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NEW GENERA AND RACES OF AFRICAN UNGULATES

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In attempting to determine the skull-characters of the various species of East African ungulates, several species have been found to possess generic characters different from those of the species with which they have hitherto been associated. They are described in the present paper, together with six new races of antelopes detected among the specimens collected by the Smithsonian African Expedition under direction of Colonel Roosevelt. In making these studies, the material in the British Museum has been drawn upon extensively and has been of invaluable assistance.

Family EQUIDÆ

DOLICHOHIPPUS, new genus

Type; *Equus grevyi* Oustalet.

Characters.—Skull elongate and narrow, the rostal portion and to a lesser degree, the occipital region, produced along the main axis of the skull; rostral portion long and narrow, the diastema equalling the alveolar length of the four last cheek teeth; lambdoidal crest of occipitals produced behind condyles and extending almost on a level with the auditory meatus, not vertically above it as in *Equus* or *Hippotigris;* facial portion of lachrymal bone large, forming one-third of orbital rim, and extending well behind nasal bones posteriorly; its length 2 to 2½ times its greatest depth, interorbital region flat or truncate medially; ascending process of premaxilla narrow; its suture with the nasal lying below the nasal notch which is wholly in the nasal bone; palatal foramina long and narrow; brain-case very shallow and depressed; color pattern composed of numerous narrow black and white transverse stripes, the loins without any "gridiron" pattern; ears large and broad; hoofs large and somewhat elongate; ergots on forelegs usually small.

The shape of the skull of *Dolichohippus grevyi* is decidedly dolichocephalic, both the rostral and occipital portions being produced somewhat as in the skull of the white rhinoceros, *Ceratotherium.* The general shape of the skull is, in fact, much nearer that of

Equus caballus, but it stands at the extreme as regards length and narrowness, the horse being intermediate in shape of skull between this type and the asses and zebras. Four skulls of *Equus caballus przevalskii* in the British Museum have been used for making these comparisons, as they represent best the original wild horse type. These four skulls are shorter and broader than that of the normal domestic horse and resemble the skulls of wild asses more closely. Skulls of the domestic breeds of horses vary considerably in length and narrowness, but none are as dolichocephalic as *Dolichohippus,* and all differ from this genus in the shorter rectangular shape of the facial portion of the lachrymal bone. In fact, *Dolichohippus grevyi* is the only species of the old genus *Equus* which shows appreciable distinctive skull characters. It is more widely separated from true *Equus* than this is from *Asinus* or *Hippotigris.* The two latter genera show no skull characters which will separate them. *Hippotigris* represents the extreme as regards shortness of skull, roundness of interorbital region, and small size of lachrymal bone; *Asinus* is somewhat more dolichocephalic and flatter in the interorbital region, while *Equus* is often quite dolichocephalic anteriorly, but lacks any occipital elongation.

The three equine genera *Equus, Asinus* and *Hippotigris* differ collectively from *Dolichohippus* by their shorter and broader skulls, shorter and more rectangular lachrymal bone (the depth of which nearly equals its length from the orbital rim), the position of the lateral nasal notch (which is at the suture of the nasals and premaxillæ), and the shorter lambdoidal crest (which terminates vertical in respect to the auditory meatus). *Hippotigris* differs further in having a rounded or convex interorbital region, and shorter posterior extension of the facial portion of the lachrymal bone which does not extend beyond the nasal bones. Other differences in that genus are the small ears, broad stripes, narrower hoofs and larger ergots on forelegs. The mountain zebra, *H. zebra,* shows only slight skull differences from the quaggas or *burchelli* group, although the wide color differences and diverse habits would lead one to anticipate other structural peculiarities in this form. The shape of the ear of *Dolichohippus* is quite different in its greater breadth from that of *Asinus,* in which genus the ears though equally long are narrow. The hoof, though strikingly different from that of *Hippotigris* and the narrow-hoofed species of *Asinus* in its large size and breadth, is very similar in these two characters to that of the kiang, *Asinus kiang.*

The Abyssinian zebra, *Dolichohippus grevyi,* is associated over much of its range with *Hippotigris burchelli granti.* Both species occur together at the southern limit of the range of the Abyssinian zebra in the northern Guaso Nyiro watershed north of Mount Kenia. In the middle course of the river directly north of Kenia, the two species are found associated in the same herds on both sides of the river.

