ON THE OCCURRENCE OF WILD BUFFALOES IN JAVA AND SUMATRA.

By

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With reference to my previous paper on the prehistoric mammals from the Sampoeng cave I should like to discuss here in more detail the question whether there still are living truly wild buffaloes in Java and the Indian Archipelago generally.

The first point for consideration is: is the fossil and prehistoric buffalo found in Java identical with the recent tame form? As to the fossil form discovered in pleistocene beds DUBOIS described it as a specific form, *Bubalus palaeokerabau,* differing from the recent species in the shape of the horn cores, the cross section of which is triangular to nearly half-circular, the frontal edges above and beneath being angular. This shape of the horn core, however, is also encountered in the recent form and does not warrant specific distinction. Later on STREMME gave a more detailed description of a cranium, arriving at the conclusion of the fossil form belonging without doubt to *B. palaeokerabau,* but at the same time emphasizing the very close relationship to the recent species.

Therefore it is no matter of surprise that at present palaeontologists unit the fossil and recent species. V.D. MAAREL considers the fossil buffalo of Java indistinguishable from the recent one, although the fossil form is diverging by the greater constriction of the occiput. However, in his opinion this difference is not even sufficient to allow racial distinctness. Consequently the fossil form has, according to him, no right to specific distinctness and is called *Buffelus bubalus* var. *sondaicus fossilis.*

This author had only some skulls and two separate horn cores at his disposal. Concerning the name given by him it is very doubtful whether this name can be applied to the fossil form. The name *sondaicus* was introduced by SCHLEGEL and MÜLLER for the tame race of the Archipelago, on account of its showing some deviations from the wild buffalo of India and the domesticated form of Asia and South-Europe. Although they give a full description they do not tell what these differences are and the name *sondaicus* is therefore not quite valid. Moreover, application of this name of a domesticated race to the fossil species supposes first that the former is racially distinct from other domesticated or wild forms and in the second place that the fossil form is the true ancestor of our present buffalo in Java. For both suppositions no arguments are given and both question are still open for discussion.

Now as already mentioned in my previous paper the prehistoric buffalo discovered in the Sampoeng cave is much larger than the recent domesticated form in Java and the few bones found match exactly those of the fossil species (see Pl. 12). Up to the present a good description of this fossil buffalo has not been published, but in the Geological Museum at Bandoeng a great amount of material is extant and an almost complete skeleton has been mounted. The figures given below I owe to Dr. VON KOENIGSWALD, palaeontologist of the said Museum.

Measurements of fossil and recent buffaloes (in mm)

	fossil	recent
height at shoulder	1600 [1]	1300 - 1450
total length of skull	± 550	468 - 533
zygomatic breadth	280	196 - 219
total length of mandible	524	427 – 460
length upper molar series	166	128 – 145
length lower molar series	164	138 – 159
length of lower m_3	43 – 45	35.1 – 39.6
length of humerus	383	327
length of radius & ulna	500	404
length of femur	534	388
length of tibia	514	366
length of calcaneum	185	152 5
length of astragalus	101.6 – 106.5	74.6
basal girth of horn core	340	202 – 304
greatest length of horn core	1300 [2]	283 – 451

[1] height of skeleton. [2] tip broken off.

From these figures the great difference in size between the fossil and tame buffalo of Java is claerly demonstrated. According to MERKENS the average height of the Malay buffalo is about 1.30 m, castrated bulls may reach a height of 1.45 m, whereas the wild Indian buffalo is said to measure in height up to 1.80 - 1.90 m. Yet size alone does not prove specific gradation and as moreover many prehistoric animals are much larger than their recent congeners the difference may be of racial rank only. We should call also attention to the fact that the living banting (*Bos banteng* RAFFL.), specially the bull, is of a much more vigorous and heavy build, reaching a height at the shoulder of 1.60 m and with a total skull length of 50 - 55 cm, than the ordinary Bali cattle which is considered a practically pure banting breed. A Bali bull reaching a height of 1.30 m and having a skull length of 45 cm is a good specimen. So it need not occasion surprise if the recent tame buffalo is only a diminutive of its pleistocene and prehistoric ancestor, particularly as in Java and other islands of the Indian Archipelago there is hardly any selection and much inbreeding.

