.9; maxillary breadth 6.8; length of palate 8.7; length of upper toothrow 9.0; least interorbital width 4.2.

REMARKS: *C. lutrella* differs from *C. aridula* in a somewhat more yellowish tone above and a decided buffier gray below. The skulls differ in that *lutrella* is smaller in all measurements taken than is *aridula*. In cranial proportions however, the two kinds agree.

It is apparent that the relationships of *aridula*, *lutrella*, and *marrensis* are with *sericea* and each other; therefore, they are all treated as subspecies of *sericea*, which is the oldest name for the group.

Crocidura sericea marrensis Thomas and Hinton

FIGURE 2,*d*

Crocidura hindei marrensis Thomas and Hinton, Proc. Zool. Soc. London, p. 252, July 6, 1923. (Wadi Konger, east-central Jebel Marra.)

SPECIMENS EXAMINED: Two, both in BM, from: *Wadi Burar, northwestern Jebel Marra*, 1; Wadi Konger, east-central Jebel Marra, 1.

MEASUREMENTS: The measurements of an adult female from the Wadi Burar are as follows: Length of head and body 83; length of tail 58; length of hind foot 13; greatest maxillary breadth of skull 7.0; length of palate 8.7; length of upper toothrow 9.4; least interorbital width 4.3.

REMARKS: *C. s. marrensis* differs from *C. s. lutrella* in browner color dorsally, darker, longer tail, and much buffier gray underparts. The skulls are practically identical except for the interpterygoid fossa in *marrensis* being more constricted posteriorly. Again, these characters do not appear to be of more than subspecific value.

***Crocidura sericea sericea* (Sundevall)**

FIGURE 2,*d*

Sorex sericeus Sundevall, Kongl. Svenska Vet.-Akad. Handl., Stockholm, pp. 173, 177, 1843. (Near Bahr-el-Abiad.)

Crocidura macrodon Dobson, Ann. Mag. Nat. Hist., ser. 6, vol. 5, p. 226, March 1890. (? Sudan.)

SPECIMENS EXAMINED: Ten, all in BM, from: Fashoda (=Kodok), 2; Jebel Ahmed Aga, 1; Lake No, White Nile, 1; *8 miles east of Lake No, White Nile*, 2; Chak Chak, 4.

MEASUREMENTS: An adult male and an adult female, from Chak Chak, respectively measure as follows: Length of head and body 96, 98; length of tail 55, 62; length of hind foot 15, 15; length of ear 10, 9; condyloincisive length of skull 24.0, 24.4; greatest breadth of skull 10.6, 10.3; greatest maxillary breadth 7.7, 7.5; length of palate 9.8, 10.5; length of upper toothrow 10.3, 10.6; least interorbital width 5.1, 4.5.

REMARKS: *C. s. sericea* differs from *C. s. lutrella* in being larger in all respects, browner on upperparts, and less gray and more buff on the underparts. In *lutrella*, *sericea*, *marrensis*, and *aridula* the flank gland is small and white.

***Crocidura turba nilotica* Heller**

FIGURE 3,*a*

Crocidura nilotica Heller, Smithsonian Misc. Coll., vol. 56, No. 15, p. 3, Dec. 23, 1910. (Rhino Camp, Lado Enclave.)

SPECIMENS EXAMINED: Nine, from: Mongalla, 1 (BM); Malek, 1 (BM); *Rhino Camp*, 7.

MEASUREMENTS: The skulls of the two specimens from the Sudan are so badly broken that only the toothrows remain identifiable, consequently, only the external measurements of an adult male from Mongalla and an adult female from Malek are available. Their measurements, respectively, are as follows: Length of head and body 89, 97; length of tail 52, 55; length of hind foot 15, 16; length of ear 11, 10.

REMARKS: The two localities from which these specimens come lie on the east bank of the Nile, while Rhino Camp is located on the west bank. It seems odd that so small an animal as this could cross back and forth across the Nile in enough instances to retain the purity of genetic stock. The type specimen of *nilotica* was obtained by J. A. Loring while the Roosevelt party was camped at Rhino Camp. It is always possible that Loring and his companion, E. A. Mearns, may have crossed the river for a few days and trapped for small

mammals there while the rest of the party worked on the west bank. Certainly there is no indication in the field notes or on specimen labels to support this hypothesis, but it seems the only logical one to assume.

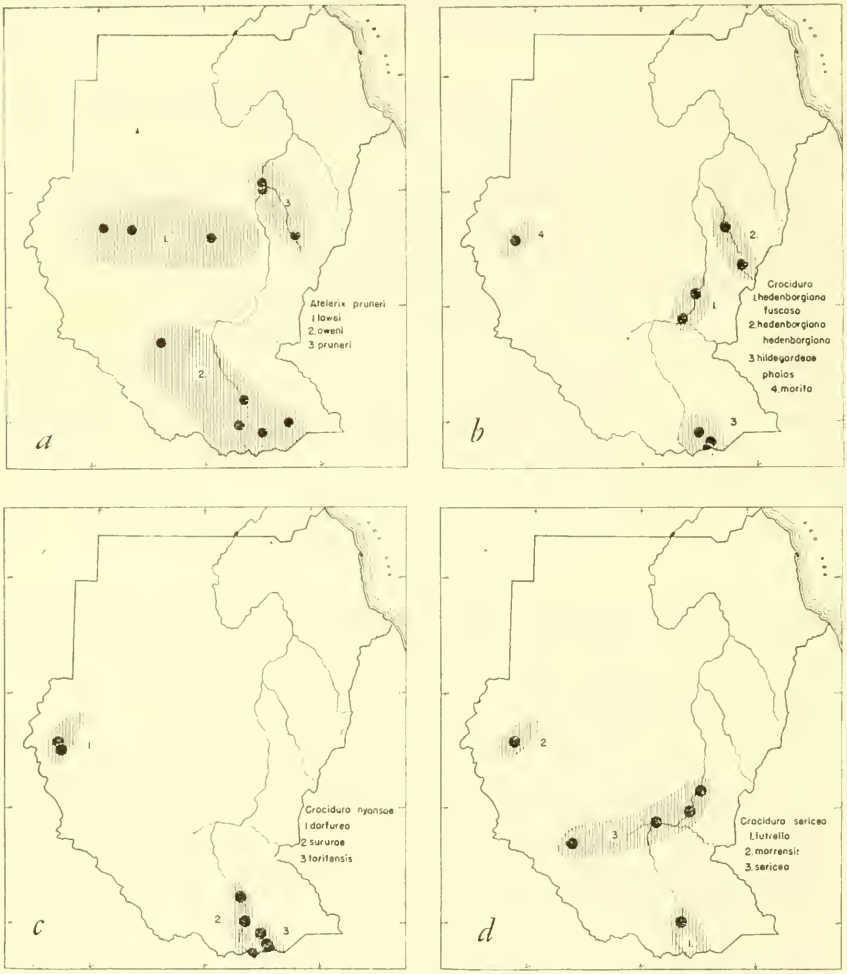

FIGURE 2.—Distribution of *Atelerix* and *Crocidura* (in part) in the Anglo-Egyptian Sudan. (Scale: 1 inch=400 miles.)

***Crocidura turba tephra*, new subspecies**

FIGURE 3,*a*

TYPE: CNHM No. 79431, adult male, skin and skull, from Torit, Equatoria Province, Anglo-Egyptian Sudan. Obtained March 14, 1952, by J. S. Owen.

SPECIMENS EXAMINED: Eleven, from: Torit, 9 (2, MCZ); Katire, 1 (MCZ); *Lokwi, 25 miles south of Torit*, 1.

DIAGNOSIS: General over-all color of upperparts Hair Brown shading to Mouse Gray on the belly; flank glands same as dorsal color; hands, feet, and tail brownish. Skull relatively long, rostrum relatively long, upper toothrow long and relatively as well as actually wide.

MEASUREMENTS OF THE TYPE SPECIMEN: Total length 146; length of tail 52; length of hind foot 15; length of ear 5; condyloincisive length of skull 23.5; greatest breadth of braincase 10.2; greatest maxillary breadth 7.2; length of palate 9.5; length of upper toothrow 10.2; least interorbital width 4.4.

COMPARISONS: The only subspecies with which *C. t. tephra* needs to be compared is *C. t. nilotica*, from which it differs in: Color lighter in all respects, size about the same in all respects, skull somewhat longer, braincase wider, width across maxillaries greater, rostrum longer and upper toothrow somewhat longer.

REMARKS: This new subspecies is remarkably lighter in color than is *C. t. nilotica*. In none of the specimens examined does the color begin to approach the saturate condition found in the latter. The type series is remarkably constant in color but the size of the skulls varies rather widely. The greatest difference in these skulls is in one old male in which the teeth are worn almost flat. This skull is about 1.5 mm. longer in the condyloincisive length than is that of the type. Most of this extra length is in the posterior development of the braincase, which is more than one millimeter longer than in the type.

Order PRIMATES

Family LORISIDAE

Galago senegalensis senegalensis E. Geoffroy

Galago senegalensis E. Geoffroy, Mag. Encycl., vol. 1, p. 38, pl. 1, 1796. (Senegal.)

Otolicnus teng Sundevall, Kongl. Svenska Vet.-Akad. Handl., Stockholm (1842), p. 201, 1843. (Bahr-el-Abiad.)

Galago sennariensis Gray, Proc. Zool. Soc. London, p. 147, October 1863. (White Nile, Sennaar.)

SPECIMENS EXAMINED: Twenty-one, from: Lotti Forest, 1; *Sunnat*, 3; *Imurok*, 4; Magwe, 36 miles southwest of Torit, 2 (MCZ); Khor Gorman, 30 miles west of Rumbek, 1 (BM); Juba, 2 (BM); *Talanga Forest, Imatong Mountains*, 2 (BM); Kulme, Wadi Aribo, 2 (BM); *Goz Abu Gama, White Nile*, 3 (BM); *Rejaf District, Mongalla Province*, 1 (BM).

MEASUREMENTS: Averages and extremes of four males from Imurok and of two females from Sunnat, respectively, are as follows: Total length 431 (411–443), 411 (402–420); length of tail 274 (265–284),

260 (252–268); length of hind foot 66 (61–68), 62 (62); length of ear 41 (41), 39 (37–41); greatest length of skull 43.2 (40.7–45.0), 41.3 (39.9–42.7); length of upper canine to M^3 15.2 (15.0–15.5), 14.9 (14.6–15.2); least interorbital width 5.4 (5.1–5.8), 4.75 (4.6–4.8); breadth across orbital ring 29.4 (26.6–31.2), 28.2 (26.6–29.9); length of nasals 10.7 (9.8–11.3), 11.1 (10.3–11.9); breadth of braincase 23.7 (22.9–24.9), 22.2 (21.8–22.6).

Remarks: All of the specimens examined are somewhat more yellowish and have lighter colored ears than typical *senegalensis*. It is apparent, though, that material from Senegal varies considerably, even within local populations. It is for this reason, and the fact that the present specimens are more widely divergent from other named kinds than from the nominate form, that they are so identified. Perhaps when one has material available from one side of the continent to the other and is able to critically analyze the material, the animals from the Sudan and farther to the east may be shown to be readily separable from the animals from western Africa. Owing to the continuum of habitat across the savannas, the above conjecture may prove to be only wishful thinking.

Family Cercopithecidae

Papio doguera heuglini Matschie

Papio heuglini Matschie, Sitz. Ges. Naturf. Freunde, Berlin, p. 81, 1898. (Near Shilluk Islands, White Nile, Anglo-Egyptian Sudan.)

Papio lydekkeri W. Rothschild, Novitates Zool., vol. 9, p. 140, Apr. 10, 1902. (Upper Blue Nile.)

Papio werneri Wettstein, Anz. K. Akad. Wiss. Wien, Math.-Nat., vol. 53, p. 190, 1916. (Gebel Talodi, near Talodi, Nuba Mountains.)

Specimens Examined: Six, from: Ikoto, 1; Torit, 1; *Imurok-Ikoto*, 1; Jebel Marra, 1 (BM); Wau, Jur River, 1 (BM); Kamisa, Dinder River, 1 (BM).

Measurements: The skin of an adult female from Kamisa, Dinder River, measures as follows: Length of head and body 597; length of tail 533; length of hind foot 180; length of ear 43. The skull of a young adult male from Imurok measures: Greatest length 235.0; greatest width across zygomatic arches 134.9; least postorbital constriction 60.1; length of canine to M^3 73.8; breadth across M^3–M^3 57.2; condyloincisive length 185.0.

Remarks: It is strange that so much of the mammal fauna of the Jebel Marra should be so distinct from surrounding areas and that the baboon found there should be the same as that found on the Upper Nile in the southern Sudan. However, the only skin and skull from the Jebel are not distinguishable from the more eastern animals and

are therefore referred to *heuglini* rather than to *P. d. tessellatus* from Ankole, Uganda.

***Cercopithecus aethiops aethiops* (Linnaeus)**

FIGURE 3,*b*

Simia aethiops Linnaeus, Systema naturae, ed. 10, vol. 1, p. 28, 1758. (Sennaar.)
Cercopithecus toldti Wettstein, Anz. K. Akad. Wiss. Wien, Math.-Nat., vol. 53, p. 189, 1916. (Jebel Riha, near Kadugli.)
Cercopithecus (*Chlorocebus*) *cailliaudi* Wettstein, Denkschr. K. Akad. Wiss. Wien, Math.-Nat., vol. 94, p. 643, 1918. (Blue Nile.)

SPECIMENS EXAMINED: Fourteen, all in BM, from: White Nile, lat. 14° N., 3; Mongalla, Moru District, 1; Kamisa, Dinder River, 8; Omdurman, 1; near Er Renk, 1.

MEASUREMENTS: Average external measurements, respectively, of two males and two females from Kamisa, Dinder River, are as follows: Length of head and body 444.5, 441.3; length of tail 605, 550; length of hind foot 129, 106; length of ear 32, 29.

REMARKS: The specimens from Kamisa are virtual topotypes of this subspecies. All of the specimens examined are paler in dorsal coloration than are any of the adjacent kinds. However, there is a considerable amount of variation in the general color. The thighs and lower hind legs are pale gray with only a faint suggestion of the banding which is prominent in *C. a. arenarius*.

***Cercopithecus aethiops arenarius* (Heller)**

FIGURE 3,*b*

Lasiopyga pygerythra arenarius Heller, Smithsonian Misc. Coll., vol. 61, No. 17, p. 11, Oct. 21, 1913. (Marelle Waterholes, Marsabit Road, Kenya Colony.)

SPECIMENS EXAMINED: Two, both in BM, from Issore, Imatong Mountains.

MEASUREMENTS: No measurements of this form are available from the Sudan since the only two specimens are native skins.

REMARKS: These two skins are both "native" skins and thus not too reliable but are probably from the Imatong mountains. The thighs and lower hind legs are marked with cross bands of dark gray on a light gray background and not uniformly clear gray as in the next adjacent form *johnstoni*. This marking of the thighs and legs is far more distinct in the Imatong specimens than in topotypes of *arenarius* in the British Museum collection.

I feel that for the present it is best to refer these specimens from the Imatongs to *arenarius* since the material is not adequate to definitely establish their true identity.

Cercopithecus aethiops marrensis Thomas and Hinton

FIGURE 3,*b*

Cercopithecus tantalus marrensis Thomas and Hinton, Proc. Zool. Soc. London, p. 248, July 6, 1923. (Foothills of Jebel Marra, Central Darfur.)

SPECIMENS EXAMINED: Three, all in BM, from: Foothills of Jebel Marra, 1; *Southwestern Jebel Marra*, 2.

MEASUREMENTS: The type, an adult male, has the following external measurements: Length of head and body 830; length of tail 1140; length of hind foot 145; length of ear 32.

REMARKS: This subspecies is more reddish in general tone than are its relatives to the east. The thigh and lower leg, instead of being a shade of clear gray, is of a pronounced yellowish tone. Faint grayish bars are present on the upper leg.

In general these animals are larger than any specimens seen of *aethiops* or *arenarius*.

Cercopithecus mitis stuhlmanni Matschie

Cercopithecus stuhlmanni Matschie, Sitzb. Ges. Naturf. Freunde, Berlin, p. 225, 1893. (Kinyawanga, northwest of Lake Albert, Belgian Congo.)

SPECIMENS EXAMINED: Fifteen, from: Lotti Forest, Imatong Mountains 5; Torit, 1; Nagichot, 100 miles east of Torit, 4; *Kipia, Imatong Mountains*, 2 (BM); Emogadung, Dongotona Mountains, 1 (BM); *Char, Didinga Mountains*, 1 (BM); *forests of Mount Lotuke, Didinga Mountains*, 1 (BM).

MEASUREMENTS: An adult male from Kipia, Imatong Mountains, and an adult female from Char, Didinga Mountains, respectively show external measurements as follows: Length of head and body 1168, 1290; length of tail 635, 795; length of hind foot 139, 138; length of ear 38, 36.

Erythrocebus patas pyrrhonotus (Hemprich and Ehrenberg)

Cercopithecus pyrrhonotus Hemprich and Ehrenberg, Symbolae physicae, Mamm., dec. 1, pl. 10 and folios hh, kk, August 1832. (Darfur.)

Cercopithecus poliophaeus Reichenbach, Völlstand. Naturg. Affen, p. 122, 1863. (Fazogli, Blue Nile.)

Cercopithecus poliolophus Heuglin, Reise in Nordost-Afrika, vol. 2, p. 6, 1877. (Fazogli, Blue Nile.)

Erythrocebus albigenus Elliot, Ann. Mag. Nat. Hist., ser. 8, vol. 4, p. 265, September 1909. (Egyptian Sudan.)

SPECIMENS EXAMINED: Six, from: Torit, 3; Kinyeti Valley, Imatong Mountains, 2 (BM); foothills of southern Jebel Marra, 1 (BM).

MEASUREMENTS: The external measurements of an adult male from the foothills of southern Jebel Marra are as follows: Length of

head and body 623; length of tail 725; length of hind foot 162; length of ear 43.

Remarks: The three specimens from Torit are all juveniles and thus no measurements are reliable or diagnostic of the race. The two specimens from Kinyeti are "native" skins and thus lack measurements. The specimen from Jebel Marra is somewhat lighter in color than are the specimens from the southeastern Sudan and this may represent the typical condition; however, since there are no actual topotypes available, or the type specimen itself, these red monkeys are all referred to *pyrrhonotus*.

Colobus polykomos dodingae Matschie

Colobus (*Guereza*) *matschiei dodingae* Matschie, Ann. Soc. Malac. Zool. Belgique vol. 57, p. 52, 1913. (Southwestern Dodinga (=Didinga) Mountains, about lat. 4°10′ N., long. 33°42′ E., 5,650 feet, Kilio.)

Specimens Examined: Fifteen, from: Lotti Forest, 5 (1 BM); *Loronyo*, 1; Imurok, 1; *Imela*, 1; *Issore*, 1 (BM); *Talanga Forest, Imatong Mountains*, 1 (BM); forests of Mount Lotuke, Didinga Mountains, 3 (BM); *Kipia, Imatong Mountains*, 2 (BM); *Laboni, Imatong Mountains*, 1 (BM).

Measurements: The external measurements of an adult male and an adult female from Mount Lotuke are, respectively, as follows: Length of head and body 1235, 1276; length of tail 690, 685; length of hind foot 180, 180; length of ear 35, 35.

Remarks: The specimens from Mount Lotuke may be considered as topotypes of *C. p. dodingae*. The other specimens from the Imatongs and from Torit agree in every detail with those selected as being topotypes.

Order PHOLIDOTA

Family Manidae

Manis temminckii Smuts

Manis temminckii Smuts, Dissertation zoologica, enumerationem mammalium Capensium continens, p. 54, pl. 3, figs. 1, 2, 1832. (Cape of Good Hope.)

Phatages hedenborgii Fitzinger, Sitzb. K. Akad. Wiss. Wien, Math.-Nat., vol. 65, sect. 1, p. 69, 1872. (Sennaar and elsewhere in northeastern and central Africa.)

Specimens Examined: One, from Torit.

Remarks: Only this single pangolin is available from the Sudan in any of the collections studied. *Phatages hedenborgii* Fitzinger, from Sennaar and elsewhere in northeastern and central Africa, is an available name for Sudanese pangolins but is listed as a synonym of *temminckii* by Allen (1939, p. 269).

Order LAGOMORPHA

Family Leporidae

Poëlagus marjorita larkeni St. Leger

Figure 3,*c*

Poëlagus marjorita larkeni St. Leger, Ann. Mag. Nat. Hist., ser. 10, vol. 16, p. 598, December, 1935. (Yambio District, 100 miles north of Diawo, southwestern Bahr-el-Ghazal, Anglo-Egyptian Sudan.)

Specimens Examined: Fourteen, all in BM, from: *Sue River, near Diawo*, 2; Ibba River, 100 miles north of Diawo, 9; Mount Baginzi, 1; Diawo, 2.

Measurements: There are no external measurements available but cranial measurements of an adult male and an adult female from Ibba River, 100 miles north of Diawo, are, respectively, as follows: Greatest length of skull 82.3, 91.0; condyloincisive length 79.8, 89.6; greatest width across zygomatic arches 38.7, 40.2; least interorbital width 18.9, 21.5; breadth of braincase 27.6, 28.7; median length of nasals 29.0, 30.6; greatest width of nasals 17.5, 18.9; length of palatal foramina 20.9, 22.4; greatest width of palatal foramina 8.0, 10.4; width of choanae opposite M^3 6.0, 5.6; length of upper molar series 14.9, 17.0.

Remarks: Major Larken noted on the original labels that these rabbits were locally very common and easily obtainable. They apparently inhabit the open savanna scrub.

Poëlagus marjorita oweni, new subspecies

Figure 3,*c*

Type: CNHM No. 73950, adult male, skin and skull, from Lotti Forest, southwestern Imatong Mountains, Equatoria Province, Anglo-Egyptian Sudan. Obtained November 21, 1950, by J. S. Owen, original No. 1604.

Specimens Examined: Five, from: Imela, 2; Lotti forest, 1; Imurok, 1 (MCZ); near Katire, 1.

Diagnosis: Nuchal spot near Ochraceous-Tawny, gradually shading over the shoulders into the dark dorsal color which is predominantly blackish but speckled with Cinnamon Buff. Hands and feet near Cinnamon Buff on dorsal surfaces, with lips and anterior and posterior parts of belly white and but lightly washed with Cinnamon Buff. Dorsal color extending around throat and middle of belly but not so much black as in dorsal aspect. Underside of tail white, no stripe on dorsal surface. Skull: Braincase broad, rostrum wide, nasals generally narrow, choanae relatively wide, and zygomatic width relatively great.

Measurements of the Type Specimen: Total length 510; length of tail 52; length of hind foot 103; length of ear from crown 85; length of ear from notch 65; greatest length of skull 87.1; condyloincisive length 76.6; greatest width across zygomatic arches 41.2; least interorbital width 19.4; breadth of braincase 30.6; median length of nasals 29.6; greatest width of nasals 17.3; length of palatal foramina 21.6; greatest width of palatal foramina 9.2; width of choanae opposite M^3 6.5; alveolar length of upper molar series 15.8.

Comparisons: From *Poëlagus marjorita marjorita*, *P. m. oweni* differs in: Color generally darker, belly with a transverse band of color same as dorsum separating anterior and posterior portions. The skull is different in that the nasals are shorter, braincase narrower, and the auditory bullae are decidedly smaller.

P. m. oweni differs from *P. m. larkeni* in darker dorsal color and by the presence of the colored transverse band on the belly. The skull has the braincase broader, the nasals generally narrower, the width of the choanae opposite M^3 greater, and the width across the zygomatic arches greater.

Remarks: The rabbits taken in the eastern part of Equatoria Province have all come from the Imatong Mountains or the immediate vicinity and all were taken in forest-type habitat. It is very probable that when the Didinga and Dongotona Mountains are better known this animal will be found to inhabit them as well.

***Lepus capensis crawshayi* De Winton**

Figure 3,*d*

Lepus crawshayi De Winton, Proc. Zool. Soc. London, p. 416, August 1, 1899. (Kitwi, east of Athi River and northeast of Machakos, Kenya Colony.)

Specimens Examined: Six, from: Ikoto, 2; *Katire*, 2; Nagichot, 2 (MCZ).

Remarks: In a series of 10 adult specimens from the Kapiti Plains, British East Africa, two adult skulls measure 85.8 and 86.6 mm. in occipitonasal length while the other eight adults are 85 mm. or less. Ellerman and Morrison-Scott (1951, p. 427) give 85 mm. or less for occipitonasal length for hares of the *capensis* complex south of the Sahara. It seems then, on the basis of the measurements above, that *crawshayi* belongs to the *capensis* group and not with *europaeus*, where it has been placed by the above authors.

Of the four specimens here referred to *crawshayi*, only one is adult, and in that one the skull is missing. The skin, however, agrees in detail with those specimens in the collection from British East Africa and identified as *crawshayi*.

Lepus capensis dinderus, new subspecies

FIGURE 3,*d*

TYPE: BM No. 14.3.8.45, adult male, skin and skull, from Kamisa, Dinder River, Anglo-Egyptian Sudan. Obtained December 24, 1913, by W. P. Lowe, original No. 47.

SPECIMENS EXAMINED: Twelve, all in BM, from: Jebel Ain, White Nile, 1; Sinkat, 4; Kamisa, Dinder River, 4; White Nile, lat. 13°, 1; Port Sudan, 1; Wad Medina, 1.

DIAGNOSIS: Nuchal spot, bases of ears, forelegs, throat patch, and a thin line on the posterior lateral part of the body, extending onto the hind leg as far as the ankle, near Ochraceous-Buff. This latter line separating the dorsal color from the pure white belly. All white hairs of belly white to the base. Ears darker than any pure color on body but anterior margin of ear with a thin line of Ochraceous-Buff. Dorsum with broadly black-tipped hairs, giving a very dark appearance. Tail white below and with a thin black line on the dorsal surface. Eye completely surrounded by a white ring. Chin, belly, inside of forelegs and hindlegs, pure white. Skull, in dorsal outline, curved; postorbital processes reach frontals above zygomatic arches; nasals relatively short but narrow; upper cheek teeth relatively light; bullae relatively small; choanae nearly parallel sided.

MEASUREMENTS OF THE TYPE SPECIMEN: Length of head and body 439; length of tail 79; length of hind foot 105; length of ear 110; greatest length of skull 85.6; condyloincisive length 73.5; greatest width across zygomatic arches 39.5; least interorbital width 17.8; breadth of braincase 28.3; median length of nasals 29.1; greatest width of nasals 18.2; length of palatal foramina 20.6; width of palatal foramina 9.5; width of choanae opposite M^3 7.4; alveolar length of upper molar series 12.6.

COMPARISONS: *Lepus capensis dinderus* may be distinguished from *Lepus capensis isabellinus* in its generally darker color, somewhat larger size, and the peculiarity of the doming of the cranium as opposed to a relatively flat dorsal outline in the latter.

From *Lepus capensis aegyptius, L. c. dinderus* differs in: General ground color of pelage gray instead of brown, somewhat larger size, and the doming of the cranium.

Lepus capensis dinderus differs from *L. c. hawkeri* in: Lighter color, broader interorbital region of the skull, smaller auditory bullae, wider basioccipital region, and wider mesopterygoid fossae.

REMARKS: *Lepus capensis dinderus* has a rather wide range north of the central swamps of the Sudan. Its place is taken farther to the south by *Lepus capensis crawshayi*, from which it differs in somewhat

smaller size and brighter color. Of the subspecies of *Lepus capensis* found in the Sudan, *hawkeri* is the most nearly related yet the most distantly removed geographically.

***Lepus capensis hawkeri* Thomas**

FIGURE 3,*d*

Lepus hawkeri Thomas, Ann. Mag. Nat. Hist., ser. 7, vol. 8, p. 277, October 1911. (Kaka, White Nile.)

SPECIMENS EXAMINED: Twenty-one, all in BM, from: Kaka, White Nile, 1; Zalingei, 5; Kulme, Wadi Aribo, 3; 75 miles east of El Fasher, 1; 50 miles east of El Obeid, 1; Gerazi, 1; Dorila Lakes, Jebel Marra, 1; 70 miles west of Nahud, 1; Juga Juga, 15 miles east-northeast of El Fasher, 1; Malhab, 1; Agageh Wells, 2; Jebel Ahmed Aga, 3.

MEASUREMENTS: An adult male from Zalingei and an adult female from Kulme, Wadi Aribo, measure respectively as follows: Length of head and body 470, 490; length of tail 85, 100; length of hind foot 104, 112; length of ear 103, 112; greatest length of skull 85.9, 90.8; median length of nasals 35.6, 38.7; least interorbital width 17.1, 19.1; greatest width across zygomatic arches 38.2, ?; condyloincisive length 76.3, 79.9; alveolar length of upper molar series 16.2, 16.5; breadth of braincase 33.8, 34.9.

REMARKS: This is the darkest subspecies of hare to be found in the Sudan. This darkness is the result of the broad black tips of the hairs of the dorsum. The skull is peculiar in that in dorsal outline it is "domed" and not flattened as in *L. c. isabellinus* and *L. c. aegyptius*. In all other aspects *hawkeri* is quite typical of what is now considered to be the species *capensis*.

***Lepus capensis isabellinus* Cretzschmar**

FIGURE 3,*d*

Lepus isabellinus Cretzschmar, *in* Rüppell, Atlas zu der Reise im nördlichen Afrika von Rüppell, pt. 1, Säugethiere, p. 52, pl. 20, 1826. (Deserts southwest of Ambukol, Sudan.)

SPECIMENS EXAMINED: Sixteen, all in BM, from: Shereik, 2; Kerma, 6; Shendy, 8.

MEASUREMENTS: No measurements are available for animals from the Sudan, but an adult male and an adult female from Naikhala, Upper Egypt, which agree in detail with specimens from the Sudan, respectively measure as follows: Length of head and body 420, 435; length of tail 92, 90; length of hind foot 103, 105; length of ear 115, 120; greatest length of skull 82.5, 82.5; median length of nasals, 35.2, ?; least interorbital width 17.2, 13.4; greatest width across zygomatic

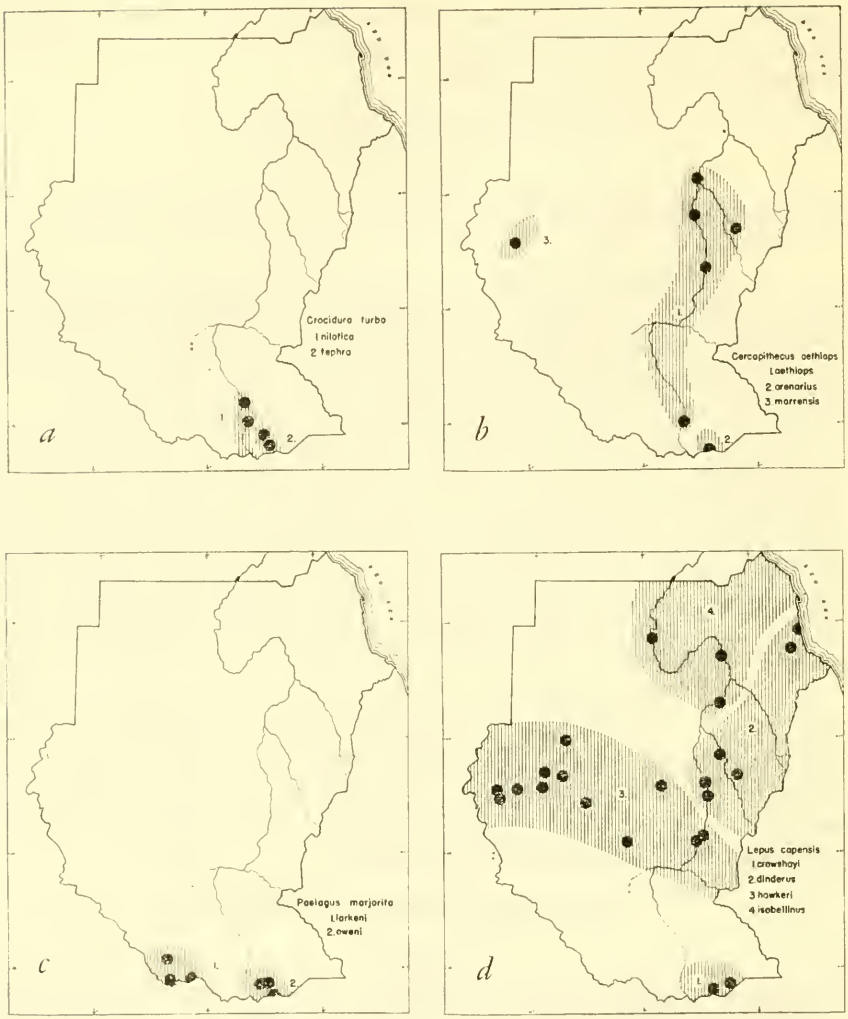

FIGURE 3.—Distribution of *Crocidura* (in part), *Cercopithecus*, *Poëlagus*, and *Lepus* (in part) in the Anglo-Egyptian Sudan. (Scale: 1 inch=400 miles.)

arches 39.8, 39.4; condyloincisive length 72.1, 72.8; alveolar length of upper molar series 15.1, 15.6; breadth of braincase 32.6, 33.3.

REMARKS: These animals are the lightest in color of any of the hares found in the Sudan. The skull is characterized by having the postorbital constriction relatively broad, the palatal bridge narrow, the pterygoid fossa constricted more than is usual, and the upper incisors quite narrow at the cutting edge.

***Lepus victoriae microtis* Heuglin**

FIGURE 4,*a*

Lepus microtis Heuglin, Leopoldina, vol. 5, p. 32, June 1865, *in* Nova Acta Acad. Caes. Leop.-Carol., Halle, p. 24, 1865. ("Lande der Ridj.," Bahr-el-Ghazal.)

SPECIMENS EXAMINED: Five, from: Nimule, 1; Torit, 1; *Bor District*, 2 (BM); Gondokoro, 1 (BM).

MEASUREMENTS: An adult female from Nimule measures as follows: Total length 507; length of tail 90; length of hind foot 99; length of ear 100; greatest length of skull 88.5; condyloincisive length 75.8; greatest width across zygomatic arches 38.9; least interorbital width 16.9; breadth of braincase 28.0; median length of nasals 30.6; greatest width of nasals 19.5; length of palatal foramina 22.3; width of palatal foramina 8.7; width of choanae opposite M^3 7.2; alveolar length of upper toothrow 16.7.

REMARKS: The specimen from Nimule is somewhat darker than the one from Torit, but both specimens are darker than any identified as *victoriae;* both are in color about as in *kakumegae* but cranially are more nearly like *microtis* as identified in the collection.

These specimens are darker than *L. c. crawshayi* and are, in general, larger in all measurements except in length of tail and length of hind foot.

Ellerman and Morrison-Scott refer this subspecies to the species *europaeus*, but from the material available at this time I prefer to use the specific name *victoriae* since there are pelage and cranial differences which appear to separate these animals from the European and Middle Eastern specimens of *europeaus*.

If the few specimens of hares available in the U. S. National Museum are any criterion, then Ellerman and Morrison-Scott are wrong in their assignation of practically all of the hares of Africa to *capensis* and *europaeus* since our material does not conform to the standards of occipitonasal length established to separate the two species.

Order RODENTIA

Family SCIURIDAE

SUBFAMILY Sciurinae

***Tamiscus emini gazellae* Thomas**

FIGURE 4,a

Tamiscus emini gazellae Thomas, Ann. Mag. Nat. Hist., ser. 9, vol. 1, p. 34, January 1918. (Meridi (=Maridi), Bahr-el-Ghazal.)

SPECIMENS EXAMINED: Six, all in BM, from: Maridi, 4; Bahr-el-Ghazal, 1; Aggar Forest, lat. 4°40′ N., long. 29°47′ E., 1.

MEASUREMENTS: The skull of the type specimen, an adult male for which no external measurements are available, measures as follows:

Greatest length 35.2; greatest width across zygomatic arches 19.5; length of nasals 8.9; crown length of upper toothrow 5.7.

REMARKS: It is apparent that this small chipmunk-like squirrel has reached the northern limit of its distribution where the Congo forest extends into the Sudan. These animals appear to be common in the Congo, where they have undergone a great amount of differentiation but appear to be relatively rare in the Sudan.

Unfortunately, all of the skulls in this small series are so badly broken that only on the type could cranial measurements be taken.

***Heliosciurus gambianus bongensis* (Heuglin)**

Sciurus bongensis Heuglin, Reise in Nordost-Afrika, vol. 2, p. 59, 1877. (Bahr-el-Ghazal.)

SPECIMENS EXAMINED: Six, all in BM, from: *Bahr-el-Ghazal*, 2; Tobbo, 2; Chak Chak, 1; Khor Gitti, 1.

MEASUREMENTS: No external measurements are available for adult animals, but the skull of an adult male from Khor Gitti measures as follows: Greatest length 42.3; condyloincisive length 37.4; greatest width across zygomatic arches 24.9; length of nasals 11.9; crown length of upper toothrow 8.2.

REMARKS: This subspecies is not too uniform in color from the localities examined but it is appreciably darker than *canaster* from the Jebel Marra. The underparts are faintly buffy as opposed to white in *canaster*. The perineal region is bright rufous in *bongensis*.

The skulls of this subspecies may be distinguished from those of *canaster* by the shorter nasals, smaller bullae, and a smaller but more rounded braincase.

***Heliosciurus gambianus canaster* Thomas and Hinton**

FIGURE 4,b

Heliosciurus bongensis canaster Thomas and Hinton, Proc. Zool. Soc. London, p. 256, July 6, 1923. (Foothills of the Jebel Marra.)

SPECIMENS EXAMINED: Four, all in BM, from the type locality.

MEASUREMENTS: The type, an adult male, and two adult females from the type locality, respectively measure as follows: Length of head and body 178, 173, 171; length of tail 217, 187, 208; length of hind foot 44, 42, 45; length of ear 15.5, 19, 15; greatest length of skull 43.7, 43.7, 43.6; condyloincisive length 38.2, 38.2, 37.9; greatest width across zygomatic arches 25.5, 26.4, 25.4; length of nasals 13.6, 13.7, 13.0; crown length of upper toothrow 8.6, 8.1, 8.4.

REMARKS: Insofar as color is concerned, *H. g. canaster* and *H. g. lateris* approach one another quite closely. In the former, though, the color is just a bit less intense and the rufescent perineal region, absent entirely in the latter, is present to a slight degree.

In one of the specimens pelage change is occurring on the tail and the new hairs are coming in a strikingly banded black, white, and gray pattern while the old hairs have faded to a rather uniform brown.

Heliosciurus gambianus hoogstraali Setzer

FIGURE 4,b

Heliosciurus gambianus hoogstraali Setzer, Proc. Biol. Soc. Washington, vol. 67, p. 87, Mar. 22, 1954. (Ikoto, Torit District.)

SPECIMENS EXAMINED: Sixteen, from: Ikoto, 9; Torit, 6; Obbo, 1.

