for it, that *bim-puluṭu* refers to the same thing as *bingmila* mentioned by Wright, and *ratmahāra* refers to land reverted to the Crown owing to re-growth of jungle.

c. Mr. Codrington here tries to show that I have misrepresented him by quoting one sentence and suppressing another. I do not know how he can justify this charge, when the one has no connection whatsoever with the other. The first refers to his description of the "appurtenances," which I was bound to discuss, while the second, which does not even occur in the same paragraph, has nothing to do with appurtenances.

With regard to the ownership of forest and waste lands in the village territory, he says that my "inference is quite unjustifiable," because he "was writing of the average village, not the exception (nindagama)." Even then, the difficulty still remains, because in what he calls the average village there is the gamarāla or the headman who occupies the same relative position as does the "Ninda Lord" in a nindagama. Mr. Codrington has not discussed this point. And the fact that he refers to nindagama as "the exception" and all the other types of village in Ceylon as "the average village" seems to exclude altogether the possibility of such a discussion by him. See also my remarks under 6 *The Village*, a. b. c.

The modern court decision, to which Mr. Codrington takes exception, was cited, as can be clearly seen, only for comparative purposes and as a means of expanding the field of research. He questions why this should be done. But why should it *not* be done?

As regards Mr. Codrington's concluding remarks, it is hardly necessary for me to refer to them, as both my criticisms and his observations are intended for those who have already studied his book, and not for others. Those who have studied it can surely judge for themselves!

JULIUS DE LANEROLLE.

SOME FOSSIL ANIMALS FROM CEYLON.

PART II.

BY

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(With three text figures by the author).

The further collection mentioned at the conclusion of the first paper of this series (Deraniyagala 1935 p. 168) discloses subspecific indication of five large mammals.[1] Two of these are akin to the extinct forms recorded from India (Falconer et Cautley 1847), the others are allied to living Indian species. As is generally the case with the living fauna of India and Ceylon, the differences among their extinct faunas appear to be subspecific, although more complete material might show that some are specific. The subspecific name *sinhalayus* suggested in the first article will now be applied to extinct Ceylon races of *Hippopotamus sivalensis* Falconer et Cautley, *Rhinoceros sivalensis* Falconer et Cautley, a large bovine probably a local race of the gaur *Bibos frontalis* (Lambert), *Elephas maximus* Linné, and a local race of the lion *Panthera leo* (Linné).

Foot note 1. As this article goes to press, the first vertebrate fossils from the Jurassic, Upper Gondwana shales at Tabbova in the North Western Province have been presented to me by Mr. D. N. Wadia. These are fine scaled fishes with cartilaginous skeletons and were probably about eight centimetres long. They inhabited fresh water, as testify the plant remains found in association with them and are of the genus *Acanthodes* Agassiz 1833.

All these forms were recovered from the same horizon of the Ratnapura series and unless otherwise stated the types will be deposited in the British Museum of Natural History.

I take this opportunity to thank Mrs. A. H. E. Molamuré, Mr. & Mrs. E. Elapata and Mr. H. Muttetuwegama for their kindness in assisting me with specimens.