Where this overlapping of ranges occurs, mixed herds of both species are of as common occurrence as unmixed, and mixing of almost every degree takes place from the association of single individuals of one species with large herds of the other species to herds where the numbers of each species are approximately equal. Notwithstanding such close association, no hybridization occurs. Several hundred miles northward in southern Abyssinia near Lake Zwai *Hippotigris* is again met with near the northern limits of the range of *Dolichohippus.*

The alarm or call note of the Abyssinian zebra is a series of deep grunts interrupted by a whistle-like squeal. At a long distance only the grunts are audible, and they are then scarcely distinguishable from the grunting noise made by the lion. The sharp barking kwa-ha of the Burchell zebra or the bray of the ass are strikingly different sounds.

Family BOVIDÆ

The sub-family Bubalinæ contains the most diverse and grotesquely-shaped species of antelopes. The genera included agree in the possession of an elongate skull, with very long nasal bones; in lacking lachrymal-nasal sinuses; in the shallow anteorbital fossa in the lachrymal bone; in the position of the infraorbital foramen which is on the side of the maxillary directly above the first or second upper premolar; in the hypselodont teeth and occasional absence of the first lower premolar. Both sexes are horned alike, but the horns are very diverse in shape in the different genera. The mammæ are two in number. The body is much higher at the shoulders than at the rump. The three genera, *Bubalis, Damaliscus,* and *Connochætes,* to which the species of the sub-family are usually assigned, are in each case made up of diverse species which show important difference in skull characters entitling them to generic rank. One of these genera, *Gorgon,* (type, *C. taurinus*) has already been named by Gray. This genus differs widely from *Connochætes,* (type, *C. gnu*) which is the most highly specialized member of the family. *Gorgon* is quite *Bubalis*-like in its skull formation, and differs from *Con-*

nochætes in its long nasal bones, and elongate rostral part of the skull, in its premaxillæ with rounded border, and the broad ascending nasal processes. The direction of the horns is outward and not forward and upward over the eyes as in *Connochætes*. The thoracic vertebræ are one less than in *Connochætes*, which is unique among African antelopes in the possession of fourteen. Both genera have as a rule only two lower premolars in the permanent dentition, the first milk molar not being replaced by a premolar. Among the species of *Bubalis* one species, *lichtensteini*, stands out from the others as a very different form, and shows a considerable degree of distinctness both in horn shape and skull characters. The broad horn pedicle[1] gives the posterior portion of the skull a striking resemblance to that of *Gorgon*. It is here considered as the type of a separate genus.

SIGMOCEROS, new genus

Type; *Bubalis lichtensteini* Peters.

Characters.—Horns with a peculiar S- or Z-shaped curvature, broad and depressed at the base, and sharply turned backward at the tips; median frontal suture raised into a prominent ridge in the interorbital region; horn pedicle[1] wide and short, its bifurcation occurring directly above the posterior margin of the condyles, the width of the pedicle equalling the distance from the bifurcation to the posterior border of the orbital rim.

In the closely allied genus *Bubalis* the horn pedicle is very long and narrow, the bifurcation taking place well posteriorly to the condyles, and the width of the pedicle is always much less than its length from the bifurcation to the orbital rim. The frontal region differs further in being flat and the horns at the base are circular without any marked depression as in *Sigmoceros*.

The geographical distribution of this distinct type is peculiar. It occupies the territory between two species of typical *Bubalis* with neither of which it is at all closely allied. Its range extends from central German East Africa southward through Nyasaland and Portuguese East Africa to the vicinity of Delagoa Bay.

The Caama, a typical *Bubalis* of the extreme dolichocephalic lelwel type, extends northwards from the Cape region as far as the Limpopo River, but does not reach the southern limits of the range of *Sigmoceros*. In central German East Africa, *Sigmoceros* reaches

[1] The term "horn pedicle" is used here and elsewhere in this paper to designate the posterior upper portion of the cranium, from the orbits to the vertex.

its northern limits, and here it meets the wide-spreading-horned species *B. cokei*, but does not, apparently, actually occur with it anywhere.

How such a distinct type as *Sigmoceros* has come to inhabit territory intermediate between two fairly closely allied species, and yet remain aloof from the territory of both does not at present admit of any ready explanation.

