

*Notice of the Various Species of Bovine Animals.* By the Editor of the 'Indian Field.' \*

I will commence with the musk ox (*Ovibos moschatus*) of the "barren-grounds" of Arctic America. The present distribution of this remarkable animal is, indeed, confined to that peculiar region, similar however to the "Tundras" of Arctic Siberia; but there is evidence of its having formerly inhabited a far more extensive range, and its fossil remains have been discovered even in Devonshire, in England!—one of many evidences of a former glacial epoch in Europe, long anterior to the existence of human beings in all probability. Remains of the rein-deer have likewise been found in England, with shells of now arctic or sub-arctic species, and correlative signs of glacier action in the valleys of the mountains, huge boulder-stones of which the present position has only hitherto been explained, intelligibly, by the transporting power of icebergs, &c. The musk ox seems to stand quite alone in its tribe; though Professor Owen classes it with its very opposites, the buffalos! Its horns, indeed, bear a certain resemblance to those of the Cape buffalo, but are much less spread out in their curvature; the naked muzzle is reduced to its extreme minimum; and the tail is short, like that of *Ovis Ammon*: the animal is densely covered with wool and long hair, which last falls over the sides so as to conceal its short limbs to near the ground. Most of our readers will have seen the fine stuffed specimen in the British Museum; but a much better idea of the living animal will be gathered from a figure in one of the narratives of Arctic expedition, we forget which (probably Ross or Back), and have not the work to refer to. Most assuredly there is nothing in that figure to betoken a near affinity to the buffalos. The head is carried very low in running; whereas in the ordinary carriage of a buffalo the nose is held out straight in a line with the back. The musk cattle clamber rocks and traverse broken ground with extraordinary facility (assuredly not a Bubaline trait), and their hoofs—unlike those of the buffalos—are adapted to their climbing propensities. † There is even considerable superficial resemblance between the Arctic musk ox and that very

\* Communicated by Charles Darwin, Esq.

† According to Colonel C. H. Smith, "the under parts of the hoof and frog show a singular softish transversely ribbed surface, of a brown-red colour, seemingly intended to secure the foot on slippery snow and ice: the outer (?) toe is round, and the other crooked and pointed."

remarkable beast, the *Budorcas taxicolor* of Mr. Hodgson ('Journal of the Asiatic Society,' vol. ix. p. 65), which inhabits the Mishmee mountains at the head of the valley of Asám. But this latter we take rather to be a massive goat or goral; just as the nilgai is akin to our little four-horned chikara, and the bubalis or "Harte-beest" group to the gazelles. It has been stated (with what truth we know not) that the musk cow has only two developed teats,—as in the sheep,—all other bovines having four. The dung of musk cattle resembles that of sheep and goats.

The Siberian fossil skull figured by Cuvier (Oss. Foss. pl. 172, figs. 6, 7,) has the descending portion of the horns still more closely appressed to the sides of the head than in the existing musk ox.—(*Id.* pl. 17, figs. 15, 16, 17); this fossil animal being referred to the *Ovibos Pallantis* of the late Professor de Blainville.

The rest of the bovines fall primarily into bisontines, taurines and bubalines, which respectively inhabit, for the most part, or typically, cold, temperate and hot climates; the indigenous taurines of tropical regions obtaining a cooler temperature upon the mountains. The humped cattle, however, form one exception, and seem proper to the hottest regions of the anciently-known hemisphere.

The bisontines sub-divide into the bisons proper, and the yak. All have cylindrical horns, very slight naked muzzle, (most developed in the European zebra), and are clad with long shaggy hair, especially on the head, chin and fore-quarters. The tail is short, not reaching below the hocks.

The true bisons have a very broad convex forehead, and stout horns curving in a semicircle. The head and fore quarters are particularly large and heavy, and the hind quarters reduced, an appearance which is exaggerated by the copious mane and beard in front. They carry the head very low, and commonly stand with their fore and hind feet near together. The orbits of the skull are remarkably prolonged and tubular. These animals inhabit swampy forests and prairies, such as was much of Central Europe in the days of the Cæsars.

The American bison (*Bos Bison—americanus*, L.; *Bos Bison* of many authors, as distinguished from the next, erroneously designated by them *B. Urus*). With fifteen pairs of ribs, and consequently but four lumbar vertebræ. The well-known so-called "buffalo" of the western prairies.\* We have seen many alive, and have remarked that

\* Whence the thriving town or city of Buffalo, on the shore of Lake Erie, and a certain familiar ditty appealing to the Terpsichorean propensities of its young ladies by moonlight.

the tail is not tufted merely at the end, but resembles that of the yak, only with the hair much less developed.

The European bison, visent, wisent or wisund, zubr or (improperly) aurochs, *i. e.* ure-ox (*Bison europæus*, Owen; also *B. priscus* of Bojanus, apud Owen; *Bos Bison*, L., apud Nilsson, as distinguished from the gigantic taurine urus of former days). With fourteen pairs of ribs, and therefore five lumbar vertebræ.\* Now confined to the great marshy forest of Bialowikza, in Lithuania (believed to be the only remnant of genuine primæval or purely natural forest still in Europe), but formerly much more extensively diffused, and considered by Owen to be identical with the *Bos priscus* of palæontologists, which co-existed with the *Elephas priscus* of what is now the temperate region of Europe—the remains of which last have been erroneously assigned (according to Dr. Falconer) to *E. primogenius*, which is the mammoth or Arctic elephant of Siberia. In the European, as compared with the American bison, the peculiar bisontine characters are in every way reduced, or more or less softened down in intensity. For an admirable description of this animal and of its habits, *vide* Weissenborn in the 'Ann. Mag. Nat. Hist.' vol. ii. p. 305 *et seq.*, also Nilsson, *id.* 2nd series, vol. iv. p. 419 *et seq.* The bulls emit a powerful musky odour, the chief seat of which is that part of the skin and hair which covers the convexity of the forehead. This is strongest in the rutting season, and is much weaker in the cows. The zubr has an invincible repugnance to the domestic *Bos Taurus*, which is not the case with the bison of North America; which latter will readily breed with domestic cattle, but the European bison never. (The mixed progeny are said to be infertile). The American is also far more tameable. Each has been known to attain about a ton in weight; but the European bison has greatly degenerated within historic times, and more so if truly identical with the fossil *Bison priscus*, the horn-cores of which are much longer and straighter, *vide* Owen's figure of a British fossil skull of *B. priscus* (Brit. Foss. Mam. and Birds, p. 490), as compared with Nilsson's Scanian sub-fossil skull of the modern type (in Ann. Mag. Nat. Hist. 2nd series, vol. iv. p. 415). The existing zubr of Lithu-

\* This character is not so absolutely constant as is generally supposed; for a cow zubr, examined by Bojanus, had only 13 pairs of ribs; and we have the authority of B. H. Hodgson, Esq., for asserting that the Indian humped cattle have occasionally fourteen pairs. That gentleman being detained in the course of a journey through the Tarai, and seeing a number of skeletons of domestic cattle lying about counted the ribs of several of them, and to his surprise observed the occasional variation referred to.

ania does not attain to half the weight mentioned ; though so late as 1752 one is stated to have weighed 1,450 lbs.

The Caucasian bison (*B. caucasicus* ?). This animal is little known. It is supposed to be distinct from the Lithuaniau zubr ; has a black dorsal stripe, which is not seen in the latter, and differently-shaped hoofs. There is also a slight difference in the horns. According to Professor Nordman, who was employed in 1836 on a scientific mission in the Caucasus, (where he was often obliged to make his excursions under the protection of a strong military escort, and a few field-pieces), "this animal, though no longer occurring near the high road from Tamar to Tefis, &c., is not very scarce in the interior of Caucasia. Herds are still found in a few districts by the river Kuban ; and the animal is met with on Mount Caucasus from the Kuban to the sources of the Psih, a distance of about 115 English geographical miles. Near the Kaban it is met with, in swampy places, all the year round. In the country of the Abazechians (Abchasians ?) it repairs to the mountains in summer, and is then frequently killed by the Psoehs and other Caucasian tribes. Late in autumn it descends from the mountains to visit the pastures in valleys never yet trodden by the feet of any European, except prisoners of war. It is particularly numerous in the district of Zaadan. Lient. Lissowski, who studied at Wilna, and possesses a thorough knowledge of the zubr of Lithuania, assured me at Bambori, that the latter animal was *not very different* from that of Caucasia."—(Vide Weissenborn, in Ann. Mag. Nat. Hist. vol. ii. pp. 254 and 291). It is very desirable that this Caucasian bison should be properly compared with that of Lithuania. Professor Nilsson assumes their identity, as a matter of course, from known facts connected with their former extensive distribution of the European bison ; but until positive and careful comparison, we cannot regard the question as settled, however may lie the probability.

A kind of bison or zubr (more probably than the great taurine "urus," or some animal akin to it), is mentioned in the 'Travels' of the old traveller Bell, as existing in his time in the country of the Tzulimm Tartars.—Vide 'Journey from Tomsy to Elimsky,' vol. i. ch. iii. p. 224). "On the hills and in the woods near this place," he remarks, "are many sorts of wild beasts, particularly the urus, or uhr-ox, one of the fiercest animals the world produces. Their force is such, that neither the wolf, bear nor tiger dares to engage with them. In the same woods is found another species of oxen called "bubul" by the Tartars. It is not so large as the urus ; its body and limbs are very handsome ; it has a high shoulder and flowing tail, with long

hair growing from the rump to its extremity, like that of a horse. Those which I saw were tame, and as tractable as other cattle." Here we have a distinct notice of the yak, both wild and tame, in a part of Asia where it would appear to be now quite unknown! The name "bubul" applied to it has probably its connexion with Bubalus. Remains of extinct bisons have been found in Siberia, and of three or four species in North America, as figured by Cuvier and by Harlan and others; and we really feel some difficulty to imagine that our modern European bison could, under any circumstances, have developed horns, the *bony cores* of which measure  $2\frac{3}{4}$  feet "from base to point upon the outer curve, 17 inches in vertical diameter [circumference?—surely not bow-string diameter, which gives an amount of curvature quite unintelligible in the particular race or species] and 4 inches from front to back at their base;" as in a specimen of *Bison priscus* from Clacton, in Essex, noticed in the 'Annals and Magazine of Natural History,' second series, vol. xx. p. 393. The largest horns of the existing Lithuanian zubr do not exceed 18 inches round the outer curvature, and this with their investing corneous sheath! The only known indigenous bovines of America are its peculiar living bison, the musk ox of the Arctic "barren grounds," and the fossil bisontine species referred to. Of one of the latter we possess drawings of a most peculiar frontlet, with narrow yet bisontine forehead and thick horn-cores, stated to be from the celebrated deposit of "Big-bone Lick," in Kentucky, of a dwarf species, which seems to be undescribed to this day.

We have not seen the skull of a yak of pure blood, but suspect that it has not the protrusile tubular orbits of the true bisons.\* The general form appears to be a step nearer to the taurines, and there is less inequality of the fore and hind quarters; still fourteen pairs of ribs: long hair on the fore quarters and pendant from the flanks; but the most striking peculiarity is the "chowry" tail. The horns are longer than in the modern typical bisons, and their tips curve considerably backwards—instead of the rigid semi-circular flexure in at least the bulls of the bisons proper. All appear to have the same grunting voice. The general aspect of the yak, it may be added, is distinctly bisontine, and it carries its head low, like the rest of the subgroup.

\* Mr. Hodgson figures a yak skull, in vol. x. of the 'Asiatic Society's Journal,' in his "Illustrations of the Genera of Bovinæ;" from which the orbits would seem to be a little protrusile; but the bisontine peculiarities are exceedingly reduced.

The yak (*Bos poephagus* or *B. grunniens*, or *Boeophagus grunniens*) is indigenous to High Tibet, and especially to Eastern Tibet, where still tolerably numerous in the wild state, though the species (as every one knows) is extensively domesticated, and the ordinary tame cattle of that elevated portion of the globe. The wild animal is known as the dong, or ban chour, and an interesting notice of it will be found in the 'Friend of India' for September 30th last.

We now come to the taurines, and among them may be recognised three principal groups:—1, that of the humped cattle; 2, that of which the European bull is characteristic; and 3, the mostly tropical group with flattened horns. All are more or less smooth-coated, our British Highland cattle displaying about the extreme of shagginess among the taurines.

The humped ox (*Bos indicus* vel *gibbosus*) is unknown in an aboriginally wild state; but large herds, the descendants of domestic cattle, still roam about the northern parts of Oudh and Rohilkund, and thus show that the species can maintain its existence, unaided by man, in a region infested by tigers.\* It does not appear that it has hitherto been met with in a fossil state, nor can we venture to assert in what country it is truly indigenous; for the domestic races are spread over

\* These feral "zebus" are noticed by Captain (now Colonel Sir T. Proby) Cautley, in the 'Asiatic Society's Journal' for 1840, p. 623. He remarks that, "In the districts of Akharpur and Dostpur, in the province of Oudh, large herds of black oxen are, or were, to be found in the wild uncultivated tracts, a fact to which I can bear testimony from my own personal observation, having, in 1820, come in contact with a very large herd of these beasts, of which we were only fortunate enough to kill one, their excessive shyness and wildness preventing us from a near approach at any second opportunity." Another writer notices herds of these wild humped cattle as occurring on the road from Agra to Bareilly. Again, in Dr. Butter's 'Outlines of the Topography and Statistics of the Southern Districts of Oudh, and of the Cantonment of Sultanpore—Oudh,' we are informed that "Bengali bulls and cows are found near Harpu,"—i. e. living wild. Their numbers would even seem to have increased of late years, to judge from a notice of them which we saw not long ago in one of the newspapers, in which attention was directed to their hides and horns as objects of commerce. As Dr. Butter distinctly calls them "Bengali bulls and cows," it follows that they are of the small race common in the country, as distinguished from the large cattle so numerous in the Upper Provinces; and Cautley's designation of them as "herds of black oxen" would seem to imply uniformity of colouring, as in aboriginally wild species. We should like, too, to know if their horns assume constantly the typical size and flexure; for these are matters of considerable interest to a naturalist. The animals are understood to have gone wild at one or more epochs, when whole districts were devastated in the grand old style, and in the fine old times of wholesale rapine and slaughter, the remembrance of which is still so fondly cherished by very many.

India, Arabia, great part of Africa, even Madagascar, and would appear to be found so far eastward as Japan; at least old Kœmpfer tells us that the Japanese "have a sort of large buffles, of monstrous size, with bunches on the back, like camels, which serve for carriage and transport of goods only in large cities." The name "buffalo," we may here remark, is currently bestowed on the humped cattle by English graziers; and thus we commonly hear of "buffalo's hump," whereas a buffalo does not happen to have a hump! The extensive herds of the Foulahs, Fellahs or Felâtahs, pre-eminently a race of herdsmen, who spread quite across Africa northward of the equator, consist exclusively of these humped cattle. According to Denham's 'Appendix,' "two kinds exist in Central Africa, one with a hump before and very small horns; the other altogether of a larger size, also with a hump, and immense horns." The latter (of which we have seen a pair sent by Denham to the British Museum) are enormously thick at base, but exhibit the true and peculiar flexure of the species; and again the Galla cattle, mentioned by Bruce and Salt, with immensely long and proportionately thick horns, are humped, and not unlike some big-horned cattle we remember noticing at Madras.\* In Madagascar there is a wild humpless race or species, long ago indicated by Flacourt, and since noticed by the missionary Ellis, but the domestic cattle of the island are stated to be all humped, and such are commonly imported thence for the markets of Mauritius and Bourbon. These humped cattle are particularly suited to a dry and torrid climate, are indifferent to the fiercest rays of the sun, seldom seek shade, and never go into the water and there stand knee- or belly-deep for hours, like the humpless cattle of Europe. Being unknown in a primitive wild state, most naturalists still regard them as a mere climatal variety of the *Bos Taurus*, especially as the two interbreed freely, and the hybrids in every proportion; but there are other instances of species thus commingling. The presence of the hump is but one difference of very many; and it and other distinctions are well shown even in the small fœtus. The one is born with teeth through the gums, the other not so! The whole form is indeed remarkably different. In *B. gibbosus* the body is shorter and rounder, and the hind-quarters slope abruptly, instead of being continued straight to form nearly a right angle; the limbs are longer and more neatly formed; the ears lanceolate and somewhat pointed, instead of being broad and rounded; the dewlap begins at the chin, instead of before

\* *Vide* also the figures of cattle in some of Barth's plates.

the breast; the eyes are larger, considerably more full and lustrous—indeed worthy of the famous comparison of Homer, his “ox-eyed” Juno! Again, the voice is utterly different, a mere grunt; and the typical flexure of the horns is not the same. The ordinary varieties of colouring are different, especially the Nil-gai markings of the feet not unfrequently seen in the humped cattle; the quality of the coat also is different, and the forehead is smooth or not shaggy.\* At rest the humped bull carries his head low as any bison, the neck sloping down in a line with the fore part of the hump. But enough! We shall believe that the humped ox or zebu is a climatal variety of *Bos Taurus*, when we are persuaded that the knobbed goose (*Anser cygnoides*) is a mere variety of the European tame goose (*A. cinereus*), and not till then; the said geese interbreeding freely as the taurines in question, and producing mutually prolific hybrids! The yak also produces a prolific hybrid with the humped cow; and if *they* are not distinct species there is no meaning in the term. Both species of smooth-coated domestic cattle are well and characteristically represented in the ancient Egyptian paintings. †



*Notice of the Various Species of Bovine Animals.* By the Editor of  
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(Continued from p. 6367.)

