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NEW AND IMPERFECTLY KNOWN SMALL
MAMMALS FROM AFRICA

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In consequence of various expeditions, there has accumulated in Field Museum during recent years a considerable collection of African small mammals. Among them are certain undescribed species, others seldom recorded, and others which throw important light upon problems of distribution and relationship. The results of preliminary studies of this material are given below in order at least to put something on record while it remains impractical to make a thorough report upon the entire collection. Four principal expeditions are represented, the Chicago Daily News Abyssinian Expedition, the Collins-Barnes Central African Expedition (mainly in Belgian Congo), the Conover-Everard Expedition (Tanganyika and Belgian Congo), and the Straus West African Expedition (mammals mainly from Mount Cameroon, British Nigeria).

Although American collections of African mammals are vastly superior to those of former years, it is still very difficult to come to reliable conclusions without direct comparison with types and critical specimens in the Natural History Museum in London. Fortunately such comparisons have been possible in a number of cases and for various courtesies in this connection I wish to express my great obligation to Director C. Tate Regan and Keeper of Zoology Martin A. C. Hinton.

Sylvisorex suncoides sp. nov.

Type from Kalongi, western slope of Mount Ruwenzori, Belgian Congo. Alt. 7,000 ft. No. 26264 Field Museum of Natural History. Adult male, collected February 13, 1925, by Edmund Heller. Orig. No. 8654.

Diagnosis.—Size very large (hind foot 17; toothrow 10+), about equal to *S. ollula*; color very dark, slaty tones prevailing rather

than brownish; terminal half of under side of tail grayish white; skull with a wide and rather shallow braincase; fourth unicuspid small and somewhat internal in position as in *Suncus*.

Measurements.—Type and one topotype: total length 150, 154; head and body 95, 92; tail vertebrae 55+, 62; hind foot 17, 17. Skull of type: condylo-incisive length 24.5; maxillary width 7.4; width of braincase 11.2; depth of braincase 5.6; upper tooththrow 10.8.

Remarks.—This form is probably most closely related to the West African *C. ollula* and is perhaps only an eastern representative of it. It equals and possibly exceeds *ollula* in size and, therefore, may be entitled to distinction as the largest species of *Sylvisorex*. The next largest forms are *S. lunaris*, *S. ruandae*, and *S. oriundus*, in all of which the skull is some two millimeters shorter than in *ollula* and *suncoides*. These three are obviously quite closely allied and it is not unlikely that *oriundus* and *ruandae* will prove to be at most only subspecies of *lunaris*.

Besides the type, there is a skin without skull in the collection from the same locality. The type was compared directly with the type of *ollula* in London. The skull of *suncoides* has the braincase decidedly wider and lower than in that of *ollula* and the proportions of the unicuspid are different. The first unicuspid is only a fourth larger than the second instead of being nearly twice as large. The second and third unicuspid are nearly equal in size, the fourth very small, less than half the size of the third and situated slightly inside the tooththrow somewhat as in *Suncus*.

Although its distinctness was obvious, the type specimen of this species was submitted to Dr. Einar Lönnberg for direct comparison with the type of *ruandae*. His comment (in litt.) is as follows: "Your shrew is very much larger and much darker, its tail is more dusky, that of ours brown. The skull is much larger than ours. It is also conspicuously flatter as well as longer and broader than ours. In our species the second unicuspid is conspicuously smaller than the third, which is not the case in yours. The fourth unicuspid is larger in our species than in yours. Thus, to sum up, the comparison proves that your specimen represents a quite different animal than *Sylvisorex ruandae*."

The small size of the fourth unicuspid and its internal position in this species are of considerable interest as indicating the close relationship of the genera *Sylvisorex* and *Suncus*. In fact, it is difficult to look upon this as anything but a species combining the char-

Sylvisorex granti Thomas.

Sylvisorex granti Thomas, Ann. Mag. Nat. Hist., (7), 19, p. 118, Jan., 1907—
Mubuku Valley, East Ruwenzori.

Five specimens of this species are in Field Museum taken by E. Heller on the west side of Mount Ruwenzori. Three of them are from Kalongi at 7,000 feet and two from Bugongo Ridge at 9,000 feet and 11,000 feet. The species is still represented in the British Museum only by the type (in alcohol) from Mubuku Valley, East Ruwenzori, at 10,000 feet. Our series shows considerable variation in size and the larger examples agree most nearly with the type. Comparison with the shrew from Kenya which I called *Sylvisorex mundus* (Field Mus. Nat. Hist., Zool. Ser., 10, p. 18, 1910) reveals very little difference, and it is evident that this should be written *Sylvisorex granti mundus* or suppressed entirely. Considering the variation, it scarcely differs in size and no color difference is apparent. In *mundus* the second unicuspid seems relatively small, but larger series than at present available will be necessary before this can be well established as a character.

Crocidura occidentalis doriana Dobson.

Crocidura doriana Dobson, Ann. Mus. Civico, Genoa, (2), 4, p. 564, 1887—
"Let Marefia," Shoa, Ethiopia (type collected by Marquis O. Antinori).

A suite of specimens of this species from central Ethiopia indicates that it belongs quite definitely to the so-called *nyansae* series and is no more than subspecifically separable from such forms as *nyansae*, *kivu*, *kijabae*, and *daphnia*. These in turn are very closely allied to *occidentalis* as shown by comparison of specimens from eastern Belgian Congo, referable to *kivu*, with a series of *occidentalis* from the Cameroons. Only slight differences between them are to be noted, such as are unlikely to be of more than subspecific importance. The earliest of the names in this group appears to be *occidentalis* (1855) and, if Dollman's conclusion is correct that the northern forms are distinct from the South African *flavescens* (1827), it would tend to clarify relationships to group them under the specific title *occidentalis* and to speak of the *occidentalis* group rather than the *nyansae* group of Dollman and Hollister. A still earlier name is *hedenborgiana* (1842), but the known specimens of *hedenborgiana* are very few and its large size seems to correspond to that of others, such as *giffardi*, *manni*, *fuscosa* and perhaps also *martienseni*, possibly forming another geographic series, so it does not seem safe at this time to extend the *occidentalis* group farther. Certainly the African *Crociduræ* are in very confused condition, with numerous

binomials standing for single specimens or very small series from widely separated localities and showing only characters which can scarcely be assumed to be constant since they are found to be variable in all large series. The number of nominal species is obviously in excess of probabilities and, although many new forms may still need characterization, it seems highly desirable at this time to call attention to resemblances among forms already named even at the risk of possible misallocations.

C. o. doriana shows considerable variation both in size and coloration. Among twenty-eight specimens from Ethiopian localities, the total length ranges from 186 to 237, the tail-length from 59 to 80 and the hind foot from 19 to 22. The length of the upper toothrow ranges from 12 to 13.8. All degrees of transition between the extremes are found and, although it is obvious that sexual differences in size are considerable and that certain aged individuals often exceed average dimensions, it is clear that only averages representing numbers of specimens can have any taxonomic significance. As a subspecies, *doriana* is characterized by medium size and by the light color of the under parts well contrasted with that of the upper parts. Although shown by the great majority of specimens, this coloration is not invariable and there are occasional individuals in which the under parts are wholly dark. Similar variation in a series of twenty-five specimens of *kijabae* has been noted by Hollister (Bull. U. S. Nat. Mus. No. 99, p. 43, 1918) and it is also to be seen in other species of *Crocidura*. Twenty-eight Ethiopian specimens of *doriana* include only two in the dark phase with the entire under parts rich brown, scarcely lighter than the upper parts; the remaining twenty-six have light under parts. The opposite condition is seen in nine specimens of *kijabae* in Field Museum, six of them having dark under parts and three light. In a smaller series, these proportions obviously cannot be maintained, and it is interesting to note two specimens of *nyansae* in Field Museum, both from Lake Elmenteita, Kenya Colony, one dark and the other light; two others from Molo, Kenya, show the same diversity and it is therefore evident that two specimens are insufficient to indicate the conditions prevailing at these localities and one specimen would be even less conclusive.

The range of *doriana* in Ethiopia appears to be restricted to the central plateau region where it was found mainly at altitudes of 7,000 feet to 9,000 feet, from southern Gojjam to Arusi and Sidamo. It does not ascend into the forests of the higher mountains, but is

usually found at the lower edges of these forests and in relatively open country elsewhere. Its upper limit is perhaps about 9,500 feet and it may descend to 6,000 feet, but probably it does not go lower. In one locality, several specimens were taken showing unusually soft, thick pelage and very bright, clear color, the contrast between upper and lower parts being so sharp as to suggest the possibility of a slight local form. These were taken at the edge of a very dense, humid forest at a place called Camp Wadago on the east side of the Chilalo Mountains, Arusi. It is not unlikely, therefore, that their appearance is correlated with habitat, but there is no indication of a well-established form having a definable range.

The relationship of *daphnia* to *doriana* is evidently quite close, but whether it is nearer to *doriana* than to *nyansae* is doubtful. Since *daphnia* stands directly between *doriana* and *nyansae*, both of which are quite variable, it is difficult to believe that it will prove to be definable either as to subspecific characters or as to geographic distribution. Since it is known only from the single type specimen from Gondokoro on the Uganda side of the White Nile, probably it should be regarded as "not proven" and dropped, at least until additional material can be examined. If specimens from the Mount Elgon region, from Molo, Kenya, and from Lake Elmenteita are correctly identified as *nyansae*, then there is very little difference between *daphnia* and *nyansae*, although both are easily distinguishable from specimens referred to *kivu* from localities on the west side of the Nile in the same latitude. In describing *daphnia*, Hollister seems to have been unduly influenced by the obviously mistaken reference of the specimen to *sururæ* by Dollman and Heller. The type of *daphnia*, kindly loaned by Mr. G. S. Miller, Jr., of the United States National Museum, is paler in color than any specimen of *doriana* examined, but it is very closely approached by specimens of *nyansae* in similar condition of pelage. The skin has been rather well stuffed, which has doubtless contributed somewhat to its pallid appearance and it is obviously in pelage worn to the last degree, with indications of new pelage appearing as small whitish spots on the under parts. These spots are lighter than usual in *nyansae* but are closely similar to the shade prevalent in *doriana*.

Specimens examined.—Ethiopia: Chilalo Mountains (east base at Camp Wadago, 9,500 feet), 5; Debra Marcos, Gojjam, 4; Dejem, Gojjam, 2; Gedeb Mountains (east base near Dodolo), 1; Gubea, Gojjam, 2; Ismala, Gojjam, 1; Ladu, Sidamo, 1; Modjo, Arusi, 1; Mota, Gojjam, 1; Mulu, Muger River, Shoa, 3; Salali District,

near Muger River, Shoa, 1; Sirre, Arusi, 2; Suksuk River, near Lake Zwai, 1; Lake Tana (west shore), 5.

Crocidura zimmeri sp. nov.

Type from Katobwe, near Bukoma, Lualaba River, Katanga Province, Belgian Congo. Alt. 2,000 ft. No. 29391 Field Museum of Natural History. Adult male, collected November 27, 1926, by John T. Zimmer. Orig. No. 552.