That under favourable circumstances the buffalo may develop into a much heavier animal is demonstrated by some specimens living in a semi-wild state. Well-known are the enormous horns of buffaloes in Sumba, the largest ones in possession of our Museum reaching nearly 3 m from tip to tip. KOPSTEIN relates of the feral buffaloes occurring on Tenimber Island that they have got "ungeheure, dunkle Köpfe mit langen, schwarzen Haaren und mächtigen Hörnern, wie man sie beim javanischen Hausbüffel niemals sieht". These beasts could not be tamed and young individuals live only a short time in captivity.

As there is consequently no reason for repudiating the descent of the domesticated race from the form living in ancient times in Java the question arises whether there are still truly indigenous buffaloes living in Java, or elsewhere, and by which diagnostic features a wild form can be distinguished from a tame one. It is rather suprising to learn that these differences are nowhere clearly defined and that I was not able to get material of a really wild specimen. At my request at the Indian Museum at Calcutta for such material they told me that all the skulls in the said museum were of doubtful origin and obviously it could not be determined whether they originated from wild or tame specimens. The only skull of a so-called wild buffalo I saw was a specimen from Sarawak kindly lent for comparison by the Sarawak Museum.

However, some characteristics seem to be inherent to wild buffaloes, which does not mean that these are always absent in tame individuals. In the wild form the forehead should be flat and the profile line straight. The parietal region in lateral view is protruding as an extensive zone behind the horn core. The horns are in the same level as the front of the head or but slightly curved downward. A wild race is further characterized by the strong development of the grooves for the bloodvessels and nerves and the rough surface of the skull-bones (Cfr. RÜTIMEYER).

In tame specimens the front behind the orbita is often raised by the extension of the sinus frontalis, the horns are not seldom curved inwards and inclining downward and the surface of the skull-bones is mostly smooth. Thus, if a specimen exhibits some features opposed to those postulated as characteristic for a wild form, this argues evidently the influence of domestication. The reverse being the case it is, however, not so easy to decide whether we are dealing with a genuinely wild race.

Now I have examined five buffalo skulls, two from East-Java and three from South-Sumatra, of individuals shot from a herd living in a wild state. It is interesting to see how far these specimens show features proper to the wild form.

Of the first specimen, a bull, collected in South Banjoewangi, East-Java, in December 1916, only the frontal portion with horns has been preserved. The facial profile is straight, the horns in the same horizontal plane as the front, further, the strong rugosity of the supraorbitalia and frontal bones is very striking, but the grooves are less conspicuous. The horns are nicely curved in a semi-lunar form, very heavily built and broad, tapering rather rapidly

towards the tip (see Pl. 13). They are transversely sculptured by a number of broad and deep irregular grooves; the horns as well as the cores are flattened above, the frontal edges being very angular.

In many respects a skull without mandibles in possession of the Buitenzorg Museum (Coll. No. 758) agrees fairly well with the specimen referred to above. It was shot by the late Mr. TE MECHELEN at Vlakke Hoek at the extreme South-east point of Sumatra. Its characters are almost the same as in the Java specimen, the horns showing a similar shape and peculiarities, but the frontal breadth between the bases of the horns is large whereas it is extremely narrow in the skull from East-Java. It is also characterized by the strong rugosity of the frontal bones and the strong development of skull grooves (see Pl. 14).

From the same locality we have another specimen representing a younger animal (Coll. No. 759). Some features shown by this skull are certainly due to juvenile characters, e.g. the more rounded and less elongated form. In many other respects it approaches the other one from South-Sumatra, e.g. in the flat front, the angular horns and the deep skull grooves.

As already said we were able to compare these three skulls with one from Sarawak, a male individual shot at the mouth of the Baram river. This race is considered to be not domesticated or feral and has been given a special name (*Bos bubalis hosei* LYD.) on account of its smaller size and the relatively short horns. The type specimen has a white gorget on the throat and the lower part of the legs whitish.