THE second group of taurines is exemplified by the domestic cattle of Europe or ordinary humpless cattle. Their horns, as in the bison-tines and also the humped taurines, are cylindrical;\* whereas in all

\* There is a considerable tendency to a flattened form in the horns even of many humped cattle.

that follow the horns are much flattened; and the *typical* flexure of the horns is first outward, then forward at about a right angle with the line of visage, and finally upward and in some inward at the tip. In all other Bovinæ, without exception, the horns do not *typically* curve forward beyond the plane of the face (a line drawn from the forehead or crest of vertex to the nose), but just attain to that plane, and mostly incline backward at the tips. Abnormally curved horns are very common in the humped cattle, but if they turn forward beyond the plane of the visage, the flexure passes downward and inward; as shown among other instances, by the hugely thick horns of the Borneese cattle of Denham. The typical curvature of horn of the humped cattle is similar in direction to that of a yak's horn (only laterally more oblique in the set); or as shown by the immense head-gear of the African Galla cattle.\* That of the humpless taurines now treated of may be familiarly exemplified by the horns of our British Devon cattle, the so-called wild cattle of Chillingham Park, and equally so by those of the fossil *Bos primogenius*, *Bos namadicus*, and others.† Various abnormal forms of horn occur in the domestic breeds of European cattle, but these do not resemble the abnormal forms of horn of the humped cattle; and, to our apprehension, the mere typical or normal flexure of the horn of the "zebu" or humped cattle (as will be obvious on a little study of the subject) resembling that of the yak's horns as before remarked, and more or less all the rest of the tribe, as opposed to the group of *humpless taurines with cylindrical horns*, is sufficient evidence of the specific distinctness of the humped races. We might have added the configuration and physiognomy of the skull to the other distinctions, the specific difference being here also well marked.

\* In the small Bengali race of cattle there is a decided exceptional tendency, at variance with the other races of humped cattle. The horns mostly incline forward at a considerable angle with the plane of visage, as remarked by Buchanan Hamilton, when noticing the contrary in the different races observed by him in Southern India; but they have an abnormal look, and very commonly curve downward and even inward at the tips, as mentioned above. Indeed, not unfrequently the prolongation of the growth would cause the tips of the horns to enter the orbits and so destroy the eyes, if those tips were not sawn off in time to prevent such injury! This, therefore, must necessarily be an *abnormal* curvature!

† The Devon and Spanish cattle quite come up to our notion of a typical form of the conventional or artificial species yclept *Bos taurus*. Why we call it so will appear in the sequel. The Herefords are the same thing magnified and coarser. The Alderneys smaller and still neater. We confess, too, a considerable admiration of the little shaggy Highland cattle, so artistically portrayed by the pencil of Rosa Bonheur.

As with the humped cattle, the living races of the humpleless with cylindrical horns have the latter thicker and shorter in the bull, longer and more slender in the ox and cow ; but it does not appear that this rule held with the more ancient of two races currently assigned to *Bos primigenius*. This more ancient race, which was contemporaneous with the long-horned form of bison (*B. priscus*), the *Elephas priscus*, &c., had horns which were both longer and thicker, *i. e.* every way larger in the bull than in the cow, and we have measured a pair (the largest of several examined), the *bony cores* of which were 3 feet long and 19 inches round at base.\* In this type the horns tend to approximate towards their tips,—not so in the other. The skull too is smaller, notwithstanding the huge magnitude of the horn-cores. In the other, or less ancient of the two races, apparently, the remains of which are found chiefly in peat-bogs, instead of the older clays and gravel-drift which contain the bones of the former, the horns (as in our modern cattle) were comparatively thick and short in the bull, longer and more slender in the cow.—*Vide* Nilsson's figures of a bull-skull in the 'Annals and Magazine of Natural History,' 2nd series, vol. iv. pp. 257, 259, and Professor Owen's figures of a cow-skull in his 'History of British Fossil Mammals and Birds,' pp. 498, 507. This race we take to be the true *urus* of Cæsar and other Roman writers (*ure-ox*, *uhr-ox*, *aurochs*, as variously written, which last has been transferred in Germany to the bison, as in modern times it is applied to the Cape buffalo by the Dutch colonists of South Africa),—a gigantic animal, which lived down to comparatively modern times, and of which Mr. Woods, as quoted by Professor Owen, cites the discovery of a skull and horns in a tumulus of the Wiltshire downs, as "evidence that a very large race of genuine taurine oxen originally existed in this country (England), although most probably entirely destroyed before the Invasion of Britain by Cæsar, since they are not mentioned as natives of Britain by him."† In all other bovines, the horns are both longer and thicker in the male sex,—the only exception (in the former respect) that occurs, being the Indian buffalo in some instances.

\* Another of the same linear dimensions, but eighteen inches in circumference at base, is noticed in the 'Annals and Magazine of Natural History,' vol. ii. p. 163 (1838).

† It surely does not follow, that even great Cæsar himself should know the animals of the country by intuition ! Our countrymen were long enough in India before they discovered the Gaour ! What, too, about the former tradition of the dun cow of Guy, Earl of Warwick ? One of the oldest known sub-fossil skulls of the giant ox is, we believe, still exhibited in Warwick Castle : and the tradition may have reference to it and be purely imaginary.

Another particular in which the humped and round-horned humpless races agree, while differing from all the rest, is in the greater length of tail, which, with its tuft, descends considerably below the hocks; the short-horned Italian race of buffalos alone approximating them in this respect.

At the present epoch, no cylindrical-horned humpless taurines are known for certain in an aboriginally wild state, though immense herds have gone wild in the pampas of South America, and there are many in the Falkland Islands, which have been finely described by Darwin, and more recently in the narrative of Sir James Ross's Antarctic Expedition. These are of Spanish descent, and therefore akin to our British Devons.—(Vide Jacobs 'Travels in Spain,' p. 154). Wild cattle of some sort, however, quite possibly aboriginal, inhabited the British forests during the middle ages, and likewise the great forest of the Ardennes,\* and in the Vosgian mountains, as mentioned by

\* The latter, however, were perhaps bisons. Dr. Weissenborn (who so ably argues for the identity of the urus and bison, despite the evidence afforded by sub-fossil remains) quotes the work of a monk of St. Gallen, who describes a hunting party of Carolus Magnus, which was held in honour of the Persian Ambassadors, not far from Aachen (Aix la Chapelle), probably in the Ardennes, in order to kill "uri or bisons;" and of one wounded by Carolus Magnus and killed by Isambardus, which he calls "bison vel urus," mentions that its horns were of an enormous size ("immanissimis cornibus in testimonium prolatis"), which should rather indicate the urus; but we have the testimony of Herberstein regarding a bison, "within whose horns three stout men could sit." A peat-bog skull of the *Bison prisæus* type, of the age of the later uri so often met with, would serve alike to corroborate Herberstein's statement, and to help to identify the *Bison prisæus* with the modern bison—or, better, as regards the latter, gradations of form in the intermediate period. It seems clear that the ecclesiastic cited did not distinguish between the bison and urus, which may indicate that the latter had already been long extirpated in his vicinity, and the name only vaguely preserved at the time he wrote. Of the so-called "wild cattle" preserved in certain British parks, the white colour is alone strong evidence of their former domesticity. Any cattle preserved as they are would become similarly wild in the course of a few generations. A recent writer describes those in Cadzow Park, belonging to the Duke of Hamilton, to be "about the size of our modern bullocks, but differing from them in their extraordinary breadth of chest and strength of forearm. They are of a creamy white, the ears, muzzle, and tips of horns being jet black. The old bulls have a shaggy mane a few inches in length. They have the range of an extensive park, the remains of an ancient oak-forest, through which they roam unmolested; they thus retain many of their normal habits and much of their original ferocity. When a calf is born it is carefully concealed by its mother, and if any one is so rash as to approach it the whole herd rush to the rescue, when most people think it safest to retreat. The old bulls in particular are very savage. A few years ago Mr. Minto, head-keeper to the Duke of Hamilton, while riding through the park was charged by one; his horse was thrown to the ground and severely gored

various writers ; FitzStephen, for example, notices the Uri Sylvestres, which, in his time, that is about 1150, infested the great forests round London. In the Nineveh representations the hunting of the wild bull is often depicted, and would appear to have been a favourite pastime of the ancient monarchs ; and the animal would seem to have been a humpless taurine of the present group, but nothing whatever is known of it beyond what the Nineveh figures supply. "Wild cattle" are often noticed by travellers in North Africa ; but the Bubalis (a species of "Harte-beest"\*) is generally intended, and sometimes even the Leucoryx or white oryx ; while the gnoos are the "wilde beasts" (*i. e.* wild cattle) of the Dutch colonists of South Africa, who again call the hippopotamus the "sea cow," a name elsewhere applied to the Manati. The wild cattle of Madagascar we know nothing about, except that they are stated to be humpless, and longer in the legs than European cattle ; † and the fine South-African domestic Caffre cattle are of the present group of taurines, though not introduced by Europeans ; a fact all the more remarkable, as we know only of humped domestic races in all middle Africa and in Madagascar ; but we have seen part of a fossil skull, with the particular flexure of horn, from the neighbourhood of the Gariép or Orange River. ‡ The horns of the Caffre cattle extend out excessively, almost in a line with each other,

in the flank, but gaining its feet it galloped off, followed by the infuriated animal, so affording its rider an opportunity of effecting his escape. I believe that the Dukes of Hamilton are bound by an old charter to preserve the breed, and great attention is now being paid to prevent the race degenerating."—*Field*.

\* We have seen what appear to be two distinct species of Bubalis from North Africa, one as big as the South African Caama or "Harte-beest," with black feet ; the other considerably smaller, with feet coloured like the body. A third from Tunis is mentioned by Dr. J. E. Gray, as being probably distinct, with a dark brown streak on the outer side of the front of the fore legs, as in the Cape "Harte-beest." Some notice of the herds of Bubalis will be found in Barth's recent 'Travels.'

† Flacourt : we were wrong in terming this, the boury, which name refers, according to this author, to a large race of domestic humped cattle common in the island. "Horned cattle are numerous, both tame and wild : many of the latter resemble, in shape and size, the cattle of Europe."—*Ellis's History of Madagascar*.

‡ Perhaps of the same species as the enormous fossil noticed in the 'Proceedings of the Geological Society' for 1840, p. 152 :—"Cores and portions of an ox in the alluvial banks of the Moddea, one of the tributaries of the Gariép or Orange River, and forty feet below the surface of the ground. The cores, with the breadth of forehead, measured 11 feet 7 inches, but it is calculated that 5 inches had been broken off at the end of each tip, and circumference of piths at base was 18 inches. The orbits were situate immediately under the base of the horns." The only wild bovine at present existing in South Africa is the Cape buffalo.

but what flexure remains is nevertheless sufficiently typical.\* Again, the Indian fossil *Bos namadicus*, from the Nerbudda deposits, is surprisingly like the European *B. urus* or *B. primogenius*; † and we have much reason to suspect that an existent species of the same group, with cylindrical horns, inhabits certain of the forests of Indo-China, in addition to the different flat-horned taurines to be noticed in due course.

The un-named species referred to is probably that mentioned by Crawford in the following passage:—"The ox is found wild in the Siamese forests, and exists very generally in the domestic state, particularly in the southern provinces. Those we saw about the capital were short-limbed, compactly made, and often without horns, being never of the white or gray colour so prevalent among the cattle of Hindustan. They also want the hump on the shoulders which characterizes the latter. They are used only in agricultural labour, for their milk is too trifling in quantity to be useful, and the slaughter of them, publicly at least, is forbidden even to strangers. Hence, during our stay, our servants were obliged to go three or four miles out of town, and to slaughter the animals at night. The wild cattle, for the protection of religion does not extend to them, are shot by professed hunters, on account of their hides, horns, bones and flesh, which last, after being converted into jerked beef, forms an article of commerce with China."—'Mission to Siam and Cochin China,' p. 430. It is probable that different species of wild cattle are here referred to, including one or more of those with flattened horns. The Rev. J. Mason,

\* The beautiful small Zulu cattle of Natal are humped. The fine Caffre cattle, with very long horns directed almost at a right angle with the axis of the body, and more or less tensely spiral, are large and noble game-looking beasts, with unusually long limbs: from them were the famous "war-oxen" of the Caffres selected and trained.

† The unfortunate supposition entertained by Linnæus as well as Buffon, that the European bison was the original wild stock of all domestic cattle, and the non-recognition of the ancient *urus* as distinct from the bison, have led to sad confusion in the systematic nomenclature, which can only be satisfactorily remedied by a violation of the generally accepted canons based on the rigorous acceptation of the first-applied systematic names, in this wise:—

*Bos americanus*, vel *Bison americanus*: the American bison.

*Bos Bison*, vel *Bison europæus*: the European bison. *B. priscus*, we apprehend, had better be retained, at least for the present; if even in the form of *Bison europæus (priscus)*.

*Bos urus*: the comparatively modern ure ox.

*Bos primogenius*: the more ancient type, which we suspect to be quite distinct; albeit the name may have been first bestowed on the other.

in his 'Notes on the Fauna, Flora, &c., of the Tenasserim Provinces' (1852), remarks that "a small ox from the Shan country is brought down sometimes in considerable numbers, which resembles in its form the English rather than the Indian ox, but is probably derived from the wild race. Occasionally a young wild ox is domesticated, and brought under the yoke." By the latter, we suspect he means the tsain, a flat-horned species akin to the banteng; and by the former the indigenous round-horned species before referred to. It is to be regretted that the last is so very vaguely brought to notice.\*

To the above may be tacked Sir Stamford Raffle's notice of the domestic cattle of Sumatra. "There is a very fine breed of cattle peculiar to Sumatra, of which I saw abundance at Menang Kabu, when I visited the capital of that country in 1818. They are short, compact, well-made animals, without a hump, and almost without exception of a light fawn-colour, relieved with white. The eyes are large and fringed with long white lashes. The legs are delicate and well-shaped. Among all that I saw I did not observe any that were not in excellent condition, in which respect they formed a striking contrast to the cattle generally met with in India. They are universally used in agriculture, and are perfectly domesticated. This breed appears to be quite distinct from the (flat-horned) banteng (*Bos sondaicus*) of Java and the more eastern islands.—'Transactions of the Linnean Society,' vol. xiii. p. 267.

There is a wild race of some kind in the Island of Celebes, which has not yet been scientifically described. In an account of the province of Minahassa, published in the 'Journal of the Indian Archipelago,' vol. ii. p. 831, we find it thus noticed:—"Wild cows are also found here, principally in the higher parts of the mountains; but they bear little resemblance to the banteng of Java; are below the middle size, yet possess, notwithstanding, an incredible strength." This is vague enough, but undoubtedly refers to some unknown quadruped,—bovine most probably, but not likely to appertain to our present sec-

\* There is a horn powder-flask in the museum of the Asiatic Society, Calcutta, which is cylindrical, and of true semi-circular bisontine curvature, which was brought from the Shan-country by the late Mr. Landers, who assured the writer that he had seen (had a good distinct view of) a true shaggy bison, "resembling the American bison," in the pine forests there. On our expressing doubt, he said that he possessed a horn of it made into a powder-flask, and afterwards presented this to the museum, being the specimen above noticed: certainly it has every character of a true bisontine horn, but might perhaps be that of a wild taurine of the present group. The mere conversion of it into a powder-horn, as a sort of trophy, is rather in favour of its having belonged to a wild bull of some kind.

tion of the taurines. The statement is nevertheless worthy of citation. The curious little straight-horned buffalo, known as *Anoa depressicornis*, is however perhaps meant.

For the same reason we quote the following from Earl's 'Voyage to the Molucca Islands and New Guinea,' p. 361 :—" Wild cattle are numerous in Timor Laut, of a brown colour, with upright horns, and size about the same as that of two-year old cattle in Holland. The natives catch them with rattan, and also shoot them with arrows."

Again, Mr. Hugh Cuming assured us, that the tamarao of the island of Mindoro (one of the Philippines) is a small bovine species, but fierce and dangerous to attack, of a dark colour, with horns rising at an angle of 45° from the forehead; therefore not akin to the *Anoa depressicornis*, which seems to be a diminutive buffalo.

The Tartar cattle of the steppes lying northward of the great Asiatic watershed are, we believe, *all* of the European type; while in China this would appear to be more or less mingled in blood with the humped races,—as the domestic geese of India are obviously of a hybrid race between *Anser cygnoides* and *A. cinereus*! Our information is, however, exceedingly scant and unsatisfactory concerning the breeds of cattle in the Chinese region, comprehending Mongolia, Manchuria, the Korean peninsula, Japan, Luchu,\* &c.; nor are the essential characters seized with reference to classification of those above described in Siam and Sumatra. The main object of the present sketch is to direct the attention of observers to those leading differential characters.

It would seem that the humpless Tartar cattle referred to interbreed with the yak in the northern limits of the range of the latter, as the

\* The cattle of the Luchu islands are described by Captain Basil Hall as "a small black breed, used principally for agricultural purposes." The presence or absence of a hump is not mentioned, which should be negative evidence of the latter. In some districts of China the humped would seem to predominate, and these are often represented in Chinese paintings. In Chusan the race appears to be mingled, with no great admixture of blood of the humped species. Cattle are generally rare in China, the strange inhabitants of that region having an aversion to milk, omnivorous as they are in most other respects: the Mantchurian Tartars, however, are particularly fond of milk. About Canton, if we mistake not, only buffalos are met with, which are employed to till the ground. It is probable that where taurine cattle are kept, the humped races predominate in the south, the humpless northward, with intermixture of blood where the two meet. The cattle of Butan would seem, from all we can learn, to be of the European or Tartar race, now, it would appear, becoming rare in the province, and the exportation of them strictly prohibited: if so, they have, doubtless, been brought round by an eastern route.



humped cattle are made to do in the southern limits of its range: at least we have the evidence of Marco Polo to that effect.

To return now to Europe, which may be regarded as the headquarters of the cylindric-horned humpless cattle,\* and from which part of the world they have been introduced into the Americas and Australian colonies, to the exclusion of other domestic cattle, though perhaps the finer breeds of humped cattle might be better suited to the warmer and drier localities of those grand regions of the earth. *That* is an experiment still worth trying. After the camel, the large humped bullock is the animal of all others best adapted for Australian or South African explorations.

The establishment of Spanish cattle in America "dates from Columbus's second voyage to St. Domingo. They there multiplied rapidly; and that island presently became a kind of nursery, from which these animals were successively transported to various parts of the continental coast, and from thence into the interior. Notwithstanding these numerous exportations, in twenty-seven years after the discovery of the island, herds of 4,000 head, as we learn from Oviedo, were not uncommon, and there were even some that amounted to 8,000. Acosta's report was 35,444; and in the same year there were exported 64,350 from the ports of New Spain. This was in the sixty-fifth year after the taking of Mexico, previous to which event the Spaniards, who came into that country, had not been able to engage in anything but war."—'Quarterly Review,' vol. xxi. p. 335.