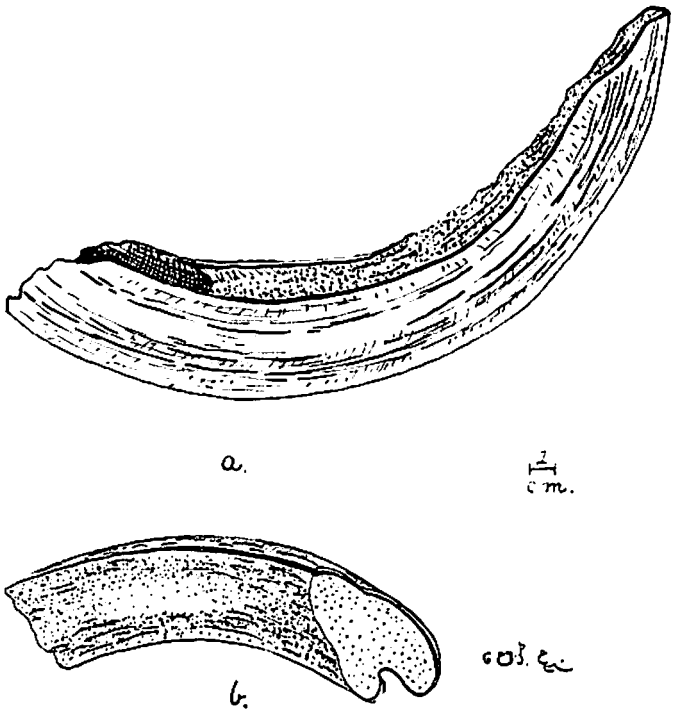

Fig. 1. Canines of *Hippopotamus s. sinhaleyus* (a) Lower (b) Upper. × ½ natural size.

Hippopotamus sivalensis sinhaleyus (Fig. 1.)

Known from a number of molars, two more or less complete incisors and several fragments, three complete canines and several fragments, and two long bones from the fore and hind limbs obtained at depths of 4 to six

metres. The majority are from different individuals, and indicate an animal smaller than the living *H. amphibus* Linné, and equal to the extinct *H. sivalensis* Falconer et Cautley., from which the Ceylon teeth differ in the relatively narrower molars with more convoluted crowns, and the stronger fluting upon the incisors and canines. Molars of different individuals obtained from Kuruvita possess the following dimensions in m.m.

Length	*Breadth*	*Crown Height*
46	32	40
54	40	45
57	33	45
57	44	49
66	37	36

The genus *Hippopotamus* became extinct in Asia in middle Pleistocene times, but apparently survived in Ceylon far into the upper Pleistocene, becoming extinct only comparatively recently. This view is based upon the following data:—(a) The hippopotamus fossils of Ceylon generally occur either in swamps or in their vicinity. These swamps have not had time to alter into dry ground since the animal became extinct. (b) In Ceylon, hippopotamus fossils are in association with those of an extinct subspecies of *Elephas maximus* Linné. This proboscidean is the most recent member of its order, and the time interval separating its extinct subspecies from the living was evidently too brief for the latter to evolve specific characters.

On the other hand the duration of the interval between the two extinctions of the hippopotamus first on the mainland, then in Ceylon, suggests that the animal was isolated sufficiently long in the latter country to evolve at least sub-specific characters, of which the teeth reveal the first indications.

Rhinoceros sivalensis sinhaleyus (Fig. 2.)

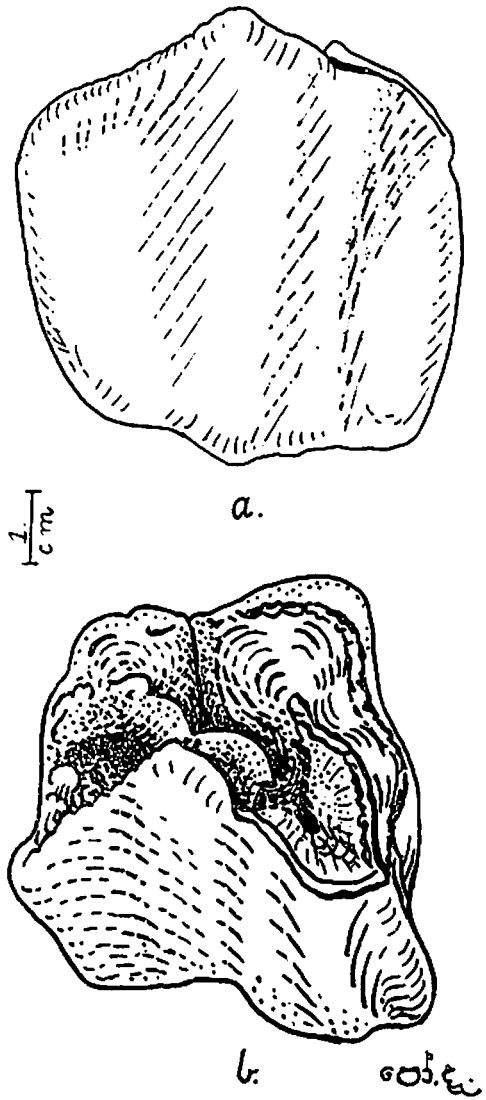

Fig. 2. Second, left, upper molar of *Rhinoceros s. sinhaleyus*. (a) lingual surface, (b) crown. (actual size).