Diagnosis.—A medium-sized, dark-colored shrew, similar in size to *C. sururæ*, but with a much shorter tail; proportions about as in *C. schweitzeri* and allied forms, but size markedly larger. Color very dark, nearly Vandyke Brown, the under parts considerably lighter with a silvery cast but not sharply separated; feet dark brown; tail dark all around, almost blackish. Tail short and thickened at the base, with numerous exserted "bristle" hairs for three-fourths of its length, only the tip without them. Skull about same size as in *sururæ*, but with dorsal outline somewhat arched or convex rather than depressed in frontal region; interorbital region somewhat swollen; sagittal crest well developed and extended forward nearly or quite to nasals; second unicuspid slightly larger than third.

Measurements.—Type and one adult topotype: total length 160, 179; tail vertebrae 48, 56; hind foot with claw (dry) 17.5, 18.2. Skull of type: condylo-incisive length 27.1; maxillary width 8.6; width of braincase 11.1; depth of braincase 6; upper toothrow 12.

Remarks.—Among central African shrews, this appears to have no near relatives and comparison with *sururæ* is made only to indicate its approximate size. It was compared with West African material in the British Museum where nothing closely approaching it was found, but it seems probable that its closest affinities are with the group of short-tailed shrews including *schweitzeri*, *foxi*, *arethusa*, and doubtless some others. A character which it shares with these in addition to a short tail is a high and definitely ridged skull quite unusual in the genus.

Mr. Zimmer made a considerable collection of *Crocidura* at Katobwe on the Lualaba and three quite distinct species are represented in it. The largest apparently belongs to the *occidentalis* group and is closely similar to or identical with *C. o. zuleika*. Six specimens of this form were taken. Next in size, and wholly distinct, are three specimens of the above-described species. Finally, a smaller, much paler species is represented by eight specimens apparently allied to *C. hirta*, perhaps indistinguishable from it.

Crocidura zaphiri Dollman.

Crocidura zaphiri Dollman, Ann. Mag. Nat. Hist., (8), 16, p. 66, July, 1915—Charada (or Sherada) Forest, Kaffa, Ethiopia.

The type of this species was examined in London and compared with Ethiopian shrews collected by Field Museum's expedition but not satisfactorily identified with any of them. Since that time there has come into my hands for determination for the Carnegie Museum of Pittsburgh a specimen which appears to represent the species. This agrees closely with notes taken from the type and finds a logical place as a northern representative of a form already known from Kenya Colony. The specimen was taken by the Childs Frick Abyssinian Expedition of 1912 at Gardula (5° 40' S.; 37° 30' E.), a locality slightly southwest of Lake Chamo in the district of Gammo at no very great distance from the province of Kaffa and the type locality of *zaphiri*.

The type of *zaphiri* is a somewhat greasy skin with a broken skull including the dentition but lacking all parts behind the palate. In such a single specimen color characters can scarcely be evaluated and, in fact, this one can be almost matched among specimens of *doriana* and it is only slightly more brownish on the upper parts than in *macmillani*. However, it is smaller than usual in *doriana* and larger than in *macmillani*, these being the only well-known forms found in the region which might by any possibility need consideration. In size and dentition it agrees almost exactly with the specimen from Gardula. The upper toothrow in the type measures 12.2 and that in the Gardula specimen 12. This specimen evidently is about the same shade of brownish on the upper parts as the type but its under parts, although well washed with brownish, are probably somewhat paler.

Comparison of the Gardula specimen with forms described from Kenya and Uganda shows it to be very closely allied to *Crocidura simiolus* Hollister from Kisumu, Kenya, a locality on the northeast shore of Lake Victoria. In cranial and dental characters it is scarcely distinguishable and whether or not it may have color characters can scarcely be determined until more material is examined. At least for the present the name for the Kenya form may be written *Crocidura zaphiri simiolus*.

In describing *simiolus*, Hollister compared it chiefly with *suahelae* and *mutesae*, which he regarded as its nearest relatives. In this he may have been quite correct, but these forms are definitely smaller than *simiolus* and do not fully support the assumption that they

may be geographic races of the same series. Comparison of *suahelae* with supposed specimens of *Crocidura hirta* reveals such close resemblance that the combinations *Crocidura hirta suahelae* and *Crocidura hirta mutesae* seem justified.

Hollister also refers to the approach of *simiolus* to *sururuae*, which is another form of uncertain relationship. Although the type of *simiolus* is much lighter-colored than *sururuae*, specimens from Kaimosi and Kibabe referred by Hollister to *simiolus* are very suggestive of *sururuae* both in color and in size.

***Crocidura turba nilotica* Heller.**

Crocidura nilotica Heller, Smiths. Misc. Coll., 56, p. 3, 1910—Rhino Camp, Lado Enclave.

Crocidura turba nilotica Hollister, Bull. Amer. Mus. Nat. Hist., 35, p. 664, 1916.

A single skin with skull and a skull without skin are the only representatives of the species *turba* in a fairly large collection of *Crocidura* from Ethiopia. These were taken at 'Njabara, Gojjam, and provide a very considerable extension of the range of the species. They do not, however, show any peculiarities by which they can be separated from *C. t. nilotica* from Rhino Camp on the west side of the White Nile. Hollister has considered *nilotica* restricted to the west bank of the Nile and specimens from the east bank, including one from Gondokoro, are referred to *zaodon*. A single topotype of *nilotica* in Field Museum does not differ from *zaodon* in color but is rather small and short-tailed, in which respects it agrees with the Ethiopian specimen above recorded.

***Crocidura baileyi* sp. nov.**

Type from Ras Dashan (Mount Geech), Simien Mountains, Ethiopia. Alt. 10,000 ft. No. 28217 Field Museum of Natural History. Adult male, collected March 22, 1927, by Alfred M. Bailey. Orig. No. 658.

Diagnosis.—A medium-sized, brownish shrew with a bicolored pattern of coloration somewhat as in *C. leucodon*; tail about one-third the total length and about one-half the head and body (ratio 44–55); pelage long and soft; tail with an abundance of long, exerted hairs. Skull of regular shape, its greatest width somewhat less than half its greatest length (ratio 45); second upper unicuspid smaller than third.

Color.—Upper parts in fresh pelage, Verona Brown; in worn pelage, Cinnamon to Sayal Brown; under parts creamy white, the

plumbeous under color more or less evident; forefeet and arms, hind feet and inner side of hind legs whitish like under parts; tail completely and sharply bicolored, brown above and whitish below.

Skull.—General form without special distinction; braincase not very wide, slightly less than half the greatest length; size slightly smaller than in Ethiopian representatives of the *fumosa* and *turba* groups, considerably greater than in *fulvaster* and *lutrella*. Second upper unicuspid considerably smaller than third.

Measurements.—Average of eight adults: total length 128 (113–138); head and body 86 (72–93); tail 44 (41–46); hind foot 14.4 (14–16). Skull of type: greatest (condylo-incisive) length 22.7; greatest (mastoid) width 10.3; greatest maxillary width 7; depth of braincase 5.7; least interorbital width 4.6; upper toothrow 9.9; tip of first incisor to tip of last premolar 4.9.

Remarks.—This shrew is readily distinguished from other Ethiopian highland species by its light brown upper parts and its sharply bicolored pattern of coloration. In typical form it was found only in the mountains of Simien and Gojjam, where it was fairly common. Two specimens from the Chilalo Mountains of Arusi agree with it in color but are somewhat larger and their skulls are distinguishable with difficulty from certain skulls of the Ethiopian representative of *C. fumosa* (*macmillani*). In the mountains of Gojjam, however, it was found at the same localities with a large, dark shrew apparently belonging to the *fumosa* series and quite distinct. That it is a northern subspecies of *fumosa*, therefore, is hard to believe, but there is some indication that somewhere in southern Ethiopia the *fumosa* type is transformed from a shrew with dark under parts and generally uniform coloration to one with a pronounced bicolored pattern.

Although this is a mountain shrew with long, full pelage, its possible relationship to northern and western forms may be considered. Several of these, all very little known, have been described from Sudanese localities. Among them is *C. fulvaster* Sundevall, of which no authentic specimens are recorded except the type in the Stockholm museum. The type locality of *fulvaster* is the White Nile, and Hollister (Bull. U. S. Nat. Mus. No. 99, p. 47, 1918) has suggested that the species may be the same as *C. lutrella* Heller from Rhino Camp. A topotype of *lutrella* directly compared with *baileyi* shows no very close affinity, being much smaller and differing in numerous details.

Another possible relative is *C. sericea* Sundevall, of the Blue Nile, which is not far from *baileyi* in size. A supposed example of *sericea* from Kordofan, however, shows that species to be relatively short-haired and dull-colored, and its skull has a narrow, elongate rostrum quite unlike that of *baileyi*. Both *fulvaster* and *sericea* inhabit hot lowlands under conditions very different from those in which *baileyi* is found.

Crocidura macrodon Dobson (Ann. Mag. Nat. Hist., (6), 5, p. 226, 1890), described without locality but assigned tentatively by Dollman to the "Sudan" and the "*fumosa* group," probably should be disposed of, at least for the present, as a synonym of *sericea*. Dobson's figure (Monog. Insect., pl. 27, fig. 3, 1882) offers nothing seriously contrary to this conclusion and his measurement of $5\frac{1}{2}$ mm. for the distance from first incisor-tip to premolar-tip seems to confirm it, for the specimen of *sericea* in hand shows definite elongation of the snout. His measurement of 68 for head and body, taken from an alcoholic specimen, probably is unreliable.

Crocidura strauchii Dobson, also from the Sudan, is probably a synonym of *fulvaster*, as suggested by Dollman. This is indicated by the small hind foot. The emargination of the hinder border of the third unicuspid, thought to be highly peculiar by Dobson, is occasionally found, at least partially developed, in any of several species examined.

Specimens examined.—Ethiopia: Amedamit Mountain, Gojjam, 1; Mount Geech, Simien Mountains, 5 (3 at 11,200 ft., 2 at 10,000 ft.); Mount Albasso, Chilalo Mountains, Arusi, 2 (not typical); 'Njabara, Gojjam, 2.

***Crocidura fumosa macmillani* Dollman.**

Crocidura luna macmillani Dollman, Ann. Mag. Nat. Hist., (8), 16, p. 361, Oct., 1915—Kotelee, Walamo, Ethiopia.

The type of this form is in a worn state of pelage showing no especial distinction from East African examples of *C. f. schistacea* or the slightly larger *C. f. selina*. In this condition it offers but little evidence of contrast between the color of the upper and under parts. Such a contrast, however, is very marked in numerous specimens from localities within fifty miles of the type locality and in the same latitude. If a series in fresh pelage were available from the type locality, therefore, it is probable that this character would show itself there. The type also appears to be a specimen of somewhat less than average size, but others no larger may easily be found when series are examined.