BUBALIS COKEI KONGONI, new subspecies

Type from Loita Plains, Southern Guaso Nyiro River, British East Africa; adult male No. 162992, U. S. Nat. Mus.; shot by Col. Theodore Roosevelt, June 19, 1909; original (Heller) number 139.

Characters.—Similar to *cokei* but differing by lighter coloration, the coat more purely buffy with very little reddish tint on the body, the rufous of the forehead and snout of *cokei* replaced by tawny; skull averaging broader with wider and shorter horn pedicle.

Coloration.—Dorsal coloration tawny-ochraceous, the rump and thighs lighter buff in color and showing considerable contrast from the darker dorsal coloration; sides of body buff in color and somewhat lighter than the medium dorsal area, merging imperceptibly into the cream-buff of the underparts. Top of head slightly darker than the back, tawny; cheeks and throat lighter more buffy, the latter pure buff in color; tip of chin hair-brown; back of ears tawny-ochraceous the inside clothed by cream-buff hairs. Front of legs tawny from the hoofs to the knees and hocks; back, and sides of legs, cream-buff like the belly. Tail with black crest and tip, the base buff like the rump.

Measurements.—Head and body, 1,820 mm.; tail, 480; hind foot, 505; ear, 210.

Skull: Condylo-basal length, 402; greatest length (bifurcation of horn pedicle to premaxillæ tip), 455; nasal, 205; breadth of horn pedicle, 94; length of horn pedicle from orbit to bifurcation, 114; length of upper tooth row 90.5; distance from first premolar to premaxillæ tip, 139.

The hartebeests inhabiting the highlands of the interior are distinctly lighter colored, or more purely buffy, in tone than those from the low coast lands. The horn- and skull-variations are so great, however, that definite skull-characters are hardly determinable. The horns show great age variation. In immaturity, they are much less bracket-shaped with long slender points, but in old age, when the teeth show much wear, the horn-points are also greatly

shortened, due to wear, and the basal shank of the horn stands out at a wider angle giving the horns a more pronounced bracket shape.

The type-specimen of *Bubalis cokei* in the British Museum consists of the dried head-skin and the skull, the latter without the mandible or nasal bones. The whole top of the head in this scalp is deep cinnamon-rufous, the cheeks and back of ears and neck tawny and the throat tawny-ochraceous. The skull is somewhat immature, the premolars having just errupted, the last one being not yet up to the level of the general tooth-line. A part of the condyles, basi-occipital and sphenoid region of the skull have been cut away. The measurements of this skull are as follows: Condylo-basal length, 383 mm.; greatest length (bifurcation to premaxillæ tip), 453; zygomatic breadth, 123; length of upper tooth-row, 93; distance from first premolar to tip of premaxillæ, 131.

Horns: Length on outside curve, 413; breadth at tip, 315; greatest breadth, 395; circumference at base, 235.

Among the Suahili this antelope is known as the kongoni, and the term has become so familiar through its constant use by the negro porters on safari that it has been adopted by sportsmen generally for this species.

BUBALIS NAKURÆ, new species

Type from Nakuru, British East Africa; adult male; No. 163130, U. S. Nat. Mus.; shot by Kermit Roosevelt, October 20, 1909; original (Heller) number, 418.

Characters.—Similar to *neumanni* of the Lake Rudolf region but differing by lighter body coloration and narrower or less broadly bracket shaped horns; similar to *cokei* in size and general body color but feet with black band bordering hoof clefts, horns narrower and less bracket shaped.

Coloration.—General dorsal color tawny-ochraceous the color becoming lighter on the sides where it is buffy but merges gradually into the cream-buff of the lower parts; rump scarcely lighter than back but the thighs buff in color like sides. Top of head tawny, the cheeks lighter tawny-ochraceous and merging into the buff of the throat; chin seal-brown at tip; back of ears ochraceous, the inside surfaces clothed by cream-buff hairs. Front of legs with seal-brown spot above hoofs which merges into a tawny stripe extending to the knees and hocks; back and inside of legs buff. Tail crest and tip black, base tawny-ochraceous.