Having noticed the rapid multiplication of Spanish cattle in the New World, it occurs to us, as worthy of remark, that European cattle do not thrive equally in India. Why should they not do so as well as at Rio Janeiro? Perhaps because the cattle of intertropical America are derived from an ancestral stock inured and thoroughly acclimatized to the torrid summers of Spain. And perhaps the same race of cattle, if imported into India from Rio or the Bahamas, would take more

\* A round-about expression; but we have positively no English word to designate the species generally,—bull, cow, ox, bullock, steer, heifer, calf, &c., of which "beeve" (analogous to the French *bœuf*) comes nearest to the mark, more so than cattle, but will hardly apply till the beast is of an age to yield beef! "Black cattle" is most absurd, seeing that they are of all colours; and "horned cattle" equally so, as being neither exclusive nor applying to the "polled" or hornless breeds. Sometimes, as in the Dutch language, this animal is emphatically the "beast," as, in the feathered class, the commonest of domestic birds is emphatically the "fowl;" but has no proper name in English, beyond such as are of more or less general application to all birds, as cock, hen, chick, pullet, capon, &c.; or sometimes emphatically "poultry," which may be compared to "beeve."

kindly to the climate than the improved and pampered breeds sent out from Britain. We happen to be among the dissentients who do not regard the beef of the humped ox—even well-fed Gyna beef—as equal to our finely interstratified (with fat and lean) Christmas beef at home; and therefore think that the cultivation of European cattle is desirable, especially in the Nilgiris and other elevated localities when the land-leeches do not interfere to prevent it.

Our notice of the “feral” humped cattle has elicited some information from a friend, who tells us that there are many in the now famous Jugdespore jungles, which he has often shot over. The late Kooer Singh granted permission to our informant to shoot what he pleased, so long as he spared the wild cattle, which, according to tradition, had inhabited the district for at least 400 years. Our friend, of course, respected the injunction, but was curious about them, and had opportunities of watching them somewhat closely. All he saw were rather of small size, of an earthy-brown colour, with shortish horns, and he thinks without the Nilgai markings on the feet. We have very long been of opinion that such was the primeval hue of the humped races; but the mottling of the feet—a white ring above the hoofs, set off above and below with black—is so very prevalent among our domestic humped cattle that we cannot help thinking it an aboriginal marking. Another friend informs us that there are many wild cattle of the sort upon the *churr*, or alluvial island, known as the “Siddee churr,” lying S. E. of Noacally in the Eastern Sundarbans. He adds that their colours vary, as in ordinary domestic cattle; and he especially approves of the quality of their beef. On this *churr* there is no high tree-jungle, and scarcely brush-wood enough to afford cover for tigers, which do not occur on the island.

To return now to our general subject. The question has been much disputed whether the urus of the old Romans was identical with their bison; and the affirmative has been very ably argued, as by Dr. Weissenborn, in the ‘Annals and Magazine of Natural History,’ vol. iv. p. 239 *et seq.*; but the two are so repeatedly contrasted that we could never doubt that the names referred to different animals, as in the following passage of Seneca:—

“Tibi dant variæ pectora tigres,  
Tibi villosi terga bisontes  
Latisque feri cornibus uri.”—HIPPOL., *Act I. v. 63.*

The most striking feature of each animal, from what we know of the still-living bison and of the sub-fossil skulls of the huge taurine found

in the peat-bogs, being here distinctly indicated. "Wide-horned" might indeed suit the *Bison priscus* type, of a long anterior and far ante-human period, but is much more applicable to the great extinct taurine than to the modern type of bison. Again, Professor Owen, in common with the other writers on the subject, quotes a very famous couplet, as follows:—"It is remarkable that the two kinds of great wild oxen recorded in the 'Niebelungen Lied' of the twelfth century, as having been slain with other beasts of chase in the great hunt of the forest of Worms, are mentioned under the same names which they received from the Romans.

'Dar nach schlouch er schiere, einen wisent und einen elch,  
Starcher ure viere, und einen grimmen schelch.

'After this he straightway slew a bison and an elk,  
Of the strong uri four, and a single fierce schelch.'

Which last is believed by some to be the famous so-called 'Irish elk' of common parlance, though Owen is decidedly opposed to that opinion, while offering no other suggestion beyond an allusion to the superstitious fables which abound in that romance. Other authors would identify the schelch with a lynx!

The fact is, that the Roman names are derived obviously from the Teuton. As Professor Nilsson remarks, "The denomination 'urox' is derived from the language which the Germanic race seems to have had in common in the earliest times, and signifies 'forest ox,' wild ox (*Bos sylvestris*), for 'ur' or 'or' signifies 'forest' or 'wood,' 'wilder-ness,' and is still used in many places in Sweden, Norway and Iceland. \* \* \* Also, in the older German, 'ur' signifies 'wood,' 'forest,' but has, in compositions of later times, been changed to 'auer;' *ex. gr.* 'auerochs,' *auerhahn*. The Romans, when in Germany, first heard the word 'urochs,' and as they generally changed all names after the fashion of their language, turned it into 'urus.' The uroxen which were conveyed to Rome, and highly prized in the bull-fights of the circus, were by the ignorant confounded with the African Antilopine 'bubalis,'—an error which Pliny notices; for example:—

"Illi cessit atrox bubalus atque bison."—MARTIAL, *Spect.* 23.

\* "By our forefathers in Scandinavia, as well as in Germany, this wild animal is, however, not called 'urox,' but 'ur,' or 'ure,' as in the poem of the 'Niebelungen,'—thence 'ura-horn' in our old Sagas. In certain provinces an angry bull is still called 'ure.' The canton of Uri,

in Switzerland, takes its name from this animal, and bears a bull's head in its arms."

The name "bison" is equally of Teutonic origin, and Cuvier thought that "wisent," &c., are derived from the German "bisam" (musk); but Dr. Weissenborn suggests, far more plausibly, that "bisam" is derived from the name of the animal in which the smell of musk forms so striking a feature. This author, however, also suggests that the name "bison" may still be of Greek origin, derived from the Greek verb signifying "to cough;" whence "bison," the coughing ox, as the voice of this animal must have struck the Greeks as much as that of the *Bos grunniens* did the travellers in Tibet; and in this respect the Indian humped bull resembles the bisons, its voice, however, being even more like a cough than a grunt, while that of the cow is also as unlike the low of the European cow as can well be. The latter explanation of the word "bison" we take to be founded on a mere coincidence.

Professor Nilsson remarks of the *urus*, "This colossal species of ox, to judge from the skeleton, resembles almost the tame ox in form and the proportions of its body, but in its bulk is far larger. To judge from the magnitude of the horn-cores, it had much larger horns, even larger than the long-horned breed of cattle found in the Campania of Rome. According to all the accounts the colour of this ox was black; it had white horns with long black points; the hide was covered with hair, like the tame ox, but it was shorter and smooth, with the exception of the forehead, where it was long and curly.\*

"The only specimens which we now possess of this extinct wild ox, are some skeletons dug up, of which two are at present preserved here, at the Museum of the University of Lund, where are also preserved about a dozen of earlier and later specimens. \* \* \*

"In the Museum of the Royal Academy are fragments of the cranium

\* Lengthened and curly hair on the forehead is, indeed, an especial feature of the present group of taurines, as before remarked, and not only as compared with the smooth-fronted humped cattle, in which hardly a tendency to lengthened hair upon the forehead is commonly shown, but equally with the third or flat-horned group of taurines, as the gaour, gayal, banteng, &c. True, Mr. Hodgson figures his Gouri gau with a very curly forehead ('Journal of the Asiatic Society,' x. 470); but he describes the hair there as merely "a little elongated and slightly waved or curled" (p. 464); and of several gaour-heads, with the skin on, that we happen to have seen, not one presented anything like the curly front of an English bull, and in fact the lengthening of the hair had to be looked for to be observed at all, and its waviness still more so. The hair of the forehead is a little elongated also in the gayal and banteng, but only noticeably so when specially examined.

of the urox, which must have belonged to an animal more than 12 feet in length from the nape to the root of the tail, and  $6\frac{1}{2}$  feet high. On one the distance between the base of the horns above is  $9\frac{1}{2}$  inches, below  $13\frac{1}{2}$  inches; the thickness at the root 15 inches [*i. e.* of the bony horn-cores! The skull of a cow in the British Museum, figured by Professor Owen, measures 30 inches from crown to tips of intermaxillaries!] The largest Scanian ox I have seen," continues Professor Nilsson, "and which was of an unusually large size, measured in length, from the nape to the root of the tail, 8 feet, and was 5 feet high over the mane. When we now consider that bulls and cows never reach the size that oxen do, and that we ought to compare the bull or the cow to the wild ox kind, we shall then easily perceive that this last-mentioned was much larger than the tame ox, and perhaps he was even somewhat bigger in the southern regions, for example, in Germany, than here in Sweden. Cæsar's account that the urus was 'magnitudine paulo infra elephantos,' was not so exaggerated as one has imagined."

The size of the urus may, in fact, be estimated as at least one-third larger, in linear dimensions, than the largest breeds of existing European cattle, and with proportionally even larger and longer horns than certain Italian, Sicilian and Hungarian bullocks, which are noted for the size of these appendages. Such were the formidable animals which Julius Cæsar describes as both strong and swift, at the same time so spiteful that they spared neither man nor other creature when they once caught sight of them. With the chase of these animals the Germanic youth became hardened, and the greater the number of horns of dead oxen they could exhibit the more highly were they esteemed.—(Bell. Gall. vol. vi. chap. 28.) One of Professor Nilsson's specimens "has on its back a palpable mark of a wound from a javelin. Several celebrated anatomists and physiologists of the present day, among whom," he remarks, "I need only mention the names of John Müller, of Berlin, and And. Retzius, of Stockholm, have inspected this skeleton, and are unanimous in the opinion that the hole in question upon the backbone is the consequence of a wound which, during the life of the animal, was made by the hand of man. The animal must have been very young, probably only a calf, when it was wounded. The huntsman who cast the javelin must have stood before it. \* \* \* It was yet young when it died, probably not more than three or four years old, and not unlikely was drowned by falling through the ice into the water, where, in after times, a turf-bog has formed over it. The skeleton lay

with its head downwards, and one of its horns had penetrated deep into the blue clay which formed the bottom under the turf.\*

A middle-sized European taurine is named *Bos frontosus* by Professor Nilsson. Its remains "are found in turf-bogs in Southern Scania, and in such a state as plainly shows that they belonged to a more ancient period than that in which tame cattle existed in this country [Sweden]. This species has lived in Scania contemporaneously with the *Bos primogenius* and *Bison europæus*; that it has also been found in England is shown by a cranium in the British Museum. As with us it belongs to the country's oldest 'post-pliocene Fauna.' \* \* \* If ever it was tamed, and thereby in the course of time contributed to form some of the tame races of cattle, it must have been the lesser large growth, small-horned and often hornless, which is to be found in the mountains of Norway, and which has a high protuberance between the setting on of the horns above the nape."

A third is the *Bos longifrons* of Owen, small and of slender build, and elaborately described by Nilsson. Found in turf-bogs, and in relatively older beds, together with bones of elephant and rhinoceros. Professor Owen thinks it probable that the small shaggy Highland and Welch cattle ("kyloes" and "runts"), with short or often no horns, are the domesticated descendants of *Bos longifrons*. †

Professor Nilsson sums up by remarking that, "We believe we come nearest to the truth in this difficult subject, if we assume—

"1. That the large-sized lowland races, with flat foreheads, and for the most part large horns, descend from the urus (*Bos primogenius*),

\* According to Colonel C. Hamilton Smith, "the bull-fights in Spain originated in the chase of the wild urus; and a Celtiberian vase, with an undecyphered Celtiberian inscription, represents the animal and its hunter." The Spanish bull-fights are generally supposed to have descended from the Roman combats of the circus.

† Within the last two or three years we have read in one of the scientific periodicals, but just now have sought in vain for the notice, of a quantity of bones that were dug up in some part of England, together with other remains, of what seemed to be the relics of a grand feast, held probably during the Roman domination of Britain (if we mistake not, some Roman coins were found associated). There were skulls and other remains of *Bos longifrons*, quite undistinguishable in form from the antique fossil, whether wild or domesticated, which of course remains a question; but Cuvier figures, in his 'Ossemens Fossiles,' the skull of a small Scottish Highland ox (as we take it to be), which can scarcely be other than a domesticated descendant of that particular aboriginal species. We also happen to possess a drawing of the skull of a small Highland bull, with descending horns, as in Cuvier's figure, which we have no hesitation in referring to the antique species. If we mistake not, the discovery of the quantity of bones above mentioned, is recorded in the first volume of the 'Proceedings of the Linnean Society,' which does not happen to be available to us just now.

and came into Sweden with a race of people who immigrated from the south and west.

"2. The somewhat small-growth Highland races, with high occiput, and small or no horns, descend from the high-necked ox (*Bos frontosus*).

"3. How far the small-grown hornless Finn-ko race descends from the dwarf ox (*Bos longifrons*) may be more fully determined through future investigations.

"We can take it for a given and general rule," he adds, "that the tame race is always less than the wild species from which it springs." \* Of this we are not so sure. Indubitably the larger breeds of domestic rabbits, geese and ducks, pigeons and common fowls, vastly exceed in size their wild progenitors; and the heavy dray-horse is probably another instance. We therefore feel a difficulty in reconciling even the largest races of humpless domestic cattle with the gigantic urus. The probability is, that other and unknown wild races have contributed to produce the domestic cattle of Europe and Northern Asia,—*e. g.* that formerly inhabiting the Ardennes, &c. (if different from the bison), even the Assyrian wild cattle, and perhaps more that we know not of; and the races so originating being now variously intermingled. An exceedingly near congener of the urus, but smaller, existed in the Indian fossil *Bos namadicus*; † and it is likely that others have existed which may yet be recovered in a sub-fossil state. Moreover, this supposed multiplicity of origin of the races of domestic humpless cattle may serve to hint the probability of more than one primal origin for the humped races, varying, as they do, so immensely in size, and more or less in a few other particulars.

The name *Bos taurus*, accordingly, seems to crumble to pieces like *Ovis aries*, *Capra hircus* and one or two more; but will always be useful in designating the aggregate of the particular domestic group, as apart from the humped races, which most assuredly have no common origin with the others.

We conclude this long notice of the present group of taurines by giving some measurements of large bullock-horns, which we took many years ago in the Museum of the Royal College of Surgeons, London. What the horns of an ox urus might have attained to we are almost afraid to conjecture.

\* Professor Nilsson's admirable treatise will be found translated in the 'Annals and Magazine of Natural History,' Second Series, vol. iv., pp. 256, 349 and 415.

† There is a fine skull of this species at the Museum of the Geological Survey Office, Calcutta.

Lithuanian ox (No. 1084 of Museum Catalogue). Absolutely similar in flexure to *B. primogenius*. White with black tips; 28 inches long, 12 inches in girth, and 88 inches from tip to tip.

Transylvanian ox (No. 1087). Colour black; 3 feet long, and 13 inches round at base.

Italian ox (No. 1088). Mottled white, dark-tipped; 37 inches long, 13 inches round at base.

Remarkable pair brought from America (No. 1091). Slender and curved as in the more ancient type of *B. primogenius*; 49 inches long, 12 inches round at base, and from tip to tip—following the curvature outside, and including forehead—10 feet 4 inches.

From a note supplied by Mr. John Stanislaus Bell, who resided some time in the interior of Circassia, we cite that “there were no cattle of a humped breed, nor any with coats so shaggy as those of our Highlands. The only remark I recollect to have made was, that there had been much mixture of Highland and Lowland breeds, from the low stature and short and slightly curved horns of some, and large ponderous frame and huge curved horns of others; while the colours of all seem to embrace all the varieties we have in our island.”

Colonel C. H. Smith remarks, that “the breeds of the Kirghiz and Kalmuk Tartars, those of Podolia and the Ukraine, of European Turkey, of Hungary, and of the Roman States, are amongst the largest known. They are nearly all distinguished by ample horns spreading sideways, then forwards and upwards, with dark points; their colour [that of the horns] is a bluish ash passing to black. That in the Papal dominions is not found represented in the ancient bas-reliefs of Rome, but was introduced most probably by the Goths, or at the same time with the buffalo.\*

With this quotation we terminate our somewhat rapid notice of the European type of taurines.



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*Notice of the Various Species of Bovine Animals.* By the Editor of  
the 'Indian Field.'

(Continued from p. 6429.)

THE third or flat-horned group of taurines is distinguished as the name imports, the horns having an oval section, at least towards the base. As far as we know, the type is exclusively Asiatic; and however the details of structure may vary, the species have certain characters in common. A short smooth coat, either black or of an earthy brown colour verging more or less on black, at least in the bulls, and white *stockings* from the mid-joint (inclusive) downwards; as may

be commonly enough seen in the Indian buffalo, of the bubaline series, regular forest animals, that browse more or less, the gayal especially being much given to crop the leaves of trees and shrubs, while the gaour is more of a grazer. Very gentle creatures, where not persecuted; and most readily tamed; inhabiting the upland forests of tropical and juxta-tropical Asia, where they pasture in the more open glades; and assimilating in their general habits to other taurines, and in no respect to the buffalos, though the gayal is very bubaline in figure and proportions. Three species are now well known and thoroughly established, and a fourth less satisfactorily—if it really constitute a fourth, which may be doubted; but the balance of evidence is in favour of its being a distinct species from the banteng of the Archipelago, however nearly akin.

The names *Bibos* and *Gavæus* have been proposed for the group; or rather the former has immediate reference to the gaour in particular, which is especially characterized by its high spinal ridge.

The gaour (*Bos gaurus*, Col. Ham. Smith; *B. gour*, Traill; *B. aculeatus*, Wagler; *Bibos cavifrons*, Hodgson; *B. asseel*, Horsfield (founded on the head of a cow in the India House Museum); *Gauri Gau* or *Gaur*, Nipal (Hodgson); *Jungli Khoodga*, Dukhani; *Kar Kona*, Kanarese, and *Gaviya*, Mahratta (Elliot); *As'l Gayal* of the Hindus in Chittagong, and *Seloi* of the Kukis (Macrae); *Gayal* of Cuttak sportsmen; *Pyoung* of Burmese (Phayre); *Sapi utan* (literally "wild cow") of the Malays of the peninsula.