This is the most common of Ethiopian shrews and was taken in numbers in all the mountain areas visited, mostly at elevations above 8,000 feet. It shows considerable variation in size and in the extent to which the light under parts are washed with smoky brownish. In general, however, its light under parts serve to distinguish it very clearly from the various forms of *fumosa* recorded from Kenya and Uganda. Four specimens from the mountains of Gojjam are unusually dark and may represent a very slight and isolated differentiation in that region, but in view of variation elsewhere no separation seems justified at this time.

In a series from the Chilalo Mountains the skull length shows a variation of nearly 10 per cent, or from 22.7 to 24.5, and occasional specimens from outlying localities have a skull length of as much as 25.5. Average collector's measurements of twenty specimens, all from the Chilalo Mountains, are: total length 146.8 (136-156); tail 51.7 (44-62); hind foot 17.97 (16-19).

There is some indication of a possible gradation between this form and the one here called *baileyi*, but if such is the case, it is probably along a line running north and south rather than east and west and present material is not sufficient to demonstrate it. Western and southern specimens tend to be larger and darker, while eastern and northern are smaller and lighter.

While examining the type of *macmillani*, in the British Museum, that of *umbrosa* was also carefully scrutinized with the conclusion that Hollister (1918) was quite justified in suspecting it to be a synonym of *schistacea*.

Specimens examined.—Ethiopia: Allata, Sidamo, 1; Amedamit Mountain, Gojjam, 1; Arbagona, Sidamo, 4; Gedeb Mountains, Bale (east base near Dodolo), 3; Mount Albasso, Chilalo Mountains, Arusi (alt. 10,000 ft. to 11,200 ft.), 28; Mount Guramba, Sidamo (west base at 8,000 ft.), 1; Sakalla, Gojjam, 3.

Crocidura hildegardae phaeura subsp. nov.

Type from west base of Mount Guramba, northeast of Allata, Sidamo, Ethiopia. Alt. 8,000 ft. No. 28266 Field Museum of Natural History. Adult, collected December 22, 1926, by W. H. Osgood. Orig. No. 6141.

Diagnosis.—Similar to *C. hildegardae*, but larger and darker, with rather a short tail and relatively large feet; under parts scarcely or not at all lighter-colored than upper parts; tail wholly dark-

colored; skull with a relatively broad and deep braincase; second unicuspid slightly smaller than third.

Measurements.—Average of type and three topotypes: total length 123 (118–126); tail 42.5 (42–44); hind foot 15. Skull of type: condylo-incisive length 20.1; maxillary width 6.1; width of braincase 9.5; depth of braincase 5.3; upper toothrow 8.8.

Remarks.—Although this form reaches a size nearly or quite equaling that of *C. jacksoni*, its real relationship appears to be with the smaller *hildegardeae*. This conclusion is based upon its dark color, its relatively wide braincase, and its narrow unicuspids, the second quite definitely smaller than the third. It is very dark-colored, even darker than in *C. jacksoni denti*. It is represented by four specimens of uniform character taken at the same time and place and not otherwise duplicated in a considerable collection of Ethiopian shrews. Two of the specimens were taken to London and compared with material in the British Museum with the result that nothing closely resembling them was found. Examination of the types of *C. macowi* and *C. ibeana* leads to the conclusion that these both are referable to *hildegardeae*. Adding them to *maanje*, *lutreola*, and *procera*, which Hollister (1918) has found indistinguishable, makes a total of five synonyms of *hildegardeae* from various parts of Kenya Colony. The type of *macowi* is rather darker than that of *hildegardeae*, but the two agree in size and cranial characters.

The distinction of *jacksoni* and *hildegardeae* is mainly one of size and their ranges are not yet well worked out. *C. jacksoni amalae* appears to be slightly larger than typical *jacksoni* and stands between it and *C. jacksoni denti*, which is about the same size as *amalae* but slightly darker in color. Whether *amalae* should be recognized, therefore, is doubtful. *C. j. denti* is represented in Field Museum by specimens from Bambuni, Mount Ruwenzori; Mambabwonga Hill, Ituri Forest; Irumu; west of Beni; and Moera's Village, Ituri Forest.

A specimen from Sakalla, Gojjam, seems to represent *jacksoni* in Ethiopia but its position is uncertain. It has very light under parts and a rather narrow skull; otherwise it has considerable resemblance to the form here described as *phaeura*.

Crocidura bicolor nana Dobson.

Crocidura nana Dobson, Ann. Mag. Nat. Hist., (6), 5, p. 225, 1890—Dolo, British Somaliland.

A single specimen taken by myself near Hadama, Arusi, on the Awash River, Ethiopia, appears to represent this rather rare shrew

in typical form. Two others, said to be from Addis Ababa, taken in 1930 by my former tent-boy Ali Eessa, are also in the collection and, although agreeing in color, are slightly larger. It is possible, therefore, that two races may be distinguishable in the Ethiopian region, although this is perhaps less likely than that the variation in size is sexual. The skull of one of these specimens is in every respect almost exactly like that of a skull of *C. b. elgonius* from Irumu, Belgian Congo. Two other skulls (without skins) from Nairobi, Kenya Colony, also are practically identical and perhaps represent the paler, more brownish form called *cunninghamei*.

Examination of this small series is convincing that *elgonius*, *cunninghamei*, *planiceps*, and *nana* all belong to one geographic series in which the different forms are distinguished mainly by color, *elgonius* being very dark with dark feet and tail, *cunninghamei* more brownish with lighter feet, and *nana* with paler, more plumbeous upper parts, light feet, and broadly bicolored tail. *C. b. planiceps* (Heller, Smiths. Coll., 56, No. 15, p. 5, Dec. 23, 1910), which has not been examined in this connection, is characterized by somewhat larger size and longer tail and, if recognizable, is probably quite local in distribution. *Crocidura nanilla* Thomas (Ann. Mag. Nat. Hist., (8), 4, p. 99, Aug., 1909) and *C. rudolfi* St. Leger (cf. *C. denti* St. Leger, Ann. Mag. Nat. Hist., (10), 9, p. 240, March, 1932) apparently belong in the same series but, being based on single specimens in alcohol, both said to be females, their status is uncertain. To regard them, at the most, as subspecies of *bicolor* would serve to place them according to indicated affinities and would be in line with probabilities.

Tatera minuscula sp. nov.

Type from Sheik Hussein, near Webbi Shebeli River, Bale, Ethiopia. Alt. 5,000 ft. No. 28863 Field Museum of Natural History. Adult female, collected December 14, 1926, by Alfred M. Bailey. Orig. No. 318.

Diagnosis.—A small *Tatera* with the tail slightly tufted and about one-third longer than the head and body. Skull with the "wing" of the zygoma root short and broad as in *T. phillipsi*, but audital bullae small as in *T. macropus* and allies; skull small and short with the braincase unusually high. Color in adults nearly clear ochraceous-tawny on back and sides, pure white below; whitish areas over eyes and on cheeks rather indistinct; tail with the tip blackish, this extending to the under side in varying proportions from scarcely

any to nearly the distal third; under surface of tail white or white mixed with buffy, sides of tail buffy; in young and adolescents the upper parts, especially the lower back, are heavily blackish.

Measurements.—Average of twenty selected specimens, measured by the collector: total length 244.7 (224–260); head and body 108.8 (94–125); tail 137.9 (125–146); hind foot 33.6 (32–35). Type specimen: total length 245; head and body 98; tail 147; hind foot (dry, with claws) 34. Skull of type: greatest length 34; basilar length 24; zygomatic width 16.8; length of nasals 13.2; interorbital constriction 5.8; width of wing of zygoma root 2.4; depth of braincase and audital bullae 14.2; alveolar length of upper molar series 5.9; audital bullae 10.1 x 6.5.

Remarks.—A series of twenty-four specimens of this form was taken by Mr. Bailey at Sheik Hussein. There is also a single specimen from Luku and another from Kukeru Springs in the same region. All these were taken within a few days, so it is evident that the species is very common. Efforts to identify this series with any named form have been unsuccessful. It is perhaps allied to *T. phillipsi* of Somaliland but it was compared with specimens of *phillipsi* in the British Museum and found to be smaller, with a shorter tail and smaller audital bullae. Its skull appears to have some resemblance to that of the form from the Blue Nile called *T. soror* by G. M. Allen, but that has an untufted tail. Direct comparison with the type of *soror*, however, has not been made. Another small species to which it may be related is *T. nigrita* of Uganda, which is described as having "large bullae." *T. bodessae* and *T. bodessana* described by Frick from southern Ethiopia have not been examined, but the published measurements indicate a much larger species, perhaps *T. shoana*, a series of which was also obtained at Sheik Hussein.

With the possible exception of the West African *T. welmanni* (St. Leger, Ann. Mag. Nat. Hist., (10), 3, p. 387, April, 1929), this is perhaps the smallest species of its genus. Although in appearance suggesting some members of *Taterillus*, it is apparently a true *Tatera* (or *Taterona*). I am unable to subscribe to the generic separation of the African forms of this group as *Taterona* from the Asiatic ones as *Tatera*. This separation was made in 1917 (Wroughton, Journ. Bomb. Nat. Hist. Soc., 25, p. 40) on the basis of a difference in angulation of the parieto-squamosal suture. In view of the enormous number of detailed similarities between the African and Asiatic forms it seems subversive of the principles of classification to give such weight to this slight difference. In any case it must be

regarded as premature, for the specific characters of various African forms are not well worked out and no one is in a position to judge as to the relative importance of characters. To the student of phylogeny or zoogeography, the great resemblance between the Asiatic and African forms is of more importance than the very slight differences, and emphasis upon the latter is all too likely to be misleading.

Tachyoryctes splendens canicaudus subsp. nov.

Type from Sirre, Awash Valley, northern Arusi, Ethiopia. Alt. about 7,000 ft. No. 28822 Field Museum of Natural History. Adult male, collected November 5, 1926, by W. H. Osgood. Orig. No. 5975.

Diagnosis.—A pale grayish form about equal in size to *splendens* and *omoensis*; slightly larger than *somalicus*; upper parts with many shining whitish hairs which extend to the tail, giving it a completely whitish or grayish white appearance; general color pale Cinnamon Buff or Clay Color passing to Avellaneous on the sides and rump; nose and forehead sooty; under parts lightly washed with silvery; skull with nasals much compressed behind and exceeded by premaxillae, thus agreeing with *splendens* and *somalicus* rather than *omoensis*.

Measurements.—Type: total length 278; tail 58; hind foot 30.5. Skull of type: condylo-basal length 44.8; greatest length 46; zygomatic width 31.4; length of nasals 16.3; greatest width of nasals 5.4; length of bulla 9; upper toothrow 8 (crowns), 8.8 (alveoli).