Rhinoceros sivalensis sinhaleyus (Fig. 2.)

Sinhala name: Kangavena.

Known from ten lower molars of which two are milk teeth, and also a single left, upper, second molar, all from a number of different individuals. Lower molars are useless for specific identification, but Forster-Cooper (1933) has shown that upper ones if unworn are of value for such a purpose.

The teeth indicate that the animal was considerably smaller than the living Indian *Rhinoceros unicornis* Linné and approximated in size *Rhinoceros sivalensis* Falconer et Cautley. Applying Forster-Cooper's methods, the upper molar is seen to be mesodont and intermediate between two living species, namely *Rhinoceros sondaicus* Demarest, and *Rhinoceros sumatrensis* Cuvier, now doubtfully placed in different subgenera.

The type is the upper molar previously referred to. Its parastyle buttress is moderately defined (fig. 2 *a.*) the crown is unworn (fig. 2 *b.*) and part of the open root has broken off. The ectoloph and protoloph are confluent, the two forming an acute angle. The dimensions of the tooth are as follow: length of ectoloph 56 mm., of protoloph 59 mm., height of crown 60 mm. The specimen was obtained from a depth of 2.7 metres at Talavitiya.

? Bibos frontalis sinhaleyus

Sinhala name: Gavara.

Teeth of a large bovine have been obtained from several localities, but the first true indication of the animal's size was from part of a femur obtained from near Elapata through the kind assistance of Mr. and Mrs. E. Elapata. The femur which consists of a head and part of the shaft, is as large as that of an ordinary race-horse, and comparison with specimens in the British Museum showed it to be definitely bovine.

Since the gaur has been recorded from Ceylon (Knox 1681) it is probable that the fossils belong to it. This animal became extinct late in historic times, for Sinhala villagers of the interior are familiar with the

tradition and affirm that such localities as Gavara tänne, Gavara eliya, Gavara villa, Gavara maditte, etc., denote areas where it once abounded in Sabaragamuva Province.

As the mammals of Ceylon usually differ at least subspecifically from those of India, it is proposed to regard this bovine as a local subspecies of the Indian gaur. The type will be deposited in the Colombo Museum.

Elephas maximus sinhaleyus

Sinhala name: Ätha (tusker); aliya (tush elephant).

Known from thirty five molars or parts of molars and several fragments of tusks. The extinct subspecies is closely allied to the ones now inhabiting Ceylon.

In the extinct subspecies *Elephas maximus sinhaleyus* tusks are common, the roots of the molars are compressed and the second molars are worn to the bases of their anterior roots before the third molars come into use (figured in my account of the Elephant elsewhere in this volume).

In the two living subspecies of Ceylon *Elephas*, tusks are rare; if the roots of the molars are compressed the third molars come into wear before the second molars are worn down to the bases of their anterior roots; if the roots of the molars are not compressed the rate of wear is as in the extinct race.

Types deposited at the British Museum are two upper second molars, one upper third molar with the posterior folds missing, and one left lower second molar of the same animal, obtained from a depth of 6.4 metres at Kuruvita. Its tusks crumbled to pieces.

Their dimensions are as follow:—

Tooth	*Crown Length*	*Crown width*	*Folds*
L.M. $\frac{2}{2}$	18·5 cm.	7·2 cm.	12+2
R.M. $\frac{2}{3}$	17 ,,	6·4 ,,	14+2
L.M. $\frac{2}{3}$	16 ,,	6·6 ,,	14+2
R.M. $\frac{3}{3}$	—	7·9 ,,	14+

The average number of enamel folds in a crown length of 10 cm. in seven upper and three lower second molars is $5\frac{1}{2}$.