MEASUREMENTS: Averages and extremes for six males and three females from Ikoto are, respectively, as follows: Total length 430.1 (410–445), 423 (417–426); length of tail 227.7 (213–242), 207 (204–209); length of hind foot 51.6 (51–53), 51.6 (51–52); length of ear 16.6 (15–17.5), 17 (16–18); greatest length of skull 48.4 (46.5–49.9), 49.2 (48.6–49.7); condyloincisive length 43.0 (40.7–44.9), 43.9 (43.5–44.6); greatest width across zygomatic arches 28.4 (26.6–29.2), 28.7 (28.6–29.0); length of nasals 14.9 (14.2–15.6), 15.1 (15.0–15.2); crown length of upper toothrow 9.2 (8.8–9.5), 9.1 (8.8–9.3).

REMARKS: This is the largest and darkest of the subspecies of *H. gambianus* found in the Sudan. Intergradation with *H. g. omensis* and *H. g. lateris* is apparent in the single specimen available from Obbo and in three of the six specimens from Torit.

Heliosciurus gambianus lateris Thomas

FIGURE 4,*b*

Heliosciurus multicolor lateris Thomas, Ann. Mag. Nat. Hist., ser. 8, vol. 4, p. 102, August 1909. (Lado.)

SPECIMENS EXAMINED: Two, the type and a specimen from Kajo Kaji, 60 miles south of Rejaf, both in BM.

MEASUREMENTS: The type, an adult female, has no external measurements on the tag, but the skull measures as follows: Greatest length 45.5; condyloincisive length 40.4; greatest width across zygomatic arches 26.7; length of nasals 15.4; crown length of upper toothrow 8.5.

REMARKS: This squirrel is intermediate in color between *bongensis* farther to the west and *madogae* to the east. In this respect only is it intermediate, since in cranial characters there is no evidence of there being any intergradation.

This complex of *gambianus* squirrels occurring in the southern Sudan is rather inexplicable. It seems without reason that three subspecies could occupy so small a geographic area as is apparent. Yet, when specimens are examined, there are morphological characters of the cranium as well as color differences of the skin to warrant the separation of these kinds.

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Heliosciurus gambianus madogae Heller

FIGURE 4,*b*

Heliosciurus multicolor madogae Heller, Smithsonian Misc. Coll., vol. 56, No. 17, p. 1, Feb. 28, 1911. (Uma, 50 miles north of Nimule.)

SPECIMEN EXAMINED: The type.

MEASUREMENTS: The measurements of the type specimen are as follows: Length of head and body 202; length of tail 204; length of hind foot 44; condyloincisive length of skull 41.5; greatest width across zygomatic arches 27.5; length of nasals 14.0; crown length of upper toothrow 9.0.

REMARKS: Intergradation between this form and *hoogstraali* has been shown in specimens from Torit. Even though the type localities of these two forms are rather close together, there are color and cranial differences which separate them readily. In color, they may be separated by the belly which is white in *hoogstraali* and buffy in *madogae*. The skulls may be distinguished by the following: in *hoogstraali* the skull is larger, has larger auditory bullae, has the braincase less rounded, and with the upper toothrows parallel and not diverging posteriorly.

It would be interesting to have more examples of these squirrels from this area for a more critical analysis of their characters. It may well be that, when more material is available, especially from the type locality of *madogae*, the name *hoogstraali* will have to fall as a synonym; however, for the present and based on available material, the two kinds are readily separable.

Euxerus erythropus chadensis Thomas

FIGURE 4,*c*

Euxerus erythropus chadensis Thomas, Ann. Mag. Nat. Hist., ser. 7, vol. 15, p. 387, April 1905. (Yo, Lake Chad.)

SPECIMENS EXAMINED: Three, all in BM, from: Jebel Meidob, 1; El Fasher, 1; 35 miles west of El Fasher, 1.

MEASUREMENTS: An adult female from Jebel Meidob measures as follows: Length of head and body 248; length of tail 207; length of hind foot 58; length of ear 15; greatest length of skull 57.2; condyloincisive length 52.0; greatest width across zygomatic arches 31.0; length of nasals 17.5; crown length of upper toothrow 11.5.

REMARKS: These animals are far paler in color than any of the surrounding races of this species, and, apparently, the name *chadensis* is to be recognized as occurring in the Sudan. The specimens agree in detail with animals from Yo, Lake Chad, in color and in cranial features.

***Euxerus erythropus leucoumbrinus* (Rüppell)**

FIGURE 4,*c*

Sciurus leucoumbrinus Rüppell, Neue Wirbelthiere zu der Fauna von Abyssinien gehörig . . . , Säugethiere, p. 38, 1835. (Abyssinia, Sennaar, and Kordofan; restricted to Abyssinia by Thomas.)

SPECIMENS EXAMINED: Twenty-seven, from: Torit, 9; Obbo, 1; Katire, 1; Opari, 50 miles southwest of Torit, 1; Soba, Blue Nile, 1 (BM); Roseires, Blue Nile, 5 (BM); *Wadferua, Blue Nile,* 2 (BM); Malek, 1 (BM); Kamisa, Dinder River, 3 (BM); near Gedaref, 1 (BM); *no locality except Sudan,* 2 (BM).

MEASUREMENTS: Averages and extremes of two males and three females, from Torit, are: Total length 444 (425–463), 454 (448–461); length of tail 205 (203–208), 202 (197–207); length of hind foot 67 (66–68), 65 (64–66); length of ear 15.75 (15.5–16), 16.3 (16–17); greatest length of skull 58.0 (56.2–59.8), 60.1 (58.4–61.8); condyloincisive length 52.5 (50.7–54.4), 54.0 (51.5–56.6); greatest width across zygomatic arches 29.6 (29.6), 31.7 (30.9–33.3); length of nasals 16.8 (15.8–18.4), 18.4 (17.2–19.5); length of upper toothrow except P^3 10.1 (9.5–11.8), 11.4 (10.6–11.8).

REMARKS: In general, *E. e. microdon* from British East Africa has a longer narrower rostrum and a more vaulted cranium than does *E. e. leucoumbrinus.* In the present series from Equatoria Province there are skulls which are close approximations to the former in nasals but to the latter in the degree of vaulting; and the converse is seen as well as the intermediate type. However, I feel that the squirrels from this Province are intergrades between *microdon* and *leucoumbrinus* but, owing to the more constant approach in coloration, that they are more referable to the latter.

One specimen from Soba approaches the paleness of *limitaneus* but cranially is identical to *leucoumbrinus*, and it is thus so referred. This paleness of color may be due to seasonal fading of the pelage and not to some genetic factor.

***Euxerus erythropus limitaneus* Thomas and Hinton**

FIGURE 4,*c*

Euxerus erythropus limitaneus Thomas and Hinton, Proc. Zool. Soc. London, p. 255, July 6, 1923. (Zalingei, Darfur.)

SPECIMENS EXAMINED: Eleven, all in BM, from: Kulme, Wadi Aribo, 3; Jebel Marra, 2; Zalingei, 1; Dilling, 2; Chak Chak, 2; Talodi, 1.

MEASUREMENTS: The type, an adult female from Zalingei, and an adult male from Jebel Marra respectively measure as follows: Length

of head and body 270, 316; length of tail 246, 247; length of hind foot 65, 68; length of ear 17, 16; greatest length of skull 62.5, 62.9; condyloincisive length 57.5, 57.6; greatest width across zygomatic arches 33.4, 32.7; length of nasals 19.3, 19.8; crown length of upper toothrow except P^3 11.9, 11.9.

Remarks: The color difference between *limitaneus* and *leucoumbrinus* is quite pronounced. The former is quite pale and rather uniform in color in the series examined, while the latter is relatively dark and not so uniform in the intensity of color. The only specimens showing a deviation in color are those from Dilling and Talodi. The specimens from these two localities are darker than the Jebel Marra material but are lighter than specimens from east of the Nile. In cranial characters they are like *limitaneus*.

Family Cricetidae

Subfamily Lophiomyinae

***Lophiomys imhausi aethiopicus* (Peters)**

Figure 4,*d*

Phractomys aethiopicus Peters, Zeitschr. Ges. Naturw., Berlin, vol. 29, p. 195, 1867. (Maman, north of Kassala, Anglo-Egyptian Sudan.)

Specimen Examined: One, from near Port Sudan, in BM.

Measurements: The above specimen, an adult male, measures as follows: Length of hind foot 42; length of ear 20; greatest length of skull 55.2; condyloincisive length 50.2; length of anterior palatine foramina 8.5; crown length of upper toothrow 11.7; greatest width across zygomatic arches 30.8; length of nasals 17.9; least interorbital width 11.1; greatest breadth of cranial shield 31.9; width of rostrum at level of antorbital foramen 8.5.

Remarks: The subspecific name as used above is only tentative since there appears to be some doubt as to its validity. Certainly the only specimen available was different in color and in general size from typical *imhausi* identified as such in the British Museum. No specimens of typical *aethiopicus* were available for comparison.

Subfamily Gerbillinae

Genus *Gerbillus* Desmarest

Ellerman (1941, pp. 502–503) attempted to group the various species of the subgenus *Dipodillus*. He placed *lowei* in the *campestris* group; *principulus* in the *garamantis* group; *stigmonyx, watersi,* and *mackilligini* in the *dasyurus* group; and *muriculus* in the *simoni* group.

I cannot comment on the species extralimital to the Sudan, but certainly the species found in the Sudan fall into three rather well defined morphological groups. Species in the first group are larger, the bullae are not greatly inflated, the cheekteeth are relatively massive, and the pterygoid fossae are fully open. To this group belong *stigmonyx* and *lowei*. Species in the second group are small bodied, the bullae are enormously inflated, the cheekteeth are small, and the pterygoid fossae are relatively closed owing to the encroachment of the anterior ends of the auditory bullae. To this group belong *watersi, principulus, muriculus,* and *mackilligini*.

In no way can I see that *stigmonyx* and *watersi* are related, but it is quite evident that *principulus* and *watersi* are closely allied and the former may even be only a subspecies of the latter.

The third group of the subgenus would contain the species *bottai*, which agrees with neither of the above groups but has minute auditory bullae and quite open pterygoid fossae. The cheekteeth are even more massive in proportion to the size of the skull than in the group characterized by *lowei* and *stigmonyx*.

Since it is apparent that the groups as proposed by Ellerman are untenable for animals of the Sudan, I would propose that the first complex be known as the *stigmonyx* group; the second as the *watersi* group; and the third as the *bottai* group with the characters as given above.

***Gerbillus (Dipodillus) bottai* Lataste**

FIGURE 4,*d*

Gerbillus bottai Lataste, Le Naturaliste, vol. 4, No. 5, p. 36, Mar. 1, 1882. (Sennaar.)

SPECIMENS EXAMINED: Two from Sennaar, both in BM.

MEASUREMENTS: An adult female from Sennaar has no external measurements, but the skull measures as follows: Greatest length 22.7; condyloincisive length 19.6; length of anterior palatine foramina 3.8; crown length of upper toothrow 3.5; length of auditory bullae 7.4; least interorbital width 4.2; length of nasals 7.8; width of rostrum at level of antorbital foramen 2.8.

REMARKS: This is a relatively dark, short-tailed species, resembling in color *G. mackilligini* but somewhat more pallid. The auditory bullae are extremely minute for a member of the genus, smaller even than in *G. muriculus*. The skull may be distinguished from all of the other species by the small bullae and the extremely wide-open pterygoid fossae. The upper cheekteeth are relatively heavy for such a small skull.

***Gerbillus (Dipodillus) lowei* (Thomas and Hinton)**

FIGURE 4,*d*

Dipodillus lowei Thomas and Hinton, Proc. Zool. Soc. London, p. 261, July 6, 1923. (Jebel Marra, Darfur.)

SPECIMENS EXAMINED: Twenty-four, all in BM, from: Jebel Marra, 12; Southeast Downs, Jebel Marra, 2; *central Jebel Marra*, 10.

MEASUREMENTS: The averages and extremes of two males and three females, from Jebel Marra, are, respectively, as follows: Length of head and body 111 (109–113), 110 (110); length of tail 146 (141–151), 146 (143–152); length of hind foot 25.5 (24–27), 26 (25–28); length of ear 15.5 (15–16), 16 (15–17); greatest length of skull 30.9 (30.5–31.3), 30.7 (29.2–31.7); condyloincisive length 26.9 (26.7–27.2), 26.8 (25.1–28.1); length of anterior palatine foramina 6.0 (5.8–6.3), 5.8 (5.3–6.2); crown length of upper toothrow 4.35 (4.3–4.4), 4.4 (4.3–4.6); length of auditory bullae 9.3 (9.2–9.4), 9.4 (8.8–9.7); least interorbital width 5.3 (5.2–5.4), 5.3 (5.1–5.5); length of nasals 11.7 (11.6–11.9), 11.9 (11.6–12.3); width of rostrum at level of antorbital foramen 3.2 (3.1–3.3), 3.0 (2.9–3.1); greatest width across zygomatic arches 15.6 (15.6), 15.2 (14.9–15.6); greatest breadth of braincase 14.7 (14.7), 14.2 (14.1–14.3).

REMARKS: This species is large and dark, by far the most saturate of any of the gerbils found in the Sudan. The white has been reduced to a minimum on the hands, feet, belly, and cheeks. The tail is dark with a black brush but which is not so well developed as in *G. mackilligini*. The skull is more massive than in *G. stigmonyx* and is quite reminiscent of the skull of the smaller members of the genus *Tatera*.

***Gerbillus (Dipodillus) mackilligini* (Thomas)**

FIGURE 4,*d*

Dipodillus mackilligini Thomas, Ann. Mag. Nat. Hist., ser. 7, vol. 14, p. 158, August 1904. (Wadi Alagi, eastern desert of Nubia, about lat. 22° N., long. 35° E.)

SPECIMENS EXAMINED: Four, all in BM, from Eastern Egyptian desert, lat. 22° N., long. 35° E.

MEASUREMENTS: An adult male and an adult female, from the above locality, respectively measure as follows: Length of head and body 78, 75; length of tail 138, 114; length of hind foot 24, 22; length of ear 14, 12; greatest length of skull 27.0, 26.2; condyloincisive length 23.4, 22.7; length of anterior palatine foramina 4.7, 4.6; crown length of upper toothrow 3.7, 3.8; length of auditory bullae 10.1, 9.5; least interorbital width 4.8, 4.8; length of nasals 10.6, 9.8; width of rostrum at level of antorbital foramen 2.7, 2.6; greatest width across zygomatic arches 13.5, 13.2; greatest breadth of braincase 13.5, 13.4.

Remarks: When compared to *Gerbillus watersi*, *G. mackilligini* is larger and much darker in color and with the tail brush well developed. The extent of the white areas has been markedly reduced. The skull is larger, the molars are markedly larger, and the pterygoid fossae are relatively closed as opposed to quite open in the latter. The auditory bullae are relatively, as well as actually, longer and more inflated. The infraorbital foramina are smaller.

***Gerbillus* (*Dipodillus*) *muriculus* (Thomas and Hinton)**

Figure 4,*d*

Dipodillus muriculus Thomas and Hinton, Proc. Zool. Soc. London, p. 263, July 6, 1923. (Madu, 80 miles northeast of El Fasher.)

Specimens Examined: Two, both in BM, from: Madu, 80 miles northeast of El Fasher, 1; *90 miles northeast of El Fasher*, 1.

Measurements: The type, an adult male, measures as follows: Length of head and body 65; length of tail 82; length of hind foot 18; length of ear 12; greatest length of skull 23.0; condyloincisive length 19.7; length of anterior palatine foramina 3.6; crown length of upper toothrow 3.2; length of auditory bullae 7.8; least interorbital width 4.2; length of nasals 8.9; width of rostrum at level of antorbital foramen 2.3; greatest width across zygomatic arches 11.8.

Remarks: *Gerbillus muriculus*, when compared to *G. principulus*, is smaller and more reddish in color. The dorsal color is carried onto the dorsal surface of the tail in the former and not in the latter. The skull is markedly smaller but the anterior palatine foramina are of the same size. The upper cheekteeth and the auditory bullae are markedly smaller.

The tail appears to have been broken in the type since a paratype has the tail measuring 115 mm.

***Gerbillus* (*Dipodillus*) *principulus* (Thomas and Hinton)**

Figure 4,*d*

Dipodillus principulus Thomas and Hinton, Proc. Zool. Soc. London, p. 262, July 6, 1923. (El Malha, Jebel Meidob, Northern Darfur.)

Specimen Examined: The type.

Measurements: The type, an adult female, measures as follows: Length of head and body 73; length of tail 115; length of hind foot 21; length of ear 11; greatest length of skull 26.1; condyloincisive length 22.6; length of anterior palatine foramina 4.0; crown length of upper toothrow 3.4; length of auditory bullae 10.1; least interorbital width 4.5; greatest width across zygomatic arches 14.3; greatest breadth of skull 14.1.

Remarks: The type is the only known specimen. In color it is very similar to *G. stigmonyx* but has a smaller body with a tail equal to

or nearly equal to the latter. The skull is, in general, smaller, the cheekteeth are decidedly smaller, and the auditory bullae are markedly larger. The pterygoid fossae are less open and the anterior palatine foramina are shorter. In many respects *principulus* is like *watersi* and may eventually prove to be only a subspecies of that form.

***Gerbillus* (*Dipodillus*) *stigmonyx stigmonyx* (Heuglin)**

FIGURE 4,*d*

Meriones stigmonyx Heuglin, Reise in Nordost-Afrika, vol. 2, p. 78, 1877. (Khartoum.)

Gerbillus stigmonyx luteolus Thomas, Ann. Mag. Nat. Hist., ser. 7, vol. 8, p. 275, October 1901. (Duem.)

SPECIMENS EXAMINED: Seven, all in BM, from: Duem, 1; Khartoum, 5; El Kowa, 1.

MEASUREMENTS: An adult female from El Kowa has the following external measurements: Length of head and body 87; length of tail 104; length of hind foot 20. An adult male from Khartoum and the adult female above have, respectively, the following cranial measurements: Greatest length of skull 27.3, 26.5; condyloincisive length 24.8, 23.6; length of anterior palatine foramina 4.9, 4.7; crown length of upper toothrow 3.7, 3.8; length of auditory bullae 9.4, 9.4; least interorbital width 4.9, 4.9; length of nasals 9.9, 9.8; width of rostrum at level of antorbital foramen 2.9, 2.7; greatest width across zygomatic arches 14.2, 14.2; breadth of braincase 13.5, 13.6.

REMARKS: *Gerbillus s. stigmonyx*, when compared to *G. mackilligini*, shows a somewhat longer head and body and a shorter tail. The color is markedly lighter and the heavy brush on the tail found in the latter is not at all pronounced in the former. The skull is narrower at the back, the auditory bullae are markedly less inflated, the anterior palatine foramina are more open and somewhat shorter, the molars are heavier, and the pterygoid fossae are more open. The rostrum is decidedly heavier in *stigmonyx* and the infraorbital foramen is more open.

The type of *luteolus* differs neither in pelage characters nor cranially from any of the specimens from Khartoum, and, assuming the specimens from Khartoum to be topotypes of *G. stigmonyx*, the name *G. s. luteolus* described by Thomas from Duem must fall as a synonym.

***Gerbillus* (*Dipodillus*) *watersi* De Winton**

Gerbillus (*Dipodillus*) *watersi* De Winton, Nov. Zool., vol. 8, p. 399, December 1901. (Shendy, Upper Nile.)

SPECIMENS EXAMINED: Forty-two, all in BM, from: Shendy, 5; Kerma, 2; Shereik, 1; Atbara, 2; Merowe, 7; Khartoum, 10; Abu

Fatima, 1; Port Sudan, 1; *Letti Basin*, 1; Khor Hanoieit, 4; eastern Egyptian desert, lat. 22° N., long. 35° E., 8.

Measurements: An adult male from Shendy measures as follows: Length of head and body 67; length of tail 111; length of hind foot 22; length of ear 11; greatest length of skull 24.4; condyloincisive length 21.6; length of anterior palatine foramina 3.9; crown length of upper molar series 3.1; length of auditory bullae 9.4; least interorbital width 4.5; length of nasals 8.7; width of rostrum at level of antorbital foramen 2.5; greatest width across zygomatic arches 12.6; greatest breadth of braincase 12.5.

Remarks: *Gerbillus watersi* may be distinguished from *G. stigmonyx* by its smaller body size but the same or nearly the same tail length and by the slightly redder color, except near the Red Sea where both species are nearly the same faded dun color. This same lightening in intensity of color is also seen in *G. pyramidum* and in *G. g. sudanensis*, both of which occupy the same geographic range.

The skulls of *watersi* may be separated from those of *stigmonyx* by their smaller size, less open pterygoid fossae, narrower rostra, smaller cheekteeth (relatively, as well as actually), larger bullae, and the smaller anterior palatine foramina of the former.

Gerbillus gerbillus agag Thomas

Figure 5,*a*

Gerbillus agag Thomas, Proc. Zool. Soc. London, p. 296, August 6, 1903. (Agageh Wells, western Kordofan.)

Specimens Examined: Twenty-one, all in BM, from: 25 miles west of En Nahud, 1; *east of En Nahud*, 1; 100 miles west of En Nahud, 2; *56 miles east of El Fasher*, 1; Sayah, 60 miles northeast of El Fasher, 3; 55 miles north of El Fasher, 2; 40 miles west of El Fasher, 4; 90 miles northeast of El Fasher, 1; *105 miles northeast of El Fasher*, 1; *19 miles north of El Fasher*, 1; El Fasher, 2; Khartoum, 1; Umm Keddada, 1.

Measurements: An adult male from El Fasher and an adult female from 19 miles north of El Fasher measure, respectively, as follows: Length of head and body 78, 80; length of tail 119, 113; length of hind foot ?, 23; length of ear 13, 14; greatest length of skull 29.0, 27.1; condyloincisive length 25.2, 23.3; length of anterior palatine foramina 5.2, 4.3; crown length of upper toothrow 3.9, 3.9; length of auditory bullae, 10.4, 9.6; least interorbital width 5.5, 5.4; length of nasals 11.1, 11.2; width of rostrum at level of antorbital foramen 3.0, 2.8; greatest width across zygomatic arches 14.0, 14.2; greatest breadth of braincase 13.8, 13.8.

Remarks: The type of *G. g. agag* is an adult male from Agageh Wells. The standard external measurements are 87–100–24–11.

The skull, though, is so badly broken that no measurements can be taken that would be reliable.

In color and from what remains of the skull, the above specimens agree in all respects and in no way seem to vary from the species *gerbillus* except in the minor characters which are used as criteria for subspecies.

***Gerbillus gerbillus sudanensis*, new subspecies**

FIGURE 5,*a*

TYPE: BM No. 29.5.19.16, adult male, skin and skull, from Port Sudan, Red Sea Province, Anglo-Egyptian Sudan. Obtained July 28, 1928, by E. W. Thomas, original No. 531.

SPECIMENS EXAMINED: Sixteen, all in BM, from: Kerma, 2; Merowe, 1; Wad Habushee, near Shendy, 1; Khor Mog, 2; Khor Hanoieit, 5; Port Sudan, 5.

DIAGNOSIS: Upperparts near Pinkish Cinnamon, purest on sides, flanks, and upper surface of nose. Ears, hands, feet, belly, cheeks to above eyes, postauricular spots, and ventral surface of tail white. Tail brush brownish. Soles of hind feet strongly haired with short white hairs. Skull with short anterior palatine foramina, small molariform teeth, moderately inflated auditory bullae, rostrum relatively short and narrow, nasals relatively short but narrow.

MEASUREMENTS OF TYPE SPECIMEN: Length of head and body 80; length of tail 120; length of hind foot 25; length of ear 12; greatest length of skull 26.2; condyloincisive length 22.4; length of anterior palatine foramina 3.7; crown length of upper toothrow 3.3; length of auditory bullae 9.9; least interorbital width 5.3; length of nasals 9.9; width of rostrum at level of antorbital foramen 2.8; greatest width across zygomatic arches 14.0; breadth of braincase 13.9.

COMPARISONS: From *G. g. agag*, *G. g. sudanensis* differs in lighter color, longer tail, and a brownish instead of blackish brush on the tail. The skull is smaller in all respects, the anterior palatine foramina are shorter, the molars are smaller, the rostrum is narrower and shorter, and the auditory bullae are not so inflated.

G. g. sudanensis may be distinguished from *G. g. gerbillus*, with which it apparently does not come into contact, by its smaller size and somewhat darker color.

REMARKS: There are no morphological differences between *sudanensis* and *agag* except in general size. It is for this reason that *sudanensis* is described as a subspecies of *G. gerbillus*. No intergradation has been demonstrated, but undoubtedly occurs.

***Gerbillus nancillus* Thomas and Hinton**

Gerbillus nancillus Thomas and Hinton, Proc. Zool. Soc. London, p. 260, July 6, 1923. (Plains of Darfur, 45 miles north of El Fasher.)

Specimens Examined: Three, all in BM, from: Haraza, 1; 16 miles east of El Fasher, 1; 45 miles north of El Fasher, 1.

Measurements: The measurements of the type, an adult female, are as follows: Length of head and body 54; length of tail 79; length of hind foot 17; length of ear 11; greatest length of skull 20.5; condyloincisive length 17.8; length of anterior palatine foramina 3.0; crown length of upper toothrow 3.4; length of auditory bullae 7.4; least interorbital width 3.9; length of nasals 6.9; width of rostrum at level of antorbital foramen 2.4; breadth of braincase 10.8.

Remarks: This diminutive gerbil is in color about like *G. g. agag*, but much smaller. The white on the nose, sides, cheeks, and postauricular spots is more extensive than in *agag*. The tail appears almost white except for the minute blackish brush on the distal one-third of the tail. This "brush" is scarcely deserving of the name since it is composed merely of blackish hairs a trifle longer than the lighter hairs meeting it.

***Gerbillus pyramidum pyramidum* E. Geoffroy**

Gerbillus pyramidum E. Geoffroy, Catalogue des mammifères du Muséum National d'Histoire Naturelle, p. 202, 1803. (Near Pyramids of Giza, Giza Province, Egypt.)

G[*erbillus*] *burtoni* F. Cuvier, Trans. Zool. Soc. London, vol. 2, p. 145, May 4, 1838. ("Dahrfur"; according to Flower, the type was an animal which James Burton took to Paris alive in 1833.)

Meriones dongolanus Heuglin, Reise in Nordost-Afrika, vol. 2, p. 79, 1877 (Dongola.)

Specimens Examined: Sixty-eight, all in BM, from: Khartoum, 10; Erkowit, 5; *Nubia*, 1; Dongola, 3; Sabaluka, 2; Shendy, 11; Port Sudan, 4; Khor Hanoieit, 9; Shereik, 2; Kerma, 7; *Hamza*, 6; Haraza, 3; Merowe, 2; Tagbo Hills, 1; Jebel Meidob, 2.

Measurements: An adult male and an adult female from Khartoum respectively measure as follows: Length of head and body 100, 109; length of tail 129, 135; length of hind foot 30, 30; length of ear 15, 15; greatest length of skull 31.7, 32.5; condyloincisive length 27.3, 28.1; length of anterior palatine foramina 5.7, 5.6; crown length of upper toothrow 4.3, 4.4; length of auditory bullae 11.3, 11.2; least interorbital width 5.8, 6.1; length of nasals 12.1, 12.3; width of rostrum at level of antorbital foramen 3.3, 3.3; greatest width across zygomatic arches 16.6, 16.4; greatest breadth of braincase 15.6, 15.4.

REMARKS: Ellerman (1941, p. 509) lists the names *burtoni*, *pygargus*, and *dongolanus* as synonyms of the nominate form. It seems odd that other kinds of gerbils tend to form subspecies over this same area and yet this species does not.

When specimens from the Sudan are compared to topotypes from Giza, there is a decidedly lighter color which becomes progressively lighter as the Red Sea coast is approached. The animals from the Red Sea coast area have, in general, narrower molars than the typical animals but certain few have the teeth as large.

In specimens from Dongola, topotypes of *dongolanus* show no appreciable differences from typical *pyramidum* except in the narrowness of the molars.

A single specimen from Port Sudan is perhaps indicative of an undescribed species in that the auditory bullae are expanded beyond all proportion for *pyramidum* and the color of the pelage is markedly darker.

The specimens from Tagbo Hills and from Jebel Meidob are far paler in color than any other specimens seen. The skulls, however, agree with animals from other localities.

It is not possible, at this time, to tell whether or not one is dealing with several subspecies or merely clinal variation of a single subspecies occupying a vast geographic range. Material from intermediate localities is needed to clarify this problem. It seems rather probable that there is more than one subspecies concerned in the area.

Gerbillus rosalinda St. Leger

Gerbillus rosalinda St. Leger, Ann. Mag. Nat. Hist., ser. 10, vol. 4, p. 295, September 1929. (Abu Zabad, 145 km. southwest of El Obeid, Kordofan.)

SPECIMENS EXAMINED: Four, all in BM, from: Abu Zabad.

MEASUREMENTS: No external measurements are available, but the skull of an adult male from Abu Zabad measures as follows: Greatest length of skull 31.8; condyloincisive length 27.4; length of anterior palatine foramina 5.2; crown length of upper molar series 3.9; length of auditory bullae 11.4; least interorbital width 5.6; length of nasals 13.1; width of rostrum at level of antorbital foramen 3.3; greatest breadth of skull 15.5.

REMARKS: The color of the above specimens is a dark reddish brown with the white reduced markedly on the sides, cheeks, and supraorbital and postauricular spots. The color of the back is carried on to the dorsal surface of the tail until the black hairs of the brush begin. The brush occupies the distal one-third of the tail.

In size, *G. rosalinda* closely approaches *G. pyramidum*, but because of the smallness of the teeth, the conformation of the anterior palatine foramina, and the pterygoid structure it is retained as a separate species for the present.

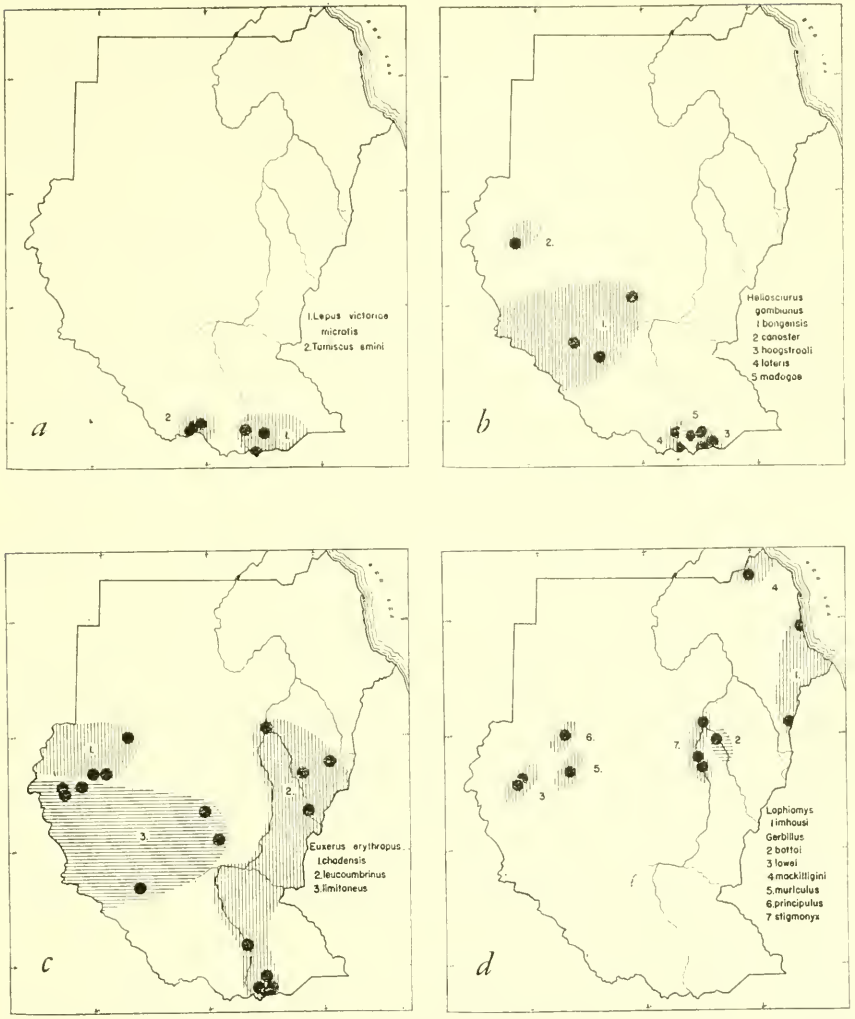

FIGURE 4.—Distribution of *Lepus* (in part), *Tamiscus*, *Heliosciurus*, *Euxerus*, *Lophiomys* and *Gerbillus* (in part) in the Anglo-Egyptian Sudan. (Scale: 1 inch=400 miles.)

***Tatera benvenuta benvenuta* (Hinton and Kershaw)**

Taterona benvenuta Hinton and Kershaw, Ann. Mag. Nat. Hist., ser. 9, vol. 6, p. 97, July 1920. (Bahr-el-Jebel, Mongalla.)

SPECIMENS EXAMINED: Eighty-two, from: Torit, 40 (12, MCZ); Ikoto, 1; Obbo, 1; Nimule, 2; Juba, 2; *Magwe, 36 miles southwest of Torit*, 1 (MCZ); Murukurun, 50 miles east of Torit, 1 (MCZ); *Mura, Lofit Hills*, 1 (MCZ); Loa, 18 miles north of Nimule, 3 (MCZ); central Jebel Marra, 2 (BM); 40 miles north of Bor, 1 (BM); *Eros, Didinga Mts.*, 1 (BM); 60 miles west-southwest of El Fasher, 2 (BM); Bor, 1

(BM); foothills, southern Jebel Marra, 3 (BM); 40 miles west of El Fasher, 1 (BM); Duk Fagioil, 1 (BM); northeastern Jebel Marra, 1 (BM); *Kurra, northeastern Jebel Marra*, 1 (BM); Chak Chak, 3 (BM); Kulme, Wadi Aribo, 5 (BM); *Wadi Kongei, east-central Jebel Marra*, 3 (BM); Mongalla, 2 (BM); Um Dona, 1 (BM); Agur, 1 (BM); Delami, 1 (BM).

Measurements: Average and extreme measurements, respectively, of ten males and three females from Torit are as follows: Length of head and body 160.6 (141–175), 147.5 (141–158); length of tail 159.6 (145–178), 167.5 (154–174); length of hind foot 37.1 (35–38), 37.5 (36–39); length of ear 21 (19–23), 20.5 (19–21); condyloincisive length of skull 35.5 (33.2–37.3), 35.3 (33.1–37.1); greatest length of skull 40.9 (38.2–43.4), 41.1 (38.6–43.1); greatest width across zygomatic arches 21.0 (20.2–22.2), 20.5 (19.5–21.5); least interorbital width 6.7 (6.4–7.0), 6.6 (6.4–6.8); length of nasals 16.1 (14.2–17.9), 16.3 (14.8–17.4); crown length of upper toothrow 6.4 (5.9–6.7), 6.4 (6.2–6.7); length of auditory bullae 11.4 (11.0–11.8), 11.3 (11.1–11.7); depth of braincase at level of auditory bullae 15.6 (14.9–16.3), 16.0 (15.8–16.4).

Remarks: There is no detectable difference in the animals from Torit and those obtained from the Jebel Marra. The amount of variation in any given series is quite remarkable, especially as regards color. All specimens, though, show the lack of the tuft on the tail and the cranial characters are all within a normal range of variation for any given series. The amount of variation noted in color may be explained on the basis of seasonal difference.

Tatera flavipes G. M. Allen

Tatera flavipes G. M. Allen, Bull. Mus. Comp. Zool., vol. 58, p. 331, July 1914. (Aradeiba, above Roseires, Blue Nile.)

Specimen Examined: The type.

Measurements: The type specimen, an adult female, measures as follows: Total length 343; length of tail 172; length of hind foot 40.5; length of ear 23; condyloincisive length of skull 40.5; greatest length of skull 44.0; greatest width across zygomatic arches 22.3; least interorbital width 7.4; length of nasals 16.9; crown length of upper tooth row 6.6; length of auditory bullae 12.2; depth of braincase at level of auditory bullae 16.9.

Remarks: The dorsal color of *flavipes* is somewhat darker than *benvenuta;* the dorsal surface of the tail and the ears are darker; the tail is longer; and the hind foot is decidedly longer and wider. The upper cheekteeth are larger labiolingually; the auditory bullae are larger and more inflated; the rostrum is wider and longer; the upper

incisors are more proodont; the zygomatic arches are more angular; and the braincase is deeper and more rounded dorsally.

The type of *flavipes* is a younger animal than any of the specimens with which it was compared. In spite of its youthfulness it is larger than an adult of *benvenuta*, to which complex it definitely belongs. The tail in *flavipes*, like in *benvenuta* and *soror*, is untufted. This complex is indeed puzzling, and more material is needed to understand the problem of the relationships of these species.

***Tatera macropus* (Heuglin)**

FIGURE 5,*b*

Meriones macropus Heuglin, Reise in Nordost-Afrika, vol. 2, p. 79, 1877. (Bongo, Bahr-el-Ghazal region.)

SPECIMENS EXAMINED: Three, all in BM, from: Halfway between Chak Chak and Dem Zubeir, 2; near Chak Chak, 1.

MEASUREMENTS: An adult male from near Chak Chak has the following measurements: Length of head and body 180; length of tail 170; length of hind foot 35; length of ear 19; condyloincisive length of skull 32.2; greatest length of skull 38.2; greatest width across zygomatic arches 19.1; least interorbital width 6.6; length of nasals 15.5; crown length of upper toothrow 6.0; length of auditory bullae 10.2; depth of braincase at level of auditory bullae 15.2.

REMARKS: These animals are of a decidedly reddish color and have a pronounced tuft on the distal end of the tail. This brush is much more distinct than that in *T. robusta* to which *macropus* is obviously allied and which may eventually prove to be only a subspecies of the former.

***Tatera robusta robusta* (Cretzschmar)**

FIGURE 5,*b*

Meriones robustus Cretzschmar, *in* Rüppell, Atlas zu der Reise im nördlichen Afrika von Rüppell, pt. 1, Säugethiere, p. 75, 1826. (Kordofan.)

SPECIMENS EXAMINED: Thirty-seven, all in BM, from: Jebel Meidob, 4; Naikhala, Upper Egypt, 6; *6 miles west of El Fasher*, 9; 40 miles west of El Fasher, 3; *40 miles west-southwest of El Fasher*, 3; *Kordofan*, 1; 170 miles east of El Fasher, 1; 90 miles east of El Fasher, 1; Tina Wells, 1; 115 miles northeast of El Fasher, 1; *16 miles east of El Fasher*, 1; En Nahud, 1; 55 miles north of El Fasher, 1; *52 miles west-southwest of El Fasher*, 1; El Fasher, 1; 5 miles west of El Obeid, 2.

MEASUREMENTS: An adult male from Naikhala, Upper Egypt, measures as follows: Length of head and body 123; length of tail 170; length of hind foot 33; length of ear 17; condyloincisive length of skull 32.7; greatest length of skull 37.1; greatest width across zygomatic arches 18.2; least interorbital width 6.5; length of nasals 15.0;

crown length of upper toothrow 5.5; length of auditory bullae 9.9; depth of braincase at level of auditory bullae 13.6.

REMARKS: This species may be distinguished from *T. benvenuta* by its generally smaller size, lighter color, and conspicuous brush at the tip of the tail.