Remarks.—This form probably is most closely related to *somalicus*, differing mainly in its paler, more grayish coloration and slightly larger size. The type specimen was compared rather hastily with that of *somalicus* in 1930, but reference to notes made at that time finds it dismissed with the statement that its color differs from anything in the British Museum and that it does not approach *somalicus* sufficiently to require close comparison. At that time it was thought that it might represent *omoensis*, which was not available, and the description and figures of which had not been carefully studied. It now appears that *omoensis* may extend northward and westward into Shoa and, if specimens from that region are properly referred, it is characterized by rather bright Cinnamon color and by a skull with nasals and premaxillae ending evenly. Specimens having these characters are in Field Museum from Mulu, Muger River, Shoa and Salali, Shoa. These are nearly the same as a series in the British Museum from Managasha and others in the same

collection taken by Zaphiri at "Barka" and "Wodjadja," localities unknown to me but not unlikely to be near the type region of *omoensis*. The relationship of *omoensis* to *splendens*, as indicated in Neumann's detailed description, is close and there seems no doubt that this as well as *somalicus* and *canicaudus* should be considered only as subspecies. Connection with some of the numerous forms described from Kenya is probable and, although this cannot now be worked out, it may be said that the skull of the dark-colored *T. ruddi* of Mount Elgon shows only minor differences from that of *splendens* and subspecies.

The skull of the type of *canicaudus* is fully adult with well-developed sagittal crest and teeth with boundaries entire. It has the parietals very narrow and the same feature appears in two other skulls. A younger specimen from Sirre is in Field Museum and two from the north bank of the Webbi Shebeli River near Lajo. These last have light tails but are darker in body color and perhaps should be referred to *somalicus*. Another from the Arusi plateau, between the Chilalo Mountains and the Webbi Shebeli, is still darker. The type of *canicaudus* was taken in open grasslands, of which there are great areas in the upper Awash Valley.

***Tachyoryctes cheesemani gallarum* subsp. nov.**

Type from Mount Albasso, northeastern Chilalo Mountains, Arusi, Ethiopia. Alt. 10,700 ft. No. 28808 Field Museum of Natural History. Adult male, collected November 11, 1926, by Alfred M. Bailey. Orig. No. 119.

Diagnosis.—Similar to *T. cheesemani*, but smaller (hind foot 31) and paler in general color, pale Ochraceous Tawny rather than Tawny or Cinnamon Brown; dark brown or blackish of frontal region frequently extending to entire head and shoulders. Similar to *T. c. pontifex*, but smaller and probably paler; tail rather short; skull with wide parietals.

Measurements.—Type: total length 285; tail 56; hind foot 31. Skull of type: condylo-basal length 50; greatest length 51.2; zygomatic width 45.4; length of nasals 18.6, greatest width of nasals 6.6; length of bulla 8.8; upper toothrow 9.4 (crowns), 9.7 (alveoli).

Remarks.—This form is represented in Field Museum by a series from several localities in high forest along the eastern side of the Chilalo Mountains. One from the base of the Gedeb Mountains, near Dodolo in Sidamo, and three others from Arbie, Sidamo, in the same vicinity, appear to belong to the same race. As a lot, they are

easily separable from typical *cheesemani* by lighter general color. Their hind feet and tails also average somewhat shorter. In three adult topotypes of *cheesemani*, the hind foot measures about 34 and the tail about 70, whereas in similar specimens of *gallarum* the figures are 31 and 55.

The only other described form with which this may have close affinity is *T. pontifex* (Neumann, Zeitsch. f. Säugethierk., 3, pp. 300–302, figs. 5, 6, 1928) from Buka, in the province of Kaffa, which lies west of the Rift Valley in about the same latitude as the Chilalo Mountains. From Neumann's description and figures, it is fairly evident that *pontifex* is closely similar to *cheesemani*, differing mainly in its larger size. The figure of the skull shows very narrow parietals which do not appear in any of twelve specimens of *gallarum* but are shown in three out of four topotypes of *cheesemani*. Although this character is probably variable, it may have some average significance. The type skull of *pontifex*, with a condylo-basal length of 55, indicates a size equaling that of *T. rex* of Kenya. The largest skulls available of *cheesemani* and *gallarum* are 10 per cent shorter than this.

Distinction of *cheesemani* and *splendens* in northern Ethiopia is fairly marked by a difference in size, but there is no evidence that the two species occur together. Apparently *splendens* is confined to the Simien Mountains and adjoining territory northeast of the Abbai or Blue Nile, while *cheesemani* occupies Gojjam to the south and west of the Nile. They do not differ appreciably in color and individual specimens may be difficult to distinguish on the basis of size, although the average difference in size is considerable. The teeth in *splendens* seem to be constantly smaller than in *cheesemani*. Apparently most of the specimens of *splendens* heretofore available have been females of small size. Among those taken by Field Museum's expedition, at Gondar and in the Simien Mountains, is one old male having a skull with a condylo-basal length of 49.2, which compares with 50.2 for the largest specimen available of *cheesemani*. These skulls, however, can be distinguished by the size of the teeth. Possibility of intergradation, nevertheless, is not eliminated. Specimens so far taken between Gojjam and Arusi are of relatively small size, more like *splendens*, and it appears that, if there is a connection between *cheesemani* and *pontifex*, it is most likely to be found in western Shoa.

Several specimens of *gallarum* have the anterior parts extensively blackish while others are so pale as to suggest possible gradation toward *canicaudus*, which seems unquestionably related to *splendens*

and *somalicus*. On the whole, therefore, although more than sixty specimens from various parts of Ethiopia have been examined in this connection, it is still impossible to say that there are more than two fully distinct species (i.e. *splendens* and *macrocephalus*) inhabiting Ethiopia.

***Dendromus insignis abyssinicus* subsp. nov.**

Type from east slope of Mount Albasso, Chilalo Mountains, Arusi, Ethiopia. Alt. 11,000 ft. Collected November 9, 1926, by W. H. Osgood. Orig. No. 5993.

Diagnosis.—Similar to *D. insignis*, but smaller with smaller skull and teeth; coloration slightly more grayish on upper parts, but with dark markings more intense and contrasted; ears deep black rather than brownish; hind feet with considerable extension of ochraceous from the body color instead of wholly dull whitish.

Measurements.—Type: total length 174; tail 95; hind foot 22. Skull of type: greatest length 22; least interorbital width 3.2; width of braincase 10.6; nasals 8; diastema 5.8; incisive foramina 4.2; upper tooththrow 3.5.

Remarks.—This appears to be a slight form probably confined to the mountains of Ethiopia. Besides the type, two younger examples have been examined. Heuglin's *D. mystacalis* from Ethiopia appears to be allied to *D. nigrifrons*. A specimen referred to it by Thomas and collected by Cheeseman at Dangila, Gojjam, is in the British Museum.

***Dendromus lunaris* sp. nov.**

Type from Kalongi, Butagu Valley, western slope of Mount Ruwenzori, central Africa. Alt. 7,000 ft. No. 26229 Field Museum of Natural History. Adult female, collected January 20, 1925, by Edmund Heller. Orig. No. 8437.

Diagnosis.—Similar to *D. insignis* and *D. i. percivali* in color, but ears somewhat more ochraceous; size slightly smaller, hind foot 19–20 instead of 21–23; skull long and narrow with a lower, shallower braincase, more slender rostrum, and smaller audital bullae; teeth smaller.

Measurements.—Type and paratype, respectively: total length 184, 180; tail 104, 110; hind foot 19.5, 20. Skull of type: greatest length 23.7; zygomatic width 11.2; width of braincase 10.7; interorbital constriction 3.5; width of infraorbital plate 1.3; nasals 9.2; diastema 5.7; incisive foramina 4; upper tooththrow 3.4.

Remarks.—In a series of twelve specimens of large-sized, striped *Dendromus* from Mount Ruwenzori it is found that ten are typical of and clearly referable to *perivali* of the *insignis* series. Two others collected at the same time and place, although very similar externally, are somewhat smaller and their skulls are of a different type. It is not unlikely, therefore, that they represent a West African species the range of which meets that of the *insignis* series in the Ruwenzori region. Possibly they are most closely related to the form described below as *oreas* from Mount Cameroon. Scarcely a half-dozen specimens of *Dendromus* are known from all of West Africa and these from widely separated localities and referable to several species. Therefore, there is much to learn in this region.

***Dendromus oreas* sp. nov.**

Type from southwest side of Mount Cameroon, Cameroon Mandate, British Nigeria. Alt. 9,000 ft. No. 42645 Field Museum of Natural History. Adult male, collected July 4, 1934, by R. and L. Boulton. Orig. No. 69.

Diagnosis.—A richly colored *Dendromus* with a dark dorsal stripe and heavily rufescent under parts. Somewhat similar to *D. insignis* and *D. lunaris* but smaller and more richly colored, especially on the under parts. Distinguished from *D. pecilei* by darker color and rufescent instead of whitish under parts.

Color.—Upper parts Cinnamon Brown; a broad blackish line from middle of back to base of tail; under parts broadly Tawny to Ochraceous Tawny, the hairs with dark bases; a patch of creamy, self-colored hairs on the chin and another in the anal region; feet whitish; tail dusky above, definitely lighter below; ears blackish brown, the finer hairs blackish overlaid by coarser tawny ones; light spot at base of ear scarcely evident.

Skull.—Much smaller than in *insignis* and with a lower braincase; supraorbital edges not sharply defined and only slightly constricted anteriorly; posterior endings of nasals slightly exceeding premaxillae; auditory bullae moderate; teeth moderate, smaller than in *insignis*, slightly smaller than in *lunaris*, but larger than in other central African forms.

Measurements.—Total length 168; tail 95; hind foot 20; ear 19. Skull of type: greatest length 21.8; zygomatic width 11.3; width of braincase 10; interorbital constriction 3.3; width of infraorbital plate 1; nasals 8.3; diastema 5.3; incisive foramina 4.2; upper toothrow 3.4.

Remarks.—Previously described West African forms of *Dendromys* include *D. pecilei*, *D. messorius*, and *D. exoneratus*. Of these, *messorius* is unstriped and *exoneratus* is a member of the subgenus *Poemys*, leaving only *pecilei* as a possible ally of the present form. This last was described in 1886 by Milne-Edwards from two specimens collected by Jacques de Brazza in French Congo and perhaps still preserved in the Paris Museum. The very full description given by Pousargues in 1896 (*Ann. Sci. Nat.*, (8), Zool., 3, pp. 385–391) shows that, although *pecilei* may be related to *oreas*, it differs in several important respects, most notably in the color of the under parts, which is said to be white overlying ashy gray. The external measurements (h.b. 72; t. 75; h.f. 18) given for *pecilei* indicate a smaller animal, but the length of the toothrow, given as 4 mm., is rather large, about equaling that of the larger forms of *insignis*. The exact type locality of *pecilei* has not been stated, but de Brazza's collections were mainly from the lowland rain forest along the Ogowe and Congo rivers in French Congo.

In the shape of its skull, the present species is more similar to the one above described as *lunaris* than to *insignis* and it is not unlikely that this will prove to be its nearest relative. It is represented only by the type obtained in the high forest of Mount Cameroon by R. and L. Boulton during the recent Straus West African Expedition.

Deomys ferrugineus Thomas.

Deomys ferrugineus Thomas, *Proc. Zool. Soc. Lond.*, pp. 130–135, pl. V, figs. 1–5, 1888—Lower Congo, West Africa.