Measurements.—Skull: Condylo-basal length, 400 mm.; greatest length (bifurcation of horn pedicle to premaxillæ tip), 463; zygo-

matic breadth, 128; nasals, 230; breadth of horn pedicle, 89; length of horn pedicle from orbit to bifurcation, 111; length of upper tooth row, 97; distance from first premolar to premaxillæ tip, 36.5.

The Smithsonian African collection contains three specimens of this race shot near Lake Nakuru by Kermit Roosevelt. These are distinctly different from the two mounted heads of *neumanni* from Lake Rudolf in the Tring and British Museums.

The horns of the Lake Rudolf specimen are much wider, practically the shape of those of *tora*, of which *neumanni* appears to be a race. The Nakuru specimens, on the other hand, have less widely spread horns, more or less intermediate between those of *cokei* and *jacksoni* in shape, and on this account they have usually been considered hybrids between these species by sportsmen. This, however, is not the case, although they occupy a somewhat intermediate geographical position. They are found on the northwestern edge of the range of *cokei*, and are really surrounded by this species and actually removed by many miles from the nearest *jacksoni*. The Nakuru race is known only by a single herd which inhabits the country lying between Lakes Nakuru and Elementaita. From *neumanni*, which occupies the region bordering the northeastern shores of Lake Rudolf, they are separated by several hundred miles.

BUBALIS LELWEL ROOSEVELTI, new subspecies

Type from Gondokoro, Uganda; adult male; No. 164734, U. S. Nat. Mus.; shot by Col. Theodore Roosevelt, February 15, 1910; original (Heller) number, 643.

Characters.—Closely allied to *insignis* of Central Uganda, but lacking the dark dorsal stripe, face blazes and hoof-bands; differing from *niedecki* by much lighter body-color.

Coloration.—Dorsal color ochraceous-buff, the rump and sides somewhat lighter being pure buff; underparts cream-buff merging gradually into the buff color on the sides. Top of head darker than the back, slightly tawny-ochraceous in color; cheeks slightly lighter ochraceous-buff; throat purer buff but chin sharply contrasted by seal-brown color; legs in front with seal-brown patch above hoofs, which is continuous with a wide tawny streak to the knees and hocks; back and inside of legs buff. Tail crest and tip black; base buff.

Measurements.—Head and body, 1,800 mm.; tail, 545; hind foot, 555; ear, 200. Skull: Condylo-basal length, 425; greatest length (bifurcation of horn pedicle to premaxillæ tip), 520; zygomatic

breadth, 125; nasals, 234; breadth of horn pedicle, 95; length of horn pedicle from orbit to bifurcation, 143; length of upper tooth row, 105; distance from first premolar to premaxillæ tip, 144.

This race is lighter and more yellowish in color than any of the other races of *lelwel*. The skull differs considerably from *jacksoni* by its longer nasal bones and upper tooth-row. The horns differ, further, in that their tips are parallel or turn inwards, as in *niediecki;* not outwardly, as in *jacksoni*. The horns are decidedly straighter in profile than in *jacksoni* the angle made by the tips being much more obtuse. On the west bank of the Nile we meet with the typical *lelwel* which has similar horn and skull-characters, but has extensive black markings about the hoofs and legs, the black on the forefeet being continued as a broad stripe from the hoof-bands to the knees.

In the genus *Damaliscus* we find a considerable difference in the shape of the horns in the different forms of the topi, on the one hand, and in the bontebok of South Africa on the other, but the skull-differences between these species are quite slight. This is, however, by no means the case with the peculiar East African species known as *Damaliscus hunteri*. The shape of the skull and horns and the coloration in this species are so different from those of the other members of the genus, that it seems necessary to separate it generically from the latter in order to avoid confusion. It is, therefore, described below as the representative of a new genus.

BEATRAGUS, new genus

Type; *Damaliscus hunteri* Sclater.

Characters.—Nasal bones long, reaching as far posteriorly as the anterior edge of the orbits, acutely pointed at frontal contact; lachrymal bone with its facial portion projecting forward along the nasal suture as a narrow, acutely-pointed process; infraorbital foramen divided; knobbed processes on basioccipital at basisphenoid suture small; lower premolars only two; horns wide spread at base, U-shaped; color characters, a white tail and white interorbital bar across forehead.