Tatera robusta taylori Hatt

FIGURE 5,*b*

Tatera robusta taylori Hatt, Amer. Mus. Nov., No. 791, p. 1, April 11, 1935. (Khor Birum, Red Sea Hills.)

SPECIMENS EXAMINED: Twenty, all in BM, from: Sinkat, 2; Soba, 6; El Kowa, 3; Shendy, 6; *Tamamiel*, 1; Roseires, 1; Sennaar, 1.

MEASUREMENTS: An adult male from Sinkat measures as follows: Length of head and body 129; length of tail 174; length of hind foot 37; length of ear 21; condyloincisive length of skull 32.0; greatest length of skull 39.6; least interorbital width 6.8; length of nasals 16.5; crown length of upper toothrow 5.9; length of auditory bullae 10.3; depth of braincase at level of auditory bullae 14.1.

REMARKS: This subspecies is somewhat paler in general, over-all color than is the nominate form from Kordofan. The auditory bullae are markedly less inflated and the anterior palatine foramina are shorter than in *robusta*. The hamulae are shorter and lighter in structure.

As the Nile or the Abyssinian highlands are approached, the color of the pelage tends to darken.

Tatera soror G. M. Allen

FIGURE 5,*b*

Tatera soror G. M. Allen, Bull. Mus. Comp. Zool., vol. 58, p. 333, July 1914. (Fazogli, Blue Nile.)

SPECIMEN EXAMINED: The type.

MEASUREMENTS: The type, an old adult female, measures as follows: Total length 299; length of tail 158; length of hind foot 34; length of ear 20; condyloincisive length of skull 34.6; greatest length of skull 38.4; greatest width across zygomatic arches 20.2; least interorbital width 6.4; length of nasals 16.3; crown length of upper toothrow 6.2; length of auditory bullae 10.2; depth of braincase at level of auditory bullae 14.3.

REMARKS: The species *soror* is the smallest of the species of *Tatera* occurring in the Sudan. The auditory bullae are small; the rostrum is narrow; and the cheekteeth are as wide as in *benvenuta* but not so massive as in *flavipes*. The anterior palatine foramina are markedly

short and narrow; the braincase is much flattened; the nasals are narrow but relatively long; and the lachrymal bone is small.

The type is an old adult with much-worn teeth. Hinton and Kershaw (1920, p. 99) considered *soror* to be a member of the *benvenuta* complex, which seems to be correct. The tail in both *soror* and *flavipes* is untufted, but whether this is of significance in allocating species to groups is quite questionable.

Genus *Taterillus* Thomas

So far as can be determined at this time, there is no character by which *emini, anthonyi, butleri, rufus, perluteus,* and *clivosus* can be distinguished as species.

Hatt (1934, p. 3) mentions integradation of *anthonyi* with *butleri,* and in certain specimens from Delami, Nuba Mountains, there is what appears to be integradation with *rufus.*

While no actual intergradation can be demonstrated between *gyas* and any of the contiguous kinds, there are certainly no morphological differences to warrant retention of this form as a full species.

The peripheral kinds, *gyas, emini,* and *clivosus,* are all dark in color, while those in the center of the area under consideration are paler and ending in the palest of the group in *perluteus.*

Hatt (1934, p. 3) when describing *anthonyi,* referred to the species *congicus* as a subspecies of *T. emini.* From the degree of morphological difference, and owing to the fact that specimens from Wau are immediately separable as *T. e. butleri* and as *T. congicus,* I feel that *congicus* should stand as a full species until its relationship with an allied species, *T. nigeriae,* has been clarified. It is certainly not a part of the complex known as the *emini* group.

Since *T. rufus* and *T. butleri* are shown to be only subspecies of one species, the name *Gerbillus* (*Taterina*) *lorenzi* Wettstein, which has been considered synonymous with *T. butleri,* should be transferred to the synonymy of *T. e. rufus* which shares its type locality but has page preference.

Color, as such, in these gerbils is relatively constant but there is some divergence in one given population such as may be seen in specimens from the vicinity of El Fasher and from Torit. In comparison with the degree of variation found in the crania (in regard to the auditory bullae, the lateral bowing of the anterior palatal foramina, and other characters) color varies not at all. It is only by comparing the skin and the skull with known specimens that one can arrive at any satisfactory determination.

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Taterillus congicus Thomas

FIGURE 5,*b*

Taterillus congicus Thomas, Ann. Mag. Nat. Hist., ser. 8, vol. 16, p. 147, August 1915. (Poko, Upper Uele River, Belgian Congo.)

SPECIMENS EXAMINED: Three, all in BM, from: Wau, 2; Yei, 1.

MEASUREMENTS: The measurements of an adult male from Yei are as follows: Length of head and body 120; length of tail 140; length of hind foot 33; length of ear 19; condyloincisive length of skull 30.3; greatest length of skull 35.6; length of nasals 14.2; least interorbital width 6.3; length of anterior palatine foramina 6.2; crown length of upper toothrow 5.0; length of auditory bullae 9.0; depth of skull at level of auditory bullae 13.8; greatest width across zygomatic arches 17.2; greatest width of skull 16.3.

REMARKS: *T. congicus* differs from *T. emini* and its subspecies in that the pterygoid fossae are deeper and not so widely flaring, anterior palatine foramina are relatively shorter, the auditory bullae are more inflated anteriorly and antero-laterally, and the anterior portion of the skull is flatter and less decurved. So far as color is concerned there is no discernible difference between the two species. However, when specimens from the same locality are compared they are readily separable by means of the skull.

Taterillus emini anthonyi Hatt

FIGURE 5,*c*

Taterillus emini anthonyi Hatt, Amer. Mus. Nov., No. 708, p. 2, Apr. 4, 1934. (White Nile, west bank, 20 miles south of Jebel Ain.)

SPECIMEN EXAMINED: The type.

MEASUREMENTS: The type, an adult female, measures as follows: Total length 316; length of tail 182; length of hind foot 35; condyloincisive length of skull 33.1; length of nasals 14.7; least interorbital breadth 7.3; length of anterior palatine foramina 7.1; crown length of upper toothrow 4.9; length of auditory bullae 10.0; depth of skull at level of auditory bullae 14.4; greatest width across zygomatic arches 15.8.

REMARKS: The type and one paratype are the only known examples of this subspecies. Hatt, in comparing these two specimens with types in the British Museum, remarked that these were strikingly different but specimens in the British Museum from intermediate localities suggested complete intergradation. It is quite apparent to me also that intergradation does occur with the form immediately to the west, which is *rufus*. For additional remarks see under *T. e. rufus*.

***Taterillus emini butleri* Wroughton**

FIGURE 5,*c*

Taterillus butleri Wroughton, Ann. Mag. Nat. Hist., ser. 9, vol. 6, pp. 293–294, September 1910. (Dugdug, Bahr-el-Ghazal.)

Gerbillus (*Taterillus*) *kadugliensis* Wettstein, Anz. K. Akad. Wiss. Wien, Math.-Nat., vol. 53, p. 151, 1916. (Kadugli, southern Kordofan.)

SPECIMENS EXAMINED: Ten, all in BM, from: Dugdug, 3; Katta, northwest of Wau, 2; *Wau*, 1; Raffili, 4.

MEASUREMENTS: The measurements of the type, an adult female from Dugdug, are as follows: Length of head and body 120; length of tail 150; length of hind foot 29; length of ear 18; condyloincisive length of skull 30.1; greatest length of skull 34.6; length of nasals 14.1; least interorbital width 6.3; length of anterior palatine foramina 6.9; crown length of upper toothrow 4.7; length of auditory bullae 9.0; depth of skull at level of auditory bullae 13.6; greatest width across zygomatic arches 15.9.

REMARKS: For remarks see under the heading of genus *Taterillus*.

***Taterillus emini clivosus* Thomas and Hinton**

FIGURE 5,*c*

Taterillus clivosus Thomas and Hinton, Proc. Zool. Soc. London, p. 258, July 6, 1923. (Kurra, Jebel Marra.)

SPECIMENS EXAMINED: Nineteen, all in BM, from: Jebel Marra, 1; Kurra, northeastern Jebel Marra, 11; Kulme, Wadi Aribo, 7.

MEASUREMENTS: An adult female from Kurra, northeastern Jebel Marra, has the following measurements: Length of head and body 120; length of tail 171; length of hind foot 32; length of ear 18; condyloincisive length of skull 31.3; length of nasals 14.9; least interorbital width 6.3; length of anterior palatine foramina 6.3; crown length of upper toothrow 5.2; length of auditory bullae 9.6; depth of skull at level of auditory bullae 14.0; greatest width across zygomatic arches 18.8; greatest breadth of skull 16.8.

REMARKS: The type, a specimen from Kurra, is aberrant from the rest of the type series in that it is somewhat darker dorsally and has a white tip on the tail. However, the skulls all agree in fundamental details.

One specimen from Kurra, northeastern Jebel Marra, is an apparent intergrade between *clivosus* and *T. e. perluteus*. In color the specimen is intermediate, in the shape of the auditory bullae it is like the latter, and in size it is like the former. In the majority of the cranial characters it is more nearly like *clivosus*.

The series from Kulme, Wadi Aribo, is consistently darker than the type, but in cranial features it is identical with the type.

Taterillus emini emini (Thomas)

FIGURE 5,*c*

Gerbillus emini Thomas, Ann. Mag. Nat. Hist., ser. 6, vol. 9, p. 78, January 1892. (Wadelai, Uganda.)

SPECIMENS EXAMINED: Sixty-two, from: Torit, 34 (13, MCZ); Obbo, 6; Ikoto, 1; Moli, 30 miles north of Nimule, 3 (MCZ); Juba, 1 (BM); Malek, 14 (BM); Mongalla, 2 (BM); *"Upper Nile,"* 1 (BM).

MEASUREMENTS: Averages and extremes for three adult males and three adult females from Torit, are as follows: Length of head and body 119 (106–130), 113 (99–124); length of tail 153 (150–157), 153 (145–160); length of hind foot 32.6 (31–34), 32.6 (31–34); length of ear 18.6 (17–19), 18.6 (18–19); condyloincisive length of the skull 28.0 (27.6–28.4), 28.8 (28.3–29.7); greatest width across zygomatic arches 18.4 (17.8–19.2), 18.1 (17.9–18.2); least interorbital width 6.2 (5.9–6.4), 6.1 (5.9–6.3); length of nasals 13.7 (13.3–14.0), 14.1 (13.7–14.7); crown length of upper toothrow 4.9 (4.7–5.0), 4.9 (4.8–5.0); length of auditory bullae 9.3 (9.0–10.0), 9.1 (8.8–9.4); depth of skull at level of auditory bullae 14.1 (13.8–14.5), 13.9 (13.7–14.0).

REMARKS: The two specimens from Mongalla are much redder in color than are any of the other specimens assigned to this subspecies. This deepening of color, however, appears to be caused by old worn pelage exposing more of the subterminal band of color.

Taterillus emini gyas Thomas

FIGURE 5,*c*

Taterillus gyas Thomas, Ann. Mag. Nat. Hist., ser. 9, vol. 2, p. 150, August 1918. (Kamisa, Dinder River.)

SPECIMENS EXAMINED: Six, all in BM, from Kamisa.

MEASUREMENTS: The type, an adult female, measures as follows: Length of head and body 127; length of tail (not the type) 175; length of hind foot 34; length of ear 21; condyloincisive length of the skull 35.0; greatest length of the skull 39.0; greatest breadth across zygomatic arches 19.5; length of nasals 15.6; least interorbital breadth 7.3; length of anterior palatine foramina 7.2; length of auditory bullae 10.2; crown length of upper molar series 5.5.

REMARKS: See under the heading of genus *Taterillus*.

Taterillus emini perluteus Thomas and Hinton

FIGURE 5,*c*

Taterillus perluteus Thomas and Hinton, Proc. Zool. Soc. London, p. 259, July 6, 1923. (Umm Keddada.)

SPECIMENS EXAMINED: Twenty-three, all in BM, from: Umm Keddada, 5; 35 miles north of El Fasher, 1; 190 miles east of El

Fasher, 1; *Hamza*, 1; El Fasher, 2; 110 miles east of El Fasher, 1; *Madu, 80 miles east of El Fasher*, 1; 60 miles west of El Fasher, 2; 49 miles west-southwest of El Fasher, 3; *35 miles west-southwest of El Fasher*, 1; near Tagbo Hills, 1; 25 miles east of En Nahud, 2; Jebel Meidob, 2.

Measurements: An adult female from Umm Keddada, measures as follows: Length of head and body 116; length of tail 151; length of hind foot 29; length of ear 21; condyloincisive length of skull 31.3; greatest length of skull 36.8; length of nasals 15.0; least interorbital width 6.4; length of anterior palatine foramina 6.0; crown length of upper toothrow 5.0; length of auditory bullae 10.4; depth of skull at level of auditory bullae 14.1; breadth of braincase 16.6.

Remarks: Intergradation with *T. e. rufus* is noted in the two specimens from near En Nahud in the intermediacy of color and in the shape and degree of inflation of the auditory bullae. The same characters indicate intergradation in the specimens from west-southwest of El Fasher with *clivosus*.

***Taterillus emini rufus* (Wettstein)**

Figure 5,*c*

Gerbillus (*Tatera*) *rufa* Wettstein, Anz. K. Akad. Wiss. Wien, Math.-Nat., vol. 53, p. 131, 1916. (El Obeid.)

Gerbillus (*Taterina*) *lorenzi* Wettstein, Anz. K. Akad. Wiss. Wien, Math.-Nat., vol. 53, p. 152, 1916. (El Obeid.)

Specimens Examined: Twenty-two, all in BM, from: 20 miles west of El Obeid, 1; 50 miles west of El Obeid, 4; Agur, 6; Nuba Mountains, 5; Delami, 5; Um Dona, 1.

Measurements: An adult male from 20 miles west of El Obeid, measures as follows: Length of head and body 130; length of tail 175; length of hind foot 32; length of ear 21; condyloincisive length of skull 33.0; length of nasals 15.6; least interorbital width 6.9; length of anterior palatine foramina 7.1; crown length of upper toothrow 5.1; length of auditory bullae 10.1; depth of skull at level of auditory bullae 14.5; breadth of braincase 16.4.

Remarks: Specimens from the Nuba Mountains appear to be intermediate in several characters between *T. e. butleri* and *T. e. rufus*. This intermediacy is demonstrated in the color of the pelage and the size and shape of the auditory bullae. In all other characters of the skull, though, they are more nearly like *rufus*.

The five specimens from Delami appear to be intergrades in color and size with *T. e. anthonyi*.

Hatt (1934, p. 3) states that specimens from 50 miles west of El Obeid are in many respects intermediate between *T. e. butleri* and *T. e. anthonyi*. Apparently Hatt overlooked the paper by Wettstein

in 1916 in which he proposed the name *rufus* with the type locality at El Obeid. Certainly the material available for study has shown that the animals from the vicinity of El Obeid are different than any of the surrounding kinds and that the name *rufus* should stand. It is also apparent that the name *T. e. anthonyi* is valid but that the range of this subspecies lies between the Nile and the Nuba Mountains, where the characters of *rufus* and *anthonyi* blend.

Desmodilliscus braueri Wettstein

Desmodilliscus braueri Wettstein, Anz. K. Akad. Wiss. Wien, Math.-Nat., vol. 53, p. 153, 1916. (Between Um Ramad and Nubbaka, south of El Obeid, Kordofan.)

Specimens Examined: Two, both in BM, from: 75 miles west of El Obeid, 1; 140 miles east of El Fasher, 1.

Measurements: An adult male from 75 miles west of El Obeid measures as follows: Length of head and body 57; length of tail 45; length of hind foot 15; greatest length of skull 21.8; condyloincisive length 18.5; crown length of upper toothrow 2.9; length of auditory bullae 9.3; least interorbital width 4.0; length of nasals 7.7; width of rostrum at level of antorbital foramen 2.6.

Remarks: This is a small, short-tailed, silky furred mouse with pronounced postauricular white spots. The hind feet are long in proportion to the body. The skull is small but robust and with the auditory bullae occupying an inordinate amount of the total size. The bullae are readily visible from above and encompass the condyles below. Both pairs of palatine foramina are long and wide open.

Meriones libycus pallidus Bonhote

Meriones crassus pallidus Bonhote, Abstr. Proc. Zool. Soc. London, No. 103, p. 3, February 13, 1912. (Atbara.)

Specimens Examined: Eight, all in BM, from: Atbara, 3; Berber, 2; Shereik, 1; Kerma, 2.

Measurements: An adult male and an adult female from Atbara measure, respectively, as follows: Length of head and body 127, 126; length of tail 110, 130; length of hind foot 28, 31; length of ear 17, 16; greatest length of skull 39.9, 38.5; condyloincisive length 35.4, 33.5; crown length of upper toothrow 4.9, 4.8; length of auditory bullae 16.4, 16.1; greatest width across zygomatic arches 21.1, 19.5; least interorbital width 6.5, 5.8; length of nasals 14.3, 14.3; breadth of braincase 22.2, 21.5.

Remarks: The genus *Meriones* is a North African element penetrating along with the desert into northern Sudan from Egypt. Its main distribution lies to the north and east into western Asia.

The two specimens from Kerma are somewhat paler in color than are the animals from Atbara. This may be due to a difference in pelage owing to season. The skulls, however, present no peculiarities.

***Psammomys obesus elegans* Heuglin**

Psammomys elegans Heuglin, Reise in Nordost-Afrika, vol. 2, p. 80, 1877. (Suakin.)

Specimens Examined: Four, all in BM, from Port Sudan.

Measurements: An adult male and an adult female from Port Sudan measure, respectively, as follows: Length of head and body 162, 140; length of tail 136, 125; length of hind foot 35, 31; length of ear 13, 11; greatest length of skull 39.8, 38.8; condyloincisive length 36.1, 35.9; crown length of upper toothrow 5.9, 5.9; length of auditory bullae 13.7, 13.4; greatest width across zygomatic arches 22.5, 22.4; least interorbital width 6.6, 6.5; length of nasals 13.8, 13.7; greatest breadth of braincase 22.7, 22.8.

Remarks: These specimens are quite reddish and lack the black wash on the dorsal surface of the body which is so typical of other members of the genus. The belly is decidedly lighter in color but still heavily washed with buff. The hands and feet are as the color of the belly, the black tip of the tail occupies about one-fourth of the total length.

Ellerman (1951, p. 538) considers *elegans* to be a synonym of *obesus*. This is not the case, however. The population, as judged by the specimens from Port Sudan, vary to the same degree from typical *obesus* as does *nicolli*. Although no actual intergradation can be demonstrated from the few specimens available, I cannot agree with Allen (1939, p. 330) that this is a good species nor can I agree with Ellerman (loc. cit.) that this a synonym of *obesus*. Thus I prefer to express its taxonomic position in the above combination.

In general, these animals resembly *Meriones* but are grosser in appearance. The skulls are grosser, the incisor faces are plain, the bullae are not so inflated ventrally, and the supramcatal triangle is nearly obliterated.

Family Muridae

Subfamily Murinae

***Grammomys macmillani erythropygus*, new subspecies**

Figure 5,*d*

Type: CNHM No. 67061, adult male, skin and skull, from Obbo, Torit District, Anglo-Egyptian Sudan. Obtained March 22, 1950, by Harry Hoogstraal, original No. 5321.

Specimens Examined: Sixty-three, from: Malek, 1 (BM); *Obbo*, 37; *Torit*, 19 (4, MCZ); Lokwi, 25 miles southwest of Torit, 1; *Katire*,

1; Ngaboli, 47 miles north of Torit, 1 (MCZ); *Ngabara, near Obbo*, 1 (MCZ); *Talanga Forest, Imatong Mountains*, 1 (MCZ); Gilo, Imatong Mountains, 1 (MCZ).

Diagnosis: Upperparts of mixed coloration; anteriorly grayish brown with some admixture of Sayal Brown gradually shading at about the middle of the back into primarily Sayal Brown intermixed with black-tipped hairs, thus presenting a "2-toned" appearance; color of anterior and posterior parts of the dorsum shading over the sides into a neutral grayish color which is bordered ventrally by a thin line of Pinkish Buff extending from the forearm along the sides and over the flanks onto the lower leg. Upper lips, under side of forelegs, under parts of thighs and entire belly pure white; tail brownish and indistinctly bicolor. Skull relatively large and robust; dorsal outline relatively flat, rostrum short and broad, anterior palatine foramina relatively short, and auditory bullae relatively large.

Measurements of the Type Specimen: Length of head and body 107; length of tail 180; length of hind foot 25; length of ear 20; greatest length of skull 29.3; condylobasal length 24.5; least interorbital width 4.5; length of nasals 10.4; crown length of upper toothrow 4.4.

Comparisons: *G. m. erythropygus* is in color like *G. s. elgonis*, but the skull is flatter, the upper cheek teeth are wider, the auditory bullae are somewhat larger, anterior palatine foramina are shorter, and the basioccipital is narrower.

The present-named form is like the type and a paratype of *G. m. gazellae* in color but the skull is larger in all measurements taken except for the length of the anterior palatine foramina, which are shorter.

G. m. erythropygus differs from the type of *G. macmillani* in that the color is less intense and does not extend so far forward on the body. The skull of the former is larger, the anterior palatine foramina are longer, the posterior choanae are wider and longer, the auditory bullae are larger, and the palate is somewhat wider.

From the type of *G. surdaster*, *G. m. erythropygus* differs in less intense color, the skull is flatter in dorsal outline, the auditory bullae are somewhat larger, the anterior palatine foramina are narrower and longer, and the rostrum is somewhat heavier.

The color of *G. m. aridulus* is decidedly paler than is *G. m. erythropygus*. The skull is about the same size but *aridulus* has the anterior palatine foramina somewhat shorter and the zygomatic arches are somewhat heavier.

From a paratype of *G. s. polionops* the present subspecies differs in a lighter color throughout. The skulls are larger, the anterior palatine foramina longer, the posterior choanae wider, the palate is wider, the

auditory bullae are somewhat larger, and the rostrum is somewhat heavier.

Remarks: From the degree of variation as may be noted in the section on comparisons, it is apparent that none of the characters formerly used to separate *G. macmillani* and *G. surdaster* are of more than subspecific worth. The characters usually associated with *surdaster* may be found in the types of *macmillani* and the converse is also true. I feel, therefore, since these characters are duplicated and do overlap to a great degree, that the animals formerly known as *surdaster* should now be called *macmillani*. The names in question are: *Grammomys macmillani surdaster, G. m. insignis, G. m. polionops, G. m. littoralis, G. m. callithrix,* and *G. m. discolor.*

Grammomys macmillani aridulus Thomas and Hinton

Figure 5,*d*

Grammomys aridulus Thomas and Hinton, Proc. Zool. Soc. London, p. 268, July 6, 1923. (Kulme, Wadi Aribo.)

Specimen Examined: The type.

Measurements: The type, an adult male, measures as follows: Length of head and body 115; length of tail 175; length of hind foot 24; length of ear 18; greatest length of skull 29.4; condylobasal length 24.6; zygomatic width 14.3; least interorbital width 4.5; length of nasals 11.0; crown length of upper toothrow 4.3.

Remarks: *G. m. aridulus* is the palest of any of the subspecies of this genus occurring in the Sudan. The anterior palatine foramina are shorter than in any of the other kinds.

Since the type is the only known specimen, it is with some misgiving that I assign it to the species *macmillani.* However, in all of the characters of the skull and skin there is no one character by which it might be accorded specific rank and by assigning the type to this species probably more nearly expresses the true relationship.

Grammomys macmillani gazellae (Thomas)

Figure 5,*d*

Thamnomys macmillani gazellae Thomas, Ann. Mag. Nat. Hist., ser. 8, vol. 5, p. 282, March 1910. (Chak Chak, Bahr-el-Ghazal.)

Specimens Examined: Six, all in BM, from: Bendele, Yambio District, 1; *"Upper Nile,"* 1; Tembura, 1; Chak Chak, 2; *Loavie, near Fort Berkeley,* 1.

Measurements: The measurements of an adult male paratype from Chak Chak are as follows: Length of head and body 105; length of tail 165; length of hind foot 28; greatest width across zygomatic

arches 13.0; least interorbital width 4.1; length of nasals 9.6; crown length of upper toothrow 4.0.

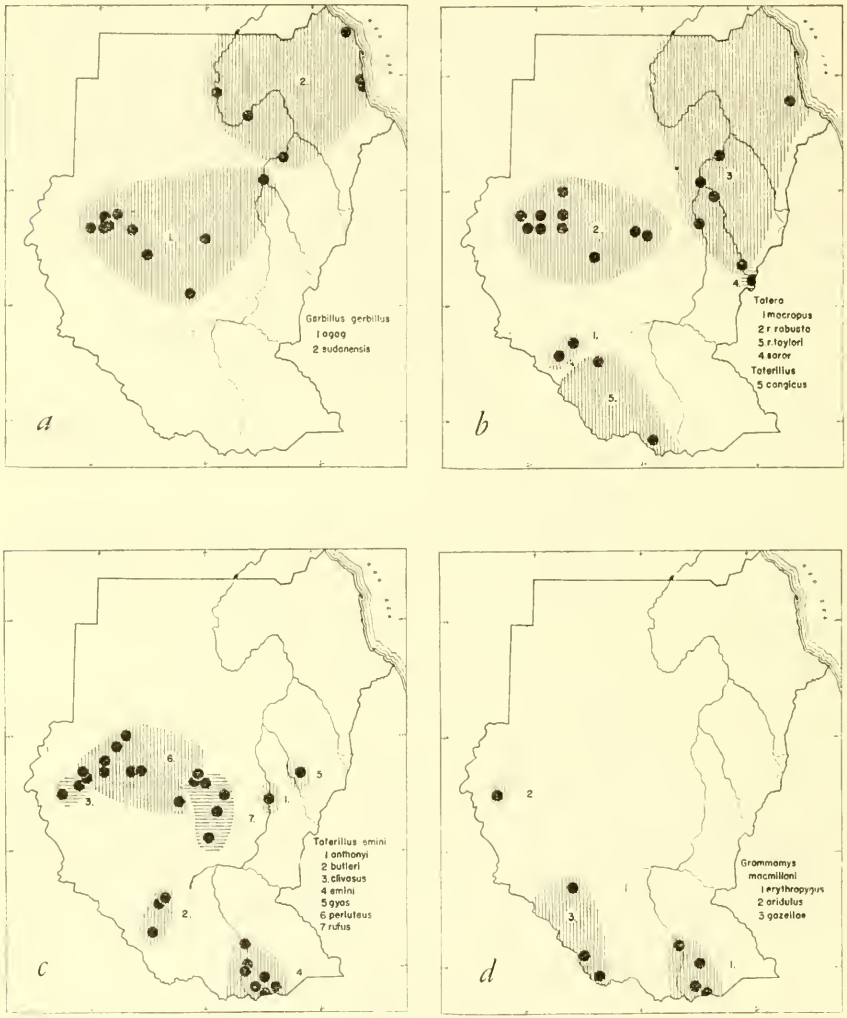

FIGURE 5.—Distribution of *Gerbillus* (in part), *Tatera*, *Taterillus*, and *Grammomys* in the Anglo-Egyptian Sudan. (Scale: 1 inch=400 miles.)

REMARKS: Both the type and the paratype of this subspecies have broken skulls so that no complete measurements are possible. This subspecies seems to be the smallest of the group found in the Sudan.

Apparently the distribution of this form lies to the west of the Nile and to the east of the Jebel Marra. While no actual intergradation of the various kinds has actually been demonstrated, they are here

considered all to belong to one species since the characters for each of them show a considerable degree of overlapping.

***Oenomys hypoxanthus talangae*, new subspecies**

TYPE: MCZ No. 45315, adult female, skin and skull, from Talanga Forest, 3,000 ft., Imatong Mountains, Equatoria Province, Anglo-Egyptian Sudan. Obtained July 10, 1950, by J. S. Owen, original No. 1338.

SPECIMENS EXAMINED: Two, from the Talanga Forest.

MEASUREMENTS OF THE TYPE SPECIMEN: Length of head and body 175; length of tail 203; length of hind foot 34; greatest length of skull 39.6; condyloincisive length 35.4; length of anterior palatine foramina 7.6; crown length of upper toothrow 6.6; least interorbital width 5.4; breadth of rostrum at level of antorbital foramen 5.0; length of nasals 15.8; greatest width across zygomatic arches 17.9.

DIAGNOSIS: General over-all color of upperparts near Argus Brown; the line of pure color separating dorsal color from pure white belly and pure color on flanks and thighs near Pinkish Cinnamon; pure color of nose near Tawny; entire underparts and undersurfaces of arms and legs pure white, all hairs white to base; tail nearly naked and rather uniformly colored; hands and feet dark grayish brown. Skull relatively long and slender; nasals long and rather wide; rostrum wide; auditory bullae relatively small; upper cheekteeth relatively small; anterior palatine foramina relatively short and widely flaring; braincase relatively long.

COMPARISONS: From *Oenomys hypoxanthus unyori*, *O. h. talangae* differs in much darker dorsal color, less rufous on the rump, and less definite line of demarcation between the dorsal color and the pure white belly. The nasals are longer, the braincase is longer, the anterior palatine foramina are larger, the auditory bullae are larger, and the rostrum is narrower.

O. h. talangae differs from *O. h. editus* in generally darker color and less rufous on the nose and rump. The skull has longer nasals, smaller auditory bullae, and a wider rostrum.

O. h. vallicola differs from *O. h. talangae* in generally lighter color, more rufous on rump and nose, shorter tail, and somewhat larger ears. The skull is smaller, the upper toothrow longer and the individual teeth wider, the anterior palatine foramina longer and narrower, auditory bullae larger, and the rostrum shorter and narrower.

REMARKS: The subspecies to which *O. h. talangae* is most closely related is *O. h. unyori*, from which it differs as set forth above. It is interesting that this new subspecies has the rufous of the rump and nose so much reduced. The types of *bacchante*, *moerens*, and *oris* are all so brightly colored that *talangae* needs no comparison with them.

Mylomys cunninghamei christyi Thomas

Mylomys christyi Thomas, Ann. Mag. Nat. Hist., ser. 8, vol. 20, p. 362, November 1917. (Mount Baginzi, Bahr-el-Ghazal.)

SPECIMENS EXAMINED: Two, both in BM, from Mount Baginzi.

MEASUREMENTS: No external measurements are available for a male, but an adult female from Mount Baginzi measures as follows:

Length of head and body 135; length of tail 140; length of hind foot 34; length of ear 19.

The cranial measurements of an adult male and the same female above are, respectively, as follows: Greatest length of skull 31.4, 33.4; condyloincisive length 28.8, 30.8; crown length of upper toothrow 14.8, 16.0; greatest width across zygomatic arches 7.7, 7.2; least interorbital width 4.1, 4.6; length of nasals 12.4, 12.8; width of rostrum at level of antorbital foramen 4.0, 4.3.

REMARKS: All of the kinds of *Mylomys* have a grizzled appearance on the dorsum similar to that found in *Arvicanthis*, but the hairs are longer and much glossier than in that genus. The tail is more pronouncedly bicolor and the belly is covered with pure white hairs which are white to the base.

M. c. christyi differs from *M. c. lutescens* in somewhat smaller skull, shorter toothrow, narrower anterior palatine foramina, more open posterior choanae, and smaller auditory bullae.

M. c. christyi differs from *M. c. cunninghamei* in the same way except for the posterior choanae which are smaller and the rostrum which is shorter and narrower.

***Dasymys incomtus palustris*, new subspecies**

FIGURE 6,*a*

TYPE: CNHM No. 73902, skin and skull, adult male, from Lokwi, 25 miles south of Torit, Equatoria Province, Anglo-Egyptian Sudan. Obtained in June 1952 by J. S. Owen, original No. 2220.

SPECIMENS EXAMINED: Five, from: Lokwi, 25 miles south of Torit, 3; Mongalla, 2 (BM).

DIAGNOSIS: General over-all color of upperparts near Snuff Brown, strongly intermixed with black; no pure color at any place except a thin subterminal band which is near Tawny-Olive. Hands and feet light brownish, tail dark brown and uniformly colored, entire underparts grayish white. Skull relatively small, anterior palatine foramina relatively large, nasals short, zygomatic arches quite flaring posteriorly, bullae relatively small, upper cheekteeth relatively small.

MEASUREMENTS OF THE TYPE SPECIMEN: Length of head and body 150; length of tail 140; length of hind foot 34; length of ear 16; con-

dyloincisive length of skull 34.7; crown length of upper toothrow 7.2; length of anterior palatine foramina 7.9; greatest width across zygomatic arches 19.6; least interorbital width 4.8; length of nasals 12.6; width of rostrum at level of antorbital foramen 4.1.

Comparisons: From *Dasymys incomtus helukus*, *D. i. palustris* differs in lighter color, that is, more red and less yellow and brown, and belly with no buffy wash as in *helukus*. Skull is smaller, auditory bullae smaller, rostrum shorter, upper cheekteeth smaller, least interorbital width greater, and nasals shorter.

D. i. palustis differs from *D. i. nigridus* in the same manner as from *D. i. helukus* and is even markedly lighter in color.

From *D. i. savannus*, *D. i. palustris* differs in having no buffy wash on the belly and in having a small skull, markedly smaller auditory bullae, shorter rostrum, and shorter nasals.

D. i. shawi differs from *D. i. palustris* in darker color, smaller auditory bullae, and longer anterior palatine foramina.

D. i. palustris differs from *D. orthos* in having a longer tail, generally redder color, and lacking the olivaceous wash on the belly. The skull has a narrower rostrum, smaller, more elongate, less inflated auditory bullae, more flaring zygomatic arches, shorter nasals, narrower interorbital region, markedly larger and longer anterior palatine foramina, and the anterior edge of the zygomatic plate being concave instead of relatively straight as in *orthos*.

Remarks: I am inclined to agree with Ellerman that the former species of *Dasymys* are in reality only one species with an infinite amount of variation. This probably includes even *orthos*, but until such time as the significance of the straight anterior edge of the zygomatic plate is understood it is probably better to treat that species as such. Certainly, in all of the specimens examined from most of the range of the genus, that peculiarity is outstanding.

From the material available it appears that *orthos* is not a part of the fauna of the southern Sudan.

***Dasymys incomtus shawi* Kershaw**

Figure 6,*a*

Dasymys shawi Kershaw, Ann. Mag. Nat. Hist., ser. 9, vol. 13, p. 25, January 1924. (Mount Baginzi, southern Bahr-el-Ghazal, near Congo border, 40 miles south-southeast of Yambio.)

Specimens Examined: Two, both in BM, from: 40 miles south-southeast of Yambio, 1; *Yambio district*, 1.

Measurements: The type, an adult male, measures as follows: Length of head and body 152; length of tail 144; length of hind foot 29; length of ear 19; condyloincisive length of skull 34.2; crown length of upper toothrow 6.6; length of anterior palatine foramina 7.6; great-

est width across zygomatic arches 17.4; least interorbital width 4.4; length of nasals 12.3; width of rostrum at level of antorbital foramen 3.9.

REMARKS: This subspecies is a saturate form which differs from other adjacent named kinds as set forth under the comparisons section for *D. i. palustris*.

Aryicanthis niloticus centralis Dollman

FIGURE 6,*b*

Arvicanthis testicularis centralis Dollman, Ann. Mag. Nat. Hist., ser. 8, vol. 8, p. 338, September 1911. (Between Chak Chak and Dem Zubeir, Bahr-el-Ghazal.)

SPECIMENS EXAMINED: Seventeen, all in BM, from: Between Chak Chak and Dem Zubeir, 1; Chak Chak, 2; Meridi, 3; Yei, 1; Temburas, 1; Kulme, Wadi Aribo, 2; *Kurro, Jebel Marra*, 2; Zalingei, 5.

MEASUREMENTS: The type, an adult male, measures as follows: Length of head and body 145; length of tail 143; length of hind foot 33; length of ear 19; greatest length of skull 37.0; condyloincisive length 34.2; length of anterior palatine foramina 6.6; crown length of upper toothrow 6.4; greatest width across zygomatic arches 18.5; least interorbital width 5.5; length of nasals 13.7; width of rostrum at level of antorbital foramen 4.5.

REMARKS: The specimens from Chak Chak and the type agree in detail. The color is somewhat darker than in *kordofanensis* and is more uniform or continuous, whereas in the latter the dorsal surface appears somewhat speckled or spotted. The skull in *centralis* is larger, the anterior palatine foramina are smaller, the auditory bullae are smaller, the zygomatic arches are more flaring posteriorly, and the upper cheekteeth are smaller.

Intergradation in color, size of upper cheekteeth, and the size of the anterior palatine foramina is found with *A. n. jebelae* in the animals from Meridi. They are more referable, though, to *centralis*.

Arvicanthis niloticus jebelae Heller

FIGURE 6,*b*

Arvicanthis niloticus jebelae Heller, Smithsonian Misc. Coll., vol. 56, No. 17, p. 9, February 28, 1911. (Rhino Camp, Lado Enclave.)

SPECIMENS EXAMINED: Seventy-seven, from: Nimule, 8 (MCZ); Torit, 29 (6, MCZ); Juba, 1; Obbo, 5; Ikoto, 9; Murukurun, 50 miles east of Torit, 4 (MCZ); Bor, 2 (BM); *Malek*, 11 (BM); Mongalla, 4 (BM); Kit River, 3 (BM); Uma River, 1 (BM).

MEASUREMENTS: Averages and extremes of three adult males and three adult females from Torit are, respectively, as follows: Length

of head and body 157 (150–169), 149 (140–156); length of tail 142 (131–152); 118 (112–129); length of hind foot 31 (30–32), 30 (30); length of ear 17 (14–19), 19 (17–21); greatest length of skull 35.2 (34.2–36.0), 34.0 (32.4–34.8); condyloincisive length 33.8 (33.1–34.3), 32.3 (31.1–33.0); length of anterior palatine foramina 7.6 (7.2–7.8), 7.4 (7.1–7.7); crown length of upper toothrow 6.4 (6.3–6.6), 6.5 (6.4–6.6); greatest width across zygomatic arches 18.8 (18.7–19.0), 17.8 (17.4–18.1); least interorbital width 5.0 (4.9–5.3), 5.1 (4.9–5.3); length of nasals 13.1 (12.7–13.6), 12.7 (12.4–13.2); width of rostrum at level of antorbital foramen 4.3 (4.1–4.5), 4.3 (4.3).

Remarks: All of the above specimens differ from *A. n. luctuosus* in generally lighter color, smaller body size, and generally shorter tail. The skulls differ in being longer and narrower, the auditory bullae generally smaller, the anterior palatine foramina shorter, the upper cheekteeth generally smaller, and the rostrum generally heavier in appearance but not wider in actual measurement.

***Arvicanthis niloticus kordofanensis* Wettstein**

Figure 6,*b*

Arvicanthis testicularis kordofanensis Wettstein, Anz. K. Akad. Wiss. Wien, Math.-Nat., vol. 53, p. 161, 1916. (Kadugli, southern Kordofan.)

Specimens Examined: Twenty, all in BM, from: Talodi, 4; Nuba Mts., 2; *Um Dona*, 2; El Fasher, 9; *Koshek*, 1; Lake No, 2.

