

## Dentition of the Malaysian Lesser Mouse-deer (*Tragulus javanicus*)

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### RINGKASAN

Gigian dua puluh lima ekor pelandok (*Tragulus javanicus*) telah diuraikan. Perbandingan gigian pelandok dengan gigian lembu dan kambing menunjukkan tidak ada perbezaan besar pada gigi raham belakang di antara spesis-spesis ini. Tetapi sebaliknya perbezaan yang lebih jelas terdapat pada gigi kacip dan gigi rahang depan. Gigi rahang depan pelandok adalah lebih sesuai untuk menebok dan memotong makanan lebih daripada digunakan untuk mengunyah.

### SUMMARY

The dentition of twenty five lesser mouse-deer (*Tragulus javanicus*) is described. Comparisons with the dentition of the ox and the goat showed very few differences in the molars among these species. However, the incisors and the premolars showed many differences. The premolars of the lesser mouse-deer are more suited for piercing and chopping food rather than for chewing.

### INTRODUCTION

Teeth are the principle organs of mastication and function with jaws, masticating muscles, lips and tongue in the prehension and mastication of food. Among mammals, the dentition is highly characteristic and therefore important in identification. The dental formula and some teeth characteristics of the lesser mouse-deer have been described (Gunderson, 1976, Webb *et al.*, 1977 and Anonymous, 1972), but detailed information of its dentition is not available. The present study was made to document the characteristics of the teeth of the lesser mouse-deer (*T. javanicus*) and to compare them with the teeth of other ruminants viz. ox and goat.

### MATERIALS AND METHODS

Altogether twenty five animals of both sexes, bred in captivity, were examined. The animals were housed at the Institute of Medical Research, fed *ad libitum* on a diet consisting of leaves of kankong (*Ipomea reptans*), long bean (*Vigna sesquipedalis*), raw peanuts (*Arachis*

*hypogea*) and commercial rabbit pellets (Zuellig). Two animals were kept in each cage measuring 2' x 4' x 8'. Accurate records of the age of the animals were available.

The animals were sedated after administration of 0.3-0.5ml xylazine hydrochloride (Rompun, Bayer). The mouth was held open by an assistant and the teeth examined. Information on the characteristics of each dental type was thus obtained. More detailed information regarding the number of ridges, grooves, infundibula and roots was obtained from dead specimens. References to the dentitions of the ox and the goat and comparative studies with the dentition of the mouse-deer were obtained from dead specimens and also from the standard reference books on Veterinary Anatomy (Nickel, Schumer and Seiferle, 1973; Getty, 1975a, b).

### RESULTS

The lesser mouse-deer is anisognathous in having a narrow lower jaw and a wider upper jaw. This results in the occlusal surfaces of the

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teeth of the upper and lower jaws being not in full occlusion. When viewed laterally, the occlusal pattern shows the ridges of one tooth alternating with the corresponding depressions of the opposite tooth. The lower jaw of the lesser mouse-deer resembles that of the ox or goat but appears to be relatively longer and narrower. The upper jaw is also relatively narrower and more pointed than that of the ox or goat. The alveolar cavities are less extensive.

### Permanent Dentition

The permanent dental formula is follows:

$$\begin{array}{cccc} 0 & 1 & 3 & 3 \\ 2(I- & C- & P- & M- ) = 34 \\ 4 & 0 & 3 & 3 \end{array}$$

*The Teeth of the Lower Jaw (Fig. 1)*

### Incisors

The lower canines have been incorporated into the row of incisors. Functionally they have become the fourth incisor and are so designated. There are four incisor teeth on each half of the lower jaw. The incisors meet the dental pad at an acute angle.

The first incisor is the largest of the incisors. It has a very broad shovel-shaped crown, a narrow neck and a stout long cylindrical root. The second and third incisors are small and appear similar in shape and size. They are sickle-shaped and have very small sharp pointed crowns. They have no definable necks. The roots are curved and the crowns reflect this curve. The fourth incisor is chisel-shaped and has a fairly broad, short crown and stout root. It lies adjacent to the second intermediate incisor and is separated from the first premolar tooth by a fairly wide diastema.

The above observations show that the incisors of the lesser mouse-deer do not resemble those of the ox and goat. Except for the central incisor, which resembles the first incisor of the ox, all other incisors are simple and characteristic of the species. The incisors appear to be suitable for nibbling and cutting soft food.