"It is somewhat remarkable," observed the Hon. Walter Elliot in 1839, "that one of the largest animals of the Indian Fauna, frequenting all the extensive forest-tracts from Cape Comorin to the Himilayas, should only have been indicated distinctly within the last two years. I have seen specimens from Tinivelli, and likewise from the whole range of the Syhadri mountains, up to Mahableswha, and I know that the animal has been killed near Vellore, in the Shirwaroya hills near Salem, at Asirgurb, in Kandesh, Rajamundri, and I doubt not that it will likewise be found in all the deeper recesses of the Eastern Ghats, and on the banks of all the great rivers passing through them. An imperfect cranium, which seems to belong to a female of the species, in the United Service Museum, is labelled thus,—“Head of a Bison from Keddah, Straits of Malacca.” We happen to have drawings of the specimen referred to, and have published copies of them, showing the skull in three aspects of view, in the ‘Asiatic Society’s Journal,’ vol. xi. p. 470; from which it will be seen that the species is quite

different from the gaour, and we take it to be the skull of a bull (divested of its horns) of the Burmese T'sain or T'soing, from the Keddah coast.

But the gaour is nevertheless plentiful in the Burmese countries, and all down the Malayan peninsula;\* and since we last treated of the bovines, we happen to have obtained possession of a fine healthy yearling bull-calf of the species, who is just now quietly chewing the cud within a dozen yards of where we are writing, brought (together with a Malayan tapir) from Singapore,—as gentle and tractable a little fellow (little in comparison with the full-grown beast, not otherwise), as can be imagined, albeit full of life and friskiness occasionally, that will have started on his voyage to England before this notice meets the eyes of our readers, who may look out for a sketch of him ere long in the 'Illustrated London News.'

The gaour is about the largest of existing bovines, a fine bull standing fully 19 hands from the summit of his elevated spinal ridge,† with a huge ponderous body, longish limbs, little trace of dewlap, a broad head, with high upturned frontal ridge occasioning a hollowness of the wide forehead, and a thorough Roman nose; eyes full and lustrous; the ears rather large; tail scarcely reaching to the hocks; and the horns of the bull out with rather a backward curvature, and passing round inwards at the tips, with commonly a slight inclination backwards at the extreme tips, which in general is much stronger in the cows,—excepting in this respect, some cow-horns differ little from those of the bull, save in being much smaller; but others we have seen, more slender, and curving very much backward at the tips, as com-

\* What was Aristotle's wild bull of Persia with depressed horns? The extinct Guavera of Ceylon, noticed by Knox, refers clearly to the species now under consideration. A correspondent of the old 'Bengal Sporting Magazine' (for 1835, p. 217), writing from the southern Mahratta country, remarks that "the 'bison' of this jungle differ materially from those of the Mahableshwa Hills. The latter is merely a blue cow, of the colour of a buffalo, but of large size. The regular 'bison' of Dandelly is a tremendous animal, the highest point being the shoulder." We have little faith in any such distinction; and merely suppose that the writer had seen a big bull in one locality, and not in the other.

† In the 'India Sporting Review,' new series, No. III. p. 329, we read of "a most splendid fellow covered with scars from fighting, his teeth gone from age, and most magnificent horns. He measured 20 hands 1½ inch without measuring his hoof." In the same periodical, No. V. p. 210, "a splendid fellow" is mentioned, who "measured 20 hands and 2½ inches. His horns," remarks the writer, "were the finest I have ever seen, either of my own shooting, or any one else's." In the preceding page "a fine young bull" is mentioned, "measuring 18½ hands at the shoulder; horns not very large."

monly in the cow banteng ; and upon such a specimen (of which—the actual individual—we possess figures) is founded the *Bos asseel* of the much respected veteran zoologist Dr. Horsfield. The finest head of a bull we ever saw, of several dozens, we purchased some time ago at a Calcutta auction for one rupee, it being put up as a buffalo skull ; and this remarkably fine specimen is now in the Calcutta Museum.

The horns upon it are beautifully symmetrical ; and—what is unusual in first-rate gaour-skulls—they are not broken away at the tips, the result, we may suppose, of the combats of these gigantic animals. Round the outside curvature they measure each 30 inches, circumference at the base  $14\frac{1}{2}$  inches, 6 inches in horizontal diameter across the base, greatest width apart 3 feet (measuring from the outside), tips 21 inches apart, distance apart posteriorly at base  $8\frac{1}{2}$  inches ; from forehead to tip of nasal bones 19 inches ; the intermaxillaries reaching 3 inches further ; breadth of orbits apart posteriorly,  $11\frac{1}{2}$  inches. Weight of the skull with horns, minus the lower jaw, just 30 lbs. Skull extraordinarily massive. The horns are much flattened as far as the outward curvature continues, rounder where the tips hook inward, and are of a pale greenish glaucous hue, with black tips ; and for nearly the basal half they exhibit a series of bold transverse rugæ. The colour of the beast is brown, passing more or less to black, with whitish fulvescent *stockings* to the four limbs, and the same pale hue on the somewhat lengthened hair of the forehead, and on that lining the ears ; the cows running generally paler. According to Mr. Hodgson, the rugous bases of the horns “are furnished posteally with a fragrant secretion.”

He was a fine fellow who originally owned the above head-piece. There is also a perfect skeleton of a very respectable bull, and another of a cow, in the museum of the Asiatic Society, Calcutta ; together with a stuffed bull, which was in tolerable proportions when first set up, but the great weight and contraction of the skin in drying have spoiled the shape altogether.

The most remarkable feature of the gaour is its high spinal ridge, the apophyses of the longest vertebræ measuring 16 inches in length ; † the dorsal line of them slopes back a little, and then terminates with a remarkable abruptness, which is observed in a less striking degree also in the gayal. In our living gaour-calf, this character is less prominent than might be expected, and the head is much less broad, and is

\* Vide figure in the ‘Journal of the Asiatic Society,’ vol. vi. p. 748.

remarkably deer-like ; the ears too seem proportionally large, and the legs are conspicuously longer than in a gayal-calf of the same age. In other respects there is considerable resemblance between the two species at this early period of life, and notably in the colouring ; but the voice is strikingly different. That of the gayal, which we have often heard, is a prolonged, strange, somewhat shrill metallic cry, as if blown through a horn. Our young gaour's voice, which we suspect is pretty much that of the adult, is an equally prolonged, full, sonorous, and not unplaintive *hoo*, of considerable volume and most peculiar in tone, not to be forgotten when once heard, and which carries one at once in imagination to the jungles ; in general likewise this is more or less modulated, and not unfrequently it has almost a human expression of languor and *ennui*. "The voice of the gauri," remarks Mr. Hodgson, "is very peculiar and quite unlike that of the ox, buffalo or bison ; but as I am not skilled in bestial languages, I shall not attempt to syllable this utterance."

There is doubtless a difference in the voices of the two sexes, at least when adult ; just as White of Selborne remarks of those of European cattle. "Oxen," he observes, "have large bent horns, and hoarse [deep] voices when they low, like cows, for bulls have short, straight horns ; and though they mutter and grumble in a deep tremendous tone, yet they low in a shrill high key." How different this from the gruff cough or grunt of the humped bull ! One remarkable particular connected with our juvenile gaour is the extreme fragrance of his breath, which is noticeable sometimes at several yards distance ; it is that of European cattle intensified, and still sweeter ; and we have never remarked this peculiar fragrance in the breath of the humped cattle. That of the gaour is really an exquisite perfume. It may be that we have not chanced to notice the same in the gayal.

Of this species in the sub-Himalayan region, Mr. Hodgson remarks :—"The Gauri Gau never quits the deepest recesses of the sal-forest, avoiding wholly the proximate *tarai* on one side, and the hills on the other. It is gregarious in herds of from ten to thirty, the females much preponderating over the males in the herds, though even in a small herd there are usually two or three grown males, whose conjoint office it is to guide and guard the party. This office is discharged with uncommon alertness, proving the animal to possess great perfection in all the senses, and with indomitable courage too, if need be ; so that neither tiger, rhinoceros nor elephant dare molest the herd.\*

\* We have read of a big gaour-bull being killed by a tiger, but taken no doubt at a disadvantage.

During the heat of the day the herd reposes in the deepest cover, coming forth at morn and eventides to feed in the small and open pastures interspersed throughout the forest. Here the animals spread, of necessity, in order to feed, but in moving to and fro from their pastures they advance in single file, along the narrow beats made by themselves, by elephants, samburs, and other large tenants of the solitary and seemingly impenetrable wilderness.

“On an elephant, and in the day-time, you may, if you show yourself distinctly, approach the herd with facility, and I have seen the males stand with a careless indifference within a few paces; probably because they fear not the wild elephant, and are never molested by sportsmen with the aid of the tame one, the *shastras* having decreed that the Gauri is like unto Bos. No gentleman of the country [Nipal] will attempt to kill the Gauri; and plebeians, if they have less tender consciences, have ordinarily no adequate appliances for the work.” A mode of hunting these animals, by people of low caste, is however described; and the pertinacity of the gaour, in watching the tree into which his pursuer may have mounted for shelter, is especially noticed. “In cases in which the luckless climber has dropped his weapon, and his companions have feared to come presently to the rescue, the Gauri has been known to keep his station at the bottom of the tree for twenty-four hours, and it is believed would never have stirred from the spot, so long as the man was above, if the animal had not been eventually destroyed.” Mr. Elliot, however, remarks that “the persevering ferocity of the ‘bison’ of the sub-Himalayan range, described by Mr. Hodgson, is quite foreign to the character of the animal in the southern forests. When wounded, it is true it charges its assailant with determined courage, and many instances have come to my knowledge of its doing so with fatal effect; but in general it will always seek its safety by flight, if permitted.”

Mr. Elliot mentions different grasses and other plants upon which the gaours subsist, and adds that “they will eat with avidity every species of grain commonly cultivated on the hills or plains, as the ryots find to their cost. They are so particularly fond of the *Dolichos lablab*, when in blossom, that they will invade and destroy fields of it in open daylight, and despite any resistance the villagers can offer. In other respects it is a very inoffensive animal, very rarely attacking any one it encounters, except in the case of a single bull driven from the herd. Such a one has occasionally been known to take up his location in some deep bowery jungle, and deliberately quarter himself on the cultivation of the adjacent villages. The villagers, though ready to

assist Europeans in the slaughter of these animals, will not themselves destroy them (the inviolability of the cow extending to the gaour); and so bold does this free-booting animal become in consequence, that he has been known to drive the ryots from the fields, and deliberately devour the produce. But in general it is a timid animal, and it is often difficult to get within gun-shot of them.

“The breeding season is said to be early in the year, and the calves are born after the rains. The bulls are often found separate from the herd, which consists generally of from ten to fifteen cows and a bull. They generally feed during the night, browsing on the young grass and the tender shoots of the bamboos, of which they are very fond. In the morning they retire to some thicket of long grass, or young bamboos, where they lie down to ruminate. When disturbed, the first that perceives the intruder stamps loudly with its foot to alarm the rest, and the whole rush through the forest breaking down every obstacle and forcing their way with a terrific crash.

————— Dat euntibus ingens  
Silva locum, et magno cedunt virgulta fragore.

*Æneid*, vii. 676.

“When suddenly approached in the night they start off with a loud hissing snort.

“The Gowálahs say that they see great numbers of gaour when pasturing their herds in the neighbouring forest. They describe them as very timid and watchful, more so than any other wild animal, always reposing in a circle, with their heads turned outside, ready to take alarm. They add that they see most calves from June to October, but the greatest number about August. They do not know how long the cow goes with calf, but suppose the period of gestation to be the same as that of the buffalo, or ten months and ten days. The old male drives the others from the herd at the breeding season, and the single ones seen in the jungle are young males of this description, and it is probable that the very old bulls are sometimes expelled also by younger and stronger males.

“For the following particulars derived from the observation of the animal in the Sherwaroya hills, I am indebted,” continues Mr. Elliot, “to Mr. Fischer of Salem. ‘The bison ordinarily frequent the hills, seeking the highest and coolest parts, but during the hottest weather, and when the hills are parched by the heat or the grass consumed by fire, the single families, in which they commonly range the hills, congregate into large herds, and strike deep into the great woods and

valleys ; but after the first showers, and when verdure begins to reappear, they again disperse and range about freely. In wet and windy weather they again resort to the valleys to escape its inclemency, and also to avoid a species of fly or gnat which harasses them greatly. In the months of July and August they regularly descend to the plains, for the purpose of licking the earth impregnated with natron or soda, which seems as essential to their well-doing as common salt is to the domestic animal when kept in hilly tracts.

“ ‘The period of gestation is with the gaour the same as with the domestic animal ; they drop their young in the months of September and October. I once had one brought to me so young that the navel-string was still unseparated. I should think that it was then about the size of a common country cow’s calf of four months’ old. It seems a slow-growing animal. A calf I had for three years was evidently in every respect still a mere calf. They seem very difficult to rear. I have known it attempted at different ages, but never knew the animal live beyond the third year. Mr. Cockburn has tried it in vain, in its native climate, the Sherwaroya hills, and I have made the attempt at Salem repeatedly. At one time I had five in my farm-yard ; one lived for three years ; but this one, with all the others, died suddenly in the same week from some disease, marked by refusal of food, running from the nose, and an abominable stench from the mouth. A similar disease, it may be noted, prevailed (as I was informed) among the gaour of the Sherwaroya, Shandamungalam and Nilgiri hills. The calves I had never became in any degree domesticated : the domestic cow could never be induced to suckle them.’ ”

A more domestic-looking little beast than the gaour-calf just outside our window it would be difficult to imagine ; and when an epidemic prevails over the country, as in the instance here noticed, it cannot but be regarded as altogether an exceptive case. The fact happens to be that the gaour, in addition to the gayal, is actually domesticated in the interior of the Tippera hills. Of this we are assured by the Rev. J. Barbe, a well-qualified observer, who to this day is (we believe) the only European who has penetrated into that little-known region. His verbal description left no doubt whatever on the subject ; and in proof of his having correctly determined the species, as distinguished from the gayal, he presented a pair of veritable gaour-horns to the Calcutta Museum as those of one of the domesticated animals which he saw.

The Hon. Walter Elliot thus describes a fine Dandelly gaour which fell to his rifle. He had tumbled over a precipitous bank into a river,



and, "when drawn ashore and examined more minutely, the first sentiment produced in all present was astonishment at his immense bulk and size; but on measuring his height, we found him much taller than his breadth at first led us to imagine.

"The head is very square, and shorter than in the common ox; the forehead ample, the bony ridge rising about five inches in height from the plane of the frontal bone, over which it inclines. When viewed behind, it rises suddenly and abruptly from the nape of the neck, from whence to the vertex it measures 7 inches; the horns make a wide sweep in continuation of the arched bony ridge, and turn slightly backwards and upwards, forming an angle of about 35 inches with the frontal bone; the whole of the head in front, behind the eyes, is covered with a coat of close short hair, of a light grayish brown colour, which below the eyes is darker, approaching almost to black. The muzzle is large and full, of a grayish colour; the eyes are smaller than in the ox, with a fuller pupil of a pale blue colour; the ears are smaller in proportion than in the ox;\* the tongue is very rough, and covered with prickles;† the neck is short, thick and heavy; the chest broad; the shoulder very deep and muscular; the fore legs short, the joints very short and strong; the arm exceedingly large and muscular. Behind the neck and immediately above the shoulder rises a fleshy gibbosity or hump‡ of the same height as the dorsal ridge, which is thinner and firmer, rising gradually as it goes backwards,§ and terminates suddenly about the middle of the back. The hind quarters are lighter and lower than the fore, falling suddenly from the termination of the ridge; the tail very short, its tuft only reaching down to the hocks.

\* In our calf they are decidedly and conspicuously large; and in form are intermediate to the more lanceolate ears of the humped cattle, and the rounder ears of the European type; we observe, moreover, that his lips are white, and that he has a distinct dark spinal list continued alike over the ridge and behind it. Be it observed that this is a Malayan individual.

† In our young animal the tongue is moderately rough to the feel, and is of a pale bluish colour on its upper surface, carneous below: he readily licks the hand that is held out to him, which affords tolerable opportunity for observation.

‡ Mr. Hodgson, who annotated a reprint of Mr. Elliot's paper in the 'Asiatic Society's Journal,' vol. x. p. 579, puts a note of interrogation respecting this hump; but its presence in the specimen is distinctly and repeatedly noticed by Mr. Elliot.

§ "Quere forwards. The height of the true dorsal ridge declines from the third process of the vertebræ, and the general appearance of the ridge therefore is a declination, not a rise, towards the croup from the withers."—Hodgson. This is well shown in the skeleton.

“The dimensions of this individual were carefully noted as follows:—

	Feet.	Inches.
Height at the shoulder . . . . .	6	1½
... at the rump, taken from hoof to insertion of tail . . . . .	5	5
Length from nose to insertion of tail . . . . .	9	6½
... of tail . . . . .	2	10
... of dorsal ridge, including the hump . . . . .	3	4
Height of dorsal ridge, including the hump . . . . .	0	4½
Girth, taken behind the fore-legs . . . . .	8	0
Breadth of the forehead . . . . .	1	3½
From muzzle to top of arched bony ridge . . . . .	2	1½
Length of ear . . . . .	0	10½
Circumference of horn at base . . . . .	1	7½ *
... of the arm . . . . .	2	6

“The skin on the neck and shoulders and on the thighs is very thick, being about two inches in this one, which has already shrunk from lying in the sun. It is used for making shields, which are much prized.

“The cows differ from the male in having a slighter and more graceful head, slender neck, no hump, a less defined dewlap, and the tips of the horns do not turn towards each other at the points, but bend slightly backwards; the horns are smaller too, and the frontal bone narrower, but the coronal ridge is distinctly marked. The bulls have the forehead broader in proportion to their age. In the young bull it is narrower than in the cow, and the bony ridge scarcely perceptible. The horns, too, in the young specimen turn more upwards.

“The general colour is dark brown, the hair thick and short, but in old individuals the upper parts are often rather bare. That on the neck and breast and beneath is longer, and the skin of the throat is somewhat loose, giving the appearance of a slight dewlap. The legs are white, with a rufous tint on the back and side of the fore legs. The cow has the legs of a purer white. The skin of the under parts where uncovered is of a deep ochry yellow.

“I saw,” continues Mr. Elliot, “a young gaour-calf in the possession of some Gowálahs, the owners of large herds of buffalos. It was caught when just dropped in the month of May, and when I saw it was seven months old, very tame and gentle, though timid, licking the hands of the Gowálahs, and frisking about with the buffalo calves. It was the same colour as the old animal, very dark brown, with white legs.

\* Query, 1 foot 1½ inch.