Measurements: The averages and extremes for three adult females from Talodi are as follows: Length of head and body 149.1 (144–156); length of tail 125 (115–130); length of hind foot 30 (30); length of ear 16.3 (16–17); greatest length of skull 33.9 (33.8–34.0); condyloincisive length 32.7 (32.2–33.2); length of anterior palatine foramina 7.5 (7.0–8.0); crown length of upper toothrow 6.9 (6.8–7.1); greatest width across zygomatic arches 16.9 (16.7–17.2); least interorbital width 5.5 (5.4–5.6); length of nasals 12.4 (12.4); width of rostrum at level of antorbital foramen 4.3 (4.3).

Remarks: The four specimens from Talodi may be assumed to be virtual topotypes of this subspecies described from Kadugli.

A. n. kordofanensis differs from *A. n. testicularis* in generally darker color and in the somewhat darker hands, feet, and tail. The amount of buffy coloration on the nose and around the eyes is reduced. The belly color is buffy white with considerable admixture of blackish hairs. The skull is smaller and more delicate than in *testicularis*, the bullae are less inflated, and the anterior palatine foramina are less flaring.

The two specimens from Lake No do not agree in pelage color with any of the other specimens referable to *kordofanensis*. The skulls,

however, fall within the range of variation as noticed for this subspecies.

***Arvicanthis niloticus luctuosus* Dollman**

FIGURE 6,*b*

Arvicanthis luctuosus Dollman, Ann. Mag. Nat. Hist., ser. 8, vol. 8, p. 339, September 1911. (Kaka, north of Fashoda.)

SPECIMENS EXAMINED: Six, all in BM, from: 20 miles north of Fashoda, 1; Kaka, 2; *Gerazi*, 3.

MEASUREMENTS: Two adult males from Kaka measure, respectively, as follows: Length of head and body 185, 184; length of tail 143, 141; length of hind foot 33, 31; length of ear 17, 17; greatest length of skull 35.5, 35.8; condyloincisive length 33.7, 34.5; length of anterior palatine foramina 8.1, 7.5; crown length of upper toothrow 7.0, 6.6; greatest width across zygomatic arches 17.3, 17.6; least interorbital width 5.2, 4.9; length of nasals 13.0, 13.4; width of rostrum at level of antorbital foramen 4.3, 4.3.

REMARKS: When specimens of *luctuosus* are compared to specimens of *A. n. testicularis* they are found to be somewhat larger and darker in color. The skull is longer, narrower, with smaller auditory bullae, and with somewhat smaller cheekteeth.

***Arvicanthis niloticus testicularis* (Sundevall)**

FIGURE 6,*b*

Isomys testicularis Sundevall, Kongl. Svenska Vet.-Akad. Handl., Stockholm, p. 221, 1843. (Bahr-el-Abiad.)

SPECIMENS EXAMINED: Forty-nine, all in BM, from: Sennaar, 2; Kamisa, Dinder River, 5; Gedaref, 1; El Kowa, 2; Gallabat, 9; *Hosh, Blue Nile*, 2; Khartoum, 13; *Ed Dueim*, 2; *Kabushiya*, 1; Shereik, 4; *Nuri, Merowe District*, 2; *Soba*, 1; Shendy, 4; *Letti Basin*, 1.

MEASUREMENTS: An adult male and an adult female from Kamisa, Dinder River, respectively measure as follows: Length of head and body 163, 152; length of tail 143, 146; length of hind foot 31, 31; length of ear 17, 18; greatest length of skull 38.5, 37.6; condyloincisive length 35.6, 35.3; length of anterior palatine foramina 7.8, 7.8; crown length of upper toothrow 6.8, 6.7; greatest width across zygomatic arches 20.0, 18.2; least interorbital width 6.3, 6.1; length of nasals 15.1, 14.9; width of rostrum at level of antorbital foramen 5.1, 4.9.

REMARKS: The two specimens from Sennaar may be accepted as topotypical. Both specimens are quite faded in color but the skull of the only adult agrees well with the specimens referred to above.

The color in a recently taken specimen from Kamisa is rather light above and gradually shading over the sides into the plumbeous based whitish hairs of the belly. The blackish tips of the hairs is most intense over the shoulders and diminishes in amount over the rump and on the upper legs. The nose and a ring around the eye are of pure color near Cinnamon Buff. The skull, which is of an adult male, is quite long with heavy supraorbital ridges and heavy zygomata. The rostrum is short and wide and the teeth are relatively massive. The auditory bullae are small but well inflated.

The specimens from Khartoum are somewhat paler than the animals from farther east.

***Lemniscomys barbarus zebra* (Heuglin)**

FIGURE 6,*c*

Mus zebra Heuglin, Nova Acta Acad. Caes. Leop.-Carol., Halle, vol. 31, No. 7, p. 10, 1864. (Djur and Bongo, Anglo-Egyptian Sudan.)

SPECIMENS EXAMINED: Thirty-four, from: Torit, 17; Ikoto, 1; Nimule, 2; Malek, 8 (BM); 25 miles east of Lake No, 1 (BM); *Bahr-el-Ghazal*, 1 (BM); Badigeru Swamp, 20 miles east of Mongalla, 1 (BM); Fashoda, 1 (BM); *Dud Majok*, 1 (BM); Wau, 1 (BM).

MEASUREMENTS: Averages and extremes of three adult males and three adult females from Torit are, respectively, as follows: Length of head and body 102 (94–110), 101 (98–104); length of tail 112 (104–120), 110 (107–116); length of hind foot 24.5 (24–25), 25 (25); length of ear 14 (14), 15 (14.5–15.5); greatest length of skull 28.0 (27.1–28.5), 27.7 (27.0–28.3); condyloincisive length 24.9 (23.9–25.6), 24.6 (24.0–25.4); length of auditory bullae 5.4 (5.0–5.6), 5.4 (5.2–5.6); crown length of upper toothrow 4.9 (4.9–5.0), 4.8 (4.8–4.9); least interorbital width 4.5 (4.5), 4.5 (4.4–4.6); width of rostrum at level of antorbital foramen 3.6 (3.5–3.8), 3.5 (3.4–3.7); length of nasals 10.2 (9.8–10.6), 10.2 (9.8–10.5); greatest width across zygomatic arches 12.9 (12.6–13.2), 13.1 (12.5–13.5).

REMARKS: There is an apparent sexual difference in size of body, length of tail, length of hind foot, and some cranial characters in which the females generally average slightly larger than the males. In general, the color is quite uniform. Three of the specimens from Torit are only slightly paler than is the rest of the series, and the single specimen from Wau is of the same color as the majority of the specimens from Torit.

This subspecies of striped mouse seems to have the largest geographic range of any of the rodents found in the Sudan. The explanation for

this apparent lack of differentiation must await further specimens from intermediate localities or until a revision is done on the genus as a whole.

Lemniscomys dunni dunni (Thomas)

FIGURE 6,*c*

Arvicanthis dunni Thomas, Proc. Zool. Soc. London, p. 297, Aug. 6, 1903. (Kaga Hills, western Kordofan.)

SPECIMENS EXAMINED: Eleven, all in BM, from: Umm Keddada, 3; El Fasher, 2; *Juga Juga, 15 miles east-northeast of El Fasher*, 1; *76 miles east of El Fasher*, 1; 110 miles east of El Fasher, 1; Kurra, Jebel Marra, 3.

MEASUREMENTS: An adult female from Juga Juga and an adult male from 76 miles east of El Fasher measure, respectively, as follows: Length of head and body 116, 108; length of tail 142, 130; length of hind foot 27, 25; length of ear 15, 16; greatest length of skull 30.1, 30.1; condyloincisive length 26.9, 26.7; length of auditory bullae 5.7, 6.2; crown length of upper toothrow 5.0, 5.3; least interorbital width 4.5, 4.8; breadth of rostrum at level of antorbital foramen 3.7, 3.4; length of nasals 11.7, 11.8.

REMARKS: The species *dunni* differs from *L. barbarus* in markedly lighter color, shorter anterior palatine foramina, markedly different shape of the posterior choanae, and the general structure of the pterygoid region. The auditory bullae are smaller, the toothrow somewhat longer, anterior parts of the zygomatic arches tapering into skull instead of flaring outward, and the braincase is more extended posterior to the posterior root of the zygoma.

There are three specimens in the British Museum without skulls from Kurra, Jebel Marra, that either represent a new species or are hybrids between *L. dunni* and *L. lynesi*. From the appearance of the skins they are intermediate in all details. I feel it best to record these specimens and only refer them to *L. dunni* provisionally.

Lemniscomys dunni nubalis Thomas and Hinton

FIGURE 6,*c*

Lemniscomys dunni nubalis Thomas and Hinton, Proc. Zool. Soc. London, p. 263, July 6, 1923. (Talodi, Nuba Country, southern Kordofan.)

SPECIMENS EXAMINED: Six, all in BM, from: Talodi, 2; Nuba Mountains, 1; Delami, 1; Agur, 2.

MEASUREMENTS: An adult male from the Nuba Mountains and an adult female from Talodi measure, respectively, as follows: Length of head and body 95, 90; length of tail 115, 112; length of hind foot 23, 22; length of ear 13, 13; greatest length of skull 28.4, ?; condyloincisive

length 25.5, ?; length of upper toothrow 4.9, 4.9; least interorbital width 4.3, 4.3; breadth of rostrum at level of antorbital foramen 3.3, 3.3; length of nasals 10.4, 9.1.

Remarks: *L. d. nubalis* is somewhat smaller than the nominate race and is pronouncedly brighter in color. The color of *dunni* is a pale buff while *nubalis* is a bright golden color. The sides and flanks, instead of being white as in *dunni*, are washed with the golden ochraceous color of the dorsum.

Lemniscomys lynesi Thomas and Hinton

Lemniscomys lynesi Thomas and Hinton, Proc. Zool. Soc. London, p. 267, July 6, 1923. (Central Jebel Marra, Darfur.)

Specimens Examined: Ten, all in BM, from: *Jebel Marra*, 3; Central Jebel Marra, 6; *South Downs, Jebel Marra*, 1.

Measurements: An adult female from South Downs, Jebel Marra, measures as follows: Length of head and body 101; length of tail 104; length of hind foot 23; length of ear 14; condyloincisive length of skull 23.9; crown length of upper toothrow 5.1; least interorbital width 4.5; breadth of rostrum at level of antorbital foramen 3.6.

Remarks: In the original description of this species, Thomas and Hinton suggested that it was more nearly related to *L. zebra* (=*L. barbarus zebra*) than to any other group in the genus. In all cranial details, and, most strikingly, in the distribution of the dorsal lines and spots and in degree of spininess, *L. lynesi* is most closely allied to *L. striatus*. From all characters studied it appears as though this is not a valid species but merely a subspecies of *striatus*. I feel certain that intergradation could be demonstrated if specimens were obtained from intermediate localities. However, until such time as specimens showing intergradation are obtained I prefer to let the name stand as a full species.

The skull, as well as the skin, is markedly different from *dunni*. The color is the darkest of any of the kinds in the Sudan. The skull differs from that of *dunni* in the markedly different shape of the bullae, in the length of the anterior palatine foramina, and in the very different structure of the pterygoid region.

Lemniscomys macculus macculus (Thomas and Wroughton)

Arvicanthis macculus Thomas and Wroughton, Trans. Zool. Soc. London, vol. 19, p. 515, March 1910. (Mokia, southeastern Ruwenzori, Uganda.)

Specimens Examined: Three, from: Torit, 1; Nimule, 2.

Measurements: The measurements of an adult male from Nimule, are as follows: Length of head and body 96; length of tail 121; length of hind foot 25; length of ear 16; greatest length of skull 26.2; condy-

loincisive length 24.2; length of auditory bullae 5.2; crown length of upper toothrow 4.8; least interorbital width 4.5; breadth of rostrum at level of antorbital foramen 3.3; length of nasals 10.2.

REMARKS: In *L. macculus* the proportion of the least interorbital width to the width of the rostrum ranges from 71.2 to 73.3 percent (79.7 to 81.6 percent in *striatus*) and the proportion of the length of the nasals to the total length of the skull ranges from 37.8 to 38.9 percent (36.0 to 36.7 percent in *striatus*). It may be noted that in the first proportion the size difference between *L. macculus* and *L. striatus* is apparent, but in the second proportion, that of nasals to total length of skull, the ratio is reversed, which shows that the nasals, even though measuring shorter in *macculus*, occupy more of the total length of the skull than in *striatus*.

These two proportions appear to hold good on other specimens of these two species in both the U. S. National Museum and the British Museum collections so that they perhaps will be valid for critically distinguishing the two species where they occur together.

In general, *macculus* is a smaller animal than is *striatus*. In the former the hind foot usually measures less than 26 mm., while in the latter the hind foot is usually larger.

Lemniscomys striatus massaicus (Pagenstecher)

Mus (*Lemniscomys*) *barbarus* L. var. *Massaicus* Pagenstecher, Jahrb. Hamburgischen Wiss. Anst., vol. 2, p. 45, 1885. (Lake Naivasha.)

SPECIMENS EXAMINED: Thirty, from: Gilo, Imatong Mountains, 11 (4, MCZ); Torit, 2; Nimule, 5 (3, MCZ); *Katire*, 9 (MCZ); Magwe, 2 (MCZ); *Talanga Forest, Imatong Mountains*, 1 (MCZ).

MEASUREMENTS: An adult male and an adult female from Gilo, Imatong Mountains, respectively measure as follows: Length of head and body 123, 107; length of tail 130, 130; length of hind foot 28, ?; length of ear 11, 12; greatest length of skull 29.4, 29.0; condyloincisive length 26.5, 26.2; length of auditory bullae 5.9, 5.0; crown length of upper toothrow 4.9, 5.1; least interorbital breadth, 4.8, 5.0; breadth of rostrum at level of antorbital foramen 3.5, 3.8; length of nasals 10.6, 10.8.

REMARKS: This species can easily be confused with *L. macculus*. There are, however, several pronounced cranial differences between the two species. In the present series, the proportion of the least interorbital width to the width of the rostrum is greater; and the proportion of the length of the nasals to the total length of the skull is less in the larger species *striatus*.

In *striatus*, the anterior palatine foramina are nearly parallel-sided as opposed to constricted anteriorly in *macculus*. The upper tooth-row, the least interorbital breadth, the breadth of the rostrum, and the condyloincisive length are all noticeably larger in *striatus* than in *macculus*.

Remarks on *Rattus*-like genera

In attempting to identify the various species of rattoid animals found in the Sudan, extreme confusion was apparent. Without a complete revision of the "genera" entailed in this group, the following remarks are of necessity limited in their application. It is apparent, however, that so far as the kinds found in the Sudan are concerned these differences and similarities do apply.

It is apparent to me that Ellerman and his co-authors have gone to an extreme in what they classify under the genus *Rattus*. Certainly there appears to be a superfluity of generic names applied to the *Rattus*-like rats in central Africa. Among these I am primarily concerned with *Aethomys*, *Mastomys*, *Praomys*, *Hylomyscus*, and *Myomys*. Ellerman, Morrison-Scott, and Hayman (1953) consider these genera to be, at best, subgenera of the genus *Rattus*, and they consider the name *Myomys* to have no status since the type species is not certainly identifiable. For the Anglo-Egyptian Sudan, *Aethomys*, *Mastomys*, and *Praomys* are distinguishable from typical *Rattus rattus* at both the generic and specific levels. The genus *Praomys* as here understood contains the names previously referred to *Myomys* and *Hylomyscus*. I can find no means by which either of the above genera can be distinguished from *Praomys* even at the subgeneric level, but the species can be distinguished without question. It is true that this particular complex is in dire need of a revision which is not based on a single character only.

The significance of the mammary formula is at the present of no importance in determining generic rank among these animals since males, and females taken other than in the breeding season, do not show the mammae at all. Table 1 is based on cranial characters that are consistent in the specimens and species examined from the Sudan and which I feel are of sufficient importance to warrant retaining these names as full genera. This has been an extremely difficult assemblage to classify, but the characters of the table do separate the genera occurring together. It is apparent that Ellerman and his co-authors, in lumping so many genera and species, are either unaware of or have ignored the matter of convergence in these particular animals.

TABLE 1.—*Consistent cranial characters in specimens and species examined from the Sudan*

Character	*Rattus*	*Mastomys*	*Aethomys*	*Praomys*
*T1 of M^2	Large and not in line with second lamina.	Large and more or less in line with second lamina.		Small but pronounced and markedly anterior to second lamina, as in *Rattus*.
T3 of M^2	Absent.	Present but reduced and more or less in line with T1 and T5.		Present, peg-like and in line with T1.
Anterior palatine foramina.	Extend posterior to anterior root of M^1.	Extend to middle of M^1.	Extend to base of M^1 and never beyond one-third of the length of the tooth.	
Lateral margins of wings of pterygoid.	Concave.	Straight.		Convex.
Anterior margin of zygomatic plate.	Straight, vertical, slightly rounded on dorsal edge.	Straight, not vertical, and strongly rounded on dorsal edge.	Concave, not vertical, and not strongly rounded.	Straight, vertical and not strongly rounded.
Antorbital foramina.	Large and triangular.	Large and rounded.		Small and triangular.

*Cusp terminology of the molars is based on Miller, Catalogue of the Mammals of Western Europe, p. 801, 1912.

Aethomys kaiseri alghazal (Wroughton)

FIGURE 6,*d*

Mus alghazal Wroughton, Ann. Mag. Nat. Hist., ser. 7, vol. 20, p. 501, December 1907. (Chak Chak, Bahr-el-Ghazel.)

SPECIMENS EXAMINED: Five, all in BM, from: Tembura, 1; *Deim Zubeir*, 1; Wau, 1; Khor, half-way between Chak Chak and Deim Zubeir, 1; Chak Chak, 1.

MEASUREMENTS: The measurements of an adult male from Chak Chak are as follows: Length of head and body 194; length of tail 195; length of ear 16; greatest length of skull 35.7; condyloincisive length 32.9; least interorbital width 5.6; length of nasals 13.6; width of rostrum at level of antorbital foramen 4.6; greatest width across zygomatic arches 17.0; crown length of upper toothrow 6.3; length of anterior palatine foramina 8.0.

REMARKS: This subspecies is decidedly paler in color than are specimens of *A. k. helleri* from Rhino Camp or from the eastern part of Equatoria Province. This paler color is caused by less gray (or black-tipped hairs) and more light brown being visible in the pelage. The underparts are strongly washed with buffy. In all specimens the feet are white above. The tails are nearly naked and average about 10 scale rows per centimeter.

Aethomys kaiseri helleri (Hollister)

FIGURE 6,*d*

Epimys kaiseri centralis Hollister, Smithsonian Misc. Coll., vol. 63, No. 7, p. 10, June 1914. (Rhino Camp.)

Rattus helleri Hollister, Proc. Biol. Soc. Washington, vol. 31, p. 97, June 29, 1918. (New name to replace *E. k. centralis*, preoccupied by *Mus auricomis centralis* Schwann, 1906.)

SPECIMENS EXAMINED: Twenty, from: Moli, 35 miles north of Nimule, 3 (MCZ); Nimule, 5 (4, MCZ); *Magwe, 36 miles southwest of Torit*, 2 (MCZ); Katire, 1 (MCZ); Torit, 5 (1, MCZ); Juba, 1; *Nadiopgi*, 2; *Lokwi, 25 miles south of Torit*, 1.

MEASUREMENTS: An adult male and an adult female from Torit measure, respectively, as follows: Length of head and body 163, 165; length of tail 135, 150; length of hind foot 30, 32; length of ear 14, 18; greatest length of skull 39.7, 40.3; condyloincisive length 36.8, 36.7; length of nasals 16.2, 17.2; least interorbital width 5.9, 5.8; width of rostrum at level of antorbital foramen 5.2, 5.1; greatest width across zygomatic arches 19.4, 18.8; crown length of upper toothrow 5.9, 6.1; length of anterior palatine foramina 8.8, 9.3.

REMARKS: In general these animals are quite variable in any one given character. This is especially so in the size of the upper molars, but even in this character these specimens are consistently larger than in the type of *A. k. helleri*. There are, however, some specimens in the type series of *helleri* that have the molars as large as and even somewhat larger than any in the present material.

There are other characters of the pelage color and cranium that are divergent from the type and type series of *helleri*. These divergences, though, are of such minute amount that it is not deemed advisable to erect a separate name for this population. It seems as though here is an example where subspeciation is occurring but that the characters have not become stable enough to warrant complete recognition.

Mastomys kulmei, new species

FIGURE 6,*d*

TYPE: BM No. 23.1.1.403, adult male, skin and skull, from Kulme, Wadi Aribo, 3,300 feet, Darfur Province, Anglo-Egyptian Sudan. Obtained September 15, 1921, by Lynes and Lowe, original No. 912.

SPECIMENS EXAMINED: Eighty-two, all in BM, from: Kulme, Wadi Aribo, 28; Niurmya, 5; 6 miles west of El Fasher, 1; 52 miles west-southwest of El Fasher, 2; *35 miles west-southwest of El Fasher*, 2;

Kurra, Jebel Marra, 10; Jebel Marra, 7; Zalingei, 8; *southern foothills, Jebel Marra,* 19.

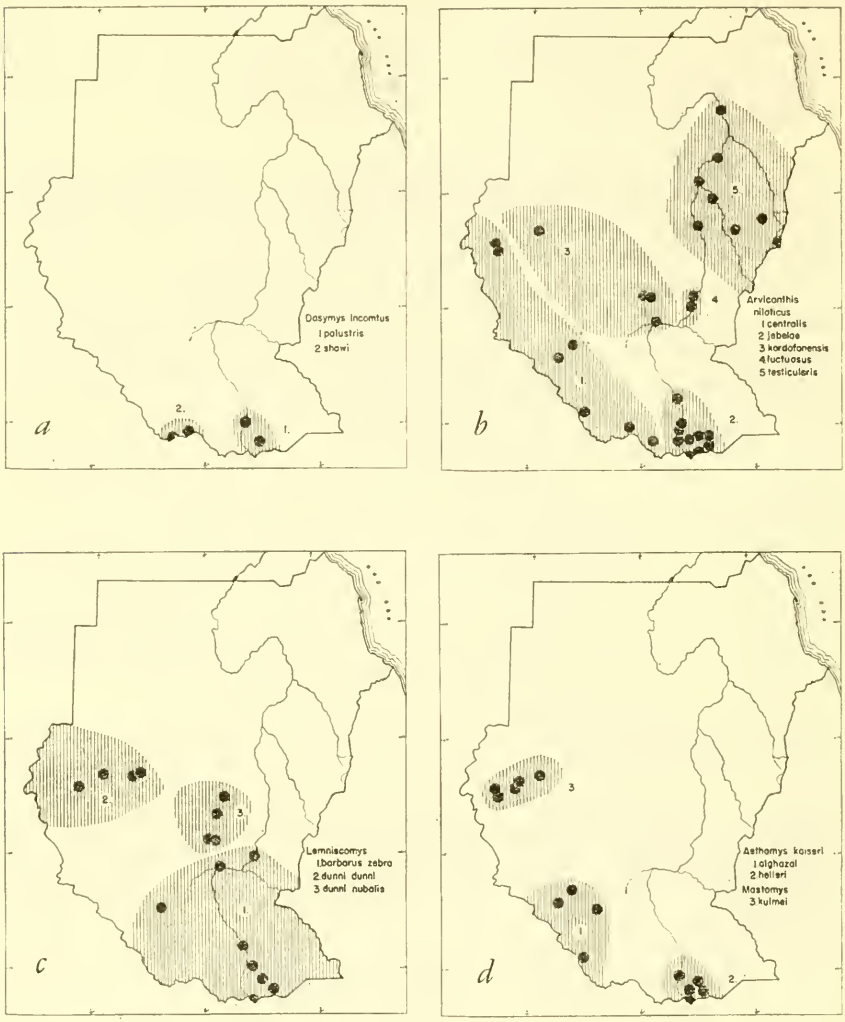

FIGURE 6.—Distribution of *Dasymys*, *Arvicanthis*, *Lemniscomys*, *Aethomys*, and *Mastomys* (in part) in the Anglo-Egyptian Sudan. (Scale: 1 inch=400 miles.)

DIAGNOSIS: Upperparts Tawny-Olive, color purest on cheeks, shoulders, and top of head. All hairs plumbeous at base, the pigmented portion only 1 to 2 mm. in length and then finely tipped with black; hands, feet, and entire underparts white. The underparts but lightly washed with buff. Tail light colored and of the same color

density top and bottom. Upperparts not delineated from white of belly by a line of pure color. Skull relatively small, anterior palatine foramina short, upper molars small, pterygoid region nearly triangular in form, zygomatic arches bowed downwards but not laterally, auditory bullae relatively small, rostrum relatively long and narrow, and supraorbital bead moderately developed and passing caudad into lateral ridges on skull.

Measurements of the Type Specimen: Length of head and body 120; length of tail 124; length of hind foot (s. u.) 22, dry c. u. 24; length of ear 20; greatest length of skull 31.2; condyloincisive length 29.2; length of anterior palatine foramina 6.8; crown length of upper toothrow 4.3; least interorbital width 4.4; width of rostrum at level of antorbital foramen 3.9; length of nasals 12.2; greatest width across zygomatic arches 15.1.

Comparisons: From the type of *Mastomys coucha* (=*natalensis*), *M. kulmei* differs in lighter, brighter color, somewhat longer hind feet, longer tail, and longer ears. The skull differs in that the anterior palatine foramina are shorter, the molars smaller, the pterygoid region not flaring laterally but the pterygoid wings being carried nearly straight back and the fossae being shallow instead of deeply excavated, and rostrum longer and slenderer.

From the type of *M. n. ugandae*, which is an immature male, *M. kulmei* differs in smaller size, lighter and brighter color, and, in animals of comparable age, a markedly smaller skull in all respects. The teeth are smaller and the pterygoid region differs as described for *M. coucha*.

From the type of *M. n. blainei*, *M. kulmei* differs in lighter, brighter color and longer tail. The skull differs in generally smaller size, shorter anterior palatine foramina, pterygoid region as described for *M. coucha*, and a longer, narrower rostrum.

From *M. n. macrolepis*, as known from El Kowa, *M. kulmei* differs in smaller size and lighter, brighter color. The skull is in all respects smaller and far more delicate, with relatively as well as actually larger auditory bullae.

Remarks: *Mastomys kulmei* occurs with another member of the genus in most of its range. They may be distinguished from one another by the generally darker color of the *coucha* kinds and by the skulls, which may be separated by the characters as set forth under comparisons.

Thomas and Hinton (1923, p. 266) remarked that there appeared to be two kinds of *Mastomys* in the Lynes-Lowe collection but postponed any naming of these kinds, merely referring them to the earlier known *M. macrolepis* and *M. ugandae* group.

Mastomys natalensis agurensis, new subspecies

FIGURE 7,*a*

TYPE: BM No. 28.3.11.54, adult male, skin and skull, from Agur, Nuba Mountain Province, Anglo-Egyptian Sudan. Obtained March 8, 1927, by W. Rutledge.

SPECIMENS EXAMINED: Twelve, all in BM, from: Agur, 2; *Jebel Um Dona*, 1; Delami, 1; Talodi, 2; *Abu Heraz*, 1; Nahud, 1; Dilling, 2; Nuba Mountains, 2.

DIAGNOSIS: Upperparts near Buckthorn Brown but slightly intermixed with black. Color purest on upper arms, shoulders, and cheeks. Underparts, thighs on inner surfaces, forearm on inner surface, hands, and feet white. Skull relatively large, auditory bullae relatively small, zygomatic arches not widely flaring, dorsal surface rather strongly arched.

MEASUREMENTS OF THE TYPE SPECIMEN: Length of head and body 114; length of tail 126; length of hind foot 23; length of ear 18; greatest length of skull 31.8; condyloincisive length 29.9; length of anterior palatine foramina 7.5; crown length of upper toothrow 4.6; least interorbital width 4.4; width of rostrum at level of antorbital foramen 4.1; length of nasals 12.6; greatest width across zygomatic arches 15.0.

COMPARISONS: From *M. n. blainei*, *M. n. agurensis* differs in markedly lighter color, longer tail, and shorter hind foot. The skulls differ in that the zygomata are narrower, auditory bullae smaller, dorsum of skull decidedly more arched, rostrum heavier, and braincase smaller.

From *M. n. macrolepis*, *M. n. agurensis* differs in being smaller and lighter in color. The skull is smaller and of less robust build.

Compared with *M. n. ismailiae*, *M. n. agurensis* is lighter in color and smaller in all external measurements. The skull is smaller in all measurements.

From *M. n. marrensis*, *M. n. agurensis* differs in markedly lighter color and somewhat smaller size. The skull is smaller, the auditory bullae are smaller, and the dorsal surface is somewhat more arched.

REMARKS: The specimen from Abu Heraz is somewhat darker in color than typical *agurensis* and may represent an intergrade with *blainei*, but since the specimen is so immature it is not possible to be positive.

The mammals available from the Nuba Mountain region all present minor differences from surrounding named kinds. It is very possible that, if additional collecting were to be done in this area, an area of endemism would be found similar to that of the Jebel Marra.

Mastomys natalensis blainei (Wroughton)

FIGURE 7,*a*

Mus blainei Wroughton, Ann. Mag. Nat. Hist., ser. 7, vol. 20, p. 502, December 1907. (Chak Chak, Bahr-el-Ghazal.)

SPECIMENS EXAMINED: Twenty-three, all in BM, from: Moyen, 1; Wau, 8; Tembura, 5; Katta, 1; Chak Chak, 8.

MEASUREMENTS: An adult male from Chak Chak measures as follows: Length of head and body 125; length of tail 115; length of hind foot 25; length of ear 17; length of anterior palatine foramina 7.5; crown length of upper toothrow 4.6; least interorbital width 4.5; width of rostrum at level of antorbital foramen 3.8; length of nasals 12.1; greatest width across zygomatic arches 15.3.

REMARKS: *M. n. blainei* is generally darker in color than any of the surrounding kinds with the exception of *M. n. macrolepis*. It may be distinguished from the latter by its much narrower zygomatic arches and narrower rostrum. From the other subspecies adjacent to *blainei* it may be distinguished cranially by its narrower rostrum and generally wider zygomatic arches.

Mastomys natalensis ismailiae (Heller)

FIGURE 7,*a*

Epimys concha (sic) *ismailiae* Heller, Smithsonian Misc. Coll., vol. 63, No. 7, p. 9, June 24, 1914. (Gondokoro.)

SPECIMENS EXAMINED: One hundred and thirteen, from: Obbo, 23; Torit, 27 (4, MCZ); Juba, 6 (2, BM); Nimule, 10 (1, MCZ); Lotti Forest, 1; Magwe, 36 miles southwest of Torit, 2 (MCZ); Mongalla, 10 (BM); Malek, 7 (BM); *Bor*, 5 (BM); Duk, 2 (BM); Evos, Didinga Mountains, 1 (BM); *Towat Boma*, 2 (BM); *Kagula*, 6 (BM); Lake No, 2 (BM); *Gondokoro*, 1 (BM); *no locality*, 1; Kaka, 3 (BM); Fashoda, 4 (BM).

MEASUREMENTS: An adult male and an adult female from Juba measure, respectively, as follows: Length of head and body 143, 143; length of tail 127, 128; length of hind foot 28, 27; length of ear 16, 16; greatest length of skull 32.9, ?; condyloincisive length 31.1, 31.5; greatest width across zygomatic arches 15.7, 16.2; least interorbital width 5.0, 4.6; length of nasals 13.8, 13.2; crown length of upper toothrow 4.9, 5.2; length of anterior palatine foramina 8.1, 7.8.

REMARKS: In spite of the large number of specimens of this subspecies available for study, only a few were fully adult. Of those that were adult, few had complete crania which could be measured.

The specimens from Juba are near topotypes of *ismailiae* and are fully adult, showing considerable wear on the molars. None of the specimens in the type series of *ismailiae* are fully adult, yet the reddish coloration as given by Heller as characteristic appears to be the only feature distinguishing this race from *ugandae* as known by specimens from Kampala, Uganda. Color, however, appears to be extremely variable since the adult specimens from Torit range from bright reddish to brownish. The skulls, though, show no marked variation in configuration or measurements from the type of *ismailiae*. Two specimens from Obbo approach *ugandae* in the saturate coloration which appears to be typical of that race. It is apparent that in this group of specimens the only ones which are truly typical of *ismailiae* are the ones from Juba. The others, at least so far as color is concerned, are apparently intergrades with *ugandae* but more referable in cranial characters to *ismailiae*.

At best, the material available can be distinguished only when adults are compared. Immatures from Nimule and Obbo show the intense reddish coloration typical of the type of *ismailiae* and have a white belly. In *ugandae*, the coloration of the belly is a strong suffusion of buff which is shown in a few specimens from Obbo.

Mastomys natalensis macrolepis (Sundevall)

FIGURE 7,*a*

Mus macrolepis Sundevall, Kongl. Svenska Vet.-Akad. Handl., Stockholm (1842), p. 218, 1843. (Sennaar.)

SPECIMENS EXAMINED: All in BM, from: Dueim, 1; Kamisa, Dinder River, 1; Roseires, 1; El Kowa, 1; Gedaref, 1.

MEASUREMENTS: An adult female from El Kowa measures as follows: Length of head and body 142; length of tail 151; length of hind foot 24; length of ear 20; total length of skull 34.3; condyloincisive length 32.3; length of anterior palatine foramina 7.9; crown length of upper toothrow 4.9; least interorbital width 4.6; width of rostrum at level of antorbital foramen 4.3; length of nasals 14.2; greatest width across zygomatic arches 17.3.

REMARKS: *M. n. macrolepis* may be distinguished from surrounding races of *M. natalensis* by its generally darker color and somewhat larger size. It is noticeably different cranially in that the auditory bullae are markedly smaller and less inflated.

Mastomys natalensis marrensis, new subspecies

FIGURE 7,*a*

TYPE: BM No. 23.1.1.425, adult female, skin and skull, from Kulme, Wadi Aribo, Darfur Province, Anglo-Egyptian Sudan. Obtained August 28, 1921, by Lynes and Lowe, original No. 897.

Specimens Examined: Nineteen, all in BM, from: Kulme, Wadi Aribo, 14; *Niurmya*, 1; *Kurra, Jebel Marra*, 3; Jebel Marra, 1.

Diagnosis: Upperparts, in general tone, near Saccardo's Umber. The pure color band of the hairs are near Sayal Brown but because of the intense admixture of black the darker color is apparent. Underparts plumbeous, but lightly tipped with buffy white. Hands and feet white, tail dark, nearly naked, and of uniform color above and below. Skull relatively large and robust; anterior palatine foramina long; upper toothrow relatively heavy; auditory bullae moderately well developed; rostrum, in general, heavy; zygomatic arches nearly parallel-sided, not tending to bow laterad excessively.

Measurements of the Type Specimen: Length of head and body 145; length of tail 127; length of hind foot 28; length of ear 18; greatest length of skull 32.7; condyloincisive length 30.9; length of anterior palatine foramina 7.6; crown length of upper toothrow 4.8; least interorbital width 4.2; width of rostrum 4.1; length of nasals 14.1; greatest width across zygomatic arches 16.0.

Comparisons: *M. n. marrensis* differs from *M. n. ugandae* in slightly paler color both above and below, the buffy wash of the belly being somewhat more pronounced. The skull is somewhat longer and more slender; the zygomata not flaring so much; auditory bullae smaller; rostrum longer and narrower; pterygoid region shorter anteroposteriorly.

From *M. n. blainei*, *M. n. marrensis* differs in darker color, longer hind foot, and longer tail. The skull is larger in all respects, with the exception that the zygomatic arches are narrower.

From *M. n. macrolepis*, *M. n. marrensis* is of about the same color but somewhat lighter and smaller in size. The skull is smaller in all respects. The bullae are relatively as well as actually more inflated, the rostrum is narrower, the pterygoid region is shorter, and the zygomata are less flaring.

From *M. kulmei*, *M. n. marrensis* is darker, larger in all respects, and shows the same variation in cranial characters as do the other members of the species *natalensis*.

Remarks: Two species of *Mastomys* occur together at Kulme, Wadi Aribo. One, *M. n. marrensis* is dark and large and is decidedly of the *natalensis* group, the other, *M. kulmei*, is relatively small and in no way resembles any member of the *natalensis* complex.

Thomas and Hinton (1923, p. 266) referred *kulmei* to the "wild living" kind *macrolepis*, and *marrensis* to the "house living" kind *ugandae*. It has since been shown that commensalism does not seem to affect the color of these animals and that animals of the same color

are taken both commensally and ferally. It may be that there is a habitat difference for these two kinds of *Mastomys* at Kulme, but if so the collectors failed to note it.

***Mastomys natalensis ugandae* (De Winton)**

FIGURE 7,*a*

Mus ugandae De Winton, Ann. Mag. Nat. Hist., ser. 6, vol. 20, p. 317, September 1897. (Entebbe, Uganda.)

SPECIMENS EXAMINED: Five, all in BM, from: Ukanda, Bahr-el-Ghazal, 1; Meridi, 2; Yei, 2.

MEASUREMENTS: An adult, unsexed, from Yei has no external measurements, but the skull measures as follows: Greatest length 33.0; condyloincisive length 31.0; length of anterior palatine foramina 8.2; crown length of upper toothrow 5.0; least interorbital width 4.7; width of rostrum at level of antorbital foramen 4.1; length of nasals 13.9; greatest width across zygomatic arches 15.8.

REMARKS: Since the type specimen of *ugandae* is an immature male it is unsuitable for comparison with other types in the species. Topotypes of *ugandae* which have been available are adult and are generally darker in color than any of the adjacent kinds except *macrolepis*.

It is interesting that this subspecies appears to enter the Sudan only where the Ubangi-Uelle Savanna District of the Guinean Savanna Province extends into the Yambio District.

The skulls of *ugandae* may be distinguished from those of *macrolepis* by their smaller size and somewhat larger auditory bullae.

***Praomys albipes fuscirostris* (Wagner)**

FIGURE 7,*b*

Mus fuscirostris Wagner, Arch. Naturg., vol. 11, sec. 1, p. 149, 1845. (Sennaar, Anglo-Egyptian Sudan.)

SPECIMENS EXAMINED: Two, both in BM, from: El Obeid, 1; *Kordofan*, 1.

MEASUREMENTS: The external measurements of an adult male from Kordofan are as follows: Length of head and body 120; length of tail 95; length of hind foot 37; length of ear 15. The cranial measurements of an adult female from El Obeid are as follows: Greatest length of skull 31.5; condyloincisive length 29.8; length of anterior palatine foramina 7.7; crown length of upper toothrow 4.7; least interorbital width 4.0; width of rostrum at level of antorbital foramen 3.9; length of nasals 12.6; greatest width across zygomatic arches 14.9.

REMARKS: These specimens are lighter in dorsal coloration than are specimens of the nominate race from Abyssinia. It seems odd that

there should be such a hiatus in distribution for this species and it may well be that the specific determination is erroneous. As pointed out elsewhere, these nomenclatorial problems can be resolved only by a competent revision.

Praomys butleri (Wroughton)

FIGURE 7,*b*

Mus butleri Wroughton, Ann. Mag. Nat. Hist., ser. 7, vol. 20, p. 503, December 1907. (Between Chak Chak and Dem Zubeir, Bahr-el-Ghazal.)

SPECIMEN EXAMINED: The type.