### Premolars

The lesser mouse-deer has three premolars in each half of the lower jaw. They are sectorial in type. The crowns are laterally compressed and pointed with a distinct cingulum and well-developed roots.

The first premolar has a crown with two linear ridges of which the rostral ridge is the bigger. It has a distinct neck and two roots. A single indistinct groove is present. The second premolar is slightly bigger than the first and has slightly more elevated rostral and caudal linear ridges. A neck, two roots and a single indistinct groove are present. The third premolar differs slightly from the first and second. The rostral ridge is more elevated and pointed than the caudal ridge. It has an indistinct groove and two roots.

The premolars of the lesser mouse-deer are morphologically distinctly different from those of the goat and ox. They are sectorial in type and suited more for piercing and chopping rather than for chewing and grinding as is the case in the premolars of the goat and ox.

### Molars

The lower molars are mediolaterally flattened and therefore the occlusal surface appear narrower than that of the upper molar. The lingual ridges are bigger than the buccal ridges in the molars of the lower jaw, whereas the reverse occurs in the upper molars.

Each of the first two molars has 4 ridges, 2 infundibula and a single groove. The second molar is, however, markedly larger than the first. The third molar has 5 ridges (2 buccal, 2 lingual and 1 caudal), 3 infundibula and 2 grooves.

The molars closely resemble the molars of the goat and ox.

*The Teeth of the Upper Jaw (Fig. 2)*

### Incisors

As in the domestic ruminants, the incisors are absent from the upper jaw; instead a dental pad is present.

### Canines

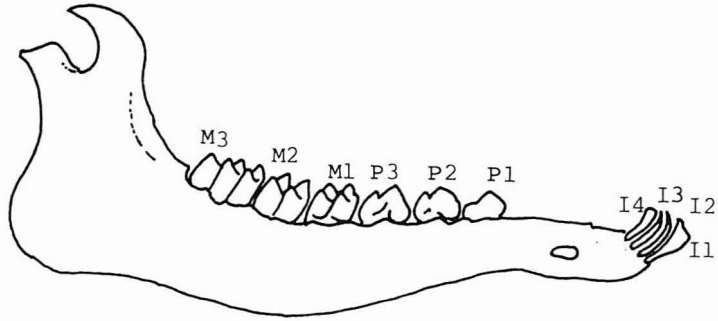
In both sexes canine teeth are present. They are mere stubs in the female. However, in the male they can be very large and prominent.

In one of the specimens the canine tooth arched backwards and even pierced the skin of the mouth. The canine teeth are mediolaterally flattened and pointed.

### Premolars

A wide diastema (smaller than that of the lower jaw) separates the canine and the premolar teeth.

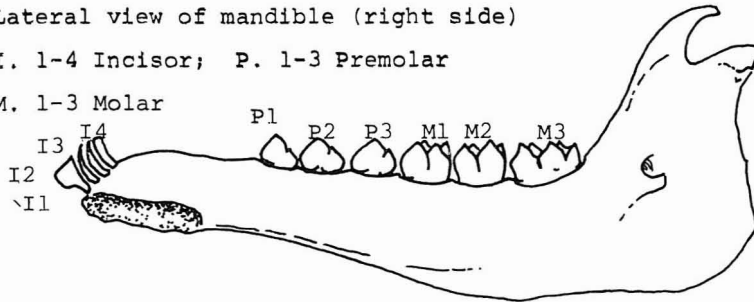
DENTITION OF THE MALAYSIAN LESSER MOUSE-DEER



Lateral view of mandible (right side)