The head small, the forehead wanting the breadth so remarkable in the adult, and the bony ridge of the crown was hardly perceptible. The horns were just beginning to sprout, the ears larger and rounder than those of the buffalo, the eyes a pale gray or cærulean colour. The hair on the throat was long, and the dewlap slightly indicated. No hump was perceptible, but the dorsal ridge was distinctly marked." Comparing this description with our living calf, it applies exactly; only our animal is rather older, with horns a moderate span in length; and we estimate his height at the dorsal ridge to be about  $3\frac{1}{4}$  feet, or perhaps a trifle more. The great change which the skull undergoes in shape is extremely remarkable, and much affects the position of the orbits, which are placed considerably more backward in the young animal before it develops the extraordinary breadth of forehead. In the old gaour the orbits are remarkably prominent, and are situate very forward in the head; and there is much of corresponding change in the shape of the head also in the gayal, which species we next proceed to notice.

(To be continued.)

*Notice of the Various Species of Bovine Animals.* By the Editor of  
the 'Indian Field.'

(Continued from p. 6485.)

THE gayal—*Bos frontalis*, Lambert; *B. gavæus*, Colebrooke; *B. sylhetanus*, F. Cuvier; *Gavæus frontalis*, Gray;\* *Gavaya*, Sanskrita; *Gavai* or *Gayál*, Hind.; *Gobay-goru*, Beng.; *Mit'hun* or *Mel'hana*, mountains bordering on Asam; *Shiall*, of the Kukis or Lunklas of Chittagong; *Jhongnua*, Mughs (if the latter does not rather apply to the Burmese *Tsoing*, which is identical with the banteng of the Archipelago†).

Another fine Indian bovine, that has been much confounded with the last, which it resembles, in many particulars while in other respects it differs strikingly and conspicuously. The general figure is heavy and recalls to mind the buffalo; spinal ridge much less elevated than the gaour, but still a conspicuous feature of the beast; dewlap tolerably well developed; and the horns curve simply outwards and a little upwards, their points never hooking inwards as in the gaour. Both in a wild and tame state, this species inhabits the hilly regions bor-

\* Nobody who knows [has observed] the living gaour and gayal would think of placing them in separate sub-divisions.

† In Orissa, as we have seen, the gaour is designated by the name gayal; both, of course, being but variations of the same root.

dering the valley of the Brahmaputra, as also the Chittagong and Tippera hills; but we have not been able to trace it further southward on sufficiently reliable evidence—not even in the Ya-ma-doung mountains, which separate Arakan from Pegu, though it is likely enough to occur there, and also to spread far eastward. Helfer, indeed, notices “*Bison guodus*” (evidently a misprint for *gavœus*) as an inhabitant of the Tenasserim provinces; but he is not sufficient authority, and we cannot learn that his statement has been confirmed. The gayal is everywhere a hill species, and does not thrive in the plains, away from its native forests; and we have observed that both the gaour and the gayal avoid the sunshine in lower Bengal, even during the height of the cold season. As remarked by Mr. Macrae, the gayal “delights to range about in the thickest forest, where he browses, evening and morning, on the tender shoots and leaves of different shrubs; seldom feeding on grass when he can get these. To avoid the noon-day heat, he retires to the deepest shade of the forest—preferring the dry acclivity of the hill to repose on, rather than the low swampy ground below; and never, like the buffalo, wallowing in mud. He is of a dull heavy appearance,” continues that gentleman, “yet of a form that indicates both strength and activity, and which approaches nearly to that of the wild buffalo; his head is set on like the buffalo’s, and is carried much in the same manner, with the nose projecting forward; but in the shape of the head he differs considerably from both the buffalo and cow, the head of the gayal being much shorter from the crown to the nose, but much broader between the horns than that of either; he has a full eye, and as he advances in age often becomes blind; but it is uncertain whether from disease, or from natural decay. The withers and shoulders of the gayal rise higher in proportion than those of the buffalo or cow, and its tail is shorter, seldom falling lower [*i. e.* its terminal tuft of hair] than the bend of the ham [hock-joint!]. Its colour is in general brown, varying from a light to a deep shade; it has at times a white forehead and [always?] white legs, with a white belly and brush. The hair of the belly is invariably of a lighter colour than that of the back and flanks. The gayal calf is of a dull red colour, which gradually changes to a brown as it advances in age.

“The disposition of this animal is gentle; even when wild in his native hills, he is not considered to be a dangerous beast, never standing the approach of man, much less bearing his attack. The Kukis hunt the wild ones for the sake of their flesh.

“Gayals have been domesticated among the Kukis from time

immemorial; and without any variation in their appearance from the wild stock. No difference whatever is observed in the colour of the wild and tame breeds; brown of different shades being the general colour of both. The wild gayal is about the size of the wild buffalo of India. The tame gayal, among the Kukis, being bred in nearly the same habits of freedom, and on the same food, without ever undergoing any labour, grows to the same size as the wild one.

“ He lives to the age of fifteen or twenty years, and when three years old the gayal cow receives the bull; goes eleven months with young, and does not again engender until the following season, after she has brought forth. She thus produces a calf once only in three years, and so long an interval between each birth must tend to make the species rare; the calf sucks his dam for eight or nine months, when he is capable of supporting himself. The Kukis tie up the calf until he is sufficiently strong to do so. The gayal cow gives very little milk, and does not yield it long; but what she gives is of a remarkably rich quality—almost equally so with the cream of other milk, which it resembles in colour. The Kukis make no use whatever of the milk, but rear the gayals entirely for the sake of their flesh and skins; they make their shields of the hide of this animal; the flesh of the gayal is in the highest estimation among the Kukis, so much so that no solemn festival is ever celebrated without slaughtering one or more gayals, according to the importance of the occasion.

“ These animals lose their sight as they grow old, and are subject to a disease of the hoof, which often proves fatal at an early age; when the Kuki considers the disease beyond the hope of cure he kills the gayal and eats its flesh, which constitutes his first article of luxury.

“ The Kukis train their gayals to no labour, although, from the great strength and gentle disposition of this animal, he must be very competent to every purpose, either of draught or carriage, to which the buffalo or the ox is applicable.\*

“ The domesticated gayals are allowed by the Kukis to roam at large during the day through the forest, in the neighbourhood of the village; but, as evening approaches, they all return home of their own accord; the young gayal being early taught this habit, by being

\* Mr. G. Harris remarks, however, of the gayal cow, that “ she is very quiet, is used for all the purposes of the dairy, as also (I have been informed by the natives) for tilling the ground, and is more tractable than the buffalo.” We suppose that the bulls rather are used for the latter purpose.

regularly fed every night with salt, of which he is very fond ; and from the occasional continuance of this practice, as he grows up, the attachment of the gayal to his native village becomes so strong, that when the Kukis migrate from it they are obliged to set fire to their huts, which they are about to leave, lest their gayals should return thither from their new place of residence before they become equally attached to it as to the former, through the same means.

“ The wild gayal sometimes steals out from the forest in the night, and feeds in the rice-fields bordering on the hills. The Kukis give no grain to their cattle. With us the tame gayals feed on calai (*Phaseolus max*);\* but, as our hills abound with shrubs, it has not been remarked what particular kind of grass they prefer.†

“ The Hindus, in this province, will not kill the gobay, which they hold in equal veneration with the cow. But the ‘As’l gayal,’ or ‘seloi,’ [i. e. the gaour], they hunt and kill, as they do the wild buffalo. The animal here alluded to has never been domesticated ; and is, in appearance and disposition, very different from the common gayal, which has just been described. The natives call him the ‘As’l gayal,’ in contra-distinction to the ‘gobay.’ The Kukis distinguish him by the name of ‘seloi,’ and the Mughls and Burmans by that of ‘phanj ;’ and they consider him (next to the tiger) the most dangerous and the fiercest animal of their forests.” No! this Burmese phanj is the f’hain apud Helfer, more correctly ‘tsain,’ or ‘tsoing,’ distinct both from the gaour and gayal, and a particularly timid and inoffensive beast, identical (as we have before mentioned) with the Javanese banteng.

“ The gayal,” Mr. Elliot writes from Tippera, “ is little known to the natives here ; it is principally considered as an inhabitant of the Chatgaon (Chittagong) Hills. In conversation with people belonging to the Raja of Tippera, on the subject of this beast, I have understood that it is known in the recesses of the more eastern part of the Tippera Hills, but has never been caught [!] In the past year some of these animals [gaours ?] were seen in a herd of elephants, and continued sometime with the herd ; but they were alarmed at the noise used in driving the elephants, and escaped being secured in the fenced enclosure. The ‘khedda’ of that season was nearly five hours’ journey from the skirts of the hills.

“ This animal is found wild, but is readily domesticated ; though,

\* *Phaseolus mungo*, L. ; *P. max* of Roxburgh.

† They graze readily enough on the ordinary grasses of Lower Bengal, when they have not the opportunity of browsing.

in this state he essentially partakes of wild habits. I have some gayals at Mannamutty; and, from their mode of feeding, I presume that they keep on the skirts of the valleys, where they can browse. They will not touch grass if they can find shrubs.

“While kept at Kamerlah (Comilla) which is situate in a level country, they used to resort to the tanks and eat on the sides; frequently betaking themselves to the water to avoid the heat of the sun. However, they became sickly and emaciated, and their eyes suffered much; but on being sent to the hills they soon recovered, and are now in a healthy condition. They seem fond of the shade; and are observed in the hot weather to take the turn of the hills, so as to be always sheltered from the sun. They do not wallow in the mud like buffalos; but delight in water, and stand in it during the greatest heat of the day, with the front of their heads above the surface.

“Each cow yields from two and a half to about four seers (from five to eight pints) of milk, which is rich, sweet, and almost as thick as cream; it is of high flavour, and makes excellent butter.”

Mr. Dick writes:—“Gayals are not confined to the woods; they are domesticated, but wild gayals are found in the mountains of Butan, &c. They are kept in a tame state by the people who inhabit the Kalanaga Hills, near Sylhet, on the eastern border of the province of Kachar, west of Manipur, and north of a tract dependent on Tippera. The tame gayals, however long they may have been domesticated, do not at all differ from the wild, unless in temper; for the wild are fierce and intractable. The colour of both is the same—namely, that of the antelope, but some are white and others are black; not any spotted or pie-bald [we have seen one much blotched with white]. They graze and range like other cattle; and eat rice, mustard, chiches, and any cultivated produce, as also chaff and chopped straw.”

Buchanan Hamilton’s description is still more elaborate, and very excellent. “The Gayal,” he remarks, “generally carries its head with the mouth projecting forward like that of a buffalo. The head at the upper part is very broad and flat, and is contracted suddenly towards the nose, which is naked like that of the common cow. From the upper angles of the forehead proceed two thick, short, horizontal processes of bone, which are covered with hair; on these are placed the horns, which are smooth, shorter than the head, and lie nearly in the plane of the forehead. They diverge outward, and turn up with a gentle curve: at the base they are very thick, and are slightly compressed, the flat sides being toward the front and the tail. The edge next the ear is rather the thinnest, so that a transverse



section would be somewhat ovate. Towards their tips the horns are rounded, and end in a sharp point. The eyes resemble those of the common [humped] ox; the ears are much larger, broader, and blunter than those of that animal.\*

“The neck is very slender near the head; at some distance from which a dewlap commences, but this is not so deep, nor so much undulated, as in the *Bos zebu* or Indian ox.†

“The dewlap is covered with strong longish hair, so as to form a kind of mane on the lower part of the neck; but this is not very conspicuous, especially when the animal is young.”‡

If we remember rightly, F. Cuvier's figure (copied from a drawing sent by Duvaucel) represents the dewlap as unusually large. In a carefully executed drawing of a fine bull, which was taken under our immediate superintendence from the living animal, the skin is shown to be a little pendent beneath the lower jaw, but not so at the throat, below which again it descends and forms one obtuse angle in front of the chest, and another between the knees, or rather just anteriorly to the knees and a little above them. In this individual the tail-tuft reached a little below the hocks. Buchanan Hamilton continues:—“The tail is covered with short hair, except near the end, where it has a tuft like that of the common ox; but, in the *gayal*, the tail descends no lower than the extremity of the tibia.

“The legs, especially the fore ones, are thick and clumsy; the false hoofs are much larger than those of the *zebu*; the hinder parts are weaker in proportion than the fore hand, and, owing to the contraction of the belly, the hinder legs—although, in fact, the shortest—appear to be the longest.

“In place of the hump, which is situated between the shoulders of the *zebu*, the *gayal* has a sharp ridge, which commences on the hinder part of the neck, slopes gradually up till it comes over the shoulder-joint, then runs horizontally almost a third part of the length of the

\* But they are not so broad as those of *B. Taurus*. Like those of the *gaour*, we should term them broadly ovate.

† From the name above given, it is evident that Buchanan Hamilton regarded his *Bos Zebu* as distinct from *B. Taurus*.

‡ With regard to dewlap, it may be remarked that the humped bull has this posteriorly developed occasionally, almost reaching to the ground. Such a bull is figured, as we remember, in one of the drawings bequeathed by General Hardwicke to the British Museum; and we have seen others like it. The large up-country cattle have also generally much pendent skin, and, what is curious, not unfrequently a very considerable appearance of præputial skin in the cows; but this nevertheless cannot be truly præputial, for reasons unnecessary to discuss here.

back, where it terminates with a very sudden slope. The height of this ridge makes the neck appear much depressed, and also adds greatly to the clumsiness of the chest, which, although narrow, is very deep. The sternum is covered by a continuation of the dewlap. The belly is protuberant, but in its hinder part is greatly contracted. The rump, or 'os sacrum,' has a more considerable declivity than that of the European ox, but less than that of the zebu.

"The whole body is covered with a thick coat of short hair, which is lengthened out into a mane on the dewlap, and into a pencil-like tuft at the end of the tail. From the summit of the head there diverges, with a whorl, a bunch of rather long coarse hair, which lies flat, is usually lighter coloured than that which is adjacent, and extends towards the horns and over the forehead. The general colour of the animal is brown in various shades, which very often approaches to black, but sometimes is rather light. Some parts, especially about the legs and belly, are usually white; but, in different individuals, these are very differently disposed."

We have seen a bull gayal, which must have stood at least 15½ or 16 hands high at the spinal ridge, and whose horns were about 3 feet from tip to tip; but this is considerably above the average size, and he stood like a giant among his adult companions of both sexes. This was in Barrackpore Park, in the time of Lord Auckland. There were five or six splendid gayals then in the park, which Lord Ellenborough (as we were informed) gave away to whoever would accept of them; and they fell into native hands, and very soon died off and were lost to science. At that time, we believe, not a specimen (either stuffed skin or skeleton, or so much as a frontlet or even a horn) existed in any museum, and the species is still extremely rare in zoological collections. In that of the Asiatic Society, Calcutta, there is now a complete skeleton of a moderately fine adult bull, the skull of a finer bull, with the horn-cores only (not the corneous sheaths), which is believed to be that of a wild individual, and was picked up in one of the hill-jungles bordering on Asam; also the stuffed skin of a young bull, and another of a large calf. The height of the skeleton is 4 ft. 4 in. from the summit of the spinal ridge; and the large skull measures 15 in. across between the bases of the horns anteriorly, 18½ in. in length from frontal ridge to tips of nasa's, and 11½ in. greatest width at the orbits. For figures of a fine gayal skull, with those of the gaour and yak for comparison, vide 'Journal of the Asiatic Society,' vol. x., p. 470.

"The cry of the gayal," remarks Buchanan Hamilton, "has no

resemblance to the grunt of the Indian ox; but a good deal resembles that of the buffalo. It is a kind of lowing, but shriller, and not nearly so loud as that of the European ox. To this, however, the gayal approaches much nearer than it does to the buffalo." We have tried to describe the voice of the gayal in our notice of the gaour.

Baron Cuvier entertained the strange opinion (expressed both in his 'Règne Animal' and his 'Ossemens Fossiles') that this species was merely a mixed race between the Indian humped cattle and the buffalo. There have been several instances of its breeding with the former, under peculiar circumstances; and in one which fell under our own observation, the sire being a gayal, a cow-calf was produced, which, to all appearance, scarcely differed from a cow gayal; it died when about half grown, and the skull is now in the Calcutta museum.

The sire was the bull whose portrait has been before alluded to; and, ponderous beast as he looked, he could leap a fence or gate with surprising facility. Mr. G. Harris remarks of the species—"He is naturally very bold, and will defend himself against any of the beasts of prey." All that we have seen, however, were the most gentle and tractable creatures imaginable; but, as Turner tells us, in the narrative of his 'Embassy to Butan' (we have not the book at hand), these good-natured animals, fed on stimulating food, are there trained for conflict, and no doubt can be worried into fierceness;\* but it is

\* We have since hunted up the passage, which is as follows:—

"Towards the close of the afternoon we were entertained with the exhibition of a bull-fight, between two animals, the strongest and fiercest of the species [genus] I ever beheld. They were of a foreign breed, from a more eastern part of the same range of mountains, and in Bengal are termed gyal. Their heads were small, their necks thick, their chests prodigiously deep, and their fore-legs remarkably short. The carcase lessened towards the loins, which made the hind-legs appear much longer than the fore. Their colour was a dark brown, almost black. They were led to the ground between many Booteas, well secured, with strong ropes fastened to them: they struggled violently, as impatient of restraint, and their prominent eyes rolled with fury, as if they were instructed in the fierce purpose for which they were brought hither. Many men took post round the field of battle, armed with large bludgeons. The bulls were released on opposite sides; and the moment they felt their liberty, they tore up the turf with their horns, elevated the spines of their backs, and appeared animated with the strongest symptoms of rage. They did not at the first instant rush together, but, turning sideways, eyed each other askance, all the while making a slow circular advance, until a very small distance divided them; they then turned, opposing a full front, and ran impetuously, their heads meeting together with an astonishing concussion. The horns, which constitute the guard as well as weapons of offence, were now entangled, and they maintained the struggle, like wrestlers, for half an hour, with surprising exertions of strength; the ground yielding to their heels as they

not their natural disposition; and the remarkable gentleness of this animal is well exemplified by the following narrative of how whole herds of wild gayals are tamed at a fell swoop.