Damaliscus differs from *Beatragus* chiefly in the shorter nasal bones (which stop well in advance of the orbits and end obtusely or are truncated), the shorter lachrymal bone, single infraorbital foramen, and the presence of the three lower premolars.

To some degree this genus is intermediate between *Bubalis* and *Damaliscus,* especially as regards the elongate nasal bones, but the

general shape of the occipital part of the skull is distinctly *Damaliscus*-like. The double infraorbital foramina and the presence of only two lower premolars suggest kinship with *Gorgon* and *Connochætes*, to which genera it obviously has, however, no real affinity. It is apparently a specialized offshoot from the *Damaliscus* stock.

The five skulls of *Boatragus* in the British Museum agree in the possession of the characters given for that genus. Three of the skulls lack mandibles, but two, recently presented to the museum by Mr. G. Blaine, who secured them on the Tana River, have enabled the writer to determine the dental characters of the genus.

SYLVICAPRA GRIMMI ROOSEVELTI, new subspecies

Nile Bush Duiker

Type from Rhino Camp, Lado Enclave; Egyptian Sudan; young adult male (first milk molar still in place); No. 164664, U. S. Nat. Mus.; shot by Theodore Roosevelt; January 25, 1910; original (Heller) number, 616.

Characters.—Smaller than any other race, and lighter colored; the body color grayish rather than yellowish, and the dark areas of lower part of legs broccoli-brown not black, dark band on forelegs from hoof to knees only faintly indicated.

Coloration.—Dorsal body coloration wood-brown vermiculated with blackish, darkest on median line, basally the hair is ecru-drab; the sides of the body lighter, becoming pure fawn where they meet the white of the underparts; the neck showing very little black vermiculation, almost wholly cinnamon-brown, this color extending onto the head, where it deepens to russet on crown and borders the wide black median stripe which extends from rhinarium to base of horns; cheeks and sides of face lighter fawn color; rump more grayish than back, drab-grey predominating; tail with a heavy black dorsal stripe, the sides and lower surfaces white, the tip chiefly white. Belly and inside of legs white, the hair at extreme base drab, chest mixed white and fawn with the drab of the basal part showing through; lower throat fawn, like the sides; gular region and upper lips and throat white, tip of chin with dark brown spot on each side separated by white of throat. Limbs grayish fawn like the back with a broccoli-brown band encircling the hoof as high as the false hoofs; a stripe of the same color extending to knees on forelegs. Outside of ears dark, covered by minute scattered cinnamon hairs; tips showing no darker borders; inside of ears clothed by long, white hairs.

Measurements.—Head and body, 860 mm.; tail, 55; hind foot, 215; ear, 73 (taken from tanned skin).

Skull: Condylo-basal length, 146; basilar length, 136; greatest length, 156; zygomatic breadth, 67; nasals, 56 x 30; interorbital width, 37; vertical diameter of orbit, 27; length of upper tooth-row, 51; first premolar to premaxillæ tip, 46; length of bullæ, 22.

The series of specimens from the Lado Enclave show very little variation from the characters given for the type, all being decidedly light-grayish in color and small in size. Specimens in the British Museum from the Bahr-el-Ghazal region, further north, show the same light coloration and small size. This species, *grimmi,* with its various racial forms, has the widest geographical and altitudinal range of any African antelope. It is found practically everywhere from Abyssinia southward to the Cape region, and from the east coast westward to the Gambian region. Its altitudinal range extends from sea-level to twelve thousand feet on the æquatorial mountain ranges. The color changes over this wide area are remarkably slight, with the single exception of the rufous race, *coronatus;* of the west coast. The southern as well as the alpine races show the darkest coat and the greatest amount of black annulation in the hair accompanied by the largest size.

In the Labo Enclave this duiker was frequently flushed from coverts of tall dry grass which are its chief haunts here in the absence of thickets of bushes. Its partiality for thick cover causes it to seek the protection of the densest patches of tall grass, but its food consists exclusively of the foliage and fruit of shrubs. One of the commonest substances found in its stomach was the hard yellow berry of the thorny nightshade, *Solanum campylacanthum.* Only solitary individuals were seen, and these when flushed, seldom stopped going until safely within the protection of some neighboring cover.