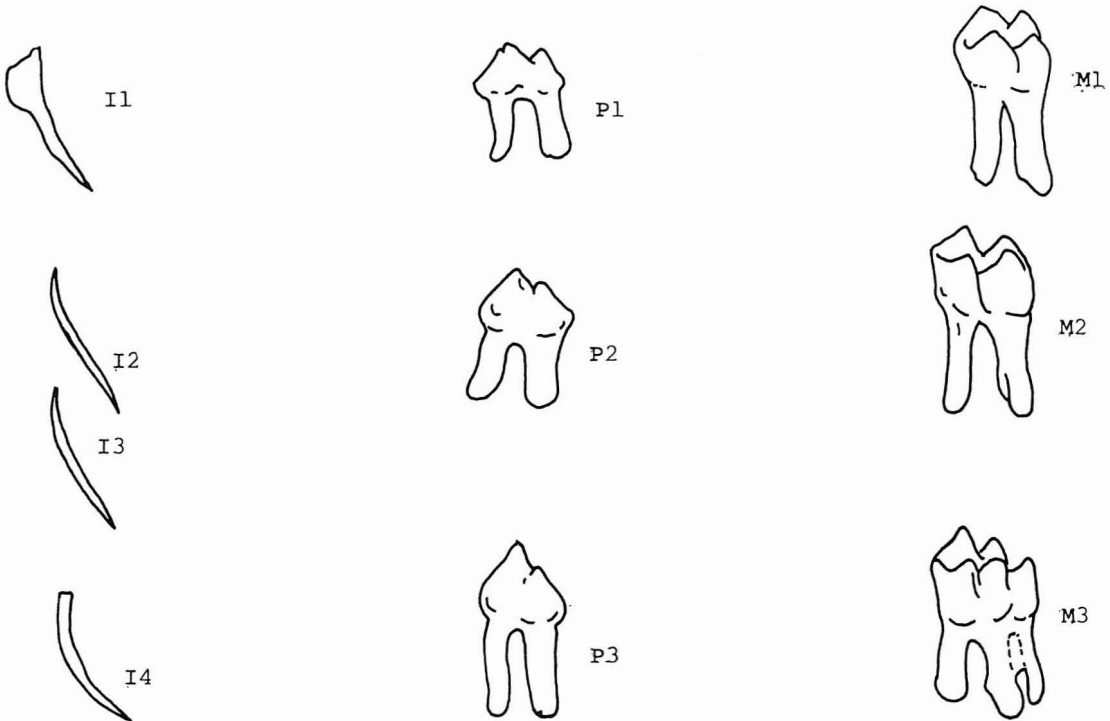
I. 1-4 Incisor; P. 1-3 Premolar

M. 1-3 Molar



Medial view of mandible (right side)

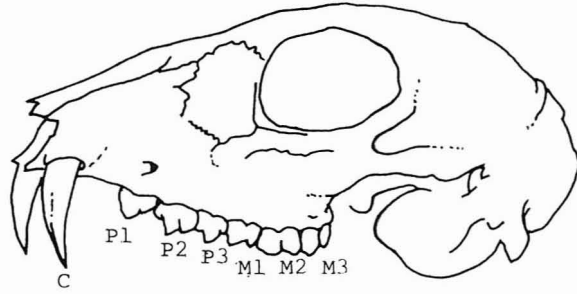
I. 1-4 Incisor; P. 1-3 Premolar; M. 1-3 Molar



Lateral view of the incisors, premolars and molars (left side).

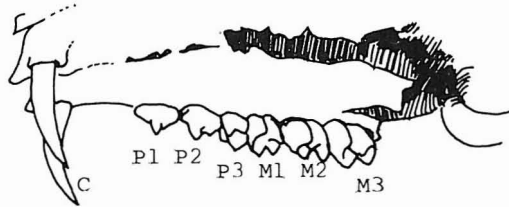
I. 1-4 Incisors; P. 1-3 Premolars; M. 1-3 Molars.

Fig. 1. The teeth of upper jaw of an adult lesser mouse-deer.



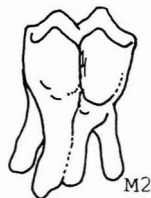
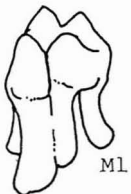
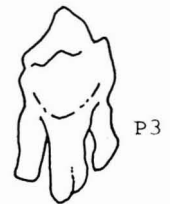
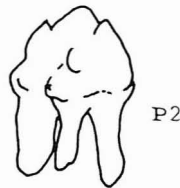
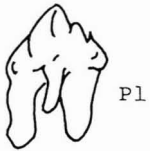
Lateral view of upper jaw (left side).

C, Canine; P, 1-3 Premolar; M, 1-3 Molar



Medioventral view of upper jaw (right side)

C, Canine; P, 1-3 Premolar; M, 1-3 Molar.



Medial view of premolars and molars (left side)

P, 1-3 Premolars; M, 1-3 Molars

*Fig. 2. The teeth of upper jaw of an adult lesser mouse-deer.*

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The first and second premolars are fairly similar in shape and size. Each has three linear ridges, a distinct neck, three roots, two indistinct grooves and no infundibulum. The central ridge of each premolar is the highest. The third premolar is triangular in shape and has only one prominent ridge which is on the buccal side. A distinct neck, three roots, and a single infundibulum are present, but grooves are absent.