“The Kukis,” writes Mr. Macrae, “have a very simple method of training the wild gayals. It is as follows:—On discovering a herd of wild gayals in the jungles, they prepare a number of balls of the size of a man’s head, composed of a particular kind of earth, salt, and cotton; they then drive their tame gayals towards the wild ones, when the two soon meet and assimilate into one herd—the males of the one attaching themselves to the females of the other, and *vice versa*. The Kukis now scatter their balls over such parts of the jungle as they think the herd most likely to pass, and watch its motions. The gayals, on meeting these balls as they go along, are attracted by their appearance and smell, and begin to lick them with their tongues; and relishing the taste of the salt, and the particular earth composing them, they never quit the place until all the balls are destroyed. The Kukis having observed the gayals to have once tasted their balls, prepare what they consider a sufficient supply of them to answer the intended purpose, and as the gayals lick them up they throw down more; and to prevent their being so readily destroyed, they mix the cotton with the earth and salt. This process generally goes on for three changes of the moon, or for a month and a half; during which time the tame and wild gayals are always together licking the decoy-balls; and the Kuki, after the first day or two of their being so, makes his appearance at such a distance as not to alarm the wild ones. By degrees he approaches nearer and nearer, until at length the sight of him has become so familiar that he can advance to stroke his tame gayals on the back and neck without frightening away the wild ones. He next extends his hand to them, and caresses them also, at the same time giving them plenty of his decoy-balls to lick; and thus in the short space of time mentioned he is able to drive them along with

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pressed their brows, and alternately retreated and pushed forwards in the conflict. At length, as their strength diminished, and when victory stood on the point of turning to the most powerful, they were parted. The weakest was driven away by the Booteas armed with bludgeons; the other, hampered with ropes, was conducted to his stall highly indignant and full of wrath. In this manner commonly the battle ends; for, if they can prevent it, they never suffer the strongest bull to pursue his advantage, which would terminate in the certain destruction of his antagonist, who is also exposed to the greatest danger, if he should happen to be thrown down in the conflict. As they are trained for this particular purpose, the Booteas exert their utmost endeavours to preserve them for future sport.”

his tame ones to his parrah or village, without the least exertion of force or compulsion, and so attached do the gayals become to the parrah, that when the Kukis migrate from one place to another they always find it necessary to set fire to the huts they are about to abandon, lest the gayals should return to them from the new grounds, were they left standing. Experience has taught the Kuki the necessity of thus destroying his huts.

“ It is a fact worthy of remark, that the new and full moon are the periods at which the Kukis generally commence their operation of catching the wild gayals, from having observed that at these changes the two sexes are most inclined to associate. The same observation has been often made to me by the elephant catchers.”

The taming of the wild elephant is truly an astonishing feat to be performed by the class of people who engage in it; and this wholesale domestication of the gayal is most instructive, and reminds us that the subjugation of almost every domestic animal was achieved, so far as we know, by people in a similar primeval state of existence, where little real transition of mode of life was required on the part of the creatures who were won over to servitude and not forced into subjection. Civilized men exterminate, but do not domesticate—have not hitherto done so, at least; nor is a cultivated country adapted for the kind of procedure detailed.

On looking over this account, we find that the gayal cow is scarcely described; but little more need be said than that she is altogether of a slighter build than the bull, with the forehead less broad, and the horns shorter and not so thick. We have borrowed largely from the seventh volume of the ‘Transactions of the Linnean Society,’ and from the eighth volume of the ‘Asiatic Researches;’ compiling a tolerably complete description of the beast under notice, by no means however unassisted by familiar personal observation of the domestic animal.

The banteng (*Bos sondaicus*, Müller; *B. bentinger*, Temminck; *B. leucoprymnus*, Quoy and Gaimard; \* *Banteng* of Europeans in Java; *Sapi leweng*, *Lembo wono* and *Sampi halas* of Javanese—all names signifying “wild cow;” *Rompo* of Dyáks, in Borneo; *Poung*, *P'hain*, *Tsain* or *Tsoing* of Burmese). After careful comparison of the

\* According to Professor Van der Hoeven, this name is founded on the hybrid race often raised in Java and Bâli, a figure of one of which we remember seeing among the Hardwicke drawings in the British Museum. If we mistake not, this mixed race, rather than the true banteng, is known by the appellation of “Bâli cattle” at Singapore.

skull of an old (though not large) bull from Pegu, the horn of another from the Arakan side of the mountains which separate the two provinces, with the admirable figures of the skulls of both sexes, at different ages, of the Javanese banteng, published by Dr. Salomon Müller, as also with two superb frontlets of bulls from Java, we can come to no other conclusion than that they are one and the same species, and upon present evidence we doubt if they can even be ranged as distinguishable varieties. It is true that in the specimens before us, the continental have more slender horns than the insular; but the peculiar flexure is absolutely the same, and we can discern no difference whatever in the configuration of the skulls. The truth is, as we suspect, that our continental specimens are ordinary, whilst the insular are extraordinarily fine.\* It has indeed been suggested to us, that the horns of the banteng are more approximated at base; but an appearance of this in one of the Japanese frontlets under examination is found to be deceptive on inspection. One very remarkable feature in an old bull banteng is the excessive development of bony substance on the forehead, rising up into coral-like asperities three-fourths of an inch above the plane of the frontal bones, above which the cuticle is enormously thickened into a rugged horn-like mass, which is hard and solid enough to turn a musket-ball. This is well shown in the finer of two frontlets before us; while in the other a portion of the same thickened cuticle, continuous with the base of each horn, has not been detached from the latter, which nevertheless is sufficiently well marked,—and hence the deceptive appearance of the horns being more approximated at base. In the Peguan skull before us, the horns are remarkably pale (even whitish), with black tips; and it is worthy of remark that Pennant in his 'Hindustan' notices the existence of white-horned wild cattle in the Indo-Chinese territories; but the Arakan horn under examination is darker, being much the same in hue as the larger Javanese pair. The frontal bones in our Peguan skull are smooth, and they are equally so in the smaller Javanese frontlet before us; though both are heads of old animals, with the frontal suture nearly obliterated: nevertheless,

\* In a skull from the "Keddah" or Quedda Coast, referred to in our notice of the gaour as being in the United Service Museum, London, and which is divested of the horns, it can nevertheless be seen that the latter must have been of full dimensions.—*Vide* figures in 'Journal of the Asiatic Society,' vol. xi. p. 470. In the same plate is figured the smaller Javanese frontlet hereinafter described, with portions of the indurated skin of the forehead continuous with the horns, occasioning the latter to appear more approximated at base than is truly the case, as noticed above. We have seen, indeed, much greater difference of size in old bull gaour-skulls.

the skin was indurated over the forehead of the latter, and we have never heard of this occurring in the Burmese animal, but have little doubt that it does so. One remarkable fact strikes us upon examining these horns, which is, that the flattening of them at base does not appear until they are fully half-grown; which may well account for the reports of Burmese wild cattle with cylindrical horns! The bison-tine-looking horn, however, from the Shán country, has not the peculiar flexure of the present species, and most assuredly cannot be referred to it.\*

The banteng, as beautifully figured by Dr. S. Müller (who gives coloured portraits of the bull and cow, and of calves young and half-grown), has much more the aspect of the European *Bos Taurus* than has either the gaour or gayal; and its less flattened horns present a further approximation. There is nothing exaggerated about its figure; the spinal ridge is not more elevated than in *B. Taurus* and the tail-tuft descends considerably below the hock-joint. There is a good deal of the gayal in its general aspect; but it has longer limbs, and is less heavy and bubaline in its proportions. Indeed, we have heard it compared to a Devonshire ox; but it has nevertheless all the general features of the present group, and is true to the particular colouring—showing the white *stockings*, and having also a great white patch on the buttocks (whence the name *leucopymnus* bestowed by MM. Quoy and Gaimard). The shoulder is a little high, with some appearance of the dorsal ridge between the scapulæ, but this slopes off and gradually disappears behind. The rump is also nearly as much squared as in European cattle. Dewlap moderate, with a different outline from that of the gayal, more as in the *B. Taurus*. Colour of the calf bright chestnut, with a black tail-tuft, and also a black dorsal line commencing from where the ridge should terminate behind; † the white *stockings* having much rufous intermixture at this age. The cows are deeper-

\* Here it may be remarked that the curious small fossil frontlet from Kentucky, with narrow forehead and thick horn-cores, and which we examined in a dealer's shop in London, we now identify for certain as the *Boötherium cavifrons* of Dr. Leidy, figured and described in the fifth volume of the 'Smithsonian Contributions to Knowledge,' Washington, 1853. It is the same as the *Ovibos Pallantis*, *De Blainville*, and should therefore now stand as *Boötherium Pallantis*. A second species existed in the *Bos bombifrons* of Harlan, also figured by Dr. Leidy, together with *Bison latifrons*, and another which he terms *B. antiquus*. *Boötherium* is evidently a good genus, intermediate between the musk cattle and the bisons.

† The skin of a young calf from Mergui, in the Calcutta Museum, corresponds with that figured by Dr. S. Müller. The same dorsal line occurs in some individuals of the humped cattle.

coloured, being of a rich light bay, and the old bulls are blackish,—both, however, relieved with the white on the legs, buttocks, lips and hair lining the ears, which last are scarcely so large as in the gaour and gayal, but of similar shape. Sir Stamford Raffles mentions, that “a remarkable change takes place in the appearance of this animal after castration, the colour in a few months becoming invariably red ;” \* *i. e.*, light bay, as in the female. The general figure, however, is still much more that of the gayal than of European cattle ; but (as before remarked) the legs are conspicuously longer than in that animal, the body is much less ponderous, the tail longer, and the head also is much less broad at the forehead. The horns again are very different.

In form of skull the banteng more resembles the gaour, with the characteristics of that species subdued, only that the frontal ridge does not turn up at all, as it slightly tends to do also in the gayal, occasioning a perceptible hollowness of the broad forehead of that species in a fine bull-skull before us. The horns of the banteng are thrown off at the same angle from the head as in the gayal, or with less of a slant backward than in the gaour, are continued out almost in a line with each other, gradually curving upwards and uncinating inwards, with a less considerable slant backwards at their tips. Such is the usual flexure in the bull, but occasionally the tips incline less inwards : in the cow the horns are small, and tend much backwards. Towards the base they are generally very rugous in old bulls ; and the full-grown horn flattens gradually from about the middle to the base ; the section of the base being oval and flattened on the lower surface. Colour pale glaucous-green with black tips, and commonly more or less black or blackish noticeable elsewhere.

\* ‘History of Java,’ vol. i. p. 3. Probably the same would be observed in the nil-gai ; and certainly in a black buck of the Indian antelope, in which the colour goes and comes with the “rut.” There is a head of an emasculated nil-gai in the Calcutta Museum, which is coloured as in the female, and has small and slender horns, the female being hornless, also a fine stuffed specimen of the castrated antelope, which is likewise coloured as in a female, and has horns similar to those which the doe antelope very rarely puts forth, but we are acquainted with three instances of the fact. *Vide* ‘India Sporting Review,’ new series, Nos. IV. p. 94, VI. p. 239, and XI. p. 191 ; and for figure of the horns of a female antelope, *vide* ‘Bengal Sporting Magazine,’ new series, vol. ii. p. 478 (1845). They resemble those of a castrated buck, but are more slender, their curvature being an open arch and not a twist. Not improbably these horned doe antelopes are barren : a doe fallow deer with one horn was found to have the ovarium of the same side schirrous, analogous to barren hen pheasants with more or less complete masculine attire, &c., &c.



Height of bull at the shoulder about 16 hands. Length of a fine skull, from vertex to tips of intermaxillaries,  $20\frac{1}{2}$  inches; breadth apart at orbits posteriorly, 9 inches; bases of horns apart anteriorly,  $12\frac{1}{2}$  inches. The horns of our largest specimen measure 2 feet 8 inches round the curvature outside; circumference at base 18 inches; breadth across at base, measuring above,  $6\frac{1}{2}$  inches; greatest width apart, 3 feet 5 inches; and the tips 2 feet  $5\frac{1}{4}$  inches asunder.

The existence of a "wild ox" in Borneo was noticed by Beckman, as cited by Pennant, who also recorded the occurrence of such an animal in Java, and had likewise (as we have seen) obtained intelligence of one "with white horns" in the Indo-Chinese countries. In Java, according to Sir Stamford Raffles, "it is found chiefly in the forests eastward of Pásuran, and in Báli, though it also occurs in other parts of Java." Dr. S. Müller remarks that the banteng is found in Java in territories which are seldom visited by man, as well in the forests of the plains and of the coast, as in those of the mountains up to 4000 feet, where it is tolerably common. "We have likewise seen traces of it," he adds, "in Borneo, and have even received a calf from the Dyáks about a month old. According to Raffles it is found in Báli; but in Sumatra it does not appear to exist."\* In Moor's 'Notices of the Indian Archipelago,' p. 2, we read that—"The ox, under the name of tambadao,† is a native of the forests of Borneo:" and at p. 95, it is

\* Most likely, however, it will be eventually found there, if not also another wild species, the aboriginal stock of the tame cattle described by Raffles. The elephant of Sumatra was considered by the late Prince of Canino to be a peculiar species, and was recognised as such by the late Professor Temminck. The rhinoceros of Sumatra is the Asiatic two-horned species (*Rhinoceros sumatrensis*), found also in the Malayau peninsula and Burmese countries, but not in Java, nor (so far as known) in Borneo; the rhinoceros of Java and Borneo (*Rhinoceros sondaicus*) being hitherto unknown in Sumatra, though found in the Tenasserim provinces, according to Helfer: if so, it will probably be more of a mountain species in the provinces and Malayan peninsula than the other. Of wild hogs, according to Dr. S. Müller, the *Sus vittatus* inhabits Sumatra, with Java and Banka; *S. verrucosus* also inhabits Java; *S. barbatus*, Borneo; *S. celebensis*, besides the baba-rusa, Celebes; *S. timoriensis*, Timor and Roti; and *S. papuensis*, New Guinea: a goodly series of wild swine, to which we have lately added the little *S. andamanensis*, which needs comparison most with *S. papuensis*, and with Mr. Hodgson's pigmy hog of the Nipál-sal Forest, which he styles *Porcula salvania*; these last three have only a tubercle in place of tail. The Continental species of wild hog have been less studied. We can hardly expect, from analogy with the neighbouring regions, that the mountain forests of Sumatra will prove destitute of wild bovine inhabitants.

† Compare this name with Tamarao in the Island of Mindoro, one of the Philippines.

stated that "the breed of cattle [in Báli] is extremely fine, almost every one of these beasts being fat, plump, and good-looking; you seldom, if ever, see a poor cow in Báli: it is a breed of a much larger size than the common run of cattle in Java, and is obtained from a cross with the wild cow [bull?] with the same animal. They are generally of a red colour, and all of them are white between the hind legs and about the rump, so that I do not remember seeing one that was not white-breeched. The people have no land expressly devoted to grazing; but let their cattle eat their old stubble or fresh grass of the rice-fields, after the crops have been taken off; and while the rice is growing they let the cattle stray into the commons or woods and pick up what they can get by the road-side. The rude plough is drawn by two abreast, which the plougher drives with one hand while he guides the plough with the other." This account pretty clearly indicates domesticated bantengs; intermingled in blood, perhaps, more or less, with the humped cattle; though there is nought to indicate such intermixture in the notice quoted, but rather that—as in the case of the gayal—both wild and tame exist and interbreed occasionally. However, we have the authority of Professor Van der Hoeven that the *Bos leucopymnus* of Quoy and Gaimard is a hybrid banteng; and we have seen a figure of a cow of this mixed race among the Hardwicke drawings in the British Museum, which—as also in the instance of the hybrid gayal we observed alive—partook much more of the general aspect of what may be termed the jungle parent. Sir Stamford Raffles, indeed, notices, in his 'History of Java,' that "the degenerate domestic cows [of that island] are sometimes driven into the forest to couple with the wild banteng, for the sake of improving the breed."

In the Malayan peninsula, and in suitable districts of the extensive region known as Indo-China, there is much reason to suspect that the gaour, gayal and banteng are alike found. Thus Captain (since General) Low, in his 'Dissertation on Penang and Province Wellesley,' mentions "two species of the wild ox, or bison;" and again, he elsewhere notifies, as inhabiting the same region, in addition to the "bison" or gaour, "the wild ox, of the size of a large buffalo [probably the gayal]; and also a species [the banteng?] resembling in every respect the domestic ox,"—besides the buffalo. Again, Helfer, in his crude notes on the Zoology of the Tenasserim provinces says,—“Of the ox kind, the *Bubalus arni* and *domesticus* are both in a wild state [we do not concede these to be two species]; and of the bisons, the great *gaurus* is rather rare, but *Bison guodus* [a misprint for *gavæus*]\* very common;

\* The words may be written to look very much alike.

besides another small [?] species of cow, called by the Burmese F'hain, of which I saw foot-prints, but never the living animal ; it remains, therefore, undecided to what species it should be referred."

From what we know of the habits of the three animals, it is probable that the gayal keeps exclusively to the hills, the gaour chiefly to the low or comparatively level country, while the banteng inhabits all elevations, being, if possible, even the very shyest of the three. All accounts seem to agree in this respect. Many years ago, the well known and highly accomplished naturalist, Col. C. Hamilton Smith, addressed the writer on the subject of "a wild ox, inhabiting to the eastward of the Brahmaputra river, and very different from the gaour and gayal. It is simply described," wrote Col. Smith, "as a fine-limbed and deer-like animal, of large size, and of a bright bay colour, exceedingly like a Devonshire ox, very active, fleet, shy, and watchful ; living in small herds in the wooded valleys, with watchers on the look out, who utter a shrill warning sound on the least alarm, when the whole dash through the jungle with irresistible impetuosity." These are just the habits of the wild banteng, and pretty much those of its immediate congeners. Another writer, alluding to the Burmese "wild cow, or Sine bar," remarks that "herds of thirty or forty frequent the open forest glades" of the Tenasserim provinces ; and our deceased friend, Capt. Gason (formerly of H. M. 32nd Regiment), observed them and killed a bull at a place called Nathongzoo, about 250 miles eastward of Maulmain. They were "excessively timid, and are generally seen feeding in the valleys, often about a large tank. It is a very game-looking animal," remarked Capt. Gason, "with a heavy body, but fine limbs ; and stands about 15½ hands high." In no account have we met with any notice of the browsing propensities so conspicuous in the gayal, and infer therefore that it is more of a grazer like the gaour. What its voice may be like we are unaware. Not improbably the wild and domestic cattle of Siam noticed by Crawford (*vide* p. 88 *ante*) are of this species ; in which case it would be remarkable that, as he states, the tame should often be hornless—scarcely more so, however, than polled or hornless buffalos which sometimes occur. He states that they are never of the white or pied colour, so prevalent amongst the cattle of Hindustan ; but of what colour are they ? The invariable white patch on the buttocks of the banteng would go far towards enabling us to recognise that species.