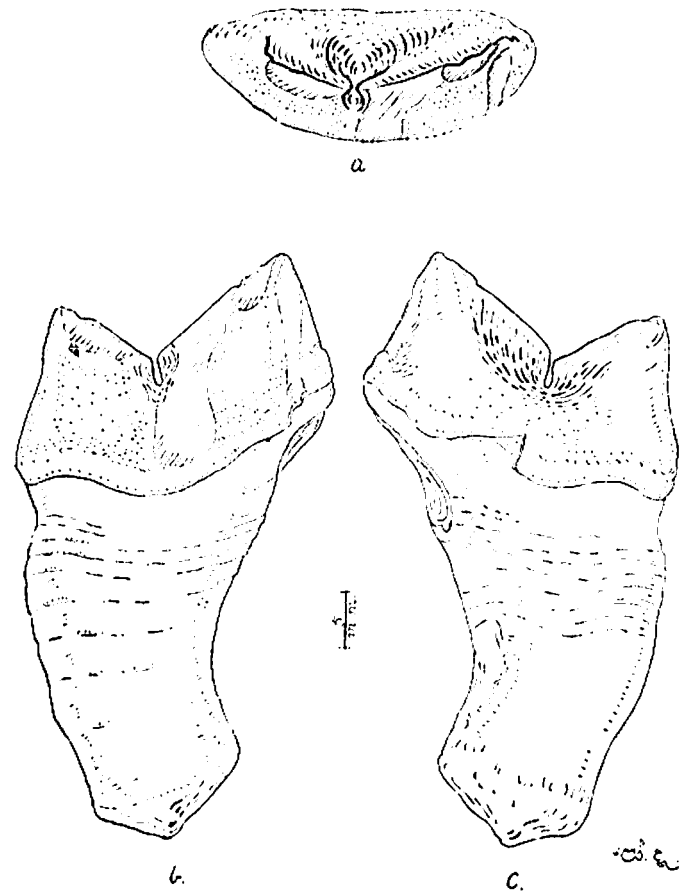

Fig. 3, last left lower carnassial of *Panthera leo sinhaleyus* (a) crown, (b) labial view, (c) lingual view. × 1.6.

Panthera leo sinhaleyus (Fig. 3.)

Sinhala name: Sinheya.

Known from a single tooth; the last, left, lower carnassial. In members of the Felidae, teeth of this

category are very similar in shape, their chief distinguishing characters being the length and breadth of the crown. Brongersma (1935) lists the carnassial dimensions of fourteen tigers *Panthera tigris*, their crown lengths ranging between 23 and 27 mm. In 1938 I measured the carnassials of two tigers and two lions at the British Museum. The Ceylon fossil although narrower and more elongate agreed in general size with the lions' teeth which possessed crown lengths of 27 and 28 mm. and a breadth of 15 mm. The crown length of the Ceylon tooth is 29 mm.; its breadth 14.5 mm. It displays distinct planes of wear upon its labial surface. The posterior root is missing. The specimen (fig. 3.) was obtained from a depth of about 6.1 metres, at Kuruvita.

Early in historic times the lion became extinct in such countries as Greece, Asia Minor and Syria, and more recently from Mesopotamia and Persia. Fossil teeth discovered in the Kurnul cave deposits near Madras were originally thought to belong to a tiger until Lydekker (1886) identified them as belonging to a lion. Hence it is evident that the lion of India, now restricted to the Gir forest of Gujerat, once roamed the entire subcontinent and formed part of the fauna isolated in Ceylon.

The animal is frequently referred to in Sinhala legend, and tradition affirms that it inhabited the Sinha Raja Adaviya (Royal Lion Forest) which is in the same province as Kuruvita (Gunn 1873). Hence it is not improbable that the extinction of the Ceylon lion occurred within historic times.

MAN.

Stones chipped by man have been discovered in Ceylon alongside proboscidean fossils (Deraniyagala 1936).

The paleoliths of Ceylon differ so markedly from those of South India which are more finished, larger and more uniform as to suggest that either the former belong to an earlier culture phase or that the two represent the work of two distinct races The lower and middle Neolithic of Ceylon however are akin to those of South India but a hiatus exists between the Neolithic and Palaeolithic cultures of Ceylon.

CONCLUSION.

Both the extinct and abundant living relict fauna of Ceylon disclose that certain continental animals isolated in this Island from time to time by the destruction of temporary land bridges, survived their mainland stock for unusually long periods, but human stone cultures failed to progress as far as in India.

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