SYLVICAPRA GRIMMI ALTIVALLIS, new subspecies

Alpine Bush Duiker

Type from summit of Aberdare Range near Kinanagop Peak, altitude 10,500 ft.; adult female, (premolars worn); No. 164746, U. S. Nat. Mus.; shot by Theodore Roosevelt, August 10, 1909; original (Heller) number, 295.

Characters.—Similar to *hindei,* but larger and dorsal color darker, much more vermiculated with black and less reddish; pelage much heavier, color of dorsal hair basally broccoli-brown, in *hindei* it is much lighter; hoofs larger; hair of under parts basally ecru-drab, not white to the roots as in *hindei.*

Coloration.—Median dorsal color mummy-brown heavily lined by black, the hair basally broccoli-brown; rump somewhat grayer; sides of body and neck tawny-olive, the color merging gradually into the white underparts; neck and sides without black vermiculation, top of head bright cinnamon rufous, with a broad median band of black from rhinarium to coronal tuft, the tuft, however, chiefly cinnamon rufous; sides of face lighter cinnamon. Underparts white, the hair basally ecru drab, chest mixed with fawn centrally; lower throat tawny-olive like sides; throat and median line of chin and upper lips white; the sides of the chin seal-brown in marked contrast. Hind limbs vermiculated with black like the rump; the hoofs and false hoofs bordered by seal-brown, which extends a few inches above the hoofs as a faint streak; forelimbs vermiculated with black like the hind, the seal-brown of the hoofs more extensive and extending up the front of the limb nearly to the shoulders. Ears clothed by short tawny hairs on the outside, inside with long white hair.

Measurements.—Head and body, 940 mm.; tail, 110; hind foot, 270; ears, 109; length of pelage, 45 mm. (in *hindei* 35 on middle of back).

Skull: Condylo-basal length, 159; basilar length, 148; greatest length, 168; zygomatic breadth, 79; nasals, 58 x 31; interorbital width, 42; vertical diameter of orbit, 315; length of upper tooth row, 465; first premolar to premaxillæ tip, 52; length of bullæ, 25.

This is a mountain race, living in the moorland of the Abedare Range and Mt. Kenia, where it attains the highest altitude of any of the *Bovidæ* in Africa.

The type-specimen was shot by Col. Roosevelt at dusk on the moorland at the summit of the Aberdare Range. The spot was within a stone's throw of the Safari camp at an elevation of approximately 10,500 feet. At this elevation, the mountain range has a broad flattened summit which extends in a North and South direction in a series of rolling downs for many miles. The downs are clothed everywhere by a thick carpet of alpine shrubs, chiefly various species of *Alchemilla,* interspersed with a few tussocks of rank grass, and widely scattered thickets of heather bushes.

The wet spongy ground is broken up into hummocks, and the Alchemallæ shrubs grow so densely that travel over the moorland is very much like wading through soft snow-drifts. The duikers do not live in the open moorland, but frequent the heather thickets where the ground is firmer. At night, however, they wander about over these boggy and shrubby moors, upon the shrubs of which they

feed. Surrounding this moorland on the slopes of the range is a dense forest of bamboo, including a scattered growth of trees. On the lower slopes the trees form a solid dense forest to the exclusion of the bamboo. This fringing forest is not inhabited by any of the *Sylvicapra* duikers, which are strictly plains or bush duikers, but serves as a barrier to their migration downwards to the plains, which are inhabited by another closely allied race, *hindei.*

We have the same conditions duplicated on Mount Kenia, the same race of high mountain duikers *S. g. altivallis,* inhabiting the moorland down to the beginning of the dense bamboo and forest zone which absolutely limits their lower vertical range, and keeps them apart from their close allies of the plains below.

OUREBIA MONTANA ÆQUATORIA, new subspecies

Nile Oribi

Type from Rhino Camp, Lado Enclave; adult male, No. 164713, U. S. Nat. Mus.; shot by Col. Theodore Roosevelt, January 12, 1910; original (Heller) number, 608.