MEASUREMENTS: The type, an adult female, has the following measurements: Length of head of body 90; length of tail 118; length of hind foot 20; length of ear 16; greatest length of skull 26.4; condyloincisive length 24.5; length of anterior palatine foramina 6.1; crown length of upper toothrow 4.4; least interorbital width 4.1; width of rostrum at level of antorbital foramen 3.4; length of nasals 9.3.

REMARKS: The type and only known specimen is reddish brown with white underparts and white hands and feet. The hairs of the belly are white to the base. There is a faint suggestion of a dorsal area darker than the color of the sides, thus giving the animal the appearance of having a stripe down the back.

Ellerman (1941, p. 209) placed *butleri* as a full species under the subgenus *Praomys* in the genus *Rattus*. Until further information is available I feel it is best to regard this specimen as a valid species of the genus *Praomys*. Therefore, I do not follow Allen in allocating it to subspecific status under the species *denniae*, which is also referred to the genus *Praomys*.

Praomys fumatus oweni, new subspecies

FIGURE 7,*b*

TYPE: MCZ No. 45883, adult male, skin and skull, from Murukurun, 50 miles east of Torit, Torit District, Equatoria Province, Anglo-Egyptian Sudan. Obtained May 9, 1950, by John S. Owen, original No. 1030.

SPECIMENS EXAMINED: Eighteen, all in MCZ, from: *Lafon*, 4; Murukurun, 1; Lalanga, eastern Lofit Hills, 1; Gilo, Imatong Mountains, 1; Ikoto, 2; *Labalwa*, 4; *Loa*, 1; *Okaru*, 3; Opari, 1.

DIAGNOSIS: General over-all dorsal color near Snuff Brown; pure color on shoulders near Cinnamon-Buff; dorsal color ending abruptly on sides, cheeks, upper arm, and leg in the pure white of the belly, throat, chin, and under sides of the forelimbs and hindlimbs; all hairs of underparts white to base; dorsal surfaces of hands and feet white. Skull relatively long and narrow; anterior palatine foramina long;

upper cheekteeth relatively small; auditory bullae relatively large; wings of pterygoid not markedly flaring laterally; rostrum relatively long but broad.

MEASUREMENTS OF THE TYPE SPECIMEN: Length of head and body 119; length of tail 126; length of hind foot 20; length of ear from notch 17; condyloincisive length of skull 26.1; greatest width across zygomatic arches 13.7; least interorbital width 4.1; length of nasals 10.6; crown length of upper toothrow 4.5; length of anterior palatine foramina 6.4; width of rostrum at level of antorbital foramen 3.7.

COMPARISONS: *Praomys fumatus oweni* differs from *P. f. subfuscus* as known by specimens from Sotik, British East Africa, as follows: Color generally darker on dorsal areas; belly with hairs pure white to base instead of plumbeous at base and belly hairs lacking the buffy wash of *subfuscus*. Skull is somewhat smaller in total length; nasals shorter; interorbital width less; rostrum shorter and narrower; and the wings of the pterygoid somewhat less flaring.

From *Praomys fumatus fumatus*, *P. f. oweni* differs as follows: Dorsal coloration generally lighter and without prominent chestnut color over nape and shoulders; underparts in both clear white; tail generally more finely annulated. Skull generally larger; anterior palatine foramina longer and narrower; wings of pterygoid not so widely flaring; rostrum somewhat longer and wider; auditory bullae slightly larger; width across zygomatic arches greater.

REMARKS: Specimens of this subspecies may be distinguished from *Praomys tullbergi* by their generally smaller size; finer annulations of the tail; and the clear white instead of slaty grey belly.

Most of the specimens listed above were taken in a rocky habitat while the others came from cultivated areas.

***Praomys stella kaimosae* (Heller)**

Epimys alleni kaimosae Heller, Smithsonian Misc. Coll., vol. 59, No. 16, p. 7, July 5, 1912. (Kaimosi, Kakumega Forest, British East Africa.)

SPECIMEN EXAMINED: One from Obbo.

MEASUREMENTS: A subadult male from Obbo has the following measurements: Length of head and body 148; length of tail 136; length of hind foot 29. No cranial measurements are available.

REMARKS: The only specimen available of this small mouse is a subadult which has not yet molted into the complete adult pelage. In addition the skull is badly broken but from the characters remaining the specimen belongs to the species *P. stella*. There are some differences in color and size of bullae, but until more specimens are available from this area I feel it best to refer its subspecific status to *kaimosae*.

***Praomys tullbergi sudanensis*, new subspecies**

TYPE: CNHM No. 67268, adult male, skin and skull, from Lotti Forest, Torit District, Anglo-Egyptian Sudan. Obtained April 7, 1950, by Harry Hoogstraal, original No. 5438.

SPECIMENS EXAMINED: Twenty-one, from: Gilo, Imatong Mountains, 16 (12, MCZ); Opari, 30 miles north-northeast of Nimule, 1 (MCZ); *Lotti Forest*, 2; Imowa, Didinga Mountains, 1 (BM); *Talanga Forest*, 1 (BM).

DIAGNOSIS: Upperparts near Antique Brown which terminates abruptly on the sides, flanks, and shoulders in the plumbeous-based, white-tipped hairs of the entire underparts, including the chin, throat, and undersides of forelimbs and hindlimbs. Tail longer than head and body and the hands and feet white with traces of the dorsal color extending on the proximal portions of the first metatarsals and metacarpals. Entire underparts with hairs white-tipped but plumbeous at base. Skull with but slightly developed supraorbital ridges; zygomatic arches relatively heavy; nasals short; anterior palatine foramina relatively short; braincase relatively flat; auditory bullae relatively large.

MEASUREMENTS OF THE TYPE SPECIMEN: Length of head and body 121; length of tail 149; length of hind foot 25; length of ear 21; condyloincisive length of skull 29.2; greatest width across zygomatic arches 15.6; least interorbital width 5.0; length of nasals 11.5; crown length of upper toothrow 4.7; length of anterior palatine foramina 7.0; width of rostrum at level of antorbital foramen 3.7.

COMPARISONS: From the type and type series of Praomys *tullbergi peromyscus*, *P. t. sudanensis* differs in lighter color throughout, belly hairs without buffy wash, tail more finely annulated, anterior palatine foramina shorter, auditory bullae larger, pterygoid wings more flared laterally, nasals shorter, least interorbital width greater, and braincase flatter.

Praomys tullbergi sudanensis differs from *P. t. jacksoni* as known from specimens from Kaimosi, British East Africa, in generally brighter color dorsally. The skull differs in that the upper cheekteeth are smaller, auditory bullae larger, width across zygomatic arches greater, rostrum wider and shorter, anterior palatine foramina shorter, nasals shorter, and the braincase is flatter.

REMARKS: The type specimen of *P. t. jacksoni* from Entebbe, Uganda, is so young that it is worthless for comparative purposes. Therefore, the specimens referred to *jacksoni* from Kaimosi have been used instead.

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The reddish brown color of these animals is characteristic of the fully adult pelage. The juveniles and subadults are a much darker plumbeous color with some admixture of brownish hairs. The change from subadult to adult pelage apparently commences on the sides and works dorsally to meet in the middorsal line. Several specimens in the above series show this transitional pelage.

Mus bellus aequatorius Setzer

FIGURE 7,*c*

Mus bellus aequatorius Setzer, Journ. Washington Acad. Sci., vol. 43, No. 10, p. 335, October 22, 1953. (Torit.)

SPECIMENS EXAMINED: Forty-eight, from: Torit, 43 (14, MCZ); Ikoto, 1; Obbo, 1; *Loa*, 1; Magwe, 1 (MCZ); Nimule, 1 (MCZ).

MEASUREMENTS: Even though a large series has been available for study, the type is the only specimen that approaches completeness in the skull. Owing to an error the external measurements as given in the original description are wrong. The correct measurements are as follows: Length of head and body 54; length of tail 37 (not 32); length of hind foot 12 (not 11); length of ear from notch 7; condyloincisive length of skull 15.9; crown length of upper toothrow 2.8; greatest width across zygomatic arches 8.8; least interorbital width 3.1; length of nasals 6.2; width of rostrum at level of antorbital foramen 2.2.

REMARKS: Specimens of this small mouse taken during the months of April through July show a marked darkening of the pelage and lack almost entirely the white postauricular and subauricular spots that are so characteristic of this subspecies in the pelage in the months from November through February. Regardless of the pelage color, this subspecies may be distinguished from the contiguous subspecies in eastern Africa by the shorter toothrow and narrower rostrum.

This mouse appears to have open savanna as its primary habitat. A few specimens, however, were taken in buildings in Torit.

Mus bellus delamensis, new subspecies

FIGURE 7,*c*

TYPE: BM No. 28.3.11.61, adult male, skin and skull, from Delami, Nuba Mountain Province, Anglo-Egyptian Sudan. Obtained June 3, 1927, by W. Ruttledge, original No. 387.

SPECIMENS EXAMINED: Eleven, all in BM, from: Delami, 9; Agur, 1; *Jebel Kadaro*, 1.

DIAGNOSIS: Upperparts near Cinnamon-Buff, purest on sides, flanks, and cheeks; middorsal area strongly intermixed with black hairs, thus presenting a rather marked stripe from the nose to the

base of the tail; entire underparts, subauricular spots, and dorsal surfaces of hands and feet pure white. Skull small, upper toothrow short, auditory bullae but moderately inflated, anterior palatine foramina relatively long, rostrum relatively short and broad, interpterygoid space broadly V-shaped, interorbital region relatively wide.

Measurements of the Type Specimen: Length of head and body 51; length of tail 36; length of hind foot 11.5; length of ear 9; greatest length of skull 16.1; condyloincisive length 14.9; length of anterior palatine foramina 3.5; crown length of upper toothrow 2.9; least interorbital width 3.1; width of rostrum at level of antorbital foramen 2.2; length of nasals 6.2; greatest width across zygomatic arches 8.5.

Comparisons: From *M. b. gondokorae*, *M. b. delamensis* may be distinguished by its markedly lighter color and smaller size. Skull smaller in all measurements except crown length of upper toothrow and length of nasals, anterior palatine foramina smaller, auditory bullae less inflated, and rostrum narrower.

M. b. delamensis may be distinguished from *M. b. enclavae* by its markedly lighter color and smaller size. The skull is markedly smaller in all dimensions but the auditory bullae are equally inflated, thus creating the impression of larger bullae in *delamensis*.

M. b. aequatorius differs from *M. b. delamensis* in darker color and more pronounced subauricular and postauricular spots and generally larger size. The skull is wider across the zygomatic arches, the auditory bullae are more inflated, and the braincase is larger.

Remarks: The above comparisons of pelages were, so far as possible, made on animals taken during the same month. As may be noted under the remarks section of *M. b. aequatorius*, there is a seasonal difference in pelage color.

Specimens in the British Museum from the Jebel Marra may be referable to *Mus bellus*, but since no skulls are available I prefer not to list them. The skins are more nearly like *M. b. delamensis* than any of the other kinds but it would seem improbable that the Jebel Marra animals would be the same.

Mus bellus gondokorae Heller

Figure 7,*c*

Mus bellus gondokorae Heller, Smithsonian Misc. Coll., vol. 56, No. 17, p. 8, February 28, 1911. (Gondokoro.)

Specimens Examined: Seventeen, from: Gondokoro, 3 (1, BM); Malek, 9 (BM); Mongalla, 2 (BM); *Juba*, 1 (BM); Kenisa, 1 (BM); *Bahr-el-Ghazal*, 1 (BM).

Measurements: The type, an adult male, measures as follows: Length of head and body 60; length of tail 43; length of hind foot 13;

length of ear 8; condyloincisive length of skull 15.9; crown length of upper toothrow 2.9; greatest width across zygomatic arches 9.0; least interorbital width 3.3; length of nasals 6.2; width of rostrum at level of antorbital foramen 2.5.

REMARKS: When specimens of this subspecies are compared with specimens of *M. b. aequatorius* they are found to differ in longer head and body, longer tail, generally longer hind foot, and darker coloration in comparable pelages. The subauricular spot is markedly less developed. The upper toothrow is longer and the rostrum is wider.

Mus musculoides emesi Heller

Mus musculoides emesi Heller, Smithsonian Misc. Coll., vol. 56, No. 17, p. 5, February 28, 1911. (Kabula Muliro, Uganda.)

SPECIMENS EXAMINED: Twelve, from: Lotti Forest, 5 (3, MCZ); Katire, 3 (MCZ); Torit, 2 (MCZ); Lafon, 2 (MCZ).

MEASUREMENTS: The only complete specimen is an adult male from Lotti Forest. It has the following measurements: Length of head and body 65; length of tail 52; length of hind foot 15; length of ear from notch 10; condyloincisive length of skull 18.1; crown length of upper toothrow 3.3; least interorbital width 3.8; length of nasals 7.6; width of rostrum at level of antorbital foramen 2.6.

REMARKS: This small series of mice agrees in most details with the type of *M. m. emesi.* There are, though, some peculiarities of the cranium which are not observable in the type. These differences may be due to age or sex, but skin color and external measurements do agree with the type of *emesi.*

This species can possibly be confused with *Mus triton,* but it can be distinguished from that species by smaller size and the clear white hairs of the belly. It can also be confused with the dark phase of *Mus bellus,* but can be differentiated by the lack of a dorsal stripe and by the much larger size of M^1.

Mus tenellus acholi Heller

FIGURE 7,*d*

Mus tenellus acholi Heller, Smithsonian Misc. Coll., vol. 56, No. 17, p. 6, February 28, 1911. (Rhino Camp, Lado Enclave.)

SPECIMEN EXAMINED: One, from Torit.

MEASUREMENTS: An adult female from Torit measures as follows: Length of head and body 71; length of tail 33; length of hind foot 14; length of ear from notch 11.5; condyloincisive length of skull 18.9; crown length of upper toothrow 3.4; least interorbital width 3.7; length of nasals 7.5; width of rostrum at level of antorbital foramen 2.6.

Remarks: In the only specimen available there are certain differences from the type of *M. t. acholi.* These differences are in the size of the bullae, the size of M^2, length of the anterior palatine foramina, and, externally, in a somewhat darker color. Whether these observable differences are geographic, individual, or seasonal cannot be determined at this time. Therefore, this specimen is being referred to *M. t. acholi* on a provisional basis.

M. t. acholi may be distinguished from the subspecies of *Mus bellus* occurring in the same area by its generally larger ear, longer head and body, greater size of M^1, greater length of the upper toothrow, and by the generally larger skull.

Mus tenellus tenellus (Thomas)

Figure 7,*d*

Leggada tenella Thomas, Proc. Zool. Soc. London, pt. 1, p. 298, August 6, 1903. (Roseires, Blue Nile.)

Specimen Examined: The type only, in BM.

Measurements: The measurements of the type, an adult female, are as follows: Length of head and body 50; length of tail 35; length of hind foot 11.5; length of ear 8; greatest length of skull 17.2; condyloincisive length 16.2; length of anterior palatine foramina 3.8; crown length of upper toothrow 2.9; least interorbital width 3.1; width of rostrum at level of antorbital foramen 2.3; length of nasals 6.7; greatest width across zygomatic arches 8.8.

Remarks: *Mus tenellus* can usually be distinguished from *Mus bellus* by its shorter tail and shorter hind foot as well as a generally darker dorsal color and less extensive white on the belly. The skull is usually larger in all respects except the auditory bullae, which are of the same size but appear smaller in consequence of the larger skull.

Apparently *tenellus* and its subspecies in the Sudan are not common mice since so few are known in collections.

Mus triton imatongensis Setzer

Mus triton imatongensis Setzer, Journ. Washington Acad. Sci., vol. 43, No. 10, p. 334, October 22, 1953. (Gilo, Imatong Mountains.)

Specimens Examined: Twenty-one, all from Gilo, Imatong Mountains (9, MCZ).

Measurements: Average and extremes of seven adult males and four adult females from Gilo are, respectively: Length of head and body 71.5 (66–79), 77.5 (72–81); length of tail 53.5 (50–56), 54 (53–57); length of hind foot 16 (14–17), 16.5 (16–17); length of ear from notch 8.5 (7.0–9.0), 8.6 (8.0–10.0); condyloincisive length of skull 19.5 (19.5), ?; greatest width across zygomatic arches 10.5 (10.3–

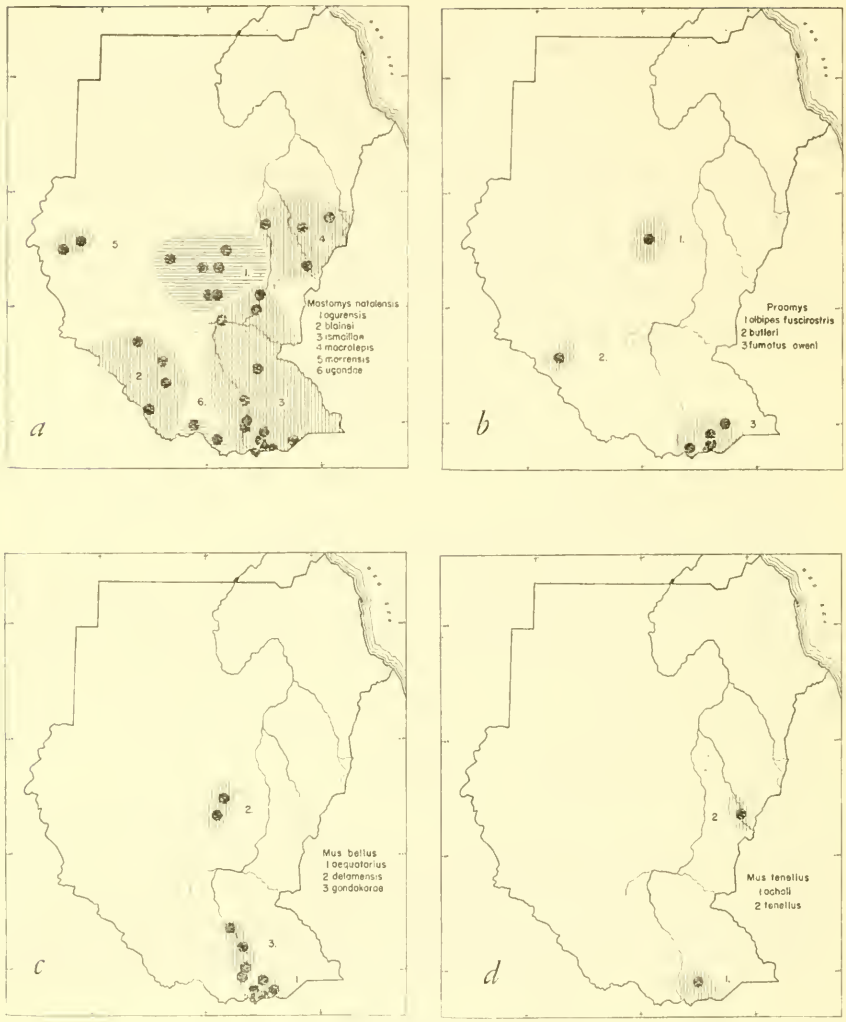

FIGURE 7.—Distribution of *Mastomys* (in part), *Praomys*, and *Mus* in the Anglo-Egyptian Sudan. (Scale: 1 inch=400 miles.)

10.8), 10.8 (10.8); length of nasals 7.9 (7.8–8.1), 8.3 (8.2–8.5); least interorbital width 3.9 (3.9); 3.9 (3.8–4.0); crown length of upper toothrow 3.6 (3.5–3.7), 3.6 (3.5–3.7).

REMARKS: These specimens were all taken in grass either in coffee plantations or along forest streams. The characters separating *imatongensis* from the nominate form from Uganda are the greater development of the auditory bullae and the vaulting of the cranium.

Specimens taken in June are somewhat lighter in color than those taken in January.

***Lophuromys aquilus margarettae* Heller**

Lophuromys aquilus margarettae Heller, Smithsonian Misc. Coll., vol. 59, No. 16, p. 7, July 5, 1912. (Mount Gargues, Matthews Range, British East Africa.)

Specimens Examined: Twenty-three, from: Gilo, Imatong Mountains, 11 (6, MCZ); *Lotti Forest, Imatong Mountains,* 4 (1, MCZ); Magwe, 36 miles southwest of Torit, 1 (MCZ); *Issore, Imatong Mountains,* 2 (BM); *Lomoling, Imatong Mountains,* 1 (BM); *Kitibol, Imatong Mountains,* 2 (BM); *Kipia, Imatong Mountains,* 2 (BM).

Measurements: There are no adult females of this species in the collection, but the measurements of an adult male from Gilo, Imatong Mountains, are as follows: Length of head and body 132; length of tail 70; length of hind foot 21; length of ear 11; condyloincisive length of skull 28.4; posterior edge of M^3 to front of incisor 14.5; length of upper toothrow 4.9; least interorbital width 5.9; length of nasals 12.8; width of rostrum at level of antorbital foramen 3.7; width across M^1–M^1 6.6.

Remarks: In general these specimens agree with the type of *margarettae* but are somewhat paler in dorsal color. The specimens from the Lotti Forest are markedly paler. It may be that these represent a new subspecies but until the amount of variation, individual, sexual, and specific, is known I feel that it is best to refer these to *margarettae* as being indicative of their nearest relationship.

There are certain peculiarities of the skull of the two species *aquilus* and *sikapusi* that may be of significance in determining the species. In the latter there is a pronounced bony tuberosity at the posterior end of the bony palate which is marked in immatures and becomes progressively more noticeable as the animal ages. This tuberosity is inconspicuous in young specimens of *aquilus* and in adulthood is about as in young of *sikapusi.* In addition, the sculpturing along the lateral margins of the palate is more pronounced at all age levels in *sikapusi* and the posterior palatine foramina are, in general, longer and more open than in *aquilus.* This size and shape of the posterior palatine foramina in certain instances shows an overlap, so the degree of usefulness is questionable. However, combining the color of the dorsum and the cranial features as outlined above as well as under the remarks section for *sikapusi pyrrhus,* the animals from the Sudan can be distinguished with a certain degree of accuracy.

***Lophuromys sikapusi pyrrhus* Heller**

Lophuromys pyrrhus Heller, Smithsonian Misc. Coll., vol. 56, No. 17, p. 10, February 28, 1911. (Rhino Camp.)

Specimens Examined: Twenty-three, from: Gilo, Imatong Mountains, 15 (1, MCZ); Nimule, 4 (MCZ); Katire, 2 (1, MCZ); Yambio District, 2 (BM).

Measurements: An adult male and an adult female from Gilo, Imatong Mountains measure, respectively, as follows: Length of head and body 119, 125; length of tail 69, 75; length of hind foot 22, 22; length of ear 11, 13; condyloincisive length of skull ?, 28.4; posterior edge of M^3 to front of incisor 14.2, 14.0; crown length of upper toothrow 4.8, 4.8; greatest width across zygomatic arches 15.2, 14.5; least interorbital width 5.9, 5.8; length of nasals 11.6, 13.0; width of rostrum at level of antorbital foramen 3.5, 3.5; width across M^1–M^1 6.7, 6.6.

Remarks: This species is difficult to distinguish from *L. aquilus* in all of the specimens examined. In general, *sikapusi* is darker in color than is *aquilus*. In addition to the darker dorsal color, the ratio between the width of the anterior ends of the auditory bullae and the width of the posterior choanae averages about 60 percent, which means that the choanae are narrower in proportion to the space between the bullae. This same ratio in *aquilus* is in the neighborhood of 80 percent. The coloration of the belly is extremely variable in both species and apparently is no criterion for separating the two kinds.

The amount of cranial variation between individuals of the two species is so great that only averages may be used to determine the correct allocation of specimens.

Acomys albigena Heuglin

Acomys albigena Heuglin, Reise in Nordost-Afrika, vol. 2. p. 68, 1877. (Bogos Country, Abyssinia.)

Specimens Examined: Four, all in BM, from Gallabat.

Measurements: An adult male from Gallabat measures as follows: Length of head and body 94; length of tail 100; length of hind foot 19; length of ear 16; greatest length of skull 30.0; condyloincisive length 26.7; length of anterior palatine foramina 7.1; crown length of upper toothrow 5.0; least interorbital width 4.7; width of rostrum at level of antorbital foramen 3.1; length of nasals 11.9; greatest width across zygomatic arches 13.4.

Remarks: This species is darker in color than any normally colored *Acomys* in the Sudan. There is a blackish stripe along the mid-dorsal line shading over the sides into a dark reddish buff. Belly, hands and feet are pure white. The tail, instead of being rather uniformly colored, as in other kinds, is dark above and white below, thus presenting a bicolored aspect.

Acomys cahirinus cineraceus Fitzinger and Heuglin

FIGURE 8,*a*

Acomys cineraceus Fitzinger and Heuglin, Sitzb. K. Akad. Wiss. Wien, vol. 54, sec. 1, p. 573, 1866. (Doka, eastern Sennaar, between the Atbara and Rahad Rivers.)

SPECIMENS EXAMINED: Eleven, all in BM, from: Khartoum, 1; *Abu Haraz*, 1; El Kowa, 2; Kamisa, Dinder River, 4; Singa, 1; Abu Ushar, 2.

MEASUREMENTS: An adult male from El Kowa measures as follows: Length of head and body 103; length of hind foot 15.5; length of ear 15; greatest length of skull 27.3; condyloincisive length 25.1; length of anterior palatine foramina 6.3; crown length of upper toothrow 4.2; least interorbital width 4.5; width of rostrum at level of antorbital foramen 3.1; length of nasals 10.5; greatest width across zygomatic arches 13.2.

REMARKS: The single specimen available from Khartoum shows intergrading characters in color and shape of the pterygoid region with *A. cahirinus hunteri*.

Acomys cahirinus hunteri De Winton

FIGURE 8,*a*

Acomys hunteri De Winton, Nov. Zool., vol. 8, p. 401, Dec. 31, 1900. (Plain of Tokar, Suakin.)

SPECIMENS EXAMINED: Thirteen, all in BM, from: Erkowit, 4; Tokar, 2; Sinkat, 1; Kerma, 2; Shereik, 1; Merowe, 2; *Katul Hills*, 1.

MEASUREMENTS: The measurements of an adult male from Tokar are as follows: Length of head and body 117; length of hind foot 16; length of ear 16; greatest length of skull 28.4; condyloincisive length 26.0; length of anterior palatine foramina 6.6; crown length of upper toothrow 3.8; least interorbital width 4.7; width of rostrum at level of antorbital foramen 3.3; length of nasals 10.5; greatest width across zygomatic arches 13.7.

REMARKS: Specimens from Kerma, Shereik, and Merowe are intergrades in color and size of auditory bullae with *A. c. cahirinus*. However, since the intermediacy of character is found in only these two features and the rest of the characters are like *hunteri* they are referred to that subspecies.

Acomys hystrella Heller

FIGURE 8,*a*

Acomys hystrella Heller, Smithsonian Misc. Coll., vol. 56, No. 17, p. 13, Feb. 28, 1911. (Nimule.)

SPECIMENS EXAMINED: Twenty-seven, from: Nimule, 12 (4, MCZ); *20 miles northeast of Nimule*, 2; Torit, 1; *20 miles west of Torit*, 2;

Moli, 35 miles west of Torit, 2 (MCZ); Lafon, 60 miles north of Torit, 3 (MCZ); Opari, 25 miles north-northeast of Nimule, 3 (MCZ); *Okaru, 25 miles west of Torit,* 2 (MCZ).

Measurements: An adult male and an adult female from Nimule measure, respectively, as follows: Length of head and body 100, 101; length of tail 90, 105; length of hind foot 18, 18; length of ear 12, 14; greatest length of skull 28.6, 29.0; condyloincisive length 26.0, 26.3; crown length of upper toothrow 4.9, 4.5; width of rostrum at level of antorbital foramen 6.0, 6.1; least interorbital width 4.7, 4.8; greatest width across zygomatic arches 13.9, 13.8; length of nasals 10.8, 11.2.

Remarks: These specimens vary somewhat from the type series of *hystrella* in that they present a slightly redder appearance. This may be due, however, to the present skins being fresher and less faded than the original series. In three of the specimens in the fresh series, the grayish color on the back is more pronounced than in the rest. The skulls, however, are somewhat narrower than in the type series, but this is the only departure in cranial features.

Acomys intermedius Wettstein

Figure 8,*a*

Acomys intermedius Wettstein, Anz. K. Akad. Wiss. Wien, Math.-Nat., vol. 53, p. 161, 1916. (Dilling.)

Specimens Examined: Eight, all in BM, from: 60 miles west of Obeid, 2; 75 miles north of El Obeid, 1; *50 miles west of El Obeid,* 1; 20 miles west of Nahud, 1; 40 miles west of Nahud, 1; 10 miles east of Nahud, 1; *10 miles west of Nahud,* 1.

Measurements: An adult male from 20 miles west of Nahud measures as follows: Length of head and body 94; length of tail 86; length of hind foot 16; length of ear 14; length of anterior palatine foramina 6.1; crown length of upper toothrow 4.0; least interorbital width 4.4; width of rostrum at level of antorbital foramen 2.9; length of nasals 9.8; greatest width across zygomatic arches 12.3.

Remarks: There is no evidence of intergradation exhibited in any of the specimens examined, so that while these animals resemble *cahirinus* they appear not to interbreed with them and are so left as a full species until a complete study is done on the genus as a whole.

Acomys lowei, new species

Figure 8,*a*

Type: BM No. 23.1.1.270, adult male, skin and skull, from 40 miles west of El Fasher, Darfur Province, Anglo-Egyptian Sudan. Obtained Feb. 13, 1921, by Lynes and Lowe, original No. 477.

Specimens Examined: Sixteen, all in BM, from: El Fasher, 15; 40 miles west of El Fasher, 1.

Diagnosis: Upperparts near Mars Yellow, underparts, cheeks, hands, feet, suborbital and supra-auricular spots pure white. Skull relatively massive, rostrum long and narrow, braincase moderately well inflated, anterior palatine foramina relatively long, bullae moderately well inflated.

Measurements of the Type Specimen: Length of head and body 94; length of tail 93; length of hind foot 17; length of ear 15; greatest length of skull 28.9; condyloincisive length 26.0; length of anterior palatine foramina 6.6; crown length of upper toothrow 4.6; least interorbital width 4.9; width of rostrum at level of antorbital foramen 3.1; length of nasals 11.2; greatest width across zygomatic arches 13.6.

Comparisons: From *Acomys cahirinus cineraceus* as known by specimens from El Kowa, *A. lowei* differs in markedly lighter color, less arched skull, larger bullae, longer anterior palatine foramina, longer rostrum, and longer nasals.

From *Acomys cahirinus cahirinus* from Giza, Egypt, *A. lowei* differs in markedly lighter color. The skull is more inflated in the region of the braincase, the nasals are somewhat longer, the auditory bullae are less inflated, there is a somewhat different shape in the pterygoid region, the upper incisors are narrower, and the anterior palatine foramina are somewhat shorter and more bowed laterally.

From *Acomys intermedius* from 20 miles west of Nahud, *A. lowei* differs in lighter, brighter color and lighter colored tail. The skull is larger and more robust in all respects.

From *Acomys cahirinus hunteri* from Erkowit, *A. lowei* differs in lighter color, somewhat smaller skull, and markedly smaller auditory bullae.

Remarks: These specimens were originally identified as *Acomys witherbyi* by Thomas in the Darfur report of 1923. Since that time the name *witherbyi* has been shown to be a synonym of *A. cineraceus*, which is now considered to be only a subspecies of *A. cahirinus*. Since the animals from the vicinity of El Fasher vary from the animals from El Kowa and its environs as set forth under the section on comparisons, it is obvious that they are not closely allied. When the genus *Acomys* is studied in detail probably many more of the species will fall as synonyms or be relegated to subspecific status, but until the genus is studied I do not see the advantage of arbitrarily relegating all species to subspecific status of the earliest named species in the genus such as has been done in the recent book of Ellerman, Morrison-Scott, and Hayman (1953) on the mammals of Southern Africa.

Acomys percivali Dollman

Acomys percivali Dollman, Ann. Mag. Nat. Hist., ser. 8, vol. 8, p. 126, July, 1911. (Chanler Falls, British East Africa.)

SPECIMENS EXAMINED: Thirteen, from: Ikoto, 3 (1, MCZ); Torit, 1; Lafon, 60 miles north of Torit, 1 (MCZ); *Mura, Lofit Hills,* 1 (MCZ); *Labalwa, 5 miles east of Torit,* 7 (MCZ).

MEASUREMENTS: An adult male from Torit and an adult female from Ikoto measure, respectively, as follows: Length of head and body 97, 100; length of hind foot 15.5, 16; length of ear 14, 14; greatest length of skull 26.6, 26.6; condyloincisive length 23.9, 24.0; crown length of upper toothrow 4.3, 4.2; width of rostrum at level of antorbital foramen 2.9, 3.1; least interorbital width 4.7, 4.7; length of nasals 10.6, 10.2; greatest width across zygomatic arches 12.7, ?.

REMARKS: This dark species of spiny mouse is readily distinguished from *A. w. argillaceus* by its much darker color and larger skull. It may be distinguished from *A. hystrella,* with which it occurs, by its darker color, shorter hind foot, relatively larger skull, flatter braincase, shorter, more constricted anterior palatine foramina, and the smaller interpterygoid fossae.

Acomys wilsoni argillaceus Hinton and Kershaw

Acomys wilsoni argillaceus Hinton and Kershaw, Ann. Mag. Nat. Hist., ser. 9, vol. 6, p. 101, July, 1920. (Mongalla.)

SPECIMENS EXAMINED: Thirteen, from: Torit, 6 (3, MCZ); Ngaboli, 47 miles north of Torit, 1 (MCZ); Longairo, 20 miles east of Torit, 1 (MCZ); Malek, 5 (BM).

MEASUREMENTS: An adult male from Ngaboli and an adult female from Torit measure, respectively, as follows: Length of head and body 128, 118; length of tail 49, 45; length of hind foot 13, 12.5; length of ear 10, 10; greatest length of skull 23.7, 22.5; condyloincisive length 21.6, 20.1; crown length of upper toothrow 3.7, 3.6; width of rostrum at level of antorbital foramen 2.8, 2.7; least interorbital width 4.6, 4.2; greatest width across zygomatic arches 11.6, 11.3; length of nasals 8.9, 8.7.

REMARKS: All of the above specimens agree in detail with the type of *argillaceus* and differ from *A. w. wilsoni* and *A. w. ablutus* in a darker dorsal color. This darker dorsal color is obtained by the lessening of the reddish subterminal bands and the lengthening of the blackish terminal bands of the spines. This species may be distinguished from other species of *Acomys* by its speckled appearance dorsally.

***Cricetomys gambianus grahami* Hinton**

Cricetomys gambianus grahami Hinton, Ann. Mag. Nat. Hist., ser. 9, vol. 4, p. 283, October, 1919. (Nuba Mountains.)

Specimen Examined: One, the type, in BM.

Measurements: The measurements of the type, an adult male, are as follows: Length of head and body 300; length of tail 357; length of hind foot 70 (dry, 65); length of ear 35; condylobasal length of skull 62.4; greatest width across zygomatic arches 31.7; least interorbital width 9.3; length of nasals 25.2; length of anterior palatine foramina 5.4; crown length of upper toothrow 10.4.

Remarks: The two specimens, in subadult pelage, from Equatoria Province and referred only to the species *gambianus*, rather closely approach *grahami* in color but owing to the immature condition of the skulls little can be said about relationships.

The types of the various subspecies of *C. gambianus* examined in the British Museum are all very similar to one another, but minute differences in cranial details and pelage color do exist. Whether these are of subspecific worth is not at present determinable. It would be highly desirable to have series of this animal from the several type localities to determine the degree of variation in each population.

***Cricetomys gambianus* subsp.**

Specimens Examined: Two, from: 6 miles southwest of Torit, 1; Nimule, 1.

Remarks: No subspecies allocation can be made on the two specimens examined since both of them are immatures. It is generally accepted that all members of this genus in the Sudan are conspecific and should be referred to *gambianus*.

The amount of variation existing in this genus is extreme. How much of it is due to age, sex or geography is a moot question. The genus is in need of a thorough revision based on more than one or two specimens from each locality.

Subfamily Dendromurinae

***Dendromus mesomelas* subsp.**

Specimens Examined: Two, both in MCZ, from: Gilo, 40 miles south-southeast of Torit.

Remarks: These two specimens are somewhat darker than *D. m. percivali* from Mount Gargues, British East Africa. The external measurements agree rather well with *percivali*, but the skulls of the Gilo specimens, even though adult, are markedly smaller.

It is apparent that these animals from the Imatong Mountains are different from any of the surrounding kinds, but owing to the broken condition of the skulls and there being only the two specimens I feel it best to identify them only at the specific level.

Dendromus pumilio lineatus Heller

Dendromus lineatus Heller, Smithsonian Misc. Coll., vol. 56, No. 17, p. 4, Feb. 28, 1911. (Rhino Camp, Lado Enclave.)

Specimens Examined: Eight, from: Lokwi, 25 miles south of Torit, 3; Obbo, 4; Loa, 18 miles north of Nimule, 1 (MCZ).

Measurements: An adult male from Loa and an adult female from Lokwi measure, respectively, as follows: Length of head and body 64, 58; length of tail 87, 85; length of hind foot 18, 17; length of ear 10, 9; greatest length of skull 20.5, 20.2; condyloincisive length 18.5, 17.9; least interorbital width 3.2, 3.2; length of nasals 7.5, 7.6; width of rostrum at level of antorbital foramen 2.5, 2.6; crown length of upper toothrow 3.3, 3.2.

Remarks: The type specimen of *D. p. lineatus* has a pronounced middorsal black stripe. None of the specimens in the present series shows this intense black stripe, but all agree with the remainder of the type series of *lineatus* in showing only a faint suggestion of this marking. It is quite apparent that Heller selected the most strikingly marked specimen, rather than an average one, to name as the type.

In referring *lineatus* to *D. pumilio* I am accepting the work of Bohmann (1942).

Steatomys aquilo Thomas and Hinton

Figure 8,*b*

Steatomys aquilo Thomas and Hinton, Proc. Zool. Soc. London, p. 264, July 6, 1923. (Niurmya, Jebel Marra.)

Specimen Examined: The type.

Measurements: Only external measurements are available for this species since the skull is badly broken. Those measurements of the type are as follows: Length of head and body 69; length of tail 39; length of hind foot 14; length of ear 13.

Remarks: The color is light brownish gray above, gradually merging over the sides into the pure white of the belly. The tail is markedly bicolor, being of the color of the body above and white below.

No accurate comments can be made about the relationships of this species since it is known only from the type, the skull of which is badly broken.

Steatomys gazellae Thomas and Hinton

FIGURE 8,*b*

Steatomys gazellae Thomas and Hinton, Proc. Zool. Soc. London, p. 265, July 6, 1923. (Temburas.)

SPECIMEN EXAMINED: The type.

MEASUREMENTS: There are no external measurements available for the type, an adult male, but the skull measures as follows. Condyloincisive length 24.0; length of anterior palatine foramina 5.1; crown length of upper toothrow 4.5; least interorbital width 4.3; width of rostrum at level of antorbital foramen 3.4.

REMARKS: The color of the pelage is dark brown above, passing over the sides and abruptly terminating in the white of the belly. The auditory bullae are large and the anterior palatine foramina are widely open.

Again, no comment can be made on the relationship of this species since it is known only from the type specimen.