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*Notice of the Various Species of Bovine Animals.* By the Editor of  
the 'Indian Field.'

(Continued from p. 6421.)

The excessive vagueness of most notices of wild or little known cattle is extremely perplexing to the naturalist, who would endeavour to make some meaning out of them. Thus it is difficult to comprehend what animal can be meant by the "gyall" of Bishop Heber's 'Journal,' briefly noticed, and very rudely figured as having been seen by that prelate in the Governor's park in Ceylon; and equally difficult is it to understand what the following passage alludes to, in Mrs. Graham's work:—At the Governor's house in Ceylon, this lady "saw, feeding by himself, an animal no less beautiful than terrible—the wild bull, whose milk-white hide is adorned with a black flowing mane!" Can there be such a creature?

"In the 'Journal of the Asiatic Society,' vol. xvi., p. 706, Mr. B. H. Hodgson thus notifies the gaour—"Bos Gaurus, *vel?* cavifrons. The Gaur or Gauri gau. Cæsar's wild bull of Europe [the urus!], and Aristotle's of Persia, are two other species of Bibos or of Gavæus, which, could we test them, might be respectively called 'classicus et Aristotelis.' [The urus is surely sufficiently made out!] The gaurs," he adds, "inhabit the primitive forests of India generally, under the great ranges of mountains, such as the sub-Himalayas, the Vindhias, the Sathpuras, the Ghats eastern and western, and their links with the Vindhias, and with the Nilgiris. Beyond the Brahmaputra Bibos is replaced by Gavæus [quite a mistake, even if the types could be accepted as sufficiently different, in which case the banteng must needs be acknowledged as a third type, about as well marked as either of the others, or at least it certainly cannot be ranged with one rather than with the other!], of which there would seem to be two species in the Indo-Chinese countries, one of them extending to Ceylon, if the Lanka wild ox be not rather a Bibos; I suspect," continues Mr. Hodgson, "there will prove to be at least two species of Bibos, as of Rusa, inhabitants of India, between the Cape (Comorin) and the sub-Himalayas, or B. Gaurus and B. cavifrons."

We respectfully submit that the gaour is one and the same species, without appreciable difference, alike in northern and southern India, formerly in Ceylon, and still numerous in the Burmese countries and Malayan peninsula; also that nearly throughout this great range of territory there is only one species of *Rusa* or Sambur deer, however individuals may vary.\* The gaour is the only existing indigenous wild taurine in cis-Brahmaputran India; for it is very doubtful if the wild humped cattle be indigenous to this country. The humped may yet prove to be the proper African type of taurines.

Of his genus *Gavæus*, as apart from *Bibos*, Mr. Hodgson remarks—“The Gavi or Gabi—habitat trans-Brahmaputran, the forests under the ranges extending from Asam to the sea. The *Senbar vel P'hain* may probably be a second species; and *B. sondaicus*, or the banteng, a third and the insular species; but these want testing. The first is more than half reduced from the wild state, like the yak of Tibet. The others are entirely wild.”

Not so: we credit Mr. Barbe's statement, founded on personal observation, that the gaour, in addition to the gayal, is domesticated in the interior of the Tippera Hills; and we have long known that the banteng was partially domesticated in the Archipelago. The Rev. J. Mason also remarks of this animal (as we believe, in the Tenasserim provinces), that “occasionally a young wild ox is domesticated, and brought under the yoke.” We identify, with scarcely a trace of hesitation, upon the strength of the evidence now before us, the T'sain or T'scing of Burma with the banteng of the Archipelago; thus reducing the number of known flat-horned taurines to three, all of which (we have much reason to conclude) are found together, or within the same district, in the Indo-Chinese region, if not also in the Malayan peninsula. What the Sumatran domestic cattle, observed

\* The Sambur of the Malayan peninsula, Sumatra and Borneo, or *Rusa equina*, would appear to be a smaller and lighter-built species, with longer and finer limbs, than that of all India, *R. Aristotelis*; the horns also being proportionally thicker, but less elongated. \*That of Java, *R. hippelaphus* apud Gray, is very distinct, and has invariably the inner prong of the terminal fork of each horn much longer than the outer prong, being the reverse of what occurs in the spotted Axis. The Javanese *Rusa* is also smaller than the Malayan; but the difference of size, as represented by Dr. S. Müller's figures of skulls (drawn on the same scale), is conspicuously much less than the difference of size of fine adult skulls from India and Java now under examination. How far northward the *R. equina* extends, we have been unable to ascertain; but *R. Aristotelis* is certainly that inhabiting Arakan. The Javaese species has long been naturalised in the Mauritius.

and insufficiently described by Sir Stamford Raffles, may be, remains still to be ascertained.

A further notice of the gaour may yet be quoted from the pen of Mr. Hodgson :—"The gaurs rut in winter and procreate in autumn, producing usually but one young at a birth. The period of gestation was in Nepaul always stated to me to exceed that of the common ox ; but Mr. Elliot will not allow this.\* The herds are ordinarily rather numerous, twenty, thirty, forty, and sometimes even double these numbers, being found together ; but in the breeding-season, not above ten or fifteen cows, with a single mature vigorous bull, who jealously expels every young and old male from his harem. The sub-Himalayan species entirely avoids the open tarai on the one hand, and the hills on the other, adhering to the most solitary parts of the sal-forest, close to and between the salient spurs of the hills, where the periodical firing of the under-growth of the forest never reaches. In the Dukhun these animals are said to penetrate into the hills in the hot weather—very partially, I fancy, or else they must then lack cover on the plain, for they are not a mountain race at all. They feed early and late in the more open glades of the forest, posting sentinels the while, and manifesting in their whole demeanour a degree of shyness unparalleled among the bovines [unless by *B. sondaicus*]. They never venture, even in the rains, when there is abundance of most rank vegetation to cover their approaches, into the open tarai to depredate on the crops, as the wild buffaloes constantly do ; nor do they ever associate or interbreed with the tame cattle, though immense numbers of the latter every spring are driven into their retreats to feed, and remain there in a half-wild condition for three or four months, when the wild buffaloes frequently interbreed with the tame ones of their kind, of which, likewise, vast numbers are depastured there. Old males of the gaour are often found solitarily wandering the forests they frequent, especially in winter ; but these have probably been recently expelled the herds by their more vigorous juniors, and re-unite themselves with some herd after the season of contention has passed. It is exceedingly difficult to rear the Gauri Gau in confinement : nor did I ever know a successful experiment, though the attempt has been, for fifty years past, constantly made by the Court of Nepaul, which finds no difficulty in rearing wild buffaloes and causing them to breed in confinement with the domestic species, which is thus greatly improved in size and other qualities.

\* There would seem to be some mistake about the excessively slow breeding of the gayal, one calf in three years only !

I have remarked on the excessive shyness of the gaur; and it follows that, when approached, they will retreat so long as they can; but if compelled to stand and defend themselves, they do so with a courage and determination not to be surpassed. Their beef is unequalled for flavour and tenderness [we have been told this likewise of the banteng]; but to the aborigines only it is illicit food, and not to all tribes of them, nor are any of them allowed to kill the gaur in Hindu kingdoms. The gaur stands from 6 to  $6\frac{1}{2}$  feet high at the shoulder, and is either of a ruddy brown *alias* tan, or of a black colour, the forehead and limbs below the mid-flexures being pale, and the forehead and knees [moderately] tufted. Captain Tickell, a good observer, believes that there are two species of Bibos in the Chota Nagpore territories alone! Doubtless close investigation will reveal many new species in the Bovinæ.

Not any more in cis-Brahmaputran India, we suspect; and we regard the identification of the continental Tsoing with the insular banteng as an important step gained. Strange indeed that such a question, referring to animals of such magnitude and interest to the sportsman, should not long ago have been settled, as all such questions require to be, by actual comparison of specimens; and still more strange that educated sporting gentlemen should feel so little interest in their decision,—that twenty years should have elapsed since Helfer, for example, called attention to the different species of bovines that inhabit the Tenasserim provinces, and that even yet they are not determined—the gayal for instance—with absolute certainty, and the banteng only now with a very near approach to certainty! Let us hope that these notices will awaken some attention to the subject.

The third primary division of the bovine animals is the bubaline, or that of the buffaloes, properly so called. We have treated of the bison-tine, which comprises—*first*, Ovibos, or the musk cattle of Arctic regions; *secondly*, *Bootherium*, extinct; *thirdly*, Bison, the true shaggy bison of the north temperate zone; and *fourthly*, *Poephagus*, or the yak of high Central Asia. Also of the taurine, in which we recognise three principal types,—*first*, Bos or Taurus, exemplified by the domestic cattle of Europe and Northern Asia; *secondly*, Zebus, or the humped cattle of the tropical regions of the anciently known continents; and, *thirdly*, Gavæus, or the flat-horned group peculiar to tropical and juxta-tropical Asia. We now arrive at the bubaline series, or that of the true buffaloes.

These animals are peculiar to the warmer regions of the eastern hemisphere, and are at once recognised and distinguished from other

bovines by their hog-like aspect and wallowing habits,\* and their relative thick and thin clad hide, the hairs of which are inserted vertically; in short by their pachydermatous exterior, superadded to the ordinary characters of the group. Their horns are flattened and mostly directed downwards and outwards, with a greater or less inclination backwards, then uncinating or gradually curving upwards to the extremity. They carry the nose horizontally, being much guided by the sense of smell; and it is a position in which they pass hours in the water, having little more than the nostrils above the surface. Their proportions are heavy, indicative of this aquatic propensity. Though inhabitants of hot climates, no animal is more impatient of heat; and nothing can prevent the domesticated races from plunging or wallowing whensoever an opportunity offers, at least when weary or over-heated,—which of course unfits them for being laden with any article to which moisture is injurious. They float, and commonly sleep in the water, and cross the broadest rivers with little effort; the females, when danger from crocodiles or other foes may be apprehended (like hippopotami), carrying their young upon the back.† They can also run swiftly up to their bellies in the stream. Hills are naturally avoided by them (albeit they thrive in hilly districts), though they scramble up steep acclivities with surprising ease, where horses cannot follow; and they prefer the coarse plants of the forest, and such as grow in swampy districts, to those of open plains. It is even stated that during the inundations of the great tropical rivers these animals frequently dive, and employ their horns to draw aquatic plants to the surface, where they feed on them, while drifting with the stream.‡ Their habits are, for the most part, gregarious (as with the bovines generally), the leader of a herd expelling the younger males as they acquire prowess to cope with him; and such banished individuals (like *san* elephants, &c.), are particularly savage and dangerous to encounter. Their voice is a low rumbling moan. In their combats they strike and butt with the forehead (like all other bovines), endeavour to lift the opponent on their horns, and when thrown, to crush him with their knees: they trample upon the body; and their vindictive fury is so lasting that they will return again and again to glut their vengeance on the same inanimate corpse. The Cape species tosses like a common bull, as the flexure

\* The American bison, however, is a good deal of a wallower.—*Vide* Catlin's work and its illustrations.

† Marsden's 'History of Sumatra,' p. 95.

‡ Pennant's 'Hindustan,' vol. i. p. 115.



of its horns would intimate; but the long-horned Indian buffaloes attack a man or tiger by goring, which, notwithstanding the backward curvature of their horns, they effect by bringing the head close under the breast (much in the manner of an oryx), and charging with the point of one horn directed forwards and almost touching the ground; the action is, however, the same in both cases. "Upon an attack or alarm," writes Marsden, "these animals flee to a short distance, and then suddenly face about and draw up in battle array, with surprising quickness and regularity; their horns being laid back, and their muzzles projecting. Upon the nearer approach of the danger that threatens them, they make a second flight, and again halt and form; and this excellent mode of retreat they continue till they have gained a neighbouring wood." They manifest the same antipathy to glaring colours, and particularly red, as the rest of the group, and likewise as the gnus (*Catoblepas*), of which sundry anecdotes have been recorded; but, as in other cattle, habituation to the sight of such colours renders them indifferent to them, as Sonnini remarked of the domestic buffaloes of Egypt, where the inhabitants, besides their red turban, wear also (in general) a shawl of the same colour enveloping the neck and chest. The flesh of buffaloes is extremely coarse and cellular, like that of the elephant, rarely fat, and of rank unpleasant flavour; but the milk of the female, though not so sweet as that of the cow, is good, and given in great quantity: \* the hide, also, is very substantial, and, when well tanned, proves equal to every purpose to which stout leather is applied. Lichtenstein remarks, of the Cape species, that its ribs are extraordinarily broad, leaving scarcely any intervals between them; which is perhaps a character of the buffaloes generally, though something very like it may be seen in ordinary "ribs of beef." The young (both of the African and Asiatic species) are born of a whitish colour, which is succeeded by yellowish buff hair, when the animal is a third grown. Those of Asia and Africa form two natural sub-divisions; the horns of the Asiatic being more widely separated at base, though the *Bubalus brachyceros* of middle Africa is intermediate in this respect. The African have also rounder ears, which in *B. brachyceros* are extraordinarily large; the Asiatic buffaloes having a more lanceolate form of ear,—like the humped taurine cattle, as opposed to the European type

\* Mr. Paget, in his work on Hungary and Transylvania (vol ii. p. 227), states that it is richer than that of the cow; but we suspect the quality varies much in the different races. Buffalo's milk is, indeed, particularly esteemed in the Dukhun and north-west of India.

of taurines. So far as known, all bubalines have, normally, thirteen pairs only of ribs, like the taurines; not fourteen or fifteen pairs, as normally (so far as known) in the bisontines.

The Indian buffalo—(*Bos Bubalus*, L.; *Bubalus buffelus*, Gray; *B. Arna*, H. Smith—at least in part; *B. speiroceros* and *B. macroceros*, Hodgson). Domestic buffaloes are so familiarly known in this country, that an elaborate description of the appearance of the animal is unnecessary. They are ungainly and clumsy-looking creatures, but useful in their way, from their great strength and fair amount of docility combined with their adaptation to marshy localities and wet and heavy soil. Emphatically, they are the beasts for tilling the ground in ordinary rice cultivation, which is mainly conducted by their aid; and they are the only domestic cattle over extensive regions of the Malayan Peninsula and Archipelago, the south of China, and much of Indo-China, and have long been introduced into Lower Egypt, Italy and Hungary, the marshy tracks bordering on the Black and Caspian Seas, and latterly on the shores of the Gulf of Carpentaria, in Northern Australia, by the Malays; and in all these different countries many have returned to wildness, not excepting in Australia. In America it does not appear that the domestic buffalo has ever been introduced, and its name is there usurped by the bison.\* There is considerable difference, however, between some of the races of domestic buffaloes, and to this we shall advert in the sequel.

As an Indian animal, Mr. Hodgson thus describes the common buffalo:—"Habitat of the tame, universal; of the wild, also everywhere that adequate cover and swamp exist. The haunts of the Arna or wild buffalo are the margins rather than the interior or primeval forests. They never ascend the mountains, and adhere, like rhinoceroses, to the most swampy sites of the districts they frequent. There is no animal upon which ages of domestication have made so small an impression as upon the buffalo,† the tame species being still most clearly referrible to the wild ones at present frequenting all the great swampy jungles of India. But in those wildernesses, as in the cow-houses, a marked distinction may be observed between the long-horned and curve-horned buffaloes—or the *B. macroceros* and *B. speiroceros* of my catalogue—which, whether they be separate species or merely

\* A correspondent of the 'St. Louis Republican' states, in a late number, that "the Utah mail encountered myriads of 'buffaloes' feeding upon the luxuriant grasses of the plains, blocking up the highways, so as to delay it, while deer and antelopes were more numerous than ever seen before."

† We think the donkey might bear comparison.

varieties, I shall not venture to decide, but I incline to regard them as species. The length of the horns of *B. macroceros* are sometimes truly enormous, or  $6\frac{1}{2}$  feet each.

“There is such a pair in the British Museum, and another pair I saw in Tirhoot. The Arna ruts in autumn, and the females produce one or two young in summer after a gestation of ten months. The herds are usually numerous, and sometimes exceedingly so, though at the season of love the most lusty males lead off and appropriate several females, with which they form small herds for the time. This noble species is, in the sal-forest and tarai, a truly stupendous animal, as tall as the gaour, and longer considerably, and of such power and vigour as by his charge frequently to prostrate a well-sized elephant! The wild animals are fully a third larger than the largest tame breed,\* and measure from snout to vent  $10\frac{1}{2}$  feet, and 6 to  $6\frac{1}{2}$  feet high at the shoulder. The wild buffalo is remarkable for the uniform shortness of its tail, which extends not lower than the hock; for the tufts which cover his forehead and knees; and, lastly, for the great size of his horns and the uniform high condition of the animal, so unlike the leanness and angularity of the domestic buffalo's figure, even at its best.”

This difference in the development of the wild and tame buffalo is equally observable where the two frequent the same pastures and commonly interbreed; and we believe the main reason of it to be, that the tame calves are deprived of their due supply of milk.† The importance of an ample supply of suitable nourishment in early life, as bearing on the future development of any animal, cannot be over-estimated. It occasionally happens, during great inundations, that many wild buffalo-calves are noosed while swimming about and added to the domestic herds.

Still, it is remarkable that this swamp-frequenting animal thrives particularly in hilly districts. The domestic are particularly fine

\* In like manner, the sub-fossil urus is fully one-third larger than the largest breeds of domestic taurines of the same type. This remarkable analogy of the wild and tame buffalos should be borne in mind.

† Since the above was in type, a friend who has just returned from Maulmein has confirmed us in this opinion. He remarks that he never had an idea of what a fine buffalo was, till he saw those of Burma. They are there much larger than in Bengal, with splendid horns, and altogether a vastly superior animal,—in fact, resembling the wild buffalo. The Burmese never milk them; having the same strange prejudice to milk which the Chinese have, though otherwise both people are nearly omnivorous.

towards the sources of the Nerbudda ; and Mr. Harkness, in his work on the aborigines of the Nilgiris, remarks that the tame buffaloes there are " fine large animals, mousters in comparison to those of the low country,"—and again, " the buffalo of the Nilgiris is of a much better description than that of the low country, and the milk they yield is of a flavour and richness superior to any of the kind I have met with. The climate seems better adapted to them than that of the plains. They are not tormented by the innumerable flies and other insects that in the latter force them to plunge into water, or, as the case may be, into some muddy pool, remaining there for the greater part of the day with just their foreheads and nostrils above the surface ; but here they quietly range over the downs, in herds often from 100 or 150 to 200, unmolested and unannoyed, feeding on a rich and luxuriant herbage, more adapted to their taste than the finer kinds of grass." Few sights surprise a novice more in India than to see a herd of these huge brutes emerge from a small muddy tank, where the presence of so many great animals was previously unsuspected.