A well-prepared modern skin of this rare rodent and a somewhat imperfect skull have recently been received at Field Museum in a collection obtained at Sakbayeme, Cameroon, West Africa, by Mr. J. A. Reis, Jr. Besides the original type of the genus and species, very fully described and figured by Thomas, a second specimen has been carefully studied by Tullberg (*Nova Acta Rec. Soc. Scient. Upsaliensis*, (3), 16, pp. 41–44, pl. I, figs. 37–44, pl. III, figs. 11, 16, 17, 35, 36, 1893). Three other examples have recently come to my attention: two in the Museum of Comparative Zoology, collected by Rev. George Schwab at Lolodorf and Metet, Cameroon, in 1916; and one in the Carnegie Museum, collected by A. I. Good at Sangmelima, Cameroon, in 1934. This makes a total of at least seven known specimens.

There is but little to add to the detailed descriptions of Thomas and Tullberg. Neither of them, however, mentions the very stiff,

almost spiny character of the pelage on the middle of the back which is shown in our specimen. This does not reach to the degree of stiffness found in *Acomys* but approaches it and, in combination with the coloration, gives the animal more superficial resemblance to *Acomys* than to any other well-known genus, although it may approach some forms of *Uranomys* with which no comparison has been made. Its very large hind feet and its long, penicillate tail suggest that it may be saltatory. The collector's measurement of the head and body is 100 and of the tail 170. The hind foot to end of claw, in dry condition, has a length of 35.5.

The skull figured by Thomas lacked the basicranial parts including the audital bullae, and these parts are not well shown in Tullberg's figures. The audital bullae are of moderate size in our specimen and the petrous is extensively exposed between the entotympanic and the basioccipital, in this respect showing resemblance to *Lophuromys*. Tullberg found considerable similarity to *Lophuromys* in the internal organs and in the anterior part of the skull. It is evident, therefore, that the genus is one which offers a rather confusing combination of characters. The dentition, although by definition classifying with that of the Dendromyinae, has its own peculiarities and with such forms as *Beamys* and *Uranomys* now to be considered there are doubtless some pretty problems of relationship involved.

***Lophuromys flavopunctatus simensis* subsp. nov.**

Type from Ras Dashan (Mount Geech), Simien Mountains, northeastern Ethiopia. Alt. 11,200 ft. No. 28550 Field Museum of Natural History. Collected March 27, 1927, by Alfred M. Bailey. Orig. No. 683.

Diagnosis.—Similar in color to *L. f. flavopunctatus* of eastern Ethiopia and *L. f. zaphiri* of central and southern Ethiopia, but smaller (hind foot about 22); skull with a short rostrum and small globular audital bullae; teeth small, actually if not relatively.

Measurements.—Average of ten adults from Simien Mountains: total length 186 (166–205); tail 62.6 (51–70); hind foot (dry) 22.3 (21–23.5). Skull of type: greatest length 29.5; condylo-basal length 28.4; zygomatic width 15; width between postorbital processes 7.4; interorbital constriction 6; mastoid width 12.5; nasals 11.8; diastema 7.8; incisive foramina 6; bony palate 4.2; upper toothrow 5 (crowns), 5.3 (alveoli).

Remarks.—*L. flavopunctatus* is a distinct species quite confined to Ethiopia where it ranges over most of the eastern and central plateau

from the northern province of Tigre to Sidamo. Within this area it may be divided into three or possibly four races characterized by slight differences in size and cranial characters. In the region north of the Blue Nile, in the provinces of Gojjam, Amhara, and Tigre, is the above-described race, which is the smallest. It seems most extreme and most constant in a series from high altitudes in the Simien Mountains. Other specimens have been examined from various localities north and northeast of the Blue Nile. These vary somewhat in size but as a whole fall together as compared with the races found south of the Blue Nile. An apparent difference between certain scattered specimens from lower altitudes and those from the Simien heights fails to seem significant when the entire series is carefully examined. It is scarcely to be supposed that the Nile is a fully effective barrier between races but it forms a convenient line which appears approximately correct. Two specimens from Debra Marcos and one from Dejem near the north bank of the Nile in Gojjam are a little large and may, perhaps, be regarded as intermediates. On the south bank of the Nile in Salali specimens were taken which are indistinguishable from others from Addis Ababa and farther south. Specimens from the Choke Mountains in Gojjam are mostly in the richly colored brown phase while those from Simien are in the paler gray phase. These phases run throughout the range of the species and color distinctions between the races are practically impossible.

The type of *flavopunctatus* was carefully examined in London and its proper identification, in the absence of specimens from the supposed type locality, has presented considerable difficulty. This type has an imperfect skull without audital bullae and a second specimen, a paratype from the same source, is in the same condition. Thomas says (Proc. Zool. Soc. Lond., p. 314, 1902): "The type of this species, which was discovered by Sir W. C. Harris during his Mission to Shoa in 1843, was probably obtained at Ankober, about 100 miles N. E. of Addis Ababa." Assuming this to be true, it was hoped to find agreement of the type with specimens from Addis Ababa or northern Shoa. The skull of the type, however, does not fully agree with these specimens. It has rather small teeth and a very short palatal bridge, characters which are variable but most pronounced in the northern form. To use the name *flavopunctatus* for the northern form would mean discrediting the type locality and this was to be avoided if possible. Among specimens taken to London for comparison were several from Galampso in the Chercher

Mountains which lie south of Ankober and east of Addis Ababa on the south side of the Awash River. The skull of one of these was found to have its rostrum and anterior parts in minute agreement with those of the type and its teeth and palatal bridge only slightly different. In comparison with the paratype practically all differences disappear. The audital bullae in the Galampso specimens are no larger than in the Simien form and much smaller than in specimens from Addis Ababa and the central plateau. Evidently another recognizable race is represented which differs from *simensis* mainly in its more elongate skull and its longer rostrum. It has been concluded, therefore, that the name *flavopunctatus* should apply to this eastern form found in the Chercher Mountains and the eastern Arusi plateau. Ankober is separated from this region by the Awash River but is nearer to it in air line distance than it is to Addis Ababa. Therefore it seems extremely likely that the type locality is correctly stated and that when topotypes are obtained they will prove to agree with the eastern rather than the central form.

For the most widely distributed race, ranging from northern Shoa to Addis Ababa and thence to Sidamo and Walamo, the name *zaphiri* (Thomas, Ann. Mag. Nat. Hist., (7), 18, p. 304, October, 1906) is available, with type locality Bodeli, Walamo, at altitude 6,200 feet. The type of *zaphiri* is in fair condition and its skull agrees very closely with specimens from northern Shoa and Addis Ababa as well as with specimens in Field Museum from Sidamo, only a short distance (about fifty miles) east of the type locality. This form is characterized by large size, heavy teeth and large audital bullae. A further name is *brunneus* (Thomas, l.c., p. 305) with type locality Manno, Jimma, at altitude 4,200 feet. This was described as a subspecies of *aquilus* but its large skull and heavy teeth leave no doubt that it is related only to *flavopunctatus*. Its skull, which lacks the posterior parts and audital bullae, is exactly similar in nearly all respects to a skull from the Chilalo Mountains in Field Museum. Its supposed long tail is the only stated character likely to have significance and this needs confirmation with well-measured modern specimens. The province of Jimma is known to contain some zoological peculiarities and possibly it may hold a form of *Lophuromys*. This, however, is not proved by the imperfect material available and the name *brunneus*, therefore, is best regarded as a probable synonym of *zaphiri*.

Very aged individuals in this group often reach a size much exceeding the average of normal adults and conclusions based upon a

small number of specimens are likely to be misleading. In many specimens of *zaphiri* the audital bullae are fully twice as large as in *flavopunctatus* and *simensis* and the average difference is large, but variation in specimens from nearby localities may be considerable. The largest bullae are found in a small series from high altitudes in the Chilalo Mountains and the possibility of a slight local highland form is suggested.

A list of ninety-one specimens examined is appended.

Lophuromys f. flavopunctatus.—Ankober, Shoa, 2 (type and paratype, B.M.); East Arusi plateau, near Webbi Shebeli Ridge, 2; Galampso, Chercher Mountains, Arusi, 3.

Lophuromys f. zaphiri.—Abela, Sidamo, 5; Addis Ababa, 12; Bodeli, Walamo, 2 (type and paratype, B.M.); Ladu, Sidamo, 2; Mount Albasso, Chilalo Mountains, Arusi, 7; N'kolo Mountain, Arusi, 1; Salali, Shoa, 1; Wando, Sidamo, 2.

Lophuromys f. simensis.—Barak, near Gondar, Amhara, 1; Dangila, Gojjam, 1; Davark, Amhara, 8; Debra Marcos, Gojjam, 2; Dejem, Gojjam, 1; near Dungulbar, Lake Tana, Gojjam, 1; Gubea, Gojjam, 3; near Jigga, Gojjam, 4; Mertola Maryam, Gojjam, 4; Mount Geech, Simien Mountains, Amhara, 16; 'Njabara, Choke Mountains, Gojjam, 5; Sakalla, Gojjam, 3.

***Lophuromys brevicaudus* sp. nov.**

Type from Mount Albasso, Chilalo Mountains, Arusi, Ethiopia (northeast side of mountains at edge of tree heather). Alt. 10,700 ft. No. 28573 Field Museum of Natural History. Adult female, collected November 13, 1926, by W. H. Osgood. Orig. No. 6014.

Diagnosis.—A soft-furred, short-tailed and finely speckled *Lophuromys* with a narrow skull and inflated audital bullae. Similar to *L. aquilus* and allies in color, but having the short tail of *L. flavopunctatus* with which it is found associated.

Color.—General external appearance and variations of color as in *L. aquilus*. Upper parts very finely and uniformly Speckled Ochraceous Tawny and blackish, producing a general effect of Bister Brown; under parts Tawny to Ochraceous Buff, the darker bases of the hairs almost invariably showing sufficiently to give a speckled effect; tail bicolor except at the tip where it is blackish all around; forefeet plain brownish; hind feet usually particolored, the sides and toes grayish or tawny and the median area dark.

Skull.—Somewhat similar to that of *L. aquilus* but having a more slender rostrum, decidedly narrower frontals, and much larger audital bullae; somewhat similar to that of *L. a. chrysopus*, but larger, with heavier teeth, larger bullae and relatively narrower frontals; resembles that of *L. flavopunctatus* mainly in narrow inter-orbital region and large bullae, that species having the rostrum shorter and thicker and the teeth much heavier.

Measurements.—Average of ten topotypes: total length 188 (175–200); tail 58.4 (52–69); hind foot 23.8 (23–24.5). Skull of type: greatest length 29.8; condylo-basal length 29.2; zygomatic width 14; width between postorbital processes 6.6; interorbital constriction 5.5; mastoid width 12.3; nasals 12.4; diastema 7.8; upper toothrow (crowns) 5, (alveoli) 5.3.

Remarks.—This appears to be a distinct species confined to high forests of mountains in south-central Ethiopia. It is represented in Field Museum by two series, one from the Chilalo Mountains and another from the Gedeb Mountains, the latter lying somewhat farther south and separated by the intervening valley of the Webbi Shebeli River. The more southern series averages slightly smaller but no separation seems necessary. South of the Gedeb Mountains there is a distinct change in vegetation, marked especially by the abundance of bamboo, and in this region a small, long-tailed *Lophuromys* occurs, which is obviously allied to *aquilus*, as well as a representative of *flavopunctatus*; so the isolation of the present species is fairly clear.