Steatomys thomasi, new species

FIGURE 8,*b*

TYPE: CNHM No. 79517, adult male, skin and skull, from Torit, Equatoria Province, Anglo-Egyptian Sudan. Obtained January 26, 1952, by J. S. Owen.

SPECIMENS EXAMINED: Twenty-three, from: Torit, 22 (2 MCZ); Ikoto, 1.

DIAGNOSIS: General over-all dorsal color near Buffy Brown abruptly terminating on sides in the pure white of the belly. Tail indistinctly bicolor. Dorsal surfaces of hands and feet, entire underparts, upper lips, and subauricular spot pure white. Skull of average size for the genus, upper cheekteeth relatively large, anterior palatine foramina large but straight-sided, auditory bullae relatively large, and interorbital region relatively narrow.

MEASUREMENTS OF THE TYPE SPECIMEN: Length of head and body 70; length of tail 32; length of hind foot 12; length of ear 10; greatest length of skull 20.5; condyloincisive length 18.8; greatest width across zygomatic arches 10.6; crown length of upper toothrow 3.1; least interorbital width 3.4; width of rostrum at level of antorbital foramen 2.9; length of nasals 8.0.

COMPARISONS: From *Steatomys aquilo*, *Steatomys thomasi* differs in more open anterior palatine foramina, and markedly darker colored upper incisors whose anterior face is much more strongly curved, that is, the radius of a circle formed by the curve of the incisors is markedly less. Since the rest of the skull of the type of *aquilo* is so

badly broken, these are the only characters that can be set forth as distinguishing these two kinds.

Steatomys thomasi differs from *Steatomys gazellae* in lighter color, smaller body-size and markedly smaller skull.

From *Steatomys athi*, *Steatomys thomasi* may be distinguished by its generally smaller size and somewhat lighter color. The skull is markedly smaller in all respects.

Remarks: The northern species of *Steatomys* are badly in need of revision. It is quite probable that the species *aquilo*, *gazellae*, *athi*, and *thomasi* are merely subspecies of the same species, but, until more specimens of *aquilo* and *gazellae* are known and intermediate areas collected, I feel it is better to record these names as species.

Subfamily Otomyinae

Otomys orestes giloensis Setzer

Otomys orestes giloensis Setzer, Journ. Washington Acad. Sci., vol. 43, No. 10, p. 334, October 22, 1953. (Gilo, Imatong Mountains.)

Specimens Examined: Nine, all from Gilo.

Measurements: The measurements of two males and two females from Gilo are, respectively, as follows: Length of head and body 160, 151, 161, 170; length of tail 72, 69, 77, ?; length of hind foot 29, 28, 28, 27; length of ear 17, 15, 17, 20; condyloincisive length of the skull 35.1, ?, 34.7, 33.7; alveolar length of upper toothrow 8.8, 8.8, 8.8, 8.8; length of anterior palatine foramina 6.9, 6.3, 6.6, 6.3; greatest width width across zygomatic arches 18.8, 17.9, 18.5, ?; least interorbital width 4.5, 4.6, 4.6, 4.5; length of nasals 16.6, 14.7, 15.7, 15.4.

Remarks: The above specimens were trapped in heavy litter on the forest floor.

Family Gliridae

Subfamily Graphiurinae

Graphiurus murinus marrensis, new subspecies

Figure 8,*c*

Type: BM No. 23.1.1.115, adult female, skin and skull, from Kulme, Wadi Aribo, 3,300 ft., Darfur Province, Anglo-Egyptian Sudan. Obtained September 23, 1921, by Lynes and Lowe, original No. 922.

Specimens Examined: Eight, all in BM, from: Kulme, Wadi Aribo, 4; Zalingei, 2; Jebel Marra, 2.

Diagnosis: Upperparts near Grayish Olive, shading over the sides into the white of the belly. Hands, feet, and tip of tail white. All hairs plumbeous at base.

Skull relatively large, braincase well inflated, zygomata widely flaring, nasals relatively long, interorbitum relatively narrow, auditory bullae strongly inflated, posterior choanae wide, and pterygoid fossae small.

MEASUREMENTS OF THE TYPE SPECIMEN: Length of head and body 107; length of tail 63; length of hind foot 17; length of ear 17; condylobasal length of skull 23.6; greatest width across zygomatic arches 15.7; least interorbital width 4.1; crown length of upper toothrow 3.3; condyloincisive length 25.2; length of nasals 11.3; width of rostrum at level of antorbital foramen 6.1.

COMPARISONS: *Graphiurus murinus marrensis* differs from *G. m. sudanensis* in somewhat paler color, lighter belly, and lighter colored tail. The skull has more open posterior choanae, larger bullae, wider zygomatic arches, wider rostrum, and more inflated braincase.

From *G. m. butleri*, *G. m. marrensis* differs in somewhat lighter color throughout. The skull is somewhat smaller, the auditory bullae are more inflated, the posterior choanae are more open, the rostrum is wider, and the braincase is more inflated.

While no specimens of *Graphyiurus orobinus* have been available, it would seem that *G. m. marrensis* can be distinguished by its longer hind foot.

REMARKS: No actual intergradation has been demonstrated in the dormice of the Sudan, but the characters by which the kinds may be distinguished from one another are at best only of subspecific rank.

Little distinction can be made between the three kinds known to occur in the Sudan by means of external measurements and in most of the cranial measurements. However, the degree of difference in color, the degree of inflation of the braincase and the auditory bullae, and the configuration of the posterior choanae readily separate these dormice.

***Graphiurus murinus butleri* Dollman**

FIGURE 8,*c*

Graphiurus butleri Dollman, Ann. Mag. Nat. Hist., ser. 8, vol. 9, p. 319, March 1912. (Jebel Ahmed Aga.)

SPECIMENS EXAMINED: Six, all in BM, from: Jebel Ahmed Aga, 1; Delami, 3; Nuba Mountains, 2.

MEASUREMENTS: The cranial measurements of the type, an adult male, are as follows: Condylobasal length of skull 23.9; least interorbital width 4.3; crown length of upper toothrow 3.2; condyloincisive length 25.5; length of nasals 11.1; width of rostrum at level of antorbital foramen 5.9.

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Remarks: While no actual intergradation can be demonstrated between *butleri, sudanensis,* or the kinds to the west, I feel that the degree of difference between these three kinds of dormice is of only subspecific worth; therefore they are all treated as subspecies of the earlier named *Graphiurus murinus.*

Graphiurus murinus sudanensis Setzer

Figure 8,*c*

Graphiurus murinus sudanensis Setzer, Journ. Washington Acad. Sci., vol. 43, No. 10, p. 333, October 22, 1953. (Torit.)

Specimens Examined: Twenty-three, from: Torit, 18 (7, MCZ); Obbo, 1; *Labalwa, 5 miles east of Torit,* 1 (MCZ); Mongalla, 1 (BM); Malek, 2 (BM).

Measurements: Two males and two females from Torit measure, respectively, as follows: Length of head and body 95, 88, 94, 93; length of tail 76, ?, 76, 82; length of hind foot 17, 18, 18, 18; length of ear 16, 16, 15, ?; condylobasal length of skull 21.7, 20.9, 21.2, 22.2; greatest width across zygomatic arches 15.0, ?, 13.9, 14.6; least interorbital width 4.5, 4.1, 4.1, 4.2; crown length of upper toothrow 3.1, 3.0, 3.0, 3.1; condyloincisive length 23.3, 22.3, 22.6, 23.8; length of nasals 9.4, 9.0, 9.4, 9.6; width of rostrum at level of antorbital foramen 5.4, 5.3, 5.2, 5.6.

Remarks: Apparently these small dormice are not restricted to any one habitat since they have been taken in trees, grassland, or rocky hills and in native huts. The type was taken in a native hut in Torit.

Graphiurus orobinus (Wagner)

Figure 8,*c*

Myoxus orobinus Wagner, Arch. Naturg., vol. 11, sec. 1, p. 149, 1845. (Sennaar.)

Specimens Examined: None.

Remarks: There have been no specimens of this dormouse available to me for study. From the description, as given by Wagner, this is a very small animal which is apparently unrelated to the *murinus* group.

The entire genus is in need of revision.

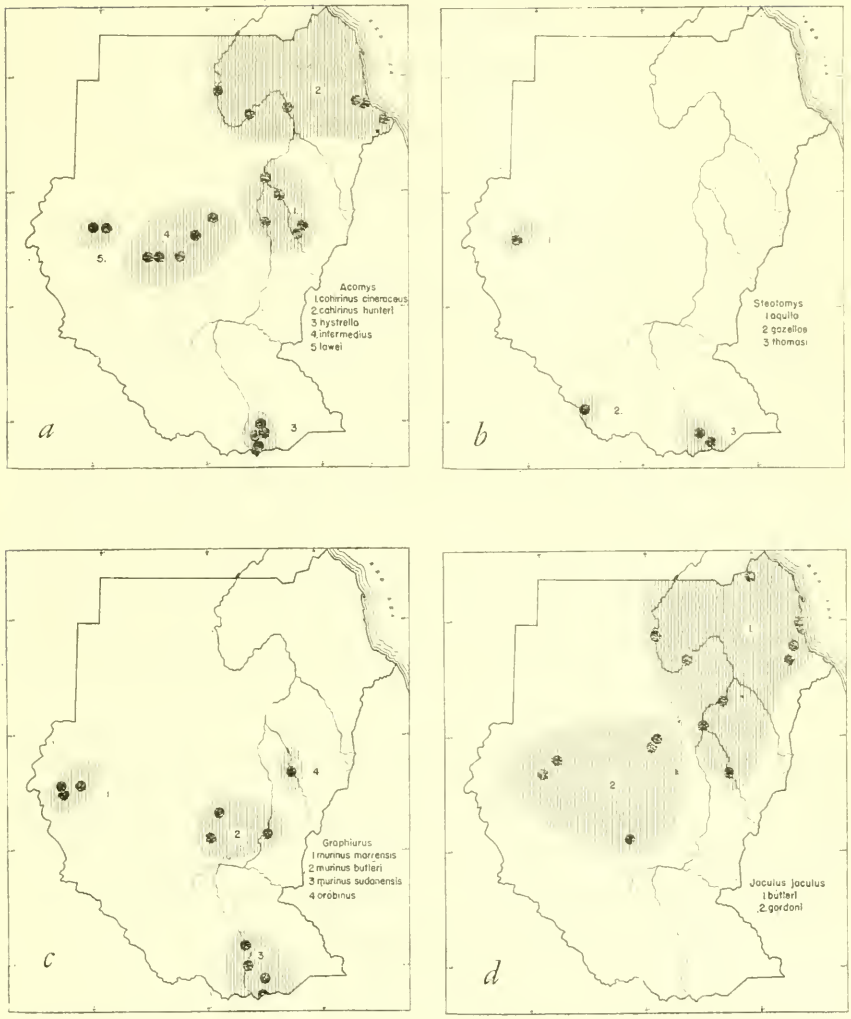

FIGURE 8.—Distribution of *Acomys*, *Steatomys*, *Graphiurus*, and *Jaculus* in the Anglo-Egyptian Sudan. (Scale: 1 inch=400 miles.)

Family Dipodidae

Subfamily Dipodinae

Jaculus jaculus butleri Thomas

FIGURE 8,*d*

Jaculus jaculus butleri Thomas, Ann. Mag. Nat. Hist., ser. 9, vol. 9, p. 296, April 1922. (Khartoum.)

SPECIMENS EXAMINED: Forty-three, all in BM, from: Khartoum, 22; Port Sudan, 6; Khor Arbat, 1; Sinkat, 1; Khor Hanoieit, 2; Shendy, 3; Kerma, 3; *Omdurman*, 1; Sennaar, 2; eastern Egyptian Desert, lat. 21°31′ N., long. 35° E., 1; Merowe, 1.

MEASUREMENTS: No external measurements are available, but cranial measurements of an adult male and averages and extremes of three adult females from Khartoum are, respectively, as follows: Greatest length of skull 32.7, 33.0 (32.7–33.5); condyloincisive length 28.8, 28.9 (28.5–29.4); crown length of upper toothrow 4.7, 4.6 (4.5–4.7); greatest breadth across anterior zygomatic processes 23.4, 24.2 (24.2); least interorbital width 11.8, 12.0 (11.8–12.2); length of nasals 12.0, 12.2 (11.8–12.7); width of rostrum at level of antorbital foramen 5.1, 5.3 (5.0–5.5); greatest breadth of braincase 22.4, 22.9 (22.4–23.3).

REMARKS: This subspecies differs from *Jaculus jaculus gordoni* in somewhat darker color, that is, more admixture of black tipped hairs; smaller hind foot; and a decidedly shorter ear. The skulls are quite similar except that the auditory bullae are smaller, the upper cheek-teeth smaller and the toothrow shorter, the rostrum somewhat narrower and shorter, and the lachrymals somewhat larger.

Jaculus jaculus gordoni Thomas

FIGURE 8,*d*

Jaculus gordoni Thomas, Proc. Zool. Soc. London, p. 299, Aug. 6, 1903. (Kaga Hills, Western Kordofan.)

SPECIMENS EXAMINED: Thirteen, all in BM, from: *Kaga Hills*, 2; Jebel Um Durragh, 1; Jebel Agageh, 1; *Hamra*, 5; Haraza, 2; near El Fasher, 1; 55 miles northeast of El Fasher, 1.

MEASUREMENTS: The type, an adult male, measures as follows: Length of head and body 120; length of tail 200; length of hind foot 66; length of ear 25; greatest length of skull 35.5; condyloincisive length 31.9; crown length of upper toothrow 5.6; greatest breadth across anterior zygomatic processes 24.1; least interorbital width 13.0; length of nasals 13.0; width of rostrum at level of antorbital foramen 6.0; greatest breadth of braincase 24.5.

Remarks: In some of the above specimens the color is as in the type but in others the color is markedly lighter and brighter. This is not due to season since all of these specimens were taken at approximately the same time of year. The skulls, however, show all of these specimens to be referable to *J. j. gordoni*.

Suborder HYSTRICOMORPHA

Family Hystricidae

Subfamily Atherurinae

Atherurus turneri St. Leger

Atherura turneri St. Leger, Ann. Mag. Nat. Hist., ser. 10, vol. 10, p. 231, September 1932 (Kakumega Forest, near Kaimosi, Kenya Colony.)

Specimen Examined: One, from Lokwi, 25 miles south of Torit.

Measurements: Measurements of an adult male from Lokwi are as follows: Length of head and body 520; length of tail 130; greatest length of skull 90.5; zygomatic width 46.9; alveolar length of upper toothrow 17.3; length of palate 38.2; length of nasals (median) 22.3; least interorbital width 28.7; least postorbital constriction 25.3; median width of nasals 12.0; breadth across external auditory meatus 40.0.

Remarks: This single specimen seems to agree in all respects with the type of *turneri*.

Family Thryonomyidae

Thryonomys gregorianus subsp.

Specimen Examined: One, in BM, from Char, Didinga Mountains.

Measurements: The external measurements of the above specimen, an adult male, are as follows: Length of head and body 500; length of tail 82; length of hind foot 67; length of ear 29.

Remarks: This single specimen from the Didinga Mountains most closely resembles the nominate race but there are differences in color. Any attempt to assign a subspecific name to this animal would, at best, be only guesswork. I prefer to leave any subspecific identification until such time as additional material is available.

Thryonomys harrisoni harrisoni Thomas and Wroughton

Thryonomys harrisoni Thomas and Wroughton, Ann. Mag. Nat. Hist., ser. 7, vol. 19, p. 384, May 1907. (Loka, 60 miles southwest of Fort Berkeley.)

Specimen Examined: One, the type, in BM.

Measurements: The cranial measurements of the type, sex unknown, are as follows: Greatest length of skull 91; length of nasals 30; least interorbital width 28.5; crown length of upper toothrow 16.

REMARKS: The skull of the species *harrisoni* may be distinguished from that of *gregorianus* by its longer and narrower build. From *swinderianus* this species may be recognized by the lack of the anterior cranial inflation.

***Thryonomys swinderianus variegatus* (Peters)**

Aulacodus variegatus Peters, Reise nach Mossambique, Säugethiere, p. 138, 1852. (Mozambique.)

Aulacodus semipalmatus Heuglin, Nova Acta Acad. Caes. Leop.-Carol., Halle, vol. 31, art. 7, p. 5, 1864. (West of Djur River, to Fertit and Niam-Niam country, upper Bahr-el-Ghazal.)

SPECIMEN EXAMINED: One, in BM, from Akanda, Bahr-el-Ghazal.

REMARKS: The cane rats are all similar in external appearance but may be distinguished by their cranial details. The species *swinderianus* has the anterior portion of the skull inflated while in *gregorianus* this portion of the skull is markedly less inflated.

These two species may be further distinguished by the longer bicolor tail in the former and the short concolor tail in the latter.

It is quite apparent that the genus *Thryonomys* needs a thorough revision based on far more material than appears to be extant at this time.

Family BATHYERGIDAE

***Cryptomys ochraceocinereus oweni*, new subspecies**

TYPE: CNHM No. 79485, sex unknown, young adult, skin and skull, from Magwe, 36 miles southwest of Torit, Equatoria Province, Anglo-Egyptian Sudan. Obtained November 2, 1951, by J. S. Owen.

SPECIMENS EXAMINED: Four, from: 5 miles east of Torit, 1 (MCZ), Torit, 1 (MCZ); Nagichot, Didinga Hills, 1; Magwe, 36 miles southwest of Torit, 1.

DIAGNOSIS: Upper parts Blackish Brown but little lighter below; hands and feet light brownish above; dorsal head spot, lips, chin, and line on mid throat ending in a spot on the breast, pure white. Skull relatively flat, rostrum narrow, auditory bullae small but well inflated, upper toothrow relatively short, interorbital width relatively small, orbital notch greatly reduced.

MEASUREMENTS OF THE TYPE SPECIMEN: Length of head and body 160; length of tail 10; length of hind foot 28; greatest length of skull 42.8; condyloincisive length 41.6; crown length of upper toothrow 6.7; greatest width across zygomatic arches 30.1; least interorbital width

9.3; least postorbital width 9.1; length of nasals 14.3; width of rostrum at level of antorbital foramen 8.3.

Comparisons: From *C. o. ochraceocinereus* as known from 400 miles west of Juba, *C. o. oweni* differs in darker color throughout; the skull has the rostrum narrower, the pterygoid fossae smaller, auditory bullae smaller but more inflated ventrally, hard palate markedly narrower, upper toothrow shorter, width across postorbital processes greater, interorbital width less, skull flatter, and the orbital notch markedly reduced.

Remarks: These specimens from Equatoria Province need no comparison with other named kinds, which are all far removed geographically from this area.

The status of the name *ochraceocinereus* is somewhat in doubt, but until such time as a revisionary study has been made I prefer to refer this new subspecies to that species.

The label on the specimen from Nagichot bears the collectors remark, "Plentiful in mountain-meadows." Unfortunately only the single specimen was obtained and saved.

Order CARNIVORA

Family Canidae

Subfamily Caninae

Canis adustus bweha (Heller)

Thos adusta bweha Heller, Smithsonian Misc. Coll., vol. 63, No. 7, p. 2, June 24, 1914. (Kisumu, British East Africa.)

Specimens Examined: Three, all in BM, from: Chak Chak, 1; Bahr-el-Ghazal, 1; Bor, 1.

Measurements: An adult male from Chak Chak has the following measurements: Length of head and body 673; length of tail 279; length of hind foot 182; length of ear 70; greatest length of skull 161.0; condyloincisive length 144.2; length of auditory bullae 21.4; greatest width across zygomatic arches 78.8; least postorbital width 27.9; least interorbital width 28.4; length of nasals 60.0.

Remarks: *Canis adustus* may be distinguished from *Canis aureus*, with which it apparently occurs, by smaller size, markedly smaller cheekteeth, smaller but more inflated auditory bullae, and the choanae tapering sharply posteriorly. The skin is lighter in color and the hair is shorter; the ears are smaller and decidedly blackish in color as opposed to pale and long in *aureus*.

***Canis aureus soudanicus* Thomas**

Canis variegatus Cretzschmar, *in* Rüppell, Atlas zu der Reise im Nördlichen Afrika von Rüppell, pt. 1, Säugethiere, p. 31, 1826. (Nubia and Upper Egypt.) (Not *Canis familiaris variegatus* Gmelin 1788.)

Canis anthus soudanicus Thomas, Proc. Zool. Soc. London, p. 295, August 1903. (El Obeid, Kordofan.)

Canis doederleini Hilzheimer, Zool. Anz., vol. 30, p. 116, Apr. 17, 1906. (Upper Egypt.)

Canis thooides Hilzheimer, Zool. Beob., vol. 47, p. 364, December 1906. (Sennaar.)

Thos aureus nubianus Cabrera, Bol. Real Soc. Española Hist. Nat., Madrid, vol. 21, p. 264, Oct. 14, 1921. (New name for *C. variegatus* Cretzschmar.)

Specimens Examined: Ten, all in BM, from: El Obeid, 1; *Sennaar*, 1; Plain of Tokar, 2; 35 miles west of Omdurman, 1; Jebel Marra, 3; *Niurmya, Jebel Marra*, 1; *Habissa Wells*, 1.

Measurements: An adult male and an adult female from the Jebel Marra measure, respectively, as follows: Length of head and body 577, 661; length of tail 261, 254; length of hind foot 161, 140; length of ear 97, 99; greatest length of skull 160, 149.5; condyloincisive length 151, 140.8; length of auditory bullae 21.0, 20.0; greatest width across zygomatic arches 86.7, 74.4; least postorbital width 27.1, 28.7; least interorbital width 24.7, 23.1; length of nasals 53.9, 51.4.

Remarks: These jackals are quite uniform in coloration but vary considerably in their cranial details. G. M. Allen (1939, p. 195) notes that Schwarz (1926) considers *soudanicus* to be the same as *nubianus*, which is a new name for *variegatus*. However, if all these jackals are the same, then the oldest available name is *Canis aureus soudanicus*.

***Canis mesomelas elgonae* (Heller)**

Thos mesomelas elgonae Heller, Smithsonian Misc. Coll., vol. 63, No. 7, p. 3, June 24, 1914. (Guas Ngishu Plateau, Kenya Colony.)

Thos mesomelas mcmillani Heller, Smithsonian Misc. Coll., vol. 63, No. 7, p. 3, June 24, 1914. (Mtoto Andei, Kenya Colony.)

Specimen Examined: One, from Ikoto.

Measurements: An adult male from Ikoto measures: Length of head and body 680; length of tail 322; length of hind foot 157; length of ear 109; greatest length of skull 146.8; length of palate 69.0; breadth M^1–M^1 47.5; greatest width across zygomatic arches 84.7; least interorbital width 29.9; postorbital constriction 35.2; length of nasals 49.7; breadth of braincase 53.2.

Remarks: In attempting to identify the only specimen of this jackal in the collection, it was necessary to compare it with specimens of *C. m. elgonae* and *C. m. mcmillani*. In no way does this specimen disagree with either named kind. Heller erected these two subspecies on the basis of the basal hair color of the belly. In *elgonae* the basal

portion is supposed to be plumbeous and in *mcmillani* the basal portion is supposed to be white. However, in the specimens used by Heller, including the types, the hair is plumbeous to the base in all specimens of both kinds. In addition, there is no method by which the skulls of the two kinds may be told apart. It is true that the auditory bullae in the type of *elgonae* are more inflated ventrally than in *mcmillani* but this character breaks down when the type series from the Guas Ngishu Plateau is examined. Therefore, since the name *Thos mesomelas elgonae* has line preference over *Thos mesomelas mcmillani*, that name will be the one for the *mesomelas* jackals from northern and eastern Kenya Colony and *mcmillani* thus becomes a synonym of *C. m. elogonae.*

***Vulpes pallida pallida* (Cretzschmar)**

Canis pallidus Cretzschmar, *in* Rüppell, Atlas zu der Reise im nördlichen Afrika von Rüppell, pt. 1, Säugethiere, p. 33, 1826. (Kordofan.)

Specimens Examined: Eighteen, all in BM, from: 25 miles west of Omdurman, 1; Shendy, 5; Wad Medani, 1; Suakin, 5; *Wad Ferow*, 1; Kulme, Wadi Aribo, 4; Jebel Marra, 1.

Measurements: Average and extreme measurements of three adult males from Shendy are as follows: Length of head and body 382.2 (333–420); length of tail 242.1 (225–270); length of hind foot 103.0 (100–108); length of ear 68.2 (65–71); greatest length of skull 97.5 (96.8–98.7); condyloincisive length 94.3 (93.3–96.0); length of auditory bullae 17.3 (15.9–18.5); greatest width across zygomatic arches 52.3 (51.0–53.6); least postorbital width 20.8 (20.2–21.9); least interorbital width 18.1 (17.1–19.1); length of nasals 31.3 (29.0–33.3).

Remarks: The specimens from Kulme and the Jebel Marra are not typically *pallida* but average larger in all measurements taken on the skull. They are darker in color than animals from farther east. The skulls have a wider braincase, larger upper molars, and the auditory bullae are, in general, larger and more inflated.

However, the differences set forth are not constant in the few specimens examined, and since there is some overlap of these characters with animals from the eastern Sudan I refer them to the nominate race.

***Vulpes rüppellii rüppellii* (Schinz)**

Canis rüppelii (sic) Schinz, Das Thierreich . . . von Cuvier, vol. 4, p. 508, 1825. (Dongola.)

Canis famelicus Cretzschmar, *in* Rüppell, Atlas zu der Reise im nördlichen Afrika von Rüppell, pt. 1, Säugethiere, p. 15, 1826. (Nubian desert and Kordofan.)

Specimens Examined: Five, all in BM, from: Selima Oasis, 100 miles west of Wadi Halfa, 2; Nagasburt, 1; No. 2 Station, between Wadi Halfa and Khartoum, 1; Khor Arbat, 1.

MEASUREMENTS: Cranial measurements of an adult male from Khor Arbat and an adult female from No. 2 Station are, respectively, as follows: Greatest length of skull 110, 106.4; condyloincisive length 106, 101.6; length of auditory bullae 20.2, 19.1; greatest width across zygomatic arches 58.0, 57.1; least postorbital width 20.2, 20.2; least interorbital width 19.7, 19.3; length of nasals 38.4, 34.9.

REMARKS: *V. rüppellii* may be distinguished from *V. pallida* by its more intense reddish color; the longer ears; and the clear anterior face of the foreleg, that is, the blackish stripe on the foreleg of *pallida* is missing in *rüppellii*.

Fennecus zerda (Zimmermann)

Canis zerda Zimmermann, Geogr. Geschichte, vol. 2, p. 247, 1780. (Sahara and other regions back of the Atlas Mountains, and in Tripoli.)

Fennecus arabicus Desmarest, Dictionnaire d'histoire naturelle, tableau de méthodique des mammiferes, p. 18, 1804; Nouveau dictionnaire d'histoire Naturelle, vol. 11, p. 342, 1817. (Barbary, Nubia, Abyssinia.)

Fennecus brucei Desmarest, Mammalogie, *in* Encyclopaedia Méthodique, p. 235, 1820. (Libya, Tunis, Algeria, and Sennaar.)

(Other synonyms extralimital to the Sudan.)

SPECIMEN EXAMINED: One, in BM, from Dongola.

MEASUREMENTS: An adult male from Dongola measures as follows: Length of head and body 360; length of tail 290; length of hind foot 92; length of ear 90; greatest length of skull 83.5; condyloincisive length 81.8; length of auditory bullae 19.5; greatest width across zygomatic arches 44.0; least postorbital width 18.0; least interorbital width 15.7; length of nasals 26.5.

REMARKS: The fennec is the smallest of the canids occurring in the Sudan. It may be further differentiated from the rest of the family in the Sudan by its extremely pallid color and by the presence of a small blackish tip on the tail.

Subfamily Simocyoninae

Lycaon pictus somalicus Thomas

Lycaon pictus somalicus Thomas, Ann. Mag. Nat. Hist., ser. 7, vol. 14, p. 98, August 1904. (Gorahai, Somaliland.)

Lycaon rüppelli Matschie, Sitzb. Ges. Naturf. Freunde, Berlin, p. 415, October 1915. (Bajuda Steppe Region, Anglo-Egyptian Sudan.)

Lycaon takanus Matschie, Sitzb. Ges. Naturf. Freunde, Berlin, p. 360, October 1915. (Near Khor el Gasch, Taka District, Anglo-Egyptian Sudan.)

(Other synonyms extralimital to the Sudan.)

SPECIMENS EXAMINED: Two, both in BM, from: Bir el Girud, 1; Bahr-el-Ghazal, 1.

MEASUREMENTS: Cranial measurements of an adult male from Bir el Girud are as follows: Greatest length of skull 217; condyloincisive

length 202; length of auditory bullae 29.8; greatest width across zygomatic arches 131.0; least postorbital width 46.3; least interorbital width 46.3; length of nasals 67.1.

Remarks: The hunting dog may be distinguished from other canids by its larger size, spotted brown and white pattern, and large rounded ear.

Family Mustelidae

Subfamily Mustelinae

Ictonyx striatus erythreae De Winton

Figure 9,*a*

Ictonyx erythraea (sic) De Winton, Ann. Mag. Nat. Hist., ser. 7, vol. 1, p. 248, March 1898. (Suakin, Red Sea Coast, Anglo-Egyptian Sudan.)

Ictonyx erythreae Anderson and De Winton, *in* Anderson, Zoology of Egypt, vol. 2, Mammalia, p. 240, 1902. (Correction of misprint.)

Specimens Examined: Eight, all in BM, from: Khartoum, 1; Medani, 1; *Loka*, 1; Roseires, 1; Erkowit, 1; Khor Arbat, 3.

Measurements: The average and extremes of cranial measurements for three adult males from Khor Arbat are as follows: Condyloincisive length of skull 58.5 (57.8–59.2); greatest width across zygomatic arches 37.6 (36.1–38.6); least postorbital width 14.6 (13.9–14.9); least interorbital width 15.6 (14.7–16.5); greatest breadth of braincase 28.1 (27.5–28.5).

Remarks: The specimens from near the Red Sea coast have the dark parts of the pelage reddish black, while the animals from near the Nile are jet black. The one exception to this is the specimen from Khartoum which is intermediate in color.

It may be that the animals from near the Nile should be referred to *I. s. intermedius*. However, upon comparison with the types it seems best to refer these to *erythreae* and note that they are intergrades in color and certain cranial features.

Ictonyx striatus sudanicus Thomas and Hinton

Figure 9,*a*

Ictonyx striatus sudanicus Thomas and Hinton, Proc. Zool. Soc. London, p. 254, July 6, 1923. (Foothills of Jebel Marra, 4,000 feet.)

Specimen Examined: The type, in BM.

Measurements: The type, an adult male, measures as follows: Length of head and body 355; length of tail 255; length of hind foot 58; length of ear 24; greatest length of skull 68.5; condyloincisive length 67.1; greatest width across zygomatic arches 38.7; least postorbital width 16.3; least interorbital width 18.0.

REMARKS: This subspecies differs from *erythreae* in having the black pigmented areas reduced, noticeably on the belly. Unless the type is an unusually large animal, *sudanicus* in markedly larger than either *intermedius* or *erythreae*.

***Poecilictis libyca multivittata* (Wagner)**

Rhabdogale multivittata Wagner, *in* Schreber, Die Säugethiere . . ., Suppl., vol. 2, p. 221, 1841. (Upper Nile.)

Ictonyx frenata Sundevall, Kongl. Svenska Vet.-Akad. Handl., Stockholm, p. 212, 1843. (Sennaar.)

SPECIMENS EXAMINED: Three, all in BM, from: Omdurman, 1; Tuli Island, Khartoum, 1; near Jebel Hadoza, 1.

REMARKS: Neither external nor cranial measurements are available for any of the above specimens. However, the specimens are smaller and present a generally darker appearance than do specimens from near Cairo, Egypt. The posterior white rosette is divided in half by a black stripe in these specimens instead of being entire as in the more northern members of the species.

Subfamily Mellivorinae

***Mellivora capensis abyssinica* Hollister**

Mellivora abyssinica Hollister, Smithsonian Misc. Coll., vol. 56, No. 13, p. 1, October 10, 1910. (Suksukki River, which connects Lake Zwai with Lake Horo Schala, Ethiopia.)

SPECIMENS EXAMINED: Six, from: Khartoum, 1 (BM); Malek, 2 (BM); Suakin, 1 (BM); Kamisa, 1 (BM); Torit, 1.

MEASUREMENTS: An adult male from Kamisa measures as follows: Length of head and body 725; length of tail 203; length of hind foot 133; length of ear 40; condyloincisive length of skull 137.5; least postorbital width 31.9; least interorbital width 36.2; breadth of braincase 63.7.

REMARKS: The name to be applied to the ratels of the Sudan is in doubt. The present specimens are all darker in color and somewhat smaller in size than is the type of *abyssinica*. However, I feel it best to refer these animals to *abyssinica* until such time as the amount of individual and sexual variation is known.

Subfamily Lutrinae

Lutra maculicollis nilotica Thomas

Lutra concolor Neumann, Sitzb. Ges. Naturf. Freunde, Berlin, p. 55, 1902. (Addis Ababa, Ethiopia.) (Preoccupied by *Lutra concolor* Rafinesque, 1832, from India.)

Lutra maculicollis nilotica Thomas, Ann. Mag. Nat. Hist., ser. 8, vol. 8, p. 726, December 1911. (Upper Nile, Malek, south of Bor.)

Specimens Examined: Five, all in BM, from: White Nile, 2; Bor District, 1; Malek, 2.

Measurements: The cranial measurements of an adult male from the Bor District and an adult female from Malek are, respectively, as follows: Condyloincisive length 112.3, 104.5; greatest width across zygomatic arches ?, 63.0; least postorbital width 17.4, 17.0; least interorbital width 19.7, 19.2; breadth of braincase 51.3, 52.0.

Family Viverridae

Subfamily Viverrinae

Genetta genetta senegalensis (J. B. Fischer)

Viverra senegalensis J. B. Fischer, Synopsis mammalium, p. 170. 1829. (Senegal.)

Viverra dongolana Hemprich and Ehrenberg, Symbolae Physicae, Zoologica, Mammalia, dec. 2, folio k, p. 2, September 1832. (Dongola, Anglo-Egyptian Sudan.)

Specimens Examined: Nine, all in BM, from: Erkowit, 1; Khartoum, 3; Kerma, 1; Port Sudan, 1; Shendy, 2; Sennaar, 1.

Measurements: An adult male from Kerma measures as follows: Length of head and body 470; length of tail 360; length of hind foot 80; length of ear 40; greatest length of skull 89.8; condyloincisive length 86.4; greatest width across zygomatic arches 48.0; least postorbital width 12.7; least interorbital width 14.7; breadth of braincase 28.2; length of auditory bullae 12.0.

Remarks: The white rings of the tail of *G. genetta senegalensis* average nine, and the last ring of the tail is white or whitish. The dorsal and lateral spots are, in general, small and are poorly defined but do not tend to coalesce. The middorsal stripe is distinct and stops well behind the shoulders.

The skull of *G. genetta*, at least in the Sudan, is larger, noticeably in the width across the zygomatic arches and in the postorbital and interorbital width, but the braincase is narrower than in *G. tigrina*.

Genetta tigrina aequatorialis Heuglin

Genetta aequatorialis Heuglin, Sitzb. K. Akad. Wiss. Wien, Math.-Nat. vol. 54, sec. 1, p. 559, 1866. (West bank of Bahr-el-Abiad, lat. 7° to 8° N., Anglo-Egyptian Sudan.)

SPECIMENS EXAMINED: Twenty, from: Torit, 5 (1, MCZ, 1, BM); *Gabt el Meghekid*, 1 (BM); Mongalla, 1 (BM); *Duk Fagwil*, 1 (BM); Malek, 2 (BM); *Moru District*, 3 (BM); Duk, 90 miles northeast of Bor, 1 (BM); *Bor District*, 2 (BM); *Yei District*, 1 (BM); Obbo, 2; *Palwar, 45 miles south of Torit*, 1 (MCZ).

MEASUREMENTS: An adult male and an adult female from the Moru District measure, respectively, as follows: Length of head and body 424, 413; length of tail 361, 382; length of hind foot 73, 65; length of ear 37, 39; greatest length of skull 84.7, 81.8; condyloincisive length 81.3, 78.9; greatest width across zygomatic arches 42.9, 42.0; least postorbital width 10.0, 9.2; least interorbital width 10.5, 10.7; breadth of braincase ?, 37.9; length of auditory bullae 17.5, 17.0.

REMARKS: *G. t. aequatorialis* has an average of seven white rings on the tail, and as a rule the last one or two white rings are interrupted dorsally by the black bands. The distal portion of the tail is always black. The spots on the back and sides are discreet and do not tend to fade out into the ground color. The line of spots immediately lateral to the middorsal stripe tends to coalesce posteriorly. The middorsal stripe ends at about the level of the shoulders.

The skulls are smaller than in *G. genetta senegalensis* except for the auditory bullae, which are of the same length and more inflated ventrally in *tigrina*.

Civettictis civetta congica Cabrera

Civettictis civetta congica Cabrera, Mem. Real Soc. Española Hist. Nat. Madrid, vol. 16, p. 36, July 10, 1929. (Niapu, Belgian Congo.)

SPECIMENS EXAMINED: Two, from: Torit, 1; Obbo, 1.

REMARKS: The above specimens do not exactly agree with the description of *congica* but more closely approximate that subspecies than any of the other named kinds.

Subfamily Herpestinae

Herpestes sanguineus sanguineus Rüppell

Herpestes sanguineus Rüppell, Neue Wirbelthiere, zu der Fauna von Abyssinien gehörig, Säugethiere, vol. 1, p. 27, 1835. (Kordofan.)

SPECIMENS EXAMINED: Thirteen, from: Niurmya, 1 (BM); Kulme, Wadi Aribo, 3 (BM); Mebit, near El Fasher, 1 (BM); southeastern Jebel Marra, 1 (BM); 35 miles north of El Fasher, 1 (BM); central Jebel Marra, 4 (BM); Darfur, 1 (BM); Torit, 1.

MEASUREMENTS: An adult male from the Jebel Marra measures as follows: Length of head and body 290; length of tail 275; length of hind foot 60; length of ear 25; greatest length of skull 62.9; condyloincisive length 60.9; greatest width across zygomatic arches 29.0; least postorbital width 13.8; least interorbital width 10.7; breadth of braincase 25.1; length of auditory bullae 14.3.

REMARKS: The mongoose here referred to *Herpestes* has long been known by the generic name *Myonax*. I am following the usage of Ellerman, Morrison-Scott, and Hayman (1953) in referring this species to the genus *Herpestes*.

***Dologale dybowskii* (Pousargues)**

Crossarchus dybowskii Pousargues, Bull. Soc. Zool. France, vol. 18, p. 51, 1893; Nouv. Arch. Mus. Hist. Nat., Paris, vol. 3, No. 6, p. 121, 1894. (Ubangi, Belgian Congo.)

Herpestes nigripes Kershaw, Ann. Mag. Nat. Hist., ser. 9, vol. 13, p. 22, January 1924. (Moru District, Mongalla.)

SPECIMENS EXAMINED: Four, from: Khartoum, 1 (BM); Issore, Imatong Mountains, 1 (BM); Rejaf District, Mongalla Province, 1 (BM); Torit, 1.