The skull deviates from the Java and Sumatra specimens mentioned above by the markedly shorter and broader nasalia and the larger molar series. Above all the premolars are much heavier and broader, especially the lower ones, also the incisors are strikingly large. As to the horns these agree with the typical form found in the other "wild" specimens. The rugosity of the skull is less prominent.

Recently we received another specimen from South-Sumatra, collected by Mr. GROENEVELDT in Lais, Bencoolen. The skull aproximates the skulls from Vlakke Hoek but the "wild" characters are less striking and the horns are of poor form lacking the impressive broadness and fine massive shape being rather narrow and irregularly built, showing a constriction at a short distance from the base. The differences may be due partly to the specimen being a female.

The skin of the head of this specimen has been preserved. The general colour is rather dark, blackish above, the muzzle being whitish; inner sides of the ears adorned with long dirty white hairs. Underneath there is an elongated crescent-shaped whitish patch on the throat as described in *B.b. hosei*, and another similar but smaller and less conspicuous marking on the chin.

At our request a second specimen from the herd living in South Banjoewangi was shot by Mr. LEDEBOER and kindly presented by him to the Museum (Coll. No. 3219). This female shows in a far lesser degree "wild" characters than the male shot many years ago. Although the frontal line is straight and the surface of the bones surrounding the orbita and horn bases is rather rough, these features

are spoiled by the rather strong downward deflection of the horns, which decline so much that, when the skull (without mandibles) is resting on the molar-rows, the tips of the horns rest on the ground too and the occiput is raised 7.5 cm above the groundlevel. The horns are also less angular and more rounded a condition often observed in tame individuals.

Mr. LEDEBOER told us that the buffaloes of this herd are remarkable for their blackish colour and having a semi-lunar white patch on the breast. So

Skull measurements of wild(?) and tame buffaloes (in mm)

Locality	Saraw wild?	S. Sumatra wild?		Benc. wild?	E. Java wild?		Java tame	Sumb. tame
Btzg. Mus. Coll. No.	♂ —	♂ 758	♂ 759	♀ 3393	♂ —	♀ 3219	♂ 3213	♂ 3220[1])
total length	468	533	474	492	510	522	503	512
basilar length	442	508	4 8	480	—	481	463	484
zygomatic breadth	196	214	207	198	217	219	207	213
greatest width	210	250	205	229	—	232	223	240
breadth below the horn pits	111	119	124	118	128	123	123	117
interorbital breadth	129	153	142	138	159	154	127	144
postorbital breadth	184	202	203	192	205	195	192	193
greatest breadth of rostrum	143	170	135	147	—	160	140	161
breadth of rostrum in front of infra-orb. canal	96	111	89	93	98	103	87	102
median length of nasals	166	203	196	190	201	201	209	204
gr. breadth of comb. nasals	60	68	52	58	67	61	50	60
palatal length	300	336	287	321	—	335	317	331
length upper molar series	145	139	—	142	—	132	135	128
length of m^3	31 5	31.0	—	28.2	—	31.2	28.0	28.2
breadth of m^3	21.9	25 1	—	20.6	—	24.5	21 9	25.0
length of lower molar series	159	—	—	158	—	149	150	138
length of m_3	39 6	—	—	35 1	—	38.7	37.4	38.7
breadth of m_3	16 3	—	—	15.3	—	18.3	16.8	17.0
breadth of i_1	23 7	—	—	19 0	—	15.3	—	13.8
breadth of i_2	23 1	—	—	18.8	—	13.7	17.7	14.1

[1]) castrated bull from Sumbawa.

Horn measurements

circumference of horn core	257	304	215	202	295	244	243	242
frontal breadth between horn cores	149	210	208	205	146	177	161	185
greatest length of horn core	325	451	283	322	425	390	286	387
tip-to-tip interval of horn cores	564	755	637	680	—	785	562	759
basal girth of horn	335	399	286	260	365	284	—	263
frontal breadth between horns	160	161	215	210	140	195	—	223
greatest length of horn	467	628	395	542	563	804	—	710
tip-to-tip interval of horns	547	702	759	763	773	690	—	605

we were very pleased when he also furnished the skin of the animal referred to above. But the colour is mainly ashy with a brownish tinge showing a prominent dorsal streak of long light tawny hairs; the head above dark brown, muzzle whitish; ears with long projecting whitish hairs. A white not clearly defined spot on the chin, the white patch on the throat very faintly indicated, another lunar spot on the breast somewhat obsolete. Forelegs brownish, underpart of the legs whitish from the knee and hock, with a peculiar $\underline{i}$ -shaped dun coloured spot on the front a little above the hoof, on the forelegs this spot being less clear. Tail ending in a blackish tuft the tip with a number of white hairs. The wild Indian buffalo has also sometimes whitish legs but in tame forms this colour seems to occur more often and to reach to greater height.