Owing to the wide color variations in this genus, due to age, season, and dimorphism, it is difficult to evaluate slight apparent peculiarities. The present species, while well-distinguished from the *aquilus* group by its short tail and its narrow frontals and inflated bullae, is sufficiently similar in color to make individual specimens confusing. Even *flavopunctatus*, which is normally very different in color, may occur in occasional instances showing considerable similarity. In viewing series, it appears that *brevicaudus* has more uniform upper parts than any member of the *aquilus* series and there is scarcely a suggestion of concentration of dark tones in the mid-dorsal line. Its pelage appears to be slightly softer and finer than in other species of the genus.

***Lophuromys aquilus chrysopus* subsp. nov.**

Type from Allata, Sidamo, Ethiopia. Alt. about 6,000 ft. No. 28592 Field Museum of Natural History. Adult male, collected December 19, 1926, by W. H. Osgood. Orig. No. 6136.

Diagnosis.—Similar to *L. a. laticeps*, but tail slightly longer and color of upper parts somewhat more coarsely speckled; hind feet wholly buffy brown or tawny in sharp contrast to the toes, which are abruptly dark brown or blackish; skull and teeth essentially as in *laticeps*; braincase averaging slightly shallower.

Measurements.—Average of ten specimens from adjacent localities in Sidamo: total length 196 (189–212); tail 71.8 (67–79); hind foot 22.4 (21–23). Skull of type: greatest length 29.7; condylo-basal length 28; zygomatic width 14.6; width between postorbital processes 7.5; interorbital constriction 6.2; mastoid width 12.5; nasals 11.9; diastema 7.6; upper toothrow (crowns) 4.9, (alveoli) 5.1.

Remarks.—The bright-colored feet of this form make it conspicuous in any series of specimens. Although the color of the feet is variable in the *aquilus* group, I have seen nothing quite like that of this form in a large series examined. In a few specimens there is a slight darkening on the center of the foot, but in most cases the foot is entirely light-colored, with the toes in marked contrast.

Among the specimens referred to *chrysopus* are several which agree with it externally but, while they have small audital bullae like *aquilus*, their interorbital regions are somewhat narrowed, suggesting approach to *brevicaudus*. The distributional change from *brevicaudus* to *chrysopus* is so abrupt, however, that one hesitates to consider these as intergrades.

Comparison has been made chiefly with *L. a. laticeps* as represented by some fifteen specimens from Lake Bunyoni and the Virunga Mountains in the Lake Kivu district. Whether *laticeps* itself is recognizable is not easily demonstrable, but the name is of relatively early date. Typical *aquilus* is now represented in Field Museum by six specimens from Usambara, near Mount Kilimanjaro, Tanganyika. These are quite dark-colored and their tails, especially, are darker than in *zena* and *laticeps*, being only faintly lighter below than above. Although both Hollister and G. M. Allen have been inclined to discredit *zena* as a race, I find it easier to distinguish than *laticeps*, since it averages considerably larger than *aquilus*, with heavier teeth and a sharply bicolored tail. Series from Kijabe, Naivasha, and Molo, presumably representing *zena*, average lighter on the under parts than in typical *aquilus*.

A large series from Mount Ruwenzori is much like *laticeps*, being only a trifle larger and darker. Among these are some with tails as dark as in *aquilus* and distinction from the small series from Tanganyika is difficult. Therefore, although it seems probable that

zena may prove recognizable, other western races in Kenya and Uganda are still in doubt. Hollister's disposition of *rubeculus* as a synonym of *zena* probably needs confirmation, since he did not examine the type, which is described as very small. A few unusually small examples appear among collections from relatively low altitudes in southern Ethiopia and these, although placed now with *chrysopus*, may need further study when series of *rubeculus* are available. A single specimen of typical *rubeculus* from Mount Elgon is in Field Museum and indicates that the race is probably recognizable. This specimen is rather small and very dark-colored, especially on the under parts, thus agreeing with the original description. Similar characters are seen in a series from Irumu, Ituri Forest, and the inference is that *rubeculus* is probably a Congo form which finds its eastern limit in the Elgon region much as does its larger relative *Lophuromys sikapusi ansorgei*. That *ansorgei* is no more than a subspecies of *sikapusi* is amply shown by specimens now in Field Museum.

The possibility that *rubeculus*, as represented by material from the Ituri Forest, might be allied to the small West African form *nudicaudus* led to examination of the type of *nudicaudus*, which was kindly lent by the United States National Museum. This type, while somewhat immature, is clearly very distinct, being especially characterized by a broad shallow braincase and a very narrow sloping infraorbital plate set at an angle of nearly forty-five degrees to the axis of the skull. Apparently it is a forest form quite different from the larger *sikapusi* and from any of the *aquilus* series of central and eastern Africa. That it should have been taken only once is evidence of the imperfect knowledge of the region.

In connection with the determination of specimens from the Ituri Forest, the type and paratype of *L. luteogaster*, recently described (Hatt, Amer. Mus. Nov., No. 708, p. 4, 1934) from this region, were examined through the courtesy of the American Museum of Natural History. Study of these specimens leads to the suspicion that the skin and skull of the type may be improperly associated. Although the skin is unique among *Lophuromys*, the skull is perfectly normal for a member of the *aquilus* group and can be matched in every detail by specimens of supposed *rubeculus* from the Ituri district. Moreover, the skull of the paratype, which seems to belong with its skin, does not agree with that of the type. This skull, although very immature and badly crushed and stained, resembles immature skulls of *L. woosnami* rather than those of

aquilus. There is no suggestion of a postorbital process, but there is a slight indication of the supraorbital bead characteristic of *woosnami*. On account of the immaturity and bad condition of the specimen, observation of these features is not wholly certain, but they are reinforced by the teeth, which are decidedly larger than in the type and definitely like those of *woosnami* rather than *rubeculus*. The skin of the type is markedly different from *woosnami*, the pelage being very harsh and stiff, the tail with very fine annulations, and the light color of the feet and under parts very pronounced. All these characters suggest the little-known genus *Uranomys* and, although the skull of the paratype gives no indication of such a relationship, it is not impossible that the species, when better known, will prove to be one to strengthen the alliance between *Lophuromys* and *Uranomys*. In case the assumption that the skin and skull of the type are mismatched is substantiated by later material, the skin would naturally be selected to represent the species.

***Muriculus imberbis chilaloensis* subsp. nov.**

Type from Mount Albasso, northeastern Chilalo Mountains, Arusi, Ethiopia. Alt. 10,700 ft. No. 28669 Field Museum of Natural History, collected November 14, 1926, by Alfred M. Bailey. Orig. No. 150.

Diagnosis.—Similar to typical *imberbis* of northern Ethiopia but paler, especially on the under parts, which are whitish or creamy buff rather than Tawny or Ochraceous Tawny.

Measurements.—Average of six topotypes: total length 144 (131–159); tail 52 (47–56); hind foot 18.6 (18–20). Skull of type: greatest length 23.5; zygomatic width 12.3; least interorbital width 3.9; nasals 7.9; interparietal 8.6 x 1.5; incisive foramina 5.2; diastema 6.8; upper toothrow 4.

Remarks.—This mouse was found inhabiting open slopes in grassy or rocky situations near the upper limit of forest in the Chilalo Mountains. Eight specimens, all from one station, have the color of the upper parts only slightly lighter than in typical *imberbis*, but the under parts, although somewhat variable, are very much paler. In one specimen they are almost white, whereas in all northern specimens they are entirely Tawny Ochraceous. The dorsal stripe is well marked in all cases, confined mostly to the posterior half of the back, although sometimes faintly extended towards the shoulders. A further external marking, often quite

conspicuous, is a tuft of Tawny Ochraceous hairs at the anterior base of the ears. The pelage is thick and soft with no suggestion of spines.

In making the generic separation of *Muriculus*, based on a single specimen, Thomas suggested a possible relationship to *Lophuromys* and, later, in describing *Hylenomys*, he is somewhat more positive as to the same supposed affinity. With a considerable series, I find little or no suggestion of *Lophuromys* and am inclined to consider *Muriculus* in series with *Zelotomys*, which perhaps connects it with larger forms having the first lamina of the first upper molar undistorted, and *Hylenomys*, which appears to connect it with *Leggada*. The one specimen used by Thomas, as pointed out to me by Miss St. Leger, has an imperfect, somewhat telescoped skull in which the palatal part is loosened and pushed backward. Apparently this caused Thomas to believe that the palate normally extended far back beyond the molars, somewhat as in *Acomys* and *Uranomys*. Additional specimens, however, do not show this and, although the palate ends slightly behind the molars, the anterior boundary of the interpterygoid fossa is square, essentially as in *Leggada* or *Mus*.

The unique type of *Hylenomys*, upon comparison with *Muriculus*, proves to be very similar externally except in the absence of a dorsal stripe. Its teeth are somewhat worn, but appear much as in *Leggada*, differing from those of *Muriculus* mainly in the smaller size of the last upper molar. Therefore, it differs from *Leggada* principally in its proodont incisors and from *Muriculus* in its plain color and its reduced third upper molar. This gives it a position exactly between *Muriculus* and *Leggada*. *Zelotomys* seems rather closely allied to *Muriculus*, differing mainly in greater size, heavier teeth, naked soles, and a first upper molar with less distorted front lamina. The South African *Ochromys* also seems related to *Zelotomys*, being distinguished mainly by its orthodont incisors and a slightly peculiar last upper molar. We have, therefore, four genera, *Muriculus*, *Hylenomys*, *Zelotomys*, and *Ochromys*, each with a single species, but all more closely related to each other than to other African murines. Whether four generic names are better than one is probably a question to be left unanswered until much more work is done. The mammary formula in *Muriculus* is 3-2=10 as in *Ochromys* and *Zelotomys*; in *Hylenomys* it is unknown. The proportions of body and tail are about the same in all four genera and in this, as in some other cases, it may be that external characters are more conservative than dental and cranial.

A list of sixteen specimens examined follows:

Muriculus imberbis.—Southwest base of Choke Mountains, Gojjam, 1; Debra Marcos, Gojjam, 2 (British Museum); Devark, Simien, 2; Mount Geech, Simien Mountains, 1; Muger River, Shoa, 1; Zegi, Lake Tana, 1 (British Museum).

Muriculus imberbis chilaloensis.—Chilalo Mountains, Arusi, 8.

Mus (Leggada) proconodon Rhoads.

Mus (Pseudoecomys) proconodon Rhoads, Proc. Acad. Nat. Sci. Phila., p. 531, 1896—Sheik Hussein, Webbi Shebeli River, Arusi, Ethiopia.