MEASUREMENTS: A young adult female from Rejaf District measures as follows: Length of head and body 215; length of tail 164; length of hind foot 54; length of ear 21; greatest length of skull 53.7; condyloincisive length 51.8; greatest width across zygomatic arches 27.7; least postorbital width 12.6; least interorbital width 9.5; breadth of braincase 25.5; length of auditory bullae 12.0.

REMARKS: The specimen from Torit was obtained in savanna country. Apparently little is known concerning the habits or distribution of this small mongoose.

***Mungos mungo gothneh* (Heuglin and Fitzinger)**

Herpestes gothneh Heuglin and Fitzinger, Sitzb. K. Akad. Wiss. Wien, Math.-Nat., vol. 54, sec. 1, p. 560, 1866.

Herpestes leucos ethicus Heuglin and Fitzinger, Sitzb. K. Akad. Wiss. Wien, Math.-Nat., vol. 54, sec. 1, p. 561 1866. (Junction of the Sobat and Bahr-el-Abiad.)

SPECIMENS EXAMINED: Four, from: White Nile, 2 (BM); Rejaf District, 1 (BM); Torit, 1.

REMARKS: Allen (1939, p. 218) lists *Herpestes adailensis* Heuglin 1861 as a synonym of *gothneh*. This is apparently in error and *adailensis* should be referred to *M. m. zebra* Rüppell, 1835, from the lowlands of Kulla and Massawa, Eritrea. In Petermann's Geographische Mittheilungen, (1861, p. 17), Heuglin states that the back is striped as in *H. zebra* and cites the "Adail-Küste unfern Tedjura" as the locality from which he examined an old male. In view of the

locality and Heuglin's description, the name *adailensis* should therefore be placed in synonymy as mentioned above.

No measurements are available for any of the specimens listed above since they are all immature.

Ichneumia albicauda albicauda (G. Cuvier)

Herpestes albicaudus G. Cuvier, Regne animal, ed. 2, vol. 1, p. 158, 1829. (Senegal.)
Herpestes leucurus Hemprich and Ehrenberg, Symbolae physicae, Mammalia, dec. 2, folio h, i, k, pl. 12, September 1832. (Dongola.)
Ichneumia albescens I. Goeffroy, *in* Mag. de Zool., Mammalia, p. 16. 1839. (Sennaar.)
Ichneumia abu-wudan Fitzinger and Heuglin, Sitzb. K. Akad. Wiss. Wien, Math.-Nat., vol. 54, sec. 1, p. 561, 1866. (Berbera, Somaliland.)

Specimens Examined: Thirty, from: Roseires, 3 (BM); Soba, 2 (BM); Shereik, 2 (BM); Merowe, 2 (BM); Kerma, 1 (BM); Shendy, 5 (BM); Nagichot, 1 (BM); Bor, 2 (BM); Moru District, 1 (BM); Ayod, 1 (BM); Singa, 1 (BM); Chak Chak, 3 (BM); Juba, 1 (BM); Malek, 1 (BM); Torit, 3 (1 MCZ); Ikoto, 1.

Measurements: External measurements of an adult male and an adult female from Shereik, are, respectively, as follows: Length of head and body 467, 470; length of tail 354, 430; length of hind foot 98, 103; length of ear 31, 36. Cranial measurements of an adult male from Shereik and an adult female from Soba, are respectively: Greatest length of skull 91.6, 97.2; condyloincisive length 89.6, 94.5; greatest width across zygomatic arches 46.0, 50.8; least postorbital width ?, 18.5; least interorbital width ?, 19.6; breadth of braincase 32.5, 31.6; length of auditory bullae 18.3, 18.4.

Remarks: The white-tailed mongooses have a melanistic phase which makes the common name seem rather absurd. These melanistic specimens have lost the white tail tip, either completely or in part. There seems always to be present some white, which occurs only at the base of the hairs, while the tips of the same hairs in the melanistic phase are black.

Melanism does not seem to be an age character since white and black tails occur at the same age levels.

Family Hyaenidae

Subfamily Protelinae

Proteles cristatus pallidior Cabrera

Proteles cristatus pallidior Cabrera, Ann. Mag. Nat. Hist., ser. 8, vol. 6, p. 464, November 1910. (Suakin.)

Specimens Examined: Four, all in BM, from Suakin.

Measurements: Cranial measurements of an adult male and an adult female from Suakin are, respectively, as follows: Greatest length

of skull 133, 132.7; condyloincisive length 130.8, 133.5; greatest width across zygomatic arches 77.6, 78.2; least interorbital width 28.5, 29.7; width of rostrum at level of canines 37.8, 39.4; width of palate at level of last molars 42.0, 42.7.

REMARKS: The skull of the aard wolf is small and the muzzle is quite blunt. The premolars and molars are reduced to mere pegs and the toothrows are virtually parallel. By these means it may be distinguished from the genus *Hyaena* which it resembles externally. However, the ears are longer, the legs are shorter, and in old animals the mane reaches farther posteriorly than in *Hyaena*.

Subfamily Hyaeninae

Crocuta crocuta fortis J. A. Allen

Crocuta crocuta fortis J. A. Allen, Bull. Amer. Mus. Nat. Hist., vol. 47, p. 214, Apr. 11, 1924. (Faradje, Belgian Congo.)

SPECIMENS EXAMINED: Five, all in BM, from: Kulme, Wadi Aribo, 1; Meshra Zeraf, 1; northern Darfur, 1; Bahr Zeraf, 1; Kaka, 1.

MEASUREMENTS: Cranial measurements of an adult male from Kaka and an adult female from Meshra Zeraf are, respectively, as follows: Greatest length of skull 257, 273; condyloincisive length 240, 250; greatest width across zygomatic arches 152, 176; least interorbital width 54.5, 64.0; greatest length of fourth upper premolar 36.6, 37.3.

REMARKS: The spotted hyaena may be distinguished readily from the striped hyaena by the pattern of the pelage. In addition, the skulls are separable by means of the larger and more inflated auditory bullae, the wider posterior choanae, and the much larger and wider upper fourth premolar.

Hyaena hyaena dubbah Meyer

Hyaena dubbah F. A. A. Meyer, Systematisch-Summarisch Uebersicht der neuesten zoologischen Entdeckungen in Neu-Holland und Afrika, p. 94, 1793. (Based on Bruce's Travels to discover source of Nile, 1791.) (Atbara.)

Canis hyaenomelas Desmarest, Encyclopaedia Méthodique, Mammalogie, p. 215, 1820. (Atbara.)

Hyaena dubia Schinz, Das Thierreich . . . von Cuvier, vol. 4, p. 509, 1825. (Dongola.)

Hyaena hienomelas Matschie, Sitzb. Ges. Naturf. Freunde, Berlin, p. 53, 1900. (Atbara.)

SPECIMENS EXAMINED: Four, all in BM, from: 100 miles west of Nahud, 1; foothills of southern Jebel Marra, 1; Sudan (no precise locality), 1; Kulme, Wadi Aribo, 1.

MEASUREMENTS: An adult male from southern Jebel Marra measures as follows: Length of head and body 1169; length of tail 332;

length of hind foot 209; length of ear 146; greatest length of skull 230; condyloincisive length 212; greatest width across zygomatic arches 150; least interorbital width 45.5; length of upper fourth premolar 31.2.

Family Felidae

Subfamily Felinae

Felis caracal nubicus J. B. Fischer

Felis caracal γ nubicus J. B. Fischer, Synopsis mammalium, p. 210, 1829. (Nubia, implied.)

Specimen Examined: One, in BM, from Suakin.

Measurements: Cranial measurements of the unsexed specimen from Suakin are as follows: Greatest width across zygomatic arches 72.0; least postorbital width 29.0; least interorbital width 19.5; breadth across P^4–P^4 44.7; length of P^4 15.7.

Remarks: The generic name of the caracals has been in constant flux between *Lynx* and *Felis*. Without attempting to arbitrate, I am following the usage of Pocock (1917) and of Ellerman and Morrison-Scott (1951).

Even though only one specimen has been examined, it would seem that the caracal would range over most of the Sudan in rocky and brushy situations.

Felis libyca libyca Forster

Figure 9,*b*

Felis libyca Forster, *in* Buffon, Naturgeschicte der Vierfüssigen Thiere . . . , vol. 6, p. 313, 1780. (Gafsa, Tunisia.)

Felis maniculata Temminck, Monographies de mammalogie, vol. 1, p. 128, 1824. (Ambukol.)

Felis ruppelii (sic) Schinz, Das Thierreich . . . von Cuvier, vol. 4, p. 509, 1824. (Dongola.)

Felis libyca lowei Pocock, Proc. Zool. Soc. London, vol. 114, p. 68, 1944. (Jebel Marra, 4,000 feet.)

Felis libyca lynesi Pocock, Proc. Zool. Soc. London, vol. 114, p. 68, 1944. (35 miles north of El Fasher.)

(Other synonyms extralimital to the Sudan.)

Specimens Examined: Seven, all in BM, from: *Dueim*, 1; Sennaar, 1; Shendy, 1; *Tamai Plains, near Suakin*, 1; Suakin, 3.

Measurements: An adult male from Shendy measures as follows: Length of head and body 490; length of tail 340; length of hind foot 132; length of ear 54; greatest length of skull 108.6; condyloincisive length 100.3; greatest width across zygomatic arches 66.6; least

postorbital width 30.0; least interorbital width 17.7; length of P^4 12.2.

Remarks: The specimens here referred to the subspecies *libyca* were referred to *ocreata* by Allen (1939). However, Pocock (1951) restricted *ocreata* to Abyssinia and referred the northern and eastern Sudanese specimens to *libyca*. It is true that the small cats from Abyssinia are darker in color than the specimens from the Red Sea coast and from near the Nile. These latter specimens, though, are virtually indistinguishable, both in color and cranially, from animals from Tunisia. I am therefore following Pocock (1951) in assigning the northeastern Sudanese specimens to the nominate race.

The two subspecies named by Pocock (1944, p. 68), *lynesi* and *lowei*, are in no measure different than animals assigned to the nominate race. The type of *lynesi* is a young adult with the characteristic bright colors of animals of like age from the range of *libyca*. The type of *lowei* is, so far as I can tell, identical with the specimen from Shendy which has been referred to *libyca*.

I feel that it is better to express *lynesi* and *lowei* as synonyms of *libyca* until such time as more material has been made available and the degree of variation has been completely worked out.

***Felis libyca ugandae* Schwann**

Figure 9,*b*

Felis ocreata ugandae Schwann, Ann. Mag. Nat. Hist., ser. 7, vol. 13, p. 424, June, 1904. (Mulema, Uganda.)

Specimens Examined: Two, both in BM, from: Juba, 1; Shubhikra, north of Omdurman, 1.

Measurements: An adult male from Juba measures as follows: Length of head and body 556; length of tail 365; length of hind foot 139; length of ear 56; greatest length of skull 103.0; condyloincisive length 93.1; greatest width across zygomatic arches 72.3; least postorbital width 30.7; least interorbital width 19.0; length of P^4 11.2.

Remarks: These two specimens agree in color with animals from Uganda in that they are much darker than specimens from farther east and north.

***Felis serval phillipsi* G. M. Allen**

Felis capensis phillipsi G. M. Allen, Bull. Mus. Comp. Zool., vol. 58, p. 337, July 1914. (El Garef, Blue Nile.)

Specimens Examined: Ten, from: White Nile, 1 (BM); Khartoum, 1 (BM); Nagichot, 1 (BM); Bahr-el-Ghazal, 1 (BM); near Juba, 1 (BM); Kulme, Wadi Aribo, 1 (BM); El Garef, 1 (MCZ); Torit, 1; Terangole, 20 miles east of Torit, 2 (1 MCZ).

Measurements: The type, an adult male, measures as follows: Length of head and body 792; length of tail 290; length of hind foot

185; length of ear 90; greatest width across zygomatic arches 78.9; least postorbital width 31.9; least interorbital width 21.7.

Remarks: There is a considerable amount of cranial variation shown by the above specimens. This variation consists of differences in size and shape of the teeth, particularly the carnassial; the width of the posterior choanae; and the size and degree of inflation of the auditory bullae. The specimen from Kulme differs from all of the other specimens in the strikingly different tone of the ground color of the pelage. This color is grayish instead of buffy and the black spots are markedly more discreet. It is probable that this specimen is wrongly referred but in comparison to other named kinds of servals it is closer to *phillipsi* than to any other.

***Panthera pardus chui* (Heller)**

Felis pardus chui Heller, Smithsonian Misc. Coll., vol. 61, No. 19, p. 6, November 1913. (Gondokoro.)

Specimens Examined: Eight, from: near Bor, 3 (BM); near Mongalla, 1 (BM); Bor District, 1 (BM); Gondokoro, 1; Ed Dueim, 1; Khartoum, 1.

Measurements: The type, an adult male, measures as follows: Length of head and body 1240; length of tail 840; length of hind foot 255; length of ear 90; greatest length of skull 243; greatest width across zygomatic arches 150; least interorbital width 37; length of nasals 76.

Remarks: Hollister (1918, p. 170) listed the specimens from Ed Dueim and Khartoum as the nominate race. On closer examination, however, these two skins only seem to fall within the range of variation of *chui* to which they are referred.

***Panthera leo leo* (Linnaeus)**

Felis leo Linnaeus, Systema naturae, ed. 10, vol. 1, p. 41, 1758. ("Africa," fixed as Constantine, Algeria, by J. A. Allen, 1924, p. 222.)

Felis leo nubicus Blainville, Osteographie . . . Mammifères . . . , Genus *Felis*, p. 58, 1843. (Nubia.)

(Other synonyms extralimital to the Sudan.)

Remarks: No specimens of the lion from the Sudan have been examined. Hollister (1918, p. 165) lists a zoo specimen from Omdurman which has been examined but rejected owing to the faulty references to locality and to the fact that the animal has been in captivity.

The generic name *Panthera* is used following Simpson (1945) and the specific and subspecific names are following Ellerman and Morrison-Scott (1951) and Ellerman, Morrison-Scott, and Hayman (1953).

Acinonyx jubatus soemmeringii (Fitzinger)

Cynailurus soemmeringii Fitzinger, Sitzb. K. Akad. Wiss. Wien, Math.-Nat., vol. 17, pt. 2, p. 245, 1855. (Steppes of Kababish, south of Bajuda Desert, Kordofan.)

Felis megabalica Heuglin, Leopoldina, Amtliche Organ K. Leop.-Carol. Deutsch. Akad. Naturf., vol. 4, No. 3, p. 23. May, 1863. (West bank of Bahr-el-Abiad.)

Acinonyx wagneri Hilzheimer, Sitzb. Ges. Naturf. Freunde, Berlin, p. 285, 1913. (Kordofan.)

Specimen Examined: One, from Ed Dueim.

Remarks: The specimen above is the only specimen available to me from the Sudan. It is a skin without a skull and external measurements.

Order TUBULIDENTATA

Family Orycteropodidae

Genus *Orycteropus* Geoffroy

No specimens of the aardvark have been examined. Two subspecies, *Orycteropus afer aethiopicus* Sundevall from the Bahr-el-Abiad and *Orycteropus afer kordofanicus* Rothschild from Kordofan have been described.

Apparently big game hunters do not call these animals game, and the mammal collector is more interested in the rodents, insectivores, and bats. Thus, extremely few specimens of aardvarks are known in museum collections.

Order PROBOSCIDEA

Family Elephantidae

Subfamily Elephantinae

Loxodonta africana oxyotis (Matschie)

Elephas (*Loxodonta*) *oxyotis* Matschie, Sitzb. Ges. Naturf. Freunde, Berlin, p. 196, 1900. (Upper Atbara River.)

Specimens Examined: One, in BM, from White Nile.

Remarks: The elephant was apparently widespread in the southern half of the Sudan in the past. However, at the present time populations seem to be quite local, in some places disappearing but in other places increasing in numbers.

For a resumé of the elephant in the Sudan see in the section on "The Elephant in the Sudan" by the late Maj. W. Barker, pages 68–79 in "The Elephant in East Central Africa, a Monograph," published by Rowland Ward, Ltd., 1953.

Order HYRACOIDEA

Family PROCAVIIDAE

***Heterohyrax brucei hoogstraali*, new subspecies**

TYPE: CNHM No. 66868, adult female, skin and skull, from Imurok, Torit District, Equatoria Province, Anglo-Egyptian Sudan. Obtained Feb. 1, 1950, by Harry Hoogstraal, original No. 5109.

SPECIMENS EXAMINED: Fifteen, from: Logire, 1; Imurok, 6; Imatong Mountains, 2; Sunnat, 2; Torit, 1; Nimule, 3.

DIAGNOSIS: Pure color on hairs of upperparts near Avellaneous. Individual hairs banded plumbeous basally, Cinnamon Drab (which does not show externally), black, Avellaneous, and finely tipped with black, thus presenting a "salt and pepper" or "agouti" pattern. Dorsal color shading gradually over sides into the grayish white of the belly. White hairs on throat, midpectoral region, and inguinal region white to base. Top of head darker than rest of dorsal color. Dorsal spot whitish, large, and bordered by darker color than rest of dorsal coloration. Skull robust, upper cheekteeth light in build, auditory bullae small, rostrum narrow, nasals short.

MEASUREMENTS OF THE TYPE SPECIMEN: Length of head and body 452; length of hind foot 69; length of ear 35; condyloincisive length of skull 83.2; crown length of upper toothrow 30.9; least postorbital width 24.5; least interorbital width 47.5; length of nasals 20.4.

COMPARISONS: From *H. b. kempi*, *H. b. hoogstraali* differs in somewhat darker color, smaller skull, shorter upper toothrow, and a markedly narrower rostrum.

H. b. hoogstraali differs from the type of *H. b. bakeri* in darker dorsal color, dorsal spot whiter, rostrum narrower, upper cheekteeth smaller, and upper toothrow somewhat shorter.

No specimens or measurements of *H. b. thomasi* have been available, but from the original description it seems that *H. b. hoogstraali* is darker and possibly larger.

REMARKS: Hollister (1924, p. 142) listed the specimens from Nimule as *Heterohyrax brucei bakeri*. However, when compared with the specimens from the Torit area and with the type of *bakeri*, there can be no question as to their affinity.

The Nimule specimens differ from *bakeri* in exactly the same degree as the Torit material. There is no evidence of intergradation in any of the specimens examined.

***Procavia habessinica burtonii* (Gray)**

FIGURE 9,*c*

Hyrax burtonii Gray, Ann. Mag. Nat. Hist., ser. 4, No. 1, p. 43, January 1868. ("Egypt.")

Hyrax dongolanus Blanford, Proc. Zool. Soc. London (1869), p. 642, April 1870. (Dongola.)

SPECIMEN EXAMINED: Only the type, in BM.

MEASUREMENTS: Cranial measurements of the type, an unsexed young adult, are as follows: Crown length of upper toothrow 36.2; least interorbital width 21.7; least postorbital width 23.5; greatest width across zygomatic arches 54.0; length of nasals 22.8.

REMARKS: In both *burtonii* and *butleri* the dorsal spot is quite small and yellowish. The former is markedly lighter in general over-all color than is *butleri*. That this is not due to fading is apparent from the original description in which Gray comments on the paleness of the color of the specimens obtained by Burton.

***Procavia habessinica butleri* Wroughton**

FIGURE 9,*c*

Procavia butleri Wroughton, Ann. Mag. Nat. Hist., ser. 8, vol. 8, p. 461, October 1911. (Jebel Fazogli, Blue Nile at Abyssinian border.)

SPECIMENS EXAMINED: Five, all in BM, from: Gebel Ain, 3; Jebel Fazogli, 1; *Wadi Ferony*, 1.

MEASUREMENTS: The cranial measurements of the type specimen, an adult male from Jebel Fazogli, are as follows: Condyloincisive length 92.3; crown length of upper toothrow 38.5; least interorbital width 22.1; least postorbital width 25.6; greatest width across zygomatic arches 54.5; length of nasals 25.0.

REMARKS: There is a decided black cap on the head in *butleri*. This black color continues caudad to just behind the shoulders as a rather broad stripe. This striped effect has not been seen on any of the other specimens of *Procavia* from the Sudan.

Ellerman and Morrison-Scott (1951, p. 334) have arranged all of the *Procavia* of Africa as subspecies of the single species *capensis*. Hahn (1934), in a revision of the family, recognized separate species. Certainly, in the Sudan, two species can be distinguished. They are *habessinica* and *ruficeps*. The former may be recognized by its markedly larger cheekteeth, the larger skull, the lack of inflation over the frontals, and the laterally curved upper incisors. Since, in specimens examined from the Sudan, these features remained constant, I prefer to recognize the two species as discreet from *capensis*.

Procavia habessinica slatini Sassi

FIGURE 9,*c*

Procavia slatini Sassi, Sitzb. K. Akad. Wiss. Wien, Math.-Nat., vol. 115, sect. 1, pt. 6, p. 1002, June 1906. (Hills on the White Nile, south of Gondokoro, lat. 5° N.)

SPECIMENS EXAMINED: Five, all in BM, from: *Moru district*, 2; Rejaf, 1; *Uvolo*, 1; Juba, 1.

MEASUREMENTS: A young adult female from the Moru district measures as follows: length of head and body 498; length of hind foot 67; length of ear 30; condyloincisive length of skull 86.4; crown length of upper toothrow 40.7; least postorbital width 21.4; least interorbital width 24.4; greatest width across zygomatic arches 49.6; length of nasals 22.4.

REMARKS: In general, *slatini* is the darkest of the *Procavia* to be found in the Sudan. The dorsal spot, unlike that in the next darkest kind, *marrensis*, is quite noticeable but is still not so pronounced as in either *ebneri* or *ruficeps*.

The skulls of *slatini* differ from *P. h. butleri* only in the smaller size of the auditory bullae, the shorter nasals, and the narrower interorbitum.

G. M. Allen (1939, p. 452) listed *slatini* as a subspecies of *ruficeps*. I feel, after a close study of the specimens in the British Museum, that these animals are referable to *Procavia habessinica* because of the lack of frontal inflation, the massiveness of the cheekteeth, and the lateral curving of the upper incisors.

Procavia ruficeps ebneri Wettstein

FIGURE 9,*d*

Procavia (*Procavia*) *ebneri* Wettstein, Anz. K. Akad. Wiss. Wien, Math.-Nat., vol. 53, p. 162, 1916. (Talodi, Kordofan.)

SPECIMENS EXAMINED: Seven, all in BM, from: Agageh Wells, 5; *Kaga Hills*, 1; Nuba Mountains, 1.

MEASUREMENTS: An adult female from Agageh Wells measures as follows: Length of head and body 473; length of hind foot 55; length of ear 27; condyloincisive length of skull 84.1; crown length of upper toothrow 33.4; least postorbital width 20.0; least interorbital width 24.7; greatest width across zygomatic arches 48.8; length of nasals 21.2.

REMARKS: These animals are darker in color than *ruficeps* but not so dark as in typical *marrensis*. The dorsal spot is large and orange colored, but not so large as in *ruficeps* and not so obscured as in *marrensis*.

Cranially, *ebneri* differs from *ruficeps* in that the frontals are not so inflated, the rostrum is narrower, the posterior choanae are not so flaring, and the auditory bullae are larger.

***Procavia ruficeps marrensis* Thomas and Hinton**

FIGURE 9,*d*

Procavia ruficeps marrensis Thomas and Hinton, Proc. Zool. Soc. London, p. 271, July 6, 1923. (Central part of Jebel Marra, Darfur.)

SPECIMENS EXAMINED: Twenty-three, all in BM, from: *Niurmya*, 5; foothills of southern Jebel Marra, 2; 60 miles northeast of El Fasher, 1; *Jebel Owi*, 3; *central Jebel Marra*, 1; Kulme, Wadi Aribo, 2; Zalingei, 5; *35 miles northeast of El Fasher*, 3; Jebel Meidob, 1.

MEASUREMENTS: An adult male and an adult female from Niurmya measure, respectively, as follows: Length of head and body 508, 534; length of hind foot 70, 67; length of ear 27, 29; condyloincisive length of skull 86.6, 90.0; crown length of upper toothrow 35.2, 34.5; least interorbital width 22.7, 24.1; least postorbital width 25.8, 24.6; greatest width across zygomatic arches 53.2, 53.1; length of nasals 21.7, 25.7.

REMARKS: The dassies from the Jebel Marra are quite dark in general color. The dorsal spot, or gland, is virtually indistinguishable. This spot, when visible, is orange colored as in other members of the species.

Specimens from the vicinity of El Fasher and Zalingei are noticeably paler in color than are the ones from the Jebel Marra. The dorsal gland is more pronounced but not so large as in *ruficeps*. I consider these animals as intergrades between *ruficeps* and *marrensis* but referable to the latter because of their generally darker tone than is found in *ruficeps*. In cranial features they more nearly resemble *marrensis*.

The skull is larger, the rostrum is wider, the ventral foramen enclosed by the zygoma is larger, the upper toothrow is generally longer, the auditory bullae are larger, and the posterior choanae are less flaring in *marrensis* than they are in *ebneri*.

***Procavia ruficeps ruficeps* (Hemprich and Ehrenberg)**

FIGURE 9,*d*

Hyrax ruficeps Hemprich and Ehrenberg, Symbolae physicae, Zool., Mamm., dec. 1, folio h, pl. 2, August 1832. (Dongola.)

SPECIMENS EXAMINED: Thirteen, all in BM, from: Shabluka Hills, 11; Khor Arbat, 1; Sinkat, 1.

MEASUREMENTS: Two adult males from Shabluka Hills measure, respectively as follows: Length of head and body 460, 470; length of hind foot 66, 67; length of ear 32, 30; condyloincisive length of skull

80.9, 81.8; crown length of upper toothrow 35.3, 34.4; least interorbital width 21.8, 25.2; least postorbital width 25.8, 26.0; greatest width across zygomatic arches 47.3, 51.8; length of nasals 20.0, 21.0.

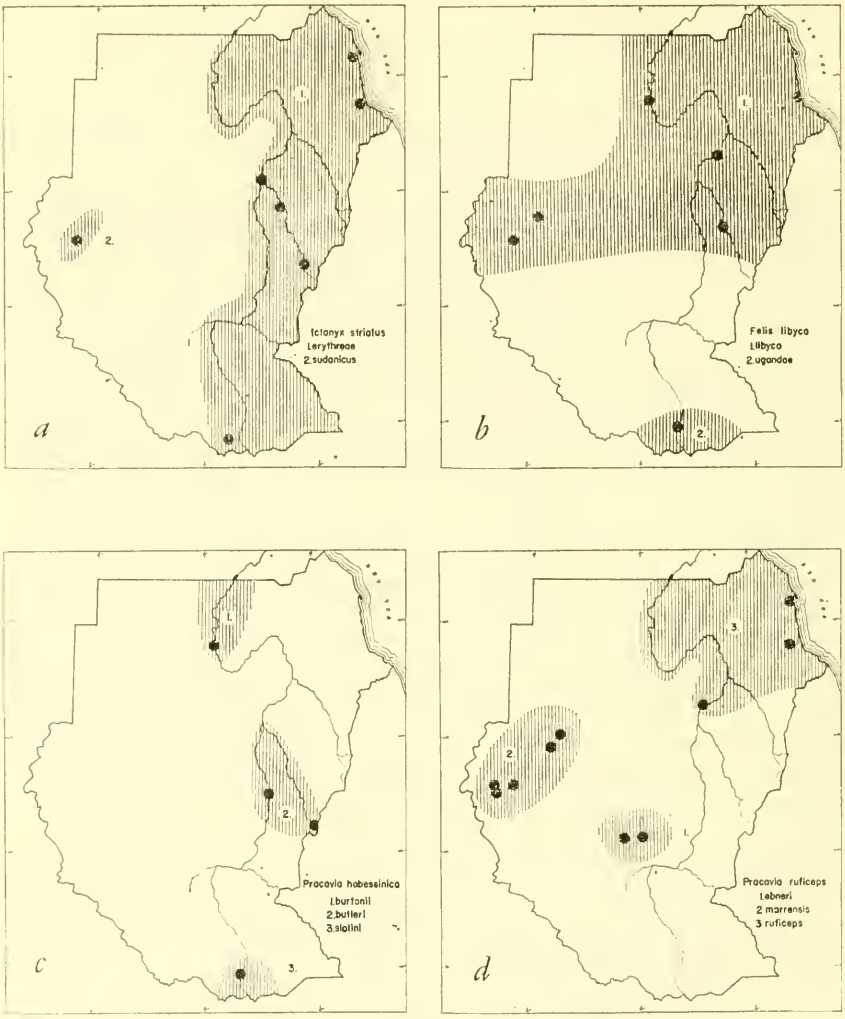

FIGURE 9.—Distribution of *Ictonyx*, *Felis*, and *Procavia* in the Anglo-Egyptian Sudan. (Scale: 1 inch=400 miles.)

REMARKS: These specimens are pale gray in general over-all color and have a rather large orange colored dorsal spot.

The nominate race may be differentiated from *marrensis* by somewhat smaller size, posterior choanae more flaring, auditory bullae

smaller, ventral foramen enclosed by the zygoma smaller, and frontals more inflated.

The amount of variation in certain aspects of the cranium is rather great, as may be seen from the measurements of two males of like age (so far as could be determined by the degree of wear on the last molar).

Order PERISSODACTYLA

Family Equidae

Subfamily Equinae

Equus asinus africanus (Fitzinger)

Asinus africanus Fitzinger, Wissenschaftlich-populäre Naturgeschicte der Säugthiere . . . vol. 3, p. 667, 1857. (Nubia.)

Remarks: No specimens of this animal have been seen. It is now considered to be extinct in its former range in Nubia.

Equus asinus dianae (Dollman)

Asinus asinus dianae Dollman, Proc. Linn. Soc. London (1934–35), 147th session, p. 132, May 9, 1935. (Wadi Hafta, lat. 17°43′ N., long. 37°36′ E.)

Specimen Examined: One, in BM, from the type locality.

Remarks: From the appearance of the skin of this ass, contrasted to a skin of *somalicus* and a color interpretation from the literature of *africanus*, it would seem to be an intergrade. Certainly the geographic area from which it comes places it between the two previously named kinds.

Owing to the fact that so few specimens are known of *dianae*, and apparently no specimens of *africanus*, I feel it is best to leave the name *dianae* as expressing a different population but which may be shown later to be the same as one of the previously named kinds adjacent to its type locality.

Equus burchellii böhmi Matschie

Eguus böhmi Matschie, Sitzb. Ges. Naturf. Freunde, Berlin, p. 131, 1892. (Pangani River, Tanganyika.)

Remarks: No specimens of this zebra have been examined. Hamilton (1920, p. 346) cites observations of this animal from the Bor District but comments that they are probably stragglers during the dry season. The same author says that lat. 7°30′ N. is probably the extreme northern limit of the range.

Family Rhinocerotidae

Ceratotherium simum cottoni (Lydekker)

Rhinoceros simus cottoni Lydekker, The Field (London), vol. 111, p. 319, Feb. 22, 1908. (Lado Enclave.)

Specimens Examined: Four, from: Bahr-el-Ghazal District, 3; Uganda-Lado-Sudan boundary, 1 (BM).

Remarks: The white, or square lipped, rhinoceros probably ranges only as far north as the swamps on the west bank of the Nile.

For further information concerning the white rhinoceros see E. Heller's article, "The White Rhinoceros" (Smithsonian Misc. Coll., vol. 61, No. 1, pp. 1–77, 1913).

Diceros bicornis somaliensis (Potocki)

Rhinoceros brucii Lesson, Nouveau tableau du règne animal . . . Mammifères, p. 159, 1842. (Nomen nudum.)

Rhinoceros bicornis somaliensis Potocki, Sport in Somaliland, p. 82, 1900. (Ogaden, Ethiopia.)

Specimens Examined: Two, both in BM, from: Jubaland, 1; Sennaar, lat. 12° to 13° N., 1.

Remarks: Mr. Harry Hoogstraal informs me that the black rhino is still to be found in certain low lying areas between Juba and Torit.

Order ARTIODACTYLA

Family Suidae

Subfamily Suinae

Sus scrofa sennaariensis Gray

Sus sennaariensis Gray, Proc. Zool. Soc. London, p. 32, May 1868. (Sennaar, Kordofan, and Sudan).

Specimens Examined: None.

Remarks: This subspecies of pig is being included in this report on the basis of observations of feral pigs in several parts of the Sudan.

Phacochoerus aethiopicus bufo Heller

Phacochoerus africanus bufo Heller, Smithsonian Misc. Coll., vol. 61, No. 22, p. 2, Jan. 26, 1914. (Rhino Camp, Lado Enclave.)

Phacochoerus barkeri Rothschild, Ann. Mag. Nat. Hist., ser. 9, vol. 6, p. 416, October 1920. (Southwest of Bahr-el-Ghazal.)

Specimens Examined: Five, from: Kulme, Wadi Aribo, 2 (BM); southwestern Bahr-el-Ghazal, 1 (BM); Torit, 2.

Remarks: *P. a. bufo* may be distinguished from *P. a. aeliani* from British East Africa and Ethiopia by the wider upper molars, less inflated auditory bullae, less concavity of the dorsal surface of the skull between the orbits, and the flatter nasals.

The skull available from Torit is of an immature female of the same age as the type of *P. a. bufo*. In all characters this skull agrees with the type and differs from *P. a. aeliani* as above. These characters are not sexual or age variations since they differ to the same degree in animals of comparable age and sex of *P. a. aeliani* from British East Africa.

The skull of *P. barkeri* differs from *P. a. aeliani* in exactly the same degree and quality as do skulls of *P. a. bufo*. Since Rothschild's name is antedated by *bufo* and since I can detect no differences between *bufo* and *barkeri* I am treating the latter as a synonym of the former.

Family Hippopotamidae

Hippopotamus amphibius amphibius Linnaeus

Hippopotamus amphibius Linnaeus, Systema naturae, ed. 10, vol. 1, p. 74, 1758. (Nile River, Egypt.)
(Other synonyms extralimital to the Sudan.)

Specimens Examined: Two, both in BM, from White Nile.

Remarks: The hippopotamus was formerly abundant throughout the Nile drainage. It is now extinct north of Khartoum and reduced in numbers throughout the rest of the drainage system except in the great lakes to the south.

Family Giraffidae

Giraffa camelopardalis Linnaeus

Remarks: Two subspecies of giraffes are supposed to exist in the Sudan. The northern and eastern one is *Giraffa camelopardalis camelopardalis* Linnaeus, 1758, with the type locality given as "Ethiopia and Sennar," actually from a captive animal in Cairo, Egypt, assumed to be from the Abyssinian, or Kassala, side of Upper Nubia. The western and southern subspecies has been described as *Giraffa camelopardalis antiquorum* Jardine, 1835, with the type locality stated as "Senaar and Darfour." Other names have been proposed but are now regarded as synonyms of the earlier *camelopardalis* and *antiquorum*.

As may be noted, both subspecies share the type locality of Sennaar. This seems highly unreasonable but without a detailed study of the genus it seems that the problem will not be solved. Only two speci-

mens have been available to me from the Sudan. These are from the White Nile and from Fashoda, both presumably within the range of the nominate form.

Apparently the giraffe is becoming more and more restricted in range and numbers in all parts of the Sudan.

Family Bovidae

Subfamily Bovinae

Tragelaphus scriptus bor Heuglin

FIGURE 10,*a*

Tragelaphus bor Heuglin, Reise in Nordost-Afrika, vol. 2, p. 122, 1877. (Req marshes and Bongo, Bahr-el-Ghazal.)

SPECIMENS EXAMINED: Nine, from: Wau, Jur River, 1 (BM); 80 miles northeast of Lado, lat. 4°50′ N., long. 32°55′ E., 1 (BM); 100 miles northeast of Bor, 4 (BM); *Lokila*, 1 (BM); Nimule, 1; 60 miles north of Nimule, 1.

REMARKS: The bushbucks listed here as species of the genus *Tragelaphus* were formerly considered to belong to the genera *Strepsiceros*, *Limnotragus*, and *Tragelaphus*. The two former genera are now considered subgenera. The species under the subgenus *Strepsiceros* is *strepsiceros*; for the subgenus *Limnotragus* the species is *spekii*; and for the subgenus *Tragelaphus* the species is *scriptus*.

Tragelaphus scriptus decula (Rüppell)

FIGURE 10,*a*

Antilope decula Rüppell, Neue Wirbelthiere zu der Fauna von Abyssinien gehörig, Säugethiere, p. 11, pl. 4, 1835. (Northwest slope of the highlands about Dembea Lake and the Kulla, Ethiopia.)

SPECIMEN EXAMINED: One, in BM, from Salam River on Upper Atbara River.

Tragelaphus scriptus dodingae Matschie

FIGURE 10,*a*

Tragelaphus cottoni dodingae Matschie, Sitzb. Ges. Naturf. Freunde, Berlin, p. 556, December 1912. (Kedef Valley, western foothills of Dodinga (=Didinga) Range, east-northeast of Dufilé.)

Tragelaphus scriptus barkeri J. D. Millais, Far away up the Nile, p. 233, 1924. Imatong Mountains.

SPECIMENS EXAMINED: Four, all in BM, from: Imatong Mountains, 3; Lomuleng, Imatong Mountains, 1.

***Tragelaphus spekii larkenii* (St. Leger)**

Limnotragus spekii larkenii St. Leger, Ann. Mag. Nat. Hist., ser. 10, vol. 8, p. 420, October 1931. (Bahr-el-Ghazal, 50 miles south of Yambio, lat. 4°30′ N., long. 28° E.)

Specimens Examined: Eight, all in BM, from: Diawo, 4; lat. 4°30′ N., long. 28° E., south of Yambio, 2; Yambio, 1; Bahr-el-Ghazal, 1

***Tragelaphus strepsiceros chora* (Cretzschmar)**

Antilope chora Cretzschmar, *in* Rüppell, Atlas zu der Reise im nördlichen Afrika von Rüppell, vol. 1, Säugethiere, p. 22, 1826. (Eastern Sudan.)

Antilope tendal Cretzschmar, *in* Rüppell, Atlas zu der Reise im nördlichen Afrika von Rüppell, pt. 1, Säugethiere, p. 22, 1826. (Deserts of "Sinerie" to Ambukol.) (Stated by Lydekker and Blaine, Catalogue of the Ungulate Mammals in the British Museum (Natural History), vol. 3, p. 202, 1914, perhaps to be *Addax nasomaculatus*.)

Strepsiceros abyssinicus Fitzinger, Sitzb. K. Akad. Wiss. Wien, Math.-Nat., vol. 59, sect. 1, p. 176, 1869. (Abyssinia, Somaliland, to Kordofan.)

Specimens Examined: Two, both in BM, from: Blue Nile, 1; Eirerib, 1.

***Taurotragus derbianus gigas* (Heuglin)**

Boselaphus gigas Heuglin, Nova Acta Acad. Caes. Leop.-Carol., Jena, vol. 30, No. 2, p. 19, pl. 1, fig. 2, 1863. (West of the Upper Nile, lat. 7° N., Bahr-el-Ghazal.)

Specimens Examined: Five, from: Khor Gorman, 30 miles west of Rumbek, 1 (BM); Bahr-el-Ghazal, 1 (BM); 25 miles west of Rejaf, 3.

Remarks: The giant eland of southwestern Sudan apparently is not a common big game species. Its affinities are definitely with the West African species *derbianus* and not with the eastern and southern African species *oryx*.