From what has been said above and from the figures given in the table we may see that these so-called "wild" forms are far from being homogenous. Although they exhibit some "wild" characters it still remains a debatable point whether we are dealing with truly indigenous or with feral individuals. The herd in East-Java is certainly not pure bred: there must be some influx of tame blood. The herd of Vlakke Hoek seems for the moment to be the most purely wild one but this herd too is said to be descended from tame buffaloes abandoned after the coastal people had been swept away by the huge tidal wave following the eruption of Krakatau in 1883.

In many other places there are still buffaloes living in a semi-wild state viz. in South Bantam, and many other localities. These beasts are called "kerbau jalang" which means "deserted buffalo". Unless the animals are marked by incisions of the ears or perforation of the nasal septum they belong to no owner but are property of the community in the neighbourhood of which they occur. Adult feral individuals are seldom captured for they are difficult to tame and cannot be used for ploughing or as draught animals. Apart from these "kerbau jalang" the natives in Bencoolen also speak of "kerbau hutan" or jungle buffalo. But about the latter catagory, living far from human habitations, very little is known.

Before ending we should like to review some of the tales and other data extant with regard to the origin of the buffalo in Java and elsewhere.

In West-Java according to TEMMINCK there runs a tradition that the first Hindu king of Padjadjaran was the first who used the buffalo for ploughing. This monarch received thereafter the name of "mahesa" (javanese for buffalo) and his son was titled "moending" (sundanese for buffalo).

RÜTIMEYER's statement that the words "kerbau" and "moending" both mean "run wild" is not correct and apparently due to a misinterpretation of the dutch text by SCHLEGEL and MÜLLER (p. 207), where they say that both "kerbau djalang" and "moending djarah" mean "feral buffalo", i.e. djalang and djarah = feral. For the exact meaning of the words mahesa and moending quoted above I am indebted to Dr. BOS, Head of the Archaeological Survey in Batavia. The title "mahesa" of which moending is an equivalent, means literally "male buffalo" but in the sense of "his majesty". In these names the official Hindu

titles are combined with the ancient Indonesian totem names, both originating from the same fundamental idea "the leader of the herd".

According to another version the buffalo in the same period came over from the jungle to men of its own free will (SCHLEGEL). This latter version may be some evidence for the suggestion that wild buffaloes have been tamed by the old inhabitants. The period of the kingdom of Padjadjaran was formerly put in much earlier times but according to more recent investigations its foundation has to be fixed as late as the fifteenth century. But the tradition coupled to a well-known historical person may as well date back from a much earlier period. Anyhow the nucleus of the tale certainly refers to the time when the buffalo was first used by men either by copying from other people or by taming indigenous animals.

Another fact worth mentioning is that on the Borobudur, the famous Hindu temple in Central Java dating from the 9th century, buffaloes are also reproduced but in the very rare case when a plough is depicted it is drawn by zebus! (KARNY).

Yet the use of the buffalo without doubt originates from a much earlier date than the arrival of the Hindus in the Archipelago in the first centuries of the Christian era. This is clearly demonstrated by the indigenous terms and and names customary to the cultivation of irrigated rice. This cultivation with which the water-buffalo is so intimately connected was already known to the primitive Malay people living here long before the arrival of the Indians. Furthermore the many native names for the buffalo — almost every tribe and every island has its own name for this animal in contradistinction to the name for the ordinary cattle — are an indication of the ancient use of the animal or perhaps of its original occurrence. RÜTIMEYER's conclusion from the same fact of the taming of the buffalo having occurred at a much later date than that of the common ox is certainly not right. In this part of the world the domestication of the buffalo has to date back from far more remote times.