Characters.—Nearest *cottoni,* but differing by the smaller, less vertical horns, which are less heavily ringed and lighter; dorsal coloration with darker tips to the ears and a few dark hairs in the tip of the tail; hair shorter; horns much heavier than *montana,* but slanting backward at same angle, tympanic bullæ and nasal bones larger. Intermediate in horn characters between *cottoni* and *montana,* but coloration nearer *cottoni.*

Coloration.—Dorsal color running-brown, vermiculated by Vandyke-brown; neck, rump and sides without the darker vermiculation, and tawny in color; crown of head bright rufous, bordered on sides by a broad white supraorbital band; snout and sides of face, buffy, the rhinarium bordered above by a broccoli-brown patch. Tail tawny like rump, with a few black hairs in tip, bordered below by a few white hairs. Limbs tawny like sides, the clefts of hoofs and posterns whitish. Ears, on outside, buffy with extreme tip seal-brown, lined on inside by long white hairs. Under parts and inside of limbs silky white; the hair white to the roots; chest suffused with buffy; throat ochraceous buff; chin, upper lips and gular region white.

Skull: Mature adult, all the cheek-teeth showing considerable wear; skull large and heavy; raised and bulging on dorsal profile along lachrymal nasal suture where the lachrymal projects laterally and roofs over the immense anteorbital fossa; nasals very large and

long, triangular, the sides posteriorly extending out to edge of anteorbital fossa, and forming part of roof; supraorbital pits large; lower edge of anteorbital fossa formed into a sharp knife edge, terminating in a prominent masseter knob; mesopteryoid fossa ending in a sharp obtuse angle, and well behind lateral fossa, which are rounded and terminate on a line with middle of first upper molar; bullæ large, long and narrowed on lower surface into a sharp ridge; tooth-row long, equalling distance from first premolar to tip of premaxillæ; inner margin straight.

Measurements.—Head and body, 960 mm.; tail, 80; hind foot, 280; ear, 107.

Skull: Condylo-basal length, 166; basilar length, 155; interorbital width, 51; zygomatic breadth, 74; nasals, 74 x 29; diameter of orbit, 32; length of upper tooth-row, 53; first premolar to premaxillæ tip, 53; length of bullæ, 22.5.

Horns: Length on curve, right, 112, left 114; circumference at base, right, 52, left, 50.

The races of *Ourebia* are strikingly alike in color and size, but most of them inhabit widely separated areas, and are well delimited geographically. The skull-variation is really immense and very little dependence can be placed on such characters. The horns, however, show good average characters as regards their slant, size and shape, but these are all quite slight and only appreciable as averages. The series from the Upper Nile shows very little color-variation, and much less skull-variation than the series of *cottoni* from the Guaso Ngishu Plateau. The difference between this race and *cottoni* is surprisingly slight, notwithstanding the fact that these two races live at the extremes of the vertical range of the genus.

OREODORCAS, new genus

Type; *Redunca fulvorufula* Afzelius.

Characters.—Tympanic sheath which encloses the tympanohyal pit low, and not extending downward on sides of bullæ; knobbed processes of basioccipital small and short; facial portion of lachrymal bone long and narrow and extending far posteriorly on orbit, well behind termination of nasal bones; orbit large, the vertical diameter one-half length of nasal bones; infraorbital opening situated posteriorly, above anterior end of middle upper premolar; masseter knob on sides of maxillary small; pit at base of condyles posterior to bullæ deep; lachrymal-nasal sinus narrow; premaxillæ long, length one and one-fourth times in nasal length.

Female skulls lack the great development of the knobbed processes of the basioccipital but the length of this latter bone is much less than in the genus *Redunca*. The most closely allied genus is *Redunca*, which differs chiefly in the long tympanic sheath, the greater development of the knobbed processes of the basioccipital bone, smaller orbit and wider and shorter lachrymal bone.

The skull-differences between *Oreodorcas* and *Redunca* are quite great notwithstanding the similarity of the general body-form, pelage and horns, which give these two types a false appearance of close kinship.

The habits of *Oreodorcas* are strikingly different from those of the swamp inhabiting *Redunca*. Its haunts are grassy or rocky hillsides, usually in close proximity to the haunts of the Klippspringer.