***Syncerus caffer aequinoctialis* (Blyth)**

B[ubalus] caffer, var. *aequinoctialis* Blyth, Proc. Zool. Soc. London, p. 372, 1866. (White Nile.)

Bubalus azrakensis Matschie, Sitzb. Ges. Naturf. Freunde, Berlin, p. 169, 1906. (Roseires.)

Bubalus solvayi Matschie, Deutsche Jäger-zeitung, vol. 57, No. 7, p. 104, 1911. (Mongalla.)

Specimens Examined: None.

Remarks: The buffalo is recorded here on the basis of sight records by Hoogstraal in the southern Sudan.

Subfamily Cephalophinae

Cephalophus caerulus aequatorialis Matschie

FIGURE 10,*b*

Cephalolophus (sic) *aequatorialis* Matschie, Sitzb. Ges. Naturf. Freunde, Berlin, p. 112, 1892. (Chagwe, Uganda.)

SPECIMENS EXAMINED: Three, all in BM, from: Diawo, 1; southwestern Sudan, 2.

REMARKS: The blue duiker has its main range to the south and east. It is doubtful that these animals are to be found in the Sudan out of the Congo forest extension and, in the case of *musculoides*, out of the mountain forest which is a counterpart of the British East African type of mountain habitat.

Cephalophus caerulus musculoides Heller

FIGURE 10,*b*

Cephalophus monticola musculoides Heller, Smithsonian Misc. Coll., vol. 61, No. 7, p. 9, July 31, 1913. (Kakamega Forest, British East Africa.)

SPECIMEN EXAMINED: One, from Lerua, southwestern slope of Acholi Mountains, Torit District.

REMARKS: This specimen is referred to *musculoides* only provisionally. It is a skin without a skull which was purchased from a native. Hoogstraal noted in his field catalog that these animals were very rare.

Sylvicapra grimmia roosevelti Heller

Sylvicapra grimmi (sic) *roosevelti* Heller, Smithsonian Misc. Coll., vol. 60, No. 8, p. 9, Nov. 2, 1912. (Rhino Camp, Lado Enclave.)

SPECIMENS EXAMINED: Six, from: Torit, 3; Torit area, 3.

REMARKS: All of the above specimens are immature. The oldest is a female in which M^1 is just erupting. While no specimens of comparable age of true *roosevelti* have been available, the characters of both skin and skull of the above animals seem to agree in detail with older specimens of *roosevelti*.

Subfamily Hippotraginae

Kobus defassa harnieri (Murie)

Antilope harnieri Murie, Proc. Zool. Soc. London, p. 5, pl. 2, May 1867. (White Nile.)

Kobus defassa breviceps Matschie, Sitzb. Ges. Naturf. Freunde, Berlin, p. 424, 1910. (Pembé, on the Nile between Dufilé and Matete, Lado Enclave.)

Kobus defassa ladoensis Matschie, Sitzb. Ges. Naturf. Freunde, Berlin, p. 426, 1910. (Matete, on the Nile between Dufilé and Lado, Lado Enclave.)

Kobus defassa griseotinctus Matschie, Sitzb. Ges. Naturf. Freunde, Berlin, p. 427, 1910. (Kerri, on the Nile near Kero, north of Lado, Lado Enclave.)

SPECIMENS EXAMINED: Three, all in BM, from: White Nile, about lat. 9° N., 1; Bahr Zeraf, Upper Nile, 1; Dinder River, 1.

REMARKS: The waterbuck probably occurs throughout the Nile drainage. It is usually found not far from permanent water.

***Adenota kob leucotis* (Lichtenstein and Peters)**

Antilope leucotis Lichtenstein and Peters, Ber. K. Preuss. Akad. Wiss., Berlin (1853), p. 164, 1854. (Sobat River, Anglo-Egyptian Sudan.)

Adenota kul Heuglin, Nova Acta Acad. Caes. Leop.-Carol., Halle, vol. 30, No. 2, p. 12, 1863. (Plains of the Sobat.)

Adenota wuil Heuglin, Nova Acta Acad. Caes. Leop.-Carol., Halle, vol. 30, No. 2, p. 13, 1863. (Sobat Plains.)

Adenota nigroscapulata Matschie, Sitzb. Ges. Naturf. Freunde, Berlin, p. 15, 1899. (Bahr-el-Gebel, between lat. 6° and 7° N.)

Cobus vaughani Lydekker, The Field (London), vol. 108, p. 693, Oct. 20, 1906. (Wau, lat. 7°30′ N., long. 28°10′ E.)

Adenota kob notata W. Rothschild, Ann. Mag. Nat. Hist., ser. 8, vol. 12, p. 575, December 1913. (Ahmed Aga, Bahr-el-Abiad.)

SPECIMENS EXAMINED: Twenty-two, from: Bahr-el-Ghazal, 2 (BM); Fan Ashir, 4 (BM); White Nile, 3 (BM); Lewelli, lat. 6° N., long. 33°40′ E., 1 (BM); Awan, 1 (BM); Jebel Ahmed Aga, 2 (BM); Lokila, 1 (BM); Lake No, 4; Mouth of Bahr-el-Zeraf, 4.

REMARKS: The specimens from Jebel Ahmed Aga described by Rothschild (loc. cit.) as *A. k. notata* are not distinguishable from animals from the mouth of the Bahr-el-Zeraf and from Lake No. Unfortunately no specimens from the plains of the Sobat have been available, but specimens from the Bahr-el-Zeraf can be considered to represent this form. It thus appears that the names *nigroscapulata* and *notata* should fall as synonyms of *leucotis*.

The name *alurae* from Rhino Camp appears to be valid, since animals of like age are smaller and generally lighter in color than *leucotis*. It may be that the name *vaughani* from Wau, assigned as a synonym to *leucotis*, may actually be valid, in which case the name *alurae* would fall as a synonym to *vaughani*. No specimens of *vaughani* have been seen.

***Redunca bohor cottoni* (W. Rothschild)**

Cervicapra redunca cottoni W. Rothschild, *in* Powell-Cotton, A sporting trip through Abyssinia (app. 3, mammals), p. 470, 1902. (Between Bahr-el-Zeraf and Bahr-el-Jebel.)

Capra redunca donaldsoni W. Rothschild, *in* Powell-Cotton, A sporting trip through Abyssinia (app. 3, mammals), p. 471, 1902. (East of Lado near Sudan-Uganda boundary, and western Somaliland.)

SPECIMENS EXAMINED: Ten, from: Gogriel, Bahr-el-Ghazal, 2 (BM); Kaka, 1 (BM); Dinder Valley, 1 (BM); 150 miles east of Lado, Mongalla Province, 2; 60 miles north of Nimule, 4.

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Remarks: The reedbuck is apparently rather widely distributed over the southern portion of the Sudan to about lat. 15° N. The favored habitat seems to be heavy reeds near watercourses.

Hippotragus equinus bakeri Heuglin

Hippotragus bakeri Heuglin, Nova Acta Acad. Caes. Leop.-Carol., Jena, vol. 30, No. 2, p. 16, 1863. (Between upper Atbara and Bahr-el-Salaam Rivers, near Abyssinian border.)

Hippotragus equinus doggetti de Beaux, Ann. Mus. Civ. Stor. Nat. Genova, ser. 3, vol. 9, p. 231, July 10, 1921. (Near Gondokoro.)

Specimens Examined: Thirteen, from: Meshra Zeraf, 3 (BM); Dinder River, 1 (BM); Dinder Valley, 1 (BM); Rejaf, 1; Gondokoro, 3; 60 miles north of Nimule, 2; Torit, 2.

Remarks: The roan antelope apparently ranges over the southeast quarter of the Sudan.

The specimens from the Dinder River area are virtual topotypes of *bakeri*. I can discern no differences between these animals and ones from Gondokoro which are topotypes of *dogetti*. Therefore, I am referring all the roan antelopes from the south and southeastern Sudan to the earlier named *bakeri*.

Oryx dammah (Cretzschmar)

Antelope dammah Cretzschmar, *in* Rüppell, Atlas zu der Reise im nördlichen Afrika von Rüppell, pt. 1, Säugethiere, p. 22, 1826. ("Probably Kordofan," Haraza, eastern Anglo-Egyptian Sudan.)

A[ntilope] tao H. Smith, *in* Griffith, The animal kingdom . . . by the Baron Cuvier . . . , vol. 4, p. 189, vol. 5, p. 327, 1827. ("Some days journey's distance from the Bahr-el-Abiad.")

Antilope algazella Rüppell, Neue Wirbelthiere zu der Fauna von Abyssinien gehörig, Säugethiere, p. 26, 1835. (Plains of Nubia to Fayum, Egypt.)

Specimen Examined: One, in BM, from Sennaar.

Remarks: The nomenclature of the scimitar oryx has been compounded in confusion. Ellerman and Morrison-Scott (1951, p. 385) regard Oken's names of 1816 to be untenable. With this, I agree. The next available name then, according to the above authors, is *Antilope tao* H. Smith, 1827, to replace *algazel* Oken, 1816. They further conclude that the northern African representatives of the oryx are not only congeneric but that they represent a monotype species. I can find no disagreement with the latter conclusion. These authors, however, overlooked the earlier name *dammah* Cretzschmar, 1826, for the scimitar oryx, and since it is conceded that these animals are a monotypic species the name should thus stand as *Oryx dammah* Cretzschmar.

***Addax nasomaculatus* (Blainville)**

Cerophorus (*Gazella*) or *A*[*ntilope*] *nasomaculata* Blainville, Bull. Sci. Soc. Philomatique, Paris, p. 75, 1816. (Probably Senegambia.)

Antilope addax Cretzschmar, *in* Rüppell, Atlas zu der Reise im nördlichen Afrika, von Rüppell, pt. 1, Säugethiere, p. 19, pl. 7, 1826. (Desert south of Ambukol to the Haraza Oasis.)

Specimens Examined: Three, all in BM, from: Southwest of Dongola, 1; northwestern Kordofan, lat. 16° N., long. 28° E., 1; Meridi, 200 miles southwest of Dongola, 1.

Remarks: It is quite apparent that Ellerman and Morrison-Scott (1951, p. 385) were correct in considering *addax* of Cretzschmar to be identical to Blainville's earlier *nasomaculatus*. I can see no differences between the Sudanese specimens and those from the Sahara.

***Damaliscus korrigum tiang* (Heuglin)**

Damalis tiang Heuglin, Nova Acta Acad. Caes. Leop.-Carol., Halle, vol. 30, No. 2, p. 22, 1863. (Sobat Valley.)

Damalis tiang-riel Heuglin, Nova Acta Acad. Caes. Leop.-Carol., Halle, vol. 30, No. 2, p. 23, 1863. (Bahr-el-Abiad.)

Damaliscus corrigum jonesi Lydekker, The Field (London), vol. 110, p. 250, Aug. 10, 1907. (Kordofan.)

Damaliscus floweri Matschie, Jahrb. Inst. Jagdk. Neudamm, vol. 2, p. 168, 1913. (Near Sherif Harrabulla, between Karkoj and Roseires, Blue Nile.)

Specimens Examined: Ten, all in BM, from: between Tonga and Lake No, 1; Lokila, 1; White Nile, 2; Gogriel, Bahr-el-Ghazal, 1; Dinder River, 3; Faki-kowi, 200 miles south of Khartoum, 1; Hagach Merurya, Khor Gelegu, upper Dinder River, 1.

***Alcelaphus buselaphus lelwel* (Heuglin)**

Figure 10,*c*

A[*cronotus*] *lelwel* Heuglin, Reise in Nordost-Afrika, vol. 2, p. 124, 1877. (Req country, Jur and Kosange Rivers. Type locality fixed as Jur River by Schwarz (1920, p. 907).)

Specimen Examined: One, from Rejaf.

Remarks: Ruxton and Schwarz (1929, p. 577) list *niediecki* as a synonym of *lelwel*. The type locality of the former, however, lies within the geographic range ascribed to *tora*. It seems, therefore, that on purely geographic grounds *niediecki* should stand as a synonym of *tora*.

***Alcelaphus buselaphus roosevelti* (Heller)**

Figure 10,*c*

Bubalis lelwel roosevelti Heller, Smithsonian Misc. Coll., vol. 60, No. 8, p. 7, Nov. 2, 1912. (Gondokoro.)

Specimens Examined: Sixteen, from: *Lokila*, 1 (BM); *Terehaima, Torit District*, 1 (BM); *Logh Afrok, Torit District*, 1 (BM); *between*

Assua River and Gondokoro, 3 (BM); Torit, 1; Obbo, 1; *Gondokoro*, 6; 80 miles north of Nimule, 1; vicinity of Nimule, 1.

REMARKS: This hartebeest may well be the same as *tora* from farther north and east. Ruxton and Schwarz (1929, p. 577) comment that this subspecies may, however, be classed with *jacksoni* whose range lies to the south and east. Whichever way *roosevelti* may be allocated it is certainly not a well defined subspecies.

***Alcelaphus buselaphus tora* Gray**

FIGURE 10,*c*

Alcephalus (sic) *tora* Gray, Nature (London), vol. 8, p. 364, Sept. 4, 1873. (Preliminary notice.)

Alcelaphus tora Gray, Ann. Mag. Nat. Hist., ser. 4, vol. 12, p. 341, October 1873. (Dembelas, Bogos country, Ethiopia.)

Bubalis niediecki Neumann, Sitzb. Ges. Naturf. Freunde, Berlin, p. 95, 1905. (Jamboland, Gelo River, upper Sobat River, Ethiopia.)

SPECIMENS EXAMINED: Two, both in BM, from Kurmuk District, Blue Nile.

REMARKS: See under *roosevelti* and *lelwel*.

***Alcelaphus buselaphus tschadensis* (Schwarz)**

FIGURE 10,*c*

Bubalis lelwel tschadensis Schwarz, Ann. Mag. Nat. Hist., ser. 8, vol. 11, p. 11, February 1913. (Ketekma, east of Tschekna, Bagirmi, French Equatorial Africa.)

SPECIMENS EXAMINED: Three, all in BM, from Kulme, Wadi Aribo.

REMARKS: This subspecies is considered by Ruxton and Schwarz (1929, p. 572) to be a part of the *lelwel* section of the species. It is doubtful, in my opinion, that any of the so-called races here given as occurring in the Sudan will stand under critical examination, but rather will be shown to be synonymous with the older name *tora*.

Subfamily Antilopinae

***Ourebia ourebi aequatoria* Heller**

Ourebia montana aequatoria Heller, Smithsonian Misc. Coll., vol. 60, No. 8, p. 12, Nov. 2, 1912. (Rhino Camp, Lado Enclave.)

Ourebia ourebi ugandae de Beaux, Ann. Mus. Civ. Stor. Nat. Genova, ser. 3, No. 9, p. 223, Mar. 31, 1921. (Near Gondokoro.)

SPECIMENS EXAMINED: Fifteen, from: Adamadi's Village, Bari Country, lat. 4°10′ N., long. 31°40′ E., 1 (BM); Mongalla Province, 80 miles north of lat. 4° N., 50 miles east of long. 32° E., 1 (BM); Nimule, 4; Torit, 5; Lokila, 3; 8½ miles north of Mongalla, 1 (BM).

REMARKS: The nomenclature of the oribis in the Sudan is indeed confused. The amount of variation in a series of *O. o. cottoni* from

the Guaso Ngishu Plateau, British East Africa, is quite striking. The color of the pelage ranges from a pale buff to a strong reddish cinnamon, yet the skulls appear to be quite uniform in their characteristics. The specimens from Nimule and Torit show this same amount of variation in color and the same degree of uniformity of cranial characters.

While no specimens have been seen from Gondokoro, specimens compared to the type of *aequatoria* from Nimule and Torit show no differences, and those specimens, in turn, compared to material from Mongalla Province show no dissimilarities. Therefore, I feel that the name *O. o. ugandae* should fall as a synonym of the earlier *aequatoria*.

***Ourebia ourebi montana* (Cretzschmar)**

Antilope montana Cretzschmar, in Rüppell, Atlas zu der Reise im nördlichen Afrika von Rüppell, pt. 1, Säugethiere, p. 11, pl. 3, 1826. (Fazogli Hills, Blue Nile.)

Ant[ilope] brevicaudata Rüppell, Neue Wirbelthiere zu der Fauna von Abyssinien gehörig, Säugethiere, p. 25, 1835. (Sennaar.)

Specimens Examined: Thirteen, all in BM, from: Between Tonga and Lake No, 1; 100 miles northeast of Bor, 1; White Nile, about lat. 11° N., 2; 5 miles west of Rumbek, 1; Kamisa, Dinder River, 1; Upper Nile, 1; Kornook, 1; 18 miles southwest of Shambe, 1; 8 miles south of Tonga, 3; halfway between 1st and 2d resthouses on way to Meshra, 1.

Remarks: In only a cursory examination of the ungulates of the Sudan, it is apparent that they all need a vast amount of work done on them. In *Ourebia*, particularly, there are many striking similarities between the subspecies. It may well be that when they are studied in more exacting detail *montana* will be found to be the name to be applied to all of the eastern and southern Sudanese oribis.

***Rhynchotragus guentheri smithii* (Thomas)**

Madoqua guentheri smithii Thomas, Proc. Zool. Soc. London (1900), p. 804, Apr. 1, 1901. (About 30 miles southeast of Lake Stephanie, Ethiopian Border.)

Specimens Examined: Twelve, from: Ikoto, 8; Torit, 3; Latuka Mountains, 1 (BM).

Remarks: The long-snouted dikdiks are apparently found only in the extreme southeastern Sudan in open savanna country.

Notes on *Gazella*

The genus *Gazella*, in the Sudan, is divided into two subgenera. The typical subgenus, *Gazella*, is distinguished by the following: Females bearing well developed horns; body size small or medium; and white of rump not intruding far into fawn color of body. The species

in the Sudan which are referable to this subgenus are *G. dorcas*, *G. leptoceros*, *G. rufifrons*, and *G. thompsonii*.

The second subgenus in the Sudan is *Nanger*. It is characterized by the following: Females with well developed horns; body size large; and white of rump extending rather far into fawn color of body. The species in the Sudan which are referable to this subgenus are *G. granti*, *G. soemmerringii*, and *G. dama*.

Key to the species in the subgenus Gazella

1. Flank band indistinct 2
   Flank band black 3
2. Horns usually lyrate . . . . . ***dorcas***
   Horns usually not lyrate . . . . . ***leptoceros***
3. Nose spot absent; light face stripes buffy . . . . . ***rufifrons***
   Nose spot black; light face stripes white . . . . . ***thompsonii***

The species of the subgenus *Nanger* may be distinguished from one another by the length of the horns. In *granti*, the horns approximate 30 inches and lack any terminal hooking; *soemmerringii* has horns approximating 22 inches and the tips hook inward; in *dama* the horns approximate 13 inches and the tips hook forward and upward.

Gazella dorcas isabella Gray

FIGURE 10,*d*

Gazella isabella Gray, Ann. Mag. Nat. Hist., ser. 1, vol. 18, p. 214, September 1846. (Type locality fixed as Abyssinia by Blaine, 1913, p. 292.)

Antilope dorcas, *α isidis* Sundevall, Kongl. Svenska Vet.-Akad. Handl., Stockholm (1845), p. 267, 1847. (Sennaar, Nubia, Egypt.)

SPECIMENS EXAMINED: Two, both in BM, from: Mashail, 1; Khor Hadhad, 1.

Gazella dorcas littoralis Blaine

FIGURE 10,*d*

Gazella littoralis Blaine, Ann. Mag. Nat. Hist., ser. 8, vol. 11, p. 295, March 1913. (Khorasot, Nubian Desert.)

SPECIMENS EXAMINED: Seventeen, from: Suakin, 3 (BM); *5 miles south of Suakin*, 1 (BM); *12 miles south of Suakin*, 1 (BM); Atra Rabai Hills, 1 (BM); *Hafta*, 1 (BM); Dongola, 2 (BM); Jebel Bawati, 8.

Gazella dorcas osiris Blaine

FIGURE 10,*d*

Gazella littoralis osiris Blaine, Ann. Mag. Nat. Hist., ser. 8, vol. 11, p. 295, March 1913. (Nakheila, near junction of Atbara with the Nile.)

SPECIMENS EXAMINED: Ten, all in BM, from: Nakheila, 5; Omdurman, 1; near El Fasher, 1; Kordofan, 1; *10 miles northwest of El Fasher*, 1; *10 miles east of El Fasher*, 1.

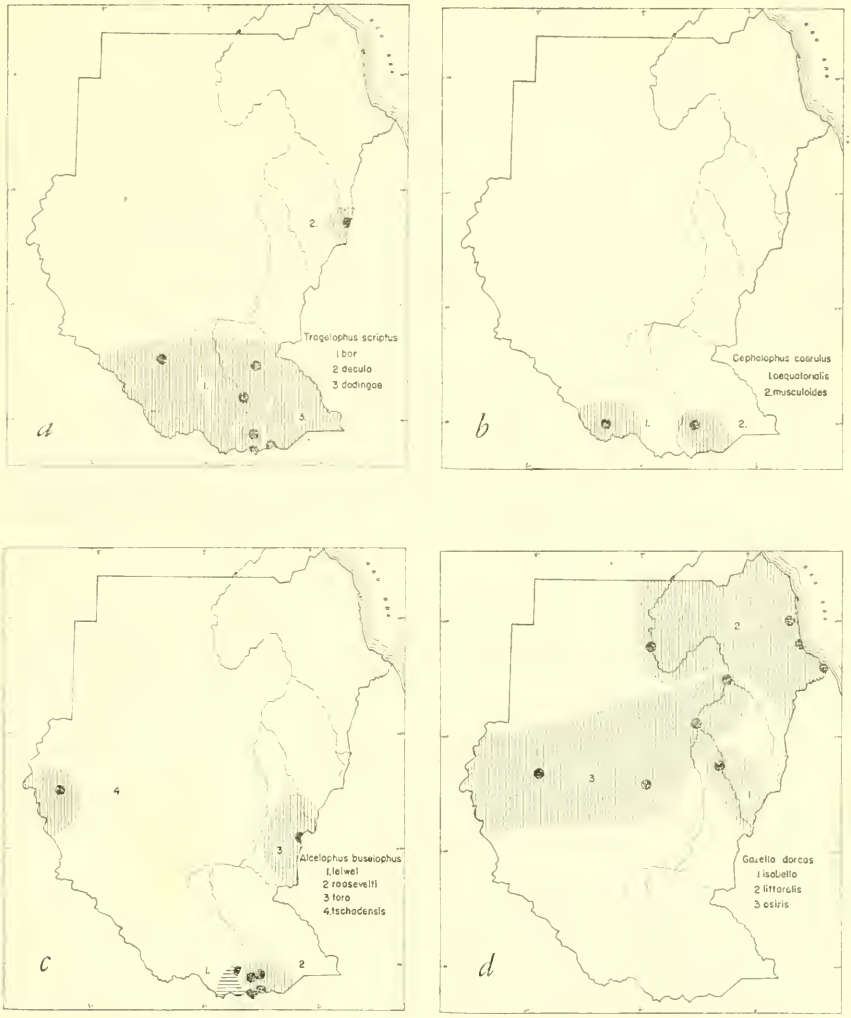

FIGURE 10.—Distribution of *Tragelaphus*, *Cephalophus*, *Alcelaphus*, and *Gazella* in the Anglo-Egyptian Sudan. (Scale: 1 inch=400 miles.)

Gazella leptoceros leptoceros (F. Cuvier)

Antilope leptoceros F. Cuvier, *in* E. Geoffroy and F. Cuvier, Histoire naturelle des mammifères, vol. 7, pt. 72, p. 2, pls. 373, 374, August 1842. ("Typical locality apparently Sennaar," Lydekker and Blaine, vol. 3, p. 68. 1914.)

REMARKS: No specimens of this gazelle have been examined and it seems doubtful to me that this species occurs as far south as the Sudan. If it does occur, it will probably be found in the extreme northwest.

Gazella rufifrons laevipes (Sundevall)

A[ntilope] laevipes Sundevall, Kongl. Svenska Vet.-Akad. Handl., Stockholm (1845), p. 266, 1847. (Sennaar; Senegal.)

Gazella salmi Lorenz, Sitzb. K. Akad. Wiss. Wien, Math.-Nat., vol. 115, sec. 1, pt. 1, p. 21, January 1906. (Fashoda.)

SPECIMENS EXAMINED: Eight, all in BM, from: Jebel Ahmed Aga, 1; Mongalla, 1; Faki-Kowi, 300 miles south of Khartoum, 1; near Fashoda, 1; White Nile, about lat. 11° N., 1; Agageh, 2; Kaka, 1.

REMARKS: The red-fronted gazelle may be distinguished from the dorcas gazelle by means of its darker color, larger size, and pronounced black lateral stripe.

Gazella thompsonii albonotatus W. Rothschild

Gazella albonotata W. Rothschild, Nov. Zool., vol. 10, p. 480, Dec. 20, 1903. (East side of White Nile, 40 miles north of Kero or Kiri, Mongalla Province.)

SPECIMENS EXAMINED: Six, all in BM, from: Mugatta, Atbara River, 1; Ishaga, Setit River, 1; Mongalla, 2; Unigara, Atbara River, 1; 90 miles east of Lado, 1.

Gazella dama ruficollis (H. Smith)

A[ntilope] ruficollis H. Smith, *in* Griffith, The animal kingdom . . . by the Baron Cuvier, vol. 4, p. 205, 1827. ("Nubia".)

Antilope addra Bennett, Proc. Zool. Soc. London, p. 2, May 17, 1833. (Nubia and Kordofan.)

A[ntilope] dama var. *orientalis* Sundevall, Kongl. Svenska Vet.-Akad. Handl., Stockholm (1845), p. 266, 1847. (Sennaar.)

SPECIMENS EXAMINED: Three, all in BM, from: 25 miles inland from Omdurman, 1; Kordofan, 1; Sennaar, 1.

Gazella granti brighti Thomas

Gazella granti brighti Thomas, Proc. Zool. Soc. London (1900), p. 805, Apr. 1, 1901. (150 miles east of Lado, lat. 5°20′ N., long. 34°5′ E.)

SPECIMENS EXAMINED: Three, from: 12 miles north of Afmadu, Jubaland, 1 (BM); 150 miles east of Lado, 1 (BM); 160 miles east of Lado, 1.

Gazella soemmerringii sibyllae Matschie

Gazella (Nanger) soemmerringii sibyllae Matschie, Sitzb. Ges. Naturf. Freunde, Berlin, p. 261, 1912. (Singa, Blue Nile.)

SPECIMENS EXAMINED: Five, all in BM, from: Rahad River, 1; Nakheila, 1; 12 miles south of Suakin, 1; Dinder Valley, 1; 18 kilometers from Tokar toward Suakin, 1.

Subfamily Caprinae

***Capra ibex nubiana* F. Cuvier**

Capra nubiana F. Cuvier, *in* E. Geoffroy and F. Cuvier, Histoire naturelle des mammifères, vol. 6, pl. 397, p. 2, June 1825. (Nubia.)

Specimens Examined: Four, all in BM, from: Mashail, 1; Red sea Province, 3.

Remarks: Ellerman and Morrison-Scott (1951, p. 407) treat the Nubian ibex as a subspecies of *Capra ibex*. This is certainly more realistic than the arrangement followed by Schwarz (1935) in which he classed these animals with *Capra hircus*.

List of New Names Proposed

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Crocidura hildegardeae phaios (460)
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Poëlagus marjorita oweni (472)
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Gerbillus gerbillus sudanensis (488)
Grammomys macmillani erythropygus (501)
Oenomys hypoxanthus talangae (505)
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Heterohyrax brucei hoogstraali (564)

Gazeteer

Abu Fatima: 22°25′ N., 36°26′ E.
Abu Heraz: 12°59′ N., 29°58′ E.; 14°30′ N., 33°35′ E.; 18°2′ N., 33°58′ E.; 19°4′ N., 32°4′ E.; 14°55′ N., 33°5′ E.
Abu Ushar: 14°55′ N., 33°5′ E.
Abu Zabad: 145 km. southwest of El Obeid.
Adamadi's Village: 4°10′ N., 31°40′ E.
Agageh Wells: 10° N., 29°12′ E.
Aggar Forest: 4°40′ N., 29°47′ E.
Agur: 11°35′ N., 30°28′ E.
Akanda (see Ukanda).
Aradeiba: 12°25′ N., 34°20′ E.
Atbara: 17°40′ N., 34° E.
Atra Rabai Hills (see Jebel Atraab).
Awan: 6°6′ N., 31°48′ E.
Ayod: 8°5′ N., 31°25′ E.
Badigeru Swamp: 20 miles east of Mongalla.
Bendele: 4°34′ N., 28°23′ E.
Berber: 18° N., 34° E.
Bir el Girud (=Bir Girid): 22°26′ N., 36°23′ E.
Bongo: 6°40′ N., 29°40′ E.
Bor: 6°10′ N., 31°35′ E.
Chak Chak: 8°40′ N., 26°55′ E.
Char, Didinga Mts.: 4°8′ N., 33°47′ E.
Delami: 11°50′ N., 30°25′ E.
Dilling: 12°5′ N., 29°40′ E.
Dongola: 19°13′ N., 30°27′ E.
Dorila Lakes: 12°55′ N., 24°15′ E.
Dud Majok (=Majak): 9°5′ N., 27°51′ E.; 9°13′ N., 28°37′ E.
Duem: 14° N., 32°20′ E.
Dugdug: 8°5′ N., 28°34′ E.
Duk: 90 miles northeast of Bor.
Duk Fagioil (=Duk Faiwil): 7°30′ N., 31°30′ E.
Eirerib (=Eireibab): 14°39′ N., 33°24′ E.
El Fasher: 13°42′ N., 25°20′ E.

El Garef: 12°3′ N., 34°19′ E.
El Kowa: 13°40′ N., 32°30′ E.
El Malha (see Jebel Meidob).
El Obeid: 13°12′ N., 30°17′ E.
Emogadung, Dongotona Mts.: 4°11′ N., 33°11′ E.
En Nahud (see Nahud).
Erkowit: 18°45′ N., 34°15′ E.
Eros: 4°7′ N., 33°46′ E.
Er Renk: 11°45′ N., 32°50′ E.
Faki-kowi: 200 miles south of Khartoum.
Fashoda (see Kodok).
Fazogli: 11°20′ N., 34°35′ E.
Fort Berkeley: 4°40′ N., 31°35′ E.
Gallabat: 12°55′ N., 36°10′ E.
Gebel Auli: 15°12′ N., 32°33′ E.
Gebel Talodi: 10°36′ N., 30°23′ E.
Gedaref: 14°3′ N., 35°25′ E.
Gerazi: 13°38′ N., 25°21′ E.
Gilo: 4°2′ N., 32°50′ E.
Gogrial: 8°30′ N., 28°3′ E.
Gondokoro: 4°54′ N., 31°40′ E.
Goz Abu Gama (=Abu Gamal): 15°10′ N., 36°26′ E.
Habissa Wells: 15°35′ N., 31°25′ E.
Hagach Merurya (=Khor Gelegu): 12°33′ N., 35°20′ E.
Hamra: 14°5′ N., 24°55′ E.; 14°30′ N., 31°55′ E.
Haraza (see Jebel Haraza).
Ikoto: 4°6′ N., 33°6′ E.
Imela: 4°10′ N., 32°41′ E.
Imowa (=Iwowa, Didinga Mts.): 4°17′ N., 33°42′ E.
Imurok: 4°19′ N., 32°24′ E.
Ishaga, Setit River: 14°10′ N., 36°15′ E.
Issore, Imatong Mts.: 3°55′ N., 32°48′ E.
Jebel Ahmed Aga: 11°3′ N., 32°40′ E.
Jebel Ain: 12°40′ N., 32°50′ E.
Jebel Atraab: 18°8′ N., 38°20′ E.
Jebel Bawati: 19°55′ N., 36°55′ E.
Jebel Haraza: 15° N., 30°25′ E.
Jebel Kadaro: 12°8′ N., 30°15′ E.
Jebel Marra: 12°45′ N., to 13°30′ N. and 24°15′ E. to 24°45′ E.
Jebel Meidob: 15°15′ N., 28°30′ E.
Jebel Um Durragh: 14°50′ N., 30°12′ E.
Juba: 4°50′ N., 31°40′ E.
Juga Juga: 15 miles east-northeast of El Fasher.
Kagula: 11°8′ N., 30°20′ E.
Kajo Kaji: 60 miles south of Rejaf.
Kaka: 10°35′ N., 32°10′ E.
Kamisa, Dinder River: 13°35′ N., 34°5′ E.
Katire: 4°2′ N., 32°47′ E.
Katta: 7°52′ N., 21°53′ E.
Katul Hills: 14°16′ N., 29°25′ E.
Kenisa: 6°50′ N., 31°10′ E.
Kerma: 19°35′ N., 30°25′ E.
Khartoum: 15°40′ N., 32°35′ E.
Khor Arbat: 19°45′ N., 36°55′ E.
Khorasot (=Khor Asot): 18°18′ N., 36°10′ E.
Khor Gitti: 7°40′ N., 27°40′ E.
Khor Gorman: 30 miles west of Rumbek.
Khor Hanoieit: 19°52′ N., 37°11′ E.
Khor Mog: 21°50′ N., 36°22′ E.
Kinyeti Valley, Imatong Mts.: 3°58′ N., 32°54′ E.
Kipia, Imatong Mts.: 3°57′ N., 32°58′ E.
Kit River: 4°30′ N., 31°45′ E.
Kitibol, Imatong Mts.: 4°2′ N., 32°51′ E.
Kodok: 9°53′ N., 32°5′ E.
Kornook (=Kurnuk): 12°45′ N., 31°57′ E.
Kulme, Wadi Aribo: 12°35′ N., 23°40′ E.
Kurra, northeastern Jebel Marra: 13°17′ N., 24°30′ E.
Labalwa: 4°26′ N., 32°38′ E.
Laboni, Imatong Mts.: 3°49′ N., 32°46′ E.
Lado: 5° N., 31°45′ E.
Lafon: 5°2′ N., 32°27′ E.
Lake No: 9°25′ N., 30°35′ E.
Lalanga, Lofit Hills: 4°36′ N., 32°54′ E.
Latuka Mts.: 4°30′ N., 32°40′ E.
Lerua: 4° N., 32°34′ E.
Letti Basin: 4°2′ N., 32°34′ E.
Lewelli: 6°N., 33°40′ E.
Loa: 18 miles north of Nimule.
Loka: 60 miles southwest of Fort Berkeley, 4°15′ N., 31° E.
Lokila: 4°40′ N., 32°30′ E.
Lokwi: 25 miles south of Torit.
Lomoling, Imatong Mts.: 4°7′ N., 32°31′ E.
Longairo: 20 miles east of Torit.
Loronyo: 4°38′ N., 32°38° E.

Lotti Forest, Imatong Mts.: 4°2′ N., 32°33′ E.
Mt. Baginzi: 4°40′ N., 29°45′ E.
Mt. Lotuke: 4°9′ N., 33°48′ E.
Madu: 80 miles northeast of El Fasher.
Magwe: 36 miles southwest of Torit.
Malakal: 9°30′ N., 31°45′ E.
Malek: 6°3′ N., 31°42′ E.
Malhab: 15°5′ N., 26°7′ E.
Maman: north of Kassala, 15°42′ N., 36°25′ E.
Medani: 14°20′ N., 33°30′ E.
Meridi: 4°55′ N., 29°32′ E.
Merowe: 18°28′ N., 31°52′ E.
Meshra Zeraf: 10°51′ N., 32°30′ E.
Moli: 30 miles north of Nimule.
Mongalla: 5°10′ N., 31°50′ E.
Moyen: 7°48′ N., 28°16′ E.
Mugatta, Atbara River: 14°40′ N., 35°55′ E.
Mura, Lofit Hills: 4°48′ N., 33°43′ E.
Murukurun: 50 miles east of Torit.
Nagichot: 100 miles east of Torit.
Nahud: 11°45′ N., 28°25′ E.
Nakheila: 17°45′ N., 34° E.
N'doruma: 5° N., 27°30′ E.
Ngaboli: 47 miles north of Torit.
Nimule: 3°36′ N., 32°3′ E.
Nubbaka(=Kubbaka), see Nabaqaya in El Obeid area: 12°47′ N., 30°46′ E.
Obbo: 4°2′ N., 32°28′ E.
Okaru: 4°29′ N., 32°10′ E.
Omdurman: 15°37′ N., 32°30′ E.
Opari: 50 miles southwest of Torit.
Palwar: 45 miles south of Torit.
Port Sudan: 19°35′ N., 37°15′ E.
Raffili: 6°52′ N., 27°58′ E.
Rejaf: 4°45′ N., 31°37′ E.
Roseires: 11°52′ N., 34°28′ E.
Rumbek: 6°45′ N., 29°40′ E.
Sabaluka: 16°20′ N., 32°40′ E.
Selima Oasis: 100 miles west of Wadi Halfa.
Sennaar: 13°35′ N., 33°40′ E.
Shabluka Hills: 16°16′ N., 32°44′ E.
Shambe: 7°8′ N., 30°52′ E.
Shendi: 16°40′ N., 33°27′ E.
Shereik: 18°45′ N., 33°36′ E.
Shilluk Islands: 9°40′ N., 31°30′ E.
Shubhikra(=Shubeika, north of Omdurman): 15°12′ N., 33°46′ E.
Singa: 13°12′ N., 33°55′ E.
Sinkat: 18°47′ N., 36°50′ E.
Soba: 15°30′ N., 32°40′ E.
Suakin: 19°5′ N., 37°22′ E.
Sue River: 4°45′ N., 28°45′ E.
Sunnat: 4°16′ N., 32°49′ E.
Tagbo Hills: 14°45′ N., 25°50′ E.
Talanga Forest, Imatong Mts.: 4° N., 32°44′ E.
Talodi: 10°40′ N., 30°25′ E.
Tembura: 5°40′ N., 27°30′ E.
Terangole: 20 miles east of Torit.
Tina Wells: 13°28′ N., 24°46′ E.
Tobbo (=Taba): 10°57′ N., 29°32′ E.
Tokar: 18°25′ N., 37°45′ E.
Tonga: 9°30′ N., 31°3′ E.
Torit: 4°24′ N., 32°34′ E.
Ukanda (=Fort Ukanda): 7°10′ N., 25°42′ E.
Uma: 50 miles north of Nimule.
Umm Keddada: 13°35′ N., 26°40′ E.; 9°57′ N., 30°30′ E.
Um Ramad: 12°58′ N., 30°2′ E.
Uvolo (=Mvolo): 6°4′ N., 29°56′ E.
Um Dona (=Umm Doma): 20°34′ N., 34°16′ E.
Wad Ferow (=Wadi Hafero): 15°24′ N. 26° 12′ E.
Wadferua: 19°30′ N., 33°24′ E.
Wadi Alagi: 22° N., 35° E.
Wadi Aribo (see Kulme).
Wadi Hafta: 17°43′ N., 37°36′ E.
Wadi Medani: 10°4′ N., 30°40′ E.
Wau, Jur River: 7°40′ N., 28°2′ E.
Yambio: 4°33′ N., 28°22′ E.
Yei: 4°7′ N., 30°40′ E.
Zalingei: 12°57′ N., 23°29′ E.

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