Topotypes of this species collected by Alfred M. Bailey during Field Museum's Ethiopian Expedition show it to be closely related to *M. pasha* of northeastern Belgian Congo. The type of *pasha* in the British Museum is in bad condition, the skin tailless, three-legged, and in worn, reddish coat. The skull is broken and without mandibles, but the rostrum, interorbital region and teeth are present. These agree closely with Ethiopian specimens. Possibly *pasha* is somewhat darker and more rufescent in color and probably it will prove recognizable as *Mus proconodon pasha*. The relationship to *sorella* appears close, distinctions being mainly of size. Two specimens from Poko Uele, Congo (Christy), look much like *pasha*, but their skulls are small as in *sorella*. Certain Ethiopian specimens also have small skulls and the possibility that *sorella* may be a subspecies of *proconodon* may need consideration when more material is available.

The dental peculiarities noted by Rhoads and used by him as the basis of subgeneric separation are appreciable in comparison with some other African species, but when Asiatic forms are considered, their significance is largely lost.

Specimens examined.—Ethiopia: Abu El Kassim, Arusi, 3; Budessa Habra, Arusi, 1; Kalata River, Arusi, 4; Kukeru Springs, Bale, 1; Luku, Bale, 1; Makki River, Gurage, 1; Muger River, Shoa, 1; Sheik Hussein, Arusi, 4.

Hylomyscus aeta laticeps subsp. nov.

Type from southwest slope of Mount Cameroon, Cameroon Mandate, British Nigeria. Alt. 5,800 ft. Adult male, collected June 25, 1934, by R. and L. Boulton. Orig. No. 30.

Diagnosis.—Similar to *H. aeta*, but darker-colored, with a concentration of blackish in the median dorsal area, at least posteriorly, forming a fairly defined line; skull beaded as in *aeta*, but the beads

less convergent anteriorly where the least interorbital width is greater than in *aeta*; audital bullae decidedly larger, about as in *H. denniae*.

Color.—Upper parts dark Ochraceous Tawny heavily mixed with blackish, especially from the middle of the back to the base of the tail where a well-defined blackish line is formed; side of face largely sooty, the usual dark eye-ring widened and intensified; under parts creamy white, the darker undercolor scarcely apparent; forefeet very thinly haired, white with a few blackish hairs; hind feet whitish laterally with a well-marked sooty median area; tail dark throughout.

Skull.—Interorbital region very wide, especially anteriorly, a sharp-edged "bead" extending from the middle of the parietals forward nearly to the posterior endings of the premaxillae; infra-orbital plate non-projecting, slightly wider than in *alleni*, *stella*, etc., but slightly narrower than in *denniae*; audital bullae much larger than in *aeta*, about the same size as in *denniae*.

Measurements.—Type specimen: total length 210; tail 120; hind foot 20; ear 16. Skull of type: greatest length 25.7; basal length 23.8; diastema 7; zygomatic width 12.5; least interorbital width 5.2; width of braincase 11.7; orbit to tip of nasals 8.4; nasals 8.4; length of infraorbital plate 2.3; upper toothrow 4.4.

Remarks.—A single specimen of this mouse from the high forest of Mount Cameroon differs so widely in cranial characters from *H. aeta* of Bitey, Ja River, at 2,000 feet, that its distinction is scarcely to be doubted. With a topotype of *aeta* at hand, labeled by Thomas, comparison of skulls is simple, but there is such difference in condition of pelage that the amount of color distinction is uncertain. As compared with *stella* and *denniae* in fresh, full pelage, the form from Mount Cameroon shows a less uniform coloration on the back, with a marked concentration of dusky in the median line posteriorly. The hind feet also are more extensively dusky. Although the pelage is full and soft it is less "woolly" than in some other forms. The skull is well characterized by great interorbital width and large audital bullae.

The generic distinction of *Hylomyscus* apparently rests upon its slightly broadened hind feet, somewhat elongated fifth hind digit, and narrow non-projecting infraorbital plate. The molars are essentially as in *Praomys*, the roots of the first upper one being the same in number (3) and position and the small, slightly developed antero-external cusplet in this tooth being essentially the same. In the species *denniae* there is at least a slight tendency toward *Praomys*. In sorting a considerable series from the Ruwenzori district of central

Africa, it has been found most convenient to distinguish *denniae* from *stella* by its wider infraorbital plate. In this series it was also found that *denniae* greatly outnumbered *stella*, perhaps because it may be less arboreal in habit and therefore more easily trapped. Of thirty-four specimens taken by Edmund Heller in the general region, twenty-four seem referable to *denniae* and eight to *stella* and *weileri*.

Mastomys coucha lateralis Heuglin.

Mus lateralis Heuglin, Reise Nordost Africa, 2, p. 71, 1877—Province of Dembea, Ethiopia.

Mus tacazienna Heuglin, l.c., p. 72, 1877—Takkaze River, Amhara, Ethiopia.

Multimammate rats of the *coucha* group are found at moderate altitudes throughout northern and eastern Ethiopia from Amhara to Arusi. With a series of some eighty specimens for comparison with considerably larger numbers from Kenya and Uganda, it is evident that an Ethiopian form of this confusing group should be distinguished, but an exact, clear-cut definition of it, applicable to every specimen, is manifestly impossible. This is partly because of variation and partly because the number and relation to each other of the southern forms is still uncertain. As compared to *hildebrandti* and *panya* the Ethiopian form has larger and broader feet and the under parts average more extensively and heavily fulvous. As compared to *ugandae*, it is smaller, the color is paler and brighter both above and below, and the pelage is softer and more dense.

At least for the present, Heuglin's name *lateralis* may be used for this subspecies, since his description and measurements apply very well to it and the locality is one in which it undoubtedly occurs. He states that it was found in dwellings in Dembea and this also points to this species. His name *tacazienna* appears to be a synonym probably based upon small or immature specimens. Rüppell's *Mus leucosternum* (Mus. Senck., p. 108, pl. 7, fig. 2, 1842) from Massaua proves to be *Rattus norvegicus*. This is demonstrated by a "cototype" now in the British Museum which clearly is an immature example of that species.

Besides this form, another *Mastomys* occurs in close proximity in various parts of Ethiopia and is sufficiently similar to be rather easily confused with it. This second species appears to be *M. macrolepis* and is represented in Field Museum by one specimen from Metemma at the Sudan border, one from the west side of Lake Tana, and five from the Blue Nile canyon in the district of Dejem,

Gojjam. Several immatures from the Muger River, a tributary of the Blue Nile in Shoa, may also belong here. In southern Ethiopia a closely related and long-tailed form was taken at Lake Shala in the Rift Valley. For this form the name *Mastomys macrolepis gardulensis* Frick seems to be available. Comparison of the material from northern Ethiopia with two specimens from the vicinity of Roseires, the type locality of *macrolepis*, shows substantial agreement, although one or two of the Ethiopian specimens tend to have more nearly whitish under parts and their general color is possibly a little darker. That the specimens from Roseires really represent *macrolepis* seems fairly certain, although G. M. Allen (Bull. Mus. Comp. Zool., 58, p. 330, 1914), in recording a large series from the region, has mentioned a specimen with large dimensions and a "buffy line in the middle of the belly." That the name is applicable to a white or pale-bellied form was indicated by Thomas in 1923 (Proc. Zool. Soc. Lond., p. 266) when he distinguished two species in Darfur and found a white-bellied form agreeing more closely with a cotype of Sundevall's species than with a member of the *coucha-ugandae* group occurring in the same region.

Allen (l.c.) has referred also to the possibility that *macrolepis* may be the same as *albipes* of Rüppell, said to be from Massaua. Examination of a "cotype" of *albipes*, now in the British Museum, shows that name to apply to a large species of *Myomys* found throughout the mountains of Ethiopia but apparently unrepresented elsewhere in Africa. It is rarely found below 6,000 feet and it is doubtful if Massaua is its exact source. The names *ankoberensis* and *alettensis* (Frick, Ann. Carnegie Mus., 9, pp. 17-18, 1914) probably are synonyms of *albipes*, as indicated by the describer's special mention of dark markings on the metapodials, these, in spite of the name, being practically diagnostic of the species. Rüppell's remark that the species is a common house rat of Massaua was probably mistaken. He mentions having collected specimens of a supposed variety of it in the mountains west of Massaua and these, in all probability, are the ones actually preserved and described.

Apparently there are two common species of *Mastomys* in central Africa, one (*macrolepis*) mainly northern and western and the other (*ugandae* et al.) of southern affinities. In Sudan, Darfur, and Nigeria they are easily distinguished; in Ethiopia they are still fairly defined; but in Kenya and Uganda they have developed such superficial similarities that the reference of every individual specimen to one or the other is next to impossible. The occurrence of the two types

in Uganda was recognized by Dollman in describing *effectus*, which is clearly distinct from *ugandae* and probably should be called *Mastomys macrolepis effectus*. Hollister, in 1919 (Bull. U. S. Nat. Mus. No. 99, pp. 87–88), was inclined to consider *effectus* as based on a small example of *ugandae*, but it appears that his material of true *ugandae* was rather scanty (unless the series called *tinctus* represents it) and this was one of the few cases in which he was led to a mistaken conclusion. Topotypes of *ugandae* and series from the Ruwenzori region in Field Museum show it to be a very large, dark-colored, and coarse-haired form, one of the most distinct in the group. Distinction of *effectus* from some of the smaller forms as *panya*, *hildebrandti*, *ismailae*, etc., is more difficult and it is possible that some of these may be more nearly related to *effectus* than to *ugandae*.

In their extreme forms the *macrolepis* and *coucha-ugandae* series are distinguishable by a combination of characters. In *macrolepis* and allies the tail is relatively long, the hind foot small and slender, the pelage soft, and the under parts (with rare exceptions) uniformly light-colored, pale buff or whitish. The skulls are smaller, with a shorter rostrum, broader and shorter nasals, and with the dorsal outline of the skull less arched. These characters, while not always apparent in single specimens, are evident in series properly selected as to age.

Specimens examined.—Ethiopia: Addis Ababa, 17; Arnoon, Boke, Arusi, 2; Chilga, Amhara, 1; Dangila, Gojjam, 6–10 (British Museum); Davart, Simien, 2; near Dungulbar, west side of Lake Tana, Gojjam, 6; Ferkaber, Amhara, 1; Galampso, near Chercher Mountains, Arusi, 3; Godessa Habra, near Chercher Mountains, Arusi, 22; Gumara River, Amhara, 5; Kukeru Springs, Bale, 2; Mota, Gojjam, 1; Sagatta, Boke, Arusi, 4; Sirre, Arusi, 1; Webbi Shebeli ridge, western Arusi, 2.

Arvicanthis abyssinicus fluvicinctus subsp. nov.

Type from Bichana, Gojjam, Ethiopia. No. 27994 Field Museum of Natural History. Adult male, collected February 23, 1927, by W. H. Osgood. Orig. No. 6290.

Diagnosis.—Similar in color and all general characters to *A. abyssinicus*, but cheek-teeth 8 to 10 per cent larger.