In western Malasia generally, and especially in Sumatra, as about Bencoolen, albino buffaloes are very prevalent, having the same disagreeable leprous look as the white elephant. Those of the Philippines and China are uniformly small, but robust, and this seems to be the race figured by Dr. Salomon Müller.\* They are finer, however,

\* Tame buffaloes seem to be co-extensive in range with the Malayan race of mankind in the Archipelago ; but we do not hear of that race having transported them to Madagascar. There is much rice cultivation, however, in that island, where the ground would appear to be tilled by a superior race of the humped cattle. With regard to the humpless wild race of cattle in Madagascar, hitherto undescribed, it seems that these animals are very numerous in the province of Mena-bé, which occupies much of the western portion of the island. In Mr. J. A. Lloyd's ' Memoir on Madagascar,' published in the 20th volume of the ' Royal Geographical Society's Journal,' we read (p. 63) that " the northern part of Mena-bé contains great numbers of wild cattle. Radama and his officers, in one of their warlike expeditions amongst the Sakalami, passing through this country, killed upwards of 340 oxen in one day for the use of his army, and two days afterwards 431 more were killed by the soldiers." All that we can as yet learn of this race (or probably species) is, that it is humpless, and with longer limbs than the cattle of Europe.

There are " wild cattle " of some sort in Albania ! (*Vide* Count Karacsay's " Geographical Account of Albania," published in the ' Royal Geographical Society's Journal,' vol. xii. p. 57). Are these bisons, or a primitive taurine stock, or tame cattle gone wild ?

We have not thought it worth while to note down every locality where European cattle have returned to wildness ; as in the Sandwich Islands, where poor Douglas, the botanical collector, met his fate in a pit-fall with a wild bull, and even in Rodriguez !—*Vide* ' Journal Royal Geographical Society,' vol. xix. p. 19.

towards the north, as in the Chusan Archipelago.\* Those of Lower Egypt are quite similar to the ordinary tame buffaloes of Lower Bengal; and Ruppel remarks that they are now found also in the wild state in the marshes of the Egyptian Delta, where termed Gamus. We have remarked that they have likewise gone wild on the north coast of Australia, where introduced by the Malays.† Chesney tells us that they are found in a wild state towards the shores of the Black Sea. The tame are numerous in Armenia, Persia, Kerdistan, Mesopotamia, and in all suitable districts of Arabia; in which last-named peninsula Chesney remarks that—"Next to the camels, in point of number, are buffaloes, which are to be found in most places where water is abundant [no prevalent feature of Araby the Unblest!]; their milk is rich and tolerably good, although inferior to that of the goat or cow."‡ From these countries they spread westward as far as Hungary and the valley of the Nile; and are now also on the island of Zanzibar, on the east

\* "In its productions, Chusan does not materially differ from the adjacent mainland of Ning-po. The sleek and small cattle and the buffaloes, larger than those in the South, are used exclusively for the plough, and never slaughtered for the use of the Chinese, so near to the head-quarters of Buddhism in the neighbouring island of Pooto."—Sir J. F. Davis, in 'Journal Royal Geographical Society,' vol. xxiii. p. 248.

"In Kambodia the buffalo lives amongst mud and ditches, and is a very powerful animal: further north its fierceness much decreases. The bullock is of a very small breed."—Gutzlaff, in 'Journal Royal Geographical Society,' vol. xix. p. 104. Here "all that comes from the cow is held in abhorrence!"

† Dr. Leichardt, in 1845, remarked that buffaloes were "very numerous at Baki-Baki's Creek, which joins Mountnorris Bay. They are equally abundant between Raffles Bay and the harbour: the whole country, particularly round Baki-Baki's Bay, and on the neck, being as closely covered with buffalo-tracks as a well-stocked cattle-run of New South Wales could be."—'Journal Royal Geographical Society,' vol. xvi. p. 237.

‡ It may here be remarked that the humped cattle of Arabia generally are "of a very small and poor race, and are never, but with the greatest reluctance, killed for food." (Wallin, in 'Journal Royal Geographical Society,' vol. xxiv. p. 148). Chesney remarks of them, that "bulls and cows take the next place to the buffalo, and like those of India, they bear a hump, and are of small size; some bullocks purchased at Suweideyah, produced each only about 224 pounds of meat." Again, in his 'Appendix' (vol. i. p. 279), he enumerates, among the domestic animals of Arabia and Mesopotamia, "both the common bull and cow, and the bull and cow with hunch." In the province of Kerman, in Persia, Mr. Keith C. Abbott remarks that "the oxen in this part of the country are of a small humped kind, and are commonly used as beasts of burden; people also ride on them, seated on a soft pad, and a rope is passed through the nostril, by which they are guided."—'Journal Royal Geographical Society,' vol. xxv. p. 43.

coast of Africa.\* Those of Circassia, as we were informed by the late J. Stanislaus Bell, “agree with the Italian in their highly-bombed forehead and ponderous conformation, as also in the abundance of excellent milk afforded by the cow (often for two years, as I was assured); but the horns—especially those of the female—are very long, incline backwards, and are much curved, annulated and serrated: attitude that of the Indian buffalo; the tail with its terminal tuft not reaching above half-way to the ground. The young are of a dusky brown; but the full-grown are almost invariably black, without a single spot of white; and their stature exceeds considerably that of the largest European [taurine] cattle.” We recognise in this description an animal similar to the tame buffalo of the Nilgiris.

According to a writer in the ‘Bengal Sporting Magazine,’ “there is a wide difference observable between the buffaloes in and about Behar, and those found near Titiláya: the former have invariably very thick but short horns, the latter (as invariably) remarkably large spreading ones;” and another writer in the same work portrays the horns of the wild buffalo of Asám, as contrasted with that of the Sunderbans.† These races are the *B. macroceros* and *B. speiroceros* of Mr. Hodgson. In the former the horns proceed out almost straightly, with a somewhat abrupt hook inward towards the end; in the latter they curve uniformly throughout, or very nearly so, to form a flat semicircle, with the usual slight tendency backward at the extreme tip. The horns of the fossil buffalo of the Nerbudda deposits (*Bos palæindicus* of Cautley and Falconer) have again another flexure, inclining backwards, outwards, and somewhat upwards, in a sweeping curve. In all, the cow-horns are more slender, and not unfrequently much longer, than in the bull.\*

\* “Bullocks, cows, and water-buffaloes are to be had at Zanzibar, but are seldom or never killed for food; they are used to carry loads (but not for draught), and are as dear as 50 dollars each.”—‘Journal Royal Geographical Society,’ vol. xxiii. p. 107.

† ‘Bengal Sporting Magazine’ for September, 1836, p. 203, and *ibid.* October, p. 231.

‡ Of abnormal horns of the Indian buffalo, we have a drawing of a pair of cow-horns (attached to the skull) from Southern India, the flexure of which is nearly that proper to the horns of the Caffrarian taurine cattle, with the tips pointing outwards! Distance apart from tip to tip 9 feet 5 inches.

The late Mr. R. W. G. Frith, who was a very close observer, considered that there are “two races of wild buffaloes in India, both of which are likewise found domesticated. One, the Kachar bhainse, is distinguished by its greater height, having longer limbs, by the general absence of hair at all seasons, and by its longer and slighter horns, which vary in form considerably more than those of the other. The

The Italian buffalo is a very different-looking beast from that of India, at least from the ordinary tame buffalo of Bengal. His carriage is different—less emphatically bubaline; he is better clad, and has a remarkably convex or bombed forehead, and short horns, that curve much down, then out and up, with the usual slant backward, which, however, is but slight. The tail, too, with its tuft, descends quite to the fetlocks. He is commonly more or less splashed with white; but this we have observed of many Indian buffaloes, especially in Oude.\* If our information can be relied upon, the same race is found in Sindh. Hornless individuals occur sometimes; and skulls of this race, both horned and hornless, are figured in the ‘Ossemens Fossiles’ of Cuvier. The buffalo is stated to have been introduced into Lombardy from India by King Agilulf, who reigned from 591 to 616,\* and has now gone wild, as usual, in the Pontine marshes. It was first described as the “Arachosian ox” by Aristotle; the site of the ancient city of Arachosia being near the modern Kandahar, as determined by Rawlinson in 1841.

The Anoa buffalo—(*Bubalus depressicornis*; *Anoa depressicornis*, C. H. Smith). This is a very curious little animal, from the mountains of Celebes, of which there is now a stuffed specimen in the British Museum; but we are unaware that aught has been added to its history since the time of Pennant! We have seen several frontlets, and one entire skull (minus the lower jaw), of which we possess drawings. Pennant remarks, in his ‘History of Quadrupeds,’ that the Anoa is a

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calf, however, is densely clad with slaty white hair, having constantly a medial white mark on the fore neck and chest, crossed by another on the fore part of the neck. This is the more valuable of the two to the herdsmen, on account of its giving more milk. The other stands lower on the legs, is altogether a thicker-made animal, and much more hairy; the horns are much thicker, and very rugous or deeply furrowed in the males; the calf has no white cross on the breast, and is of a more rufous colour than that of the other. This race is called the Bhángar. Both occur in the same herd, but the former are less numerous; and they breed freely together, the offspring of the first, second and third crosses being readily distinguished by the herdsmen; nevertheless, characteristic specimens of both are generally to be found in every herd.” We should be glad if any reader could verify and further carry out these observations.

\* Black, white and pied, or rather black splashed with white. We have seen no intermediate shades of coloring, except in the calf.

† “Tunc primum caballi sylvatici et Bubali in Italiâ delatis, Italiæ populis miraculo fuerunt.”—Warnefridi, ‘De gestis Longobardorum,’ Lib., vol. iv. c. 2; Misson’s ‘Voyage,’ vol. iv. p. 395, as quoted by Pennant.

very small species of buffalo, of the size of a middling sheep. They are wild in small herds, in the mountains of Celebes, which are full of caverns. They are taken with great difficulty, and even in confinement are so fierce that Mr. Soten lost in one night fourteen stags [*Rusa* ? — ?], which were kept in the same paddock, whose bellies they ripped up.”

In an excellent treatise on the generic sub-division of the hollow-horned ruminants, by R. N. Turner, jun., published in the ‘Proceedings of the Zoological Society’ for 1851, it is remarked that—“Although Colonel C. H. Smith was deceived as to the affinities of the Anoa, later as well as earlier naturalists have assigned it to its true place, and a glance at the stuffed specimen in the British Museum leaves the matter beyond a doubt. I have examined the skull in the Museum of the Royal College of Surgeons, and cannot see that it has even a title to generic distinction. Naturalists seem at all times to have been prone to assign generic rank to whatever was mysterious or difficult to classify, and I can in no other way account for this species being made a genus.”

Mr. Turner does not carry the sub-division of the bovines beyond Bison, Bos and Bubalus; but he admits Ovibos, and remarks of it:—“This animal, which derives its name from its general aspect being intermediate to that of the ox and that of the sheep, has generally been placed among the bovine forms. Taking the aggregate of its characters it appears to me to be at least as nearly, if not more, allied to the sheep, but should most properly stand alone.” To us it appears to be immediately connected with the bisons by the intervention of the fossil genus *Bootherium*. Mr. Hodgson, on the contrary, would separate the African buffaloes from the Indian; admitting which separation, the Anoa should be likewise so distinguished.\*

The Anoa has straight, flat, bubaline horns, continued back nearly in a line with the forehead, as in the Cape or Abyssinian oryx, or as in the eland; they are shorter than the head, smooth, and very sharp-pointed, and are depressed below the plane of the visage; they scarcely diverge in their exterior outline, but sharpen off from about the middle

\* Of the *Budorcas taxicolor* of Mr. Hodgson, Mr. Turner remarks that “a glance at the representations of the skull indicates very plainly that it is closely allied to *Nemorhedus* [in which we think he is altogether wrong in associating the goral with the *surróws*], to which Mr. Hodgson admits certain resemblances, and that it has no relationship with the gnus or the musk ox.” This quite coincides with our own opinion.



in their interior outline.\* In our drawings, made carefully on the scale of an inch to a foot, the total length of skull, from vertex to tips of intermaxillaries, should be  $13\frac{1}{2}$  inches; greatest breadth posterior to orbits, 6 inches; length of horns, 9 inches; width apart at base,  $1\frac{1}{2}$  inch; at tips  $4\frac{1}{2}$  inches; width apart at base, measuring from the outside, about  $4\frac{1}{4}$  inches. The dagger-like shape of the horns indicates them to be extremely formidable weapons. We can hardly think that this very small animal can be the "wild cow" of Celebes. It is the *Bos bubalus*, var. B, of Pennant; and some other species, unknown to modern science, he has certainly indicated by his var. A, which he has very rudely figured, and describes as follows:—

"Naked: a small sort, exhibited in London some years ago, under the name of *Bonassus*; of the size of a runt: hair on the body bristly, and very thin, so that the skin appeared; the rump and thighs quite bare, the first marked on each side with two dusky stripes; horns compressed sideways, taper, sharp at the point.—East Indies."† Can this have been one of the "wild cattle of Timor Laut," noticed by Mr. Earl, but said to have "upright horns?" Pennant's figure would seem to represent an animal nearly akin to the *Anoa* of Celebes, with depressed horns curving a little inwards. He represents two dark bars on the naked rump, and two others across the thigh; the neck and body anterior to the haunch being clad with longish hairs.

(To be continued.)

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*Addendum to the Paper on Bovine Animals : the Cattle of Egypt and Nubia.*—“ In the upper countries the cattle are of a peculiar and probably distinct species of ox, very much like our own, but with a hump on the back ; and the females are, as milch cows, good for nothing, being always nearly dry ; so that we could scarcely ever procure cow’s milk, even when meeting with large herds of them, much as we should have preferred it to that of goats. Our common breed or species is also seen in Nubia, &c., but more rarely. In most parts of Egypt, but especially in the lower pro-

vinces, the common and hump-backed cattle are in a great degree supplanted by the buffalo, to which we were indebted for some of the milk obtained in Egypt, and all the abominable mass of indigestible fibres sold for beef. The buffalo has not made its way very far beyond the second cataract, or into Nubia. It is an excellent swimmer; thousands may be seen on the banks and shallows of the Nile during the heat of the day, luxuriously reposing, with only their heads, or even the tips of their hippopotamus-like noses, visible above water; the stream that is continually passing over them bringing renewed coolness with it. At times one envies them their position." (The late Dr. W. Arnold Bromfield, in the 'Zoologist.') As contrasted with the buffalo, of course the humped cattle are "very much like our own;" but the hump is only one of many distinctions, as already noticed in detail. We learn, however, something of the present range of the domestic Indian buffalo in the valley of the Nile. The ox of Cochin China, as noticed in Crawford's 'Embassy to Siam and Cochin China,' p. 479, "is a small animal, uniformly of a reddish brown colour, and destitute of the hump so remarkable in the Indian cattle." It is not identified by this author with the humpless cattle of Siam, which he also notices. From Johnson's 'Indian Field Sports' (p. 24) it would appear that the gaour (*Bos gaurus*) inhabited the hill districts bordering on the Damooda so late as about half a century ago; nor would it appear to have been then of rare occurrence. Describing a "hunquah," or grand hunting party, when the game had been driven from all quarters to a particular jungle, he remarks, "If any credit could be given to the assertions of the people, there were very few of them who had not seen tigers, leopards, gours (a species of wild bullock), and all sorts of wild animals in the course of the day." The banteng (*B. sondaicus*), we have lately been assured by our late and much-lamented friend Major Bedmore, is found in the southernmost part of the Tenasserim provinces in large herds; the animal so much resembling the humpless domestic cattle that our informant, at the time of his personally observing them, was not aware that it constituted a peculiar wild species. We have also learned that "feral" humped cattle are numerous in parts of the province of Mysore, where their beef is held in the highest estimation, and very justly so, according to the judgment of our informant, who speaks from practical experience.—*Editor of the 'Indian Field.'*

Mr. Westwood stated that he had himself made nearly the same observations as Mr. Stone, on the habits of the perfect *Sitaris*, many years ago, in a village, in Oxfordshire, when he had found it usually abundant, and had succeeded in rearing the larvæ from the eggs laid by the females. He had since been favoured, by Madame Audouin, with permission to make copies of the extensive series of observations made on the habits and transformations of the same species, by the late lamented Prof. Audouin, which he promised to lay before the Society at a future opportunity.

Part 3 of the current volume of the Society's 'Transactions' was on the table.—*E. S.*

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*Note on the Paper on Bovine Animals.*—In reading a very interesting paper on the "Species of Bovine Animals" in the 'Zoologist,' I found a statement (Zool. 6553) to the effect that buffaloes are the only domestic cattle over extensive regions of the South of China, and are used for the purpose of tilling the ground. I have no doubt it would afford some information to your readers to state that in Amoy and its neighbourhood the small yellow cow is chiefly used for ploughing the wet paddy fields. The buffalo is mostly kept for its milk, which article the natives in the neighbouring country of Chang-chow consume largely, though the Amoyites will not touch it. It is the only milk the Europeans drink here, and is much richer and more unwholesome than cow's milk. Buffaloes are slaughtered as well as cows for the market, but the flesh of the former somewhat resembles horse-flesh, and is far inferior to that of the latter, which in winter often puts us in mind of good old English roast beef. The Chinese here seem to have little partiality for beef, and it is therefore the cheapest meat procurable. The yellow cow is rather a timid animal, and always turns tail when a stranger approaches. Not so the buffalo: this brute faces you and snuffs at you, and has often been known to chase a European for a considerable distance. The only two-legged animals it seems to humour are the black magnalis (*Acridotheres cristatellus*, Linn.) and the russet egrets (*Bupluris rufator*, Temm.) I have often seen several of these perched on the backs of buffaloes who were wallowing in the water or quietly grazing. Sometimes, in catching a fly off the sides of the buffalo, the egret would give the brute a sharp "dig," but the buffalo would merely turn his head round, and then continue grazing as before.—*Robert Swinhoe; British Consulate, Amoy, August 1, 1859.*