Anyhow we may conclude that the generally admitted theory of all buffaloes living in a state of nature in the islands of the Indian Archipelago being domesticated specimens run wild need not be accepted anymore without further investigation.

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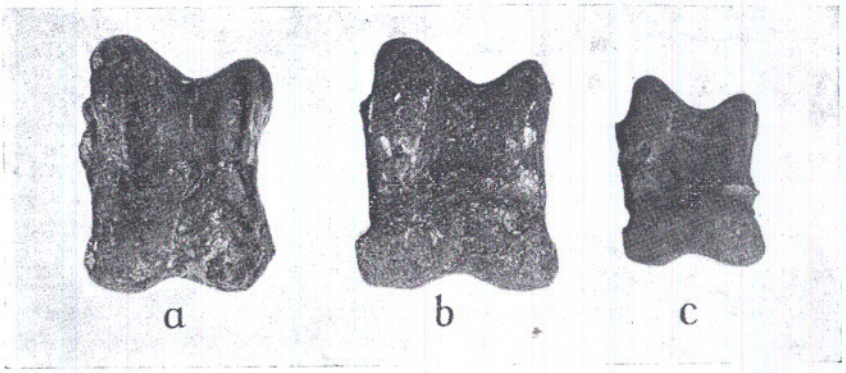
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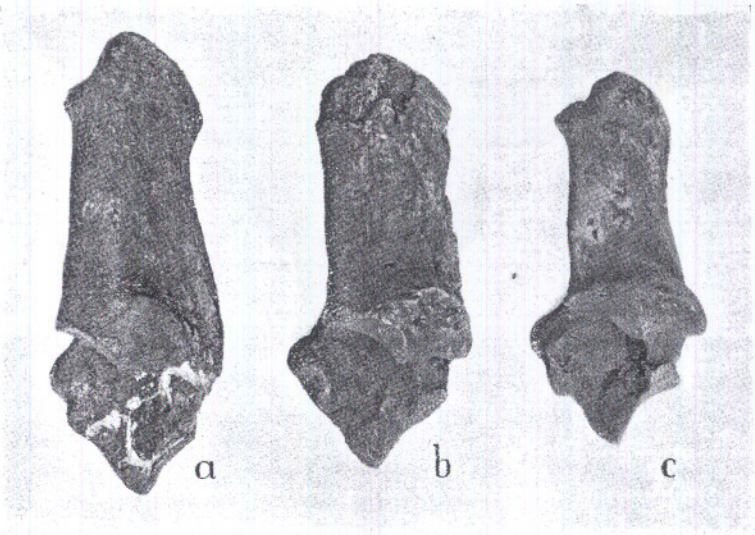
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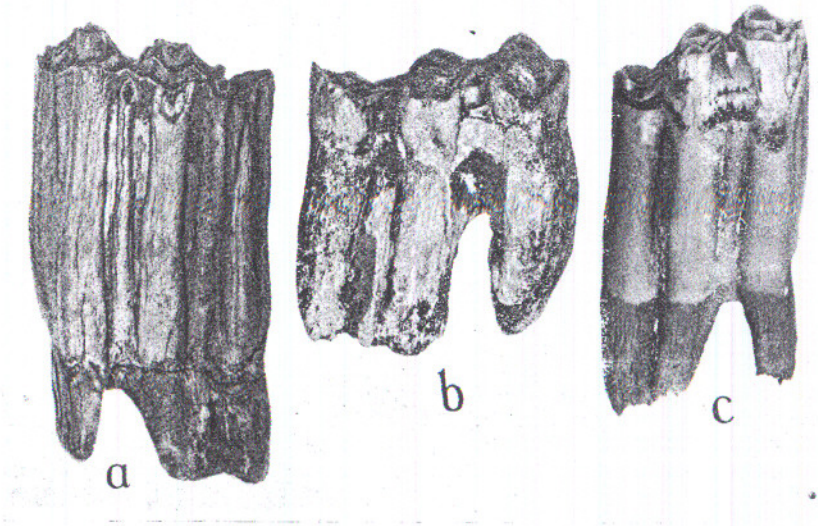
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