Measurements.—Average of ten topotypes: total length 253 (229–273); head and body 144 (129–161); tail 119 (94–122); hind foot 31 (30–32). Skulls of type and aged topotype: condylo-basal length

31.2, 33.4; zygomatic width 17.7, 18.3; interorbital constriction 4.5, 4.8; nasals 11.6, 13.8; incisive foramina 6.3, 6.9; palatal notch to lip of foramen magnum 11, 12.8; diastema 8.3, 8.9; upper toothrow 7, 7.3 (crowns), 7.6, 7.8 (alveoli).

Remarks.—This is a slight form, but of especial interest since it seems to indicate the effectiveness of the upper Blue Nile canyon as a faunal barrier. It is found only in the rather small area north and west of the Nile and entirely in the province of Gojjam. Typical *abyssinicus* is found north and east of it in Amhara and Simien as well as south into Shoa and as far south as western Arusi. But for the fact that series of considerable size are available, it might have been overlooked. In some forty specimens representing it, the teeth are uniformly larger than in *abyssinicus* and the inference is clear that within its range it has been subjected to what are practically insular conditions. The half-circle which confines it is open to the northwest, but apparently it does not extend far in that direction. Collections from the west side of Lake Tana do not contain it, although unstriped forms of *Arvicanthis* related to *testicularis* and *lacernatus* were taken there in numbers.

The species *abyssinicus* is well distinguished from other Ethiopian forms by its relatively short tail, pale color, conspicuous light spots behind and below the ears, and well-defined dorsal stripe. It is not unlikely that it is confined to Ethiopia and at least some of the forms of Kenya and Uganda which have been associated with it will need other allocation. Besides the typical form and the present one, only one other appears in Ethiopia. This is *Arvicanthis a. saturatus* Dollman (Ann. Mag. Nat. Hist., (8), 8, p. 343, 1911) from the Didessa River in the province of Jimma—a dark, blackish, but distinctly striped form.

Determination of the identity of *abyssinicus* is based upon a series of modern specimens from the type region and upon comparison of these with two so-called cotypes now in the British Museum which obtained them from Rüppell's collections in Frankfort. Complete agreement was found in the specimens, but reference to the original description finds no mention of a dorsal stripe and the figure with it shows an animal of rather dark color. The locality is stated very definitely as follows: "Diese Nager leben Familienweise in Erdhöhlen auf dem Ackerfeld um Entschetqab in der abyssinischen Provinz Simen, welches beiläufig 10,000 franz. Fuss über der Meeresfläche erhaben ist." The type locality, therefore, is the Simien Mountains, although Dollman gave "Simien and Shoa," because Rüppell later

mentioned some specimens from Shoa. So far as known only the one species occurs in the Simien Mountains.

Arvicanthis lacernatus Rüppell.

Meriones lacernatus Rüppell, Mus. Senck., 3, p. 96, pl. VI, fig. 1, 1842—Lake Dembea (=Lake Tana), Ethiopia.

Mus dembeensis Rüppell, l.c., p. 109, pl. VI, fig. 3, 1842—shores of Lake Dembea (=Lake Tana), Ethiopia.

Arvicanthis lacernatus Dollman, Ann. Mag. Nat. Hist., (8), 8, p. 343, 1911.

Arvicanthis pelliceus Thomas, Ann. Mag. Nat. Hist., (10), 1, p. 303, Feb., 1928—Zauday Gar, south shore of Lake Tana, Ethiopia.

In 1911 the name *lacernatus* was disposed of by Dollman with the following comment: "Appears to represent *abyssinicus* in an abnormal condition of pelage, either during a change of fur or else in a state of erythrism. The skin dimensions (head and body 143 mm.; tail 97; hind foot 26.5) are quite similar to those of *abyssinicus*." If this conclusion were justified, *lacernatus* would replace *abyssinicus*, for it has page priority. Fortunately this is not necessary. Dollman probably was misled by the apparent shortness of the tail and perhaps by the belief that only one species occurred in the region. Reference to the original description shows that Rüppell's specimen had an imperfect tail and his measurement was only "biz zu der abgebrochenen Endspitze." Moreover, collections from the type region (shores of Lake Tana) include only specimens of a large, long-tailed, and unstriped species, which is frequently quite reddish in color and agrees essentially with Rüppell's description and figures of *lacernatus*. This species has been redescribed by Thomas under the name *pelliceus* (Ann. Mag. Nat. Hist., (10), 1, p. 303, Feb., 1928), as determined by direct comparison of the type with specimens in Field Museum. A slight southern form of it, probably recognizable, is *Arvicanthis lacernatus zaphiri* Dollman (l.c., p. 349). Apparently allied to *zaphiri* and perhaps indistinguishable are *mearnsi* and *raffertyi* (Frick, Ann. Carnegie Mus., 9, pp. 22-23, 1914).

Heuglin's *Mus rufidorsalis* (Reise Nordöst Africa, 2, p. 70, 1877) may also be a synonym of *lacernatus*, although the description is a hopeless mixture of the characters of *lacernatus* and *abyssinicus*. The color seems to indicate *lacernatus*, since no dorsal stripe is mentioned and emphasis is placed upon the reddish tones of the hind part of the back and feet. The tail measurement, however, is considerably shorter than the head and body, and the type locality ("Grasigen Hochflächen in Semien und Wogara") is in the region

where our expedition found only *abyssinicus*. Perhaps the best conclusion is that of Thomas, who says: "Any determination of *rufidorsalis*, therefore, with no type in existence, would be mere guesswork, and it should probably be put down as a synonym of *A. abyssinicus*" (Ann. Mag. Nat. Hist., (10), 1, p. 304, 1928).

The name *dembeensis*, which was once associated with *Desmomys*, is quite clearly a synonym of *lacernatus*. The description and figure of Rüppell are even more satisfactory than in the case of *lacernatus* itself. Especially significant in the figure is the artist's obvious attempt to show the distinction between the grayish color of the head and shoulders and the more reddish color of the hinder parts. This is the usual coloration shown by modern specimens, although some, as the type of *pelliceus*, are more uniformly colored. Thomas, in 1928 (Ann. Mag. Nat. Hist., (10), 1, p. 302), has referred to *dembeensis* as follows: "I do not now think that Rüppell's *Mus dembeensis* is a *Desmomys* at all, as was formerly supposed to be the case. The 'staffen haaren,' 'schmutzigashgrau' under surface and large claws do not agree by any means with *Desmomys*, but apply well to an *Arvicanthis*, to which genus I have little doubt *dembeensis* is referable." With the fresh material now in hand, it is plain that this conclusion is correct and *dembeensis* is not only an *Arvicanthis* but the species called *lacernatus* by Rüppell, this name having a priority of several pages over *dembeensis*. It is doubtful if *Desmomys* occurs within the region (province of Dembea) assigned to *dembeensis*, which is on the north side of Lake Tana. Our expedition found *Desmomys* in northern Ethiopia only in the higher mountains of the province of Gojjam. In collections from lower altitudes on the northwest shore of Lake Tana in Dembea it is not present.

***Hybomys univittatus badius* subsp. nov.**

Type from southwest slope of Mount Cameroon, Cameroon Mandate, British Nigeria. Alt. 5,800 ft. No. 42643 Field Museum of Natural History. Adult male, collected June 29, 1934, by R. and L. Boulton. Orig. No. 45.

Diagnosis.—Similar to *H. univittatus* and *H. u. planifrons* but smaller and much darker in color; light color of under parts very restricted and rich Tawny or Ochraceous Tawny instead of grayish white or buffy.

Color.—Upper parts very dark, approaching Mummy Brown in general tone; dorsal stripe well defined from shoulders to rump but not conspicuously contrasted; under parts lightly washed with dull

Ochraceous Tawny mainly in the narrow median line and on either side of a broad dark pectoral patch; hairs in anal region and about base of tail rather brightly tipped with Ochraceous Tawny; feet deep Mummy Brown, almost black; tail quite black above and below.

Skull.—Smaller than in *univittatus* and *planifrons*, about as in *lunaris*; dorsal outline arched much as in *univittatus*; interorbital width reduced.

Measurements.—Type: total length 224; tail 115; hind foot 29; ear 15. Skull of type: greatest length 31.9; zygomatic width 15.7; interorbital constriction 5.5; nasals 13; zygomatic plate 3.5; diastema 8.1; incisive foramina 6.2; upper toothrow 5.3.

Remarks.—This is represented by a single specimen, but its exceedingly dark color, especially on the under parts, leaves no room for doubt of its distinctness. Possibly the form is confined to the high forest of Mount Cameroon. In size it agrees more nearly with *lunaris* of Mount Ruwenzori than it does with the nearby *univittatus*. The latter is available in supposed typical form from Lolodorf and Sakbayeme, Edea, southern Cameroon. *H. u. planifrons*, of Liberia, has not been examined, but the very detailed and illustrated description given by the original describer renders this unnecessary.

***Dasymys incomptus griseifrons* subsp. nov.**

Type from southwest side of Lake Tana, near Dungulbar, Gojjam, Ethiopia. No. 28642 Field Museum of Natural History. Adult female, collected April 1, 1927, by W. H. Osgood. Orig. No. 6460.

Diagnosis.—A large form (hind foot 34–36) with the under parts pale buffy or whitish rather than olivaceous; sides of face, nose, and forehead paler than in the allied forms *helukus* and *savannus* of Uganda and Kenya.

Color.—Upper parts Snuff Brown or Olive Brown nearly uniform with scarcely any mid-dorsal darkening in adults; under parts pale buffy to whitish; sides of nose, base of whiskers, and forehead relatively pale and grayish rather than sooty; tail dark above, slightly lighter below; feet mainly brownish but often with some mixture of whitish hairs; ears brownish with scattered, short, whitish hairs inside.

Skull.—Large and heavy with heavy teeth, much as in *helukus* and *savannus*; infraorbital plate broad, slightly excavated anteriorly and without a pronounced "hook"; supraorbital ridges tending to be parallel at least for a short distance.

Measurements.—Average of five adults: total length 321 (312–332); tail 146 (135–153); hind foot 35.6 (34–37). Skull of type: greatest length 38; basilar length 32.8; zygomatic width 20; inter-orbital constriction 5; nasals 14.4; width of infraorbital plate 4.4; diastema 11.5; upper toothrow (alveoli) 7.5.

Remarks.—Although *Dasymys* was not found in southern and central Ethiopia and the nearest records of the genus are from localities some eight hundred miles away, it suddenly appeared in the vicinity of Lake Tana and the upper waters of the Blue Nile. A series of ten specimens was taken in this region, but in spite of the apparent isolation they do not show very pronounced differentiation. As compared with *helukus* and *savannus* of Kenya, they are distinguishable mainly by the paler color of the under parts, face, and nose. *D. orthos* from Butiaba, on the east shore of Lake Edward, is represented by so few specimens that its status is indeterminate at present. Apparently, it is very closely similar to or perhaps identical with *helukus*. *D. shawi*, from southern Bahr-el Ghazel, is a small form doubtless related to *bentleyae* and *medius*.

Both external and cranial characters in this genus are elusive and the range of variation throughout is comparatively slight. There is considerable indication of two color phases, one brownish and the other grayish. Immature animals as well as adults show both phases and in the immatures of the gray phase there is rather more differentiation of a blackish dorsal area.

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