In attempting to break up the sub-family Tragelaphinæ into natural genera, many difficulties are met with, owing to the absence of appreciable structural characters among the species. The subfamily is based chiefly upon the spiral twist of the horns. Accompanying this horn-character is a close similarity in shape of skull and of the individual bones which compose it. The situation of the foramina, fossa and sinuses is nearly the same throughout the group. The teeth are also practically identical in shape and relative size. The group may be defined as follows: *Bovidæ* in which the males are armed with spirally twisted horns, arising above the orbits and extending backward and upward at an angle to the general dorsal profile of the skull; horns of the female, when present, closely resembling those of the male; antiorbital fossa wanting; lachrymal-nasal sinus well-developed, but not enlarged; lachrymal bone large, the facial portion about equalling the orbit in size; intraorbital foramen placed far forward, immediately in advance of the first premolar, and on the maxillary canthus, the opening directed forward; cheek-teeth somewhat brachyodont and simple, the enamel fossets not having accessory lobes; body banded by transverse light stripes or by spots formed by the breaking up of the striped pattern.

Nearly all the species of the Tragelaphinæ are so closely allied that they might all be included in a single genus. Such an arrangement would, however, result in considerable geographical confusion and obscure the real relationships of the species. The attempt to make genera of equal weight so as to express the relationships clearly, or avoid confusion, results in a multiplicity of genera from splitting into groups such closely allied species as those now under consideration. The genera adopted by most writers are based almost solely upon horn-characters.

As a single character, the shape of the horns is certainly the most reliable guide to the natural affinities of the various species. A careful study of the skulls, however, reveals some important differences between species which have hitherto been combined in the same genus on account of horn resemblances solely. The genus of the Kudus, *Strepsiceros,* is an instance of this sort. The Lesser Kudu, *Strepsiceros inberbis,* is, without doubt, as closely allied to the bushbuck, *Tragelaphus* as to the Greater Kudu, as regards its skull characters and pattern of coloration. It is a geographical associate of both genera, and deserves recognition as a separate genus in order to emphasize its true relationships. The Nyala, *Tragelaphus angasi,* is another species which must also be accorded distinct generic rank. Here, however, we have to do with a species showing almost identical horn characters, with *Tragelaphus,* but differing distinctly in skull-characters, pattern of coloration and habits.

AMMELAPHUS, new genus

Type; *Strepsiceros imberbis* Blyth.

Characters.—Lachrymal-nasal sinus wide and rectangular in shape; premaxillæ long, three-fourths length of nasal bones lachrymal with a long acute projection following the nasal bones; maxillary border of jugal long with a wide right angled notch below the orbit; supraorbital sinus small; masseter knob on sides of maxillary small; anterior palatine foramina long; dorsal profile of snout raised in a slight hump at posterior end of nasal bones; horns narrowly spiral with distinct annular rings; male without throat mane, both sexes with white throat and chest patches and transverse body stripes. *Strepsiceros* differs by having a narrow triangular lachrymal nasal sinus, masseter knob greatly developed; horns more openly whorled and smoother with rings obsolete; male with a heavy throat mane and both sexes without white throat patches.

Tragelaphus differs somewhat less from *Ammelaphus* in skull-characters than *Strepsiceros,* the chief differences being shallower nasal notches, larger lachrymal-nasal sinus, shorter premaxillæ, less deeply angulated maxillary-jugal suture, and smaller basioccipital processes. In color-pattern, *Tragelaphus* differs from *Ammelaphus* by its spotted coat and absence of transverse body stripes. The horns of *Tragelaphus* are more openly whorled, have a distinct keel and lack rings.

NYALA, new genus

Type; *Tragelaphus angasi* Angas.

Characters.—Orbit small; facial portion of lachrymal bone long and narrow; lachrymal-nasal sinus small; nasal processes of premaxillæ broad at the tips; nasal bones notched at tip on the outer border, horn whorl open, short, three-fourths of a turn; male with heavy dorsal and throat manes and spotted coloration; female with transverse white body stripes.

In *Tragelaphus* we find a lachrymal bone which is widest along its maxillary suture, its width on the orbital rim being much less, the nasals also differ by having the terminal notches or clefts central, the nasal processes of the premaxillæ are more slender and attenuate at the tips and the orbit is larger than in *Nyala*. The most closely allied genus is *Limnotragus* which shares the small orbit, narrow lachrymal bones and short, open-whorled horns. The long throat-mane of the male suggests *Strepsiceros*, as do also the transverse white body-stripes of the female, which, however, are lacking in the male whose light spots have the characteristic *Tragelaphus* arrangement. The gregarious habits of the Nyala show further affinity to *Strepsiceros*.