The upper premolars of the lesser mouse-deer do not resemble those in the ox and goat. The ridges are linearly arranged, simple and do not resemble the molars. The upper premolars resemble the lower premolars in the lesser mouse-deer but each upper premolar has three ridges and three roots.

### Molars

The three upper molars resemble the lower molars in the lesser mouse-deer. All are quadrangular in shape, have four ridges, one groove, two infundibula and three roots. The upper molars are larger and more quadrangular than the lower molars.

The upper molars in the lesser mouse-deer resemble those of the ox and goat. The crowns are smaller and their roots longer than in either the ox or goat. The upper and lower molars in the lesser mouse-deer resemble each other but the third lower molar has five ridges while the upper molar has only four.

### Deciduous Dentition

The deciduous dental formula is as follows:

$$2 \begin{pmatrix} 0 & 1 & 3 \\ \text{Di}^- & \text{Dc}^- & \text{Dp}^- \\ 3 & 1 & 3 \end{pmatrix} = 22$$

### *The Teeth of Lower Jaw*

#### Incisors

The four deciduous incisors resemble the permanent incisors but they are smaller.

#### Premolars

The premolars are smaller. The first premolar is the smallest and has three linear ridges, two roots, two indistinct grooves and no infundibulum. The anterior ridge is the largest. The second premolar is very similar in shape to the first but is slightly larger and the central ridge is highest. The third premolar is very characteristic. It has five ridges (one rostral, two lingual and two buccal), three indistinct infundibula and two grooves. The lingual ridges are higher than the buccal ridges.

#### Molars

There are no temporary molars.

### *The Teeth of Upper Jaw*

#### Incisors

Incisors are absent but a dental pad is present.

#### Canines

The canines are mere stubs.

#### Premolars

The first premolar has three linear ridges of which the central ridge is the largest and most pointed. It has a distinct neck, two roots, and two indistinct grooves. The second premolar is characteristic and has four ridges (three buccal and one lingual). It has four roots and two indistinct buccal grooves. The third premolar resembles the permanent molar and has four ridges (two buccal and two lingual), a single groove and two infundibula.

## DISCUSSION

Teeth are highly specialized structures which serve as weapons of offence or defence and for dietary needs (Miller, Christensen and Evans, 1964). The large upper canines are known to be used for engaging in battle among males without serious injuries (personal observation). However, they may serve more as weapons of display rather than for engaging in serious fighting. The narrow jaws and the shapes of the incisors and premolars indicate a type of dentition suitable for a diet consisting of succulent grasses and vegetables, fruits, roots and tubers. The dentition of lesser mouse-deer when compared to the two domestic ruminants, goat and ox, suggests an ability to use less coarse material. In laboratory conditions, this species is not known to consume grasses but prefers succulent vegetables such as kangkong (*Ipomea reptans*), long beans (*Vigna sesquipedalis*) and raw peanuts (*Arachis hypogea*). (personal observation).

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REFERENCES

- ANONYMOUS, (1972): Gnzimek's Animal Life Encyclopedia Vol. 13. Part IV: Mammals. London. Von Nostrand Reinhold Company. pp. 150.
- GETTY, R. (1975a): Sisson and Grossman's The Anatomy of the Domestic Animals Vol. I (5th Edn.) London. W.B. Saunders Co.
- GETTY, R. (1975b): Sisson and Grossman's The Anatomy of the Domestic Animals Vol. II (5th Edn.) London. W.B. Saunders Co.
- GUNDERSON, HARVEY L. (1976): Mammalogy. London. McGraw Hill Publishing Co. Ltd. pg. 129.
- MILLER, M.E., CHRISTENSEN, G.C. and EVANS, H.E. (1964): Anatomy of the Dog. London. W.B. Saunders.
- NICKEL, R., SCHUMMER, A. and SEIFERLE, E. (1973): The viscera of the Domestic Mammals. Berlin. Verlag Paul Parey.
- WEBB, J.E., WALLWORK, J.A. and ELGOOD, J.H. (1977): Guide to Living Mammals. London. The Macmillan Press. Ltd. pg. 131.

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