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DENTAL LESIONS IN THE LOWLAND TAPIR (*TAPIRUS TERRESTRIS*)

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Abstract: Dental ailments, mandibular swelling, and dentoalveolar abscesses are common in tapirs, but knowledge about prevalence or etiology of these lesions in the Tapiridae family in general, and in lowland tapirs (*Tapirus terrestris*) in particular, is scarce. A recent study identified resorptive lesions of unknown etiology as a common problem in the Malayan tapir (*Tapirus indicus*). In order to investigate the type and prevalence of dental lesions occurring in lowland tapirs, and to compare these with findings with the Malayan tapir, skulls and teeth from 46 deceased lowland tapirs were visually and radiographically examined. The specimens were divided into subpopulations according to age (juveniles, young adults, adults) and origin (free-range or captive). Dental lesions were identified in 24% (11/46) of the study population. The most common pathologic findings were complicated dental fractures with associated periapical reaction (15%) and periapical reactions of various degrees without associated detectable dental pathology (13%). All these lesions likely originated from dental trauma. As in Malayan tapirs, juveniles had significantly fewer lesions than adults. This study shows that dental lesions present frequent problems for lowland tapirs, occurring both in captive and in free-ranging individuals, and indicates that increasing age should be considered a risk factor for the development of these lesions. Notably, the predominant dental problems in lowland tapirs and Malayan tapirs are not the same.

Key words: Fracture, lowland tapir, periapical reaction, *Tapirus terrestris*, tooth.

BRIEF COMMUNICATION

The lowland tapir (*Tapirus terrestris*) is one of four species in the family of Tapiridae, within the order Perissodactyla,¹¹ and is indigenous to the South American continent.⁶ The adult tapir has 42 teeth with a dental formula of I-3/3, C-1/1, P-4/3, M-3/3.¹¹

Scientific literature concerning dental lesions in tapirs is scarce but dental ailments, mandibular swelling, and dentoalveolar abscesses are described as frequently occurring problems in tapirs.^{2,8,9} Recently the occurrence of dental lesions in Malayan tapirs was investigated, documenting a very high prevalence of resorptive lesions of unknown etiology.⁴

The aim of this study was to describe the type and prevalence of dental lesions occurring in the

lowland tapir by exploring predisposing factors including age and captivity. The study population consisted of 46 heads (skull and mandible) from deceased lowland tapirs acquired from museum collections. Specimens were obtained from Naturalis, National Museum of Natural History, Leiden, The Netherlands (36 specimens); the Natural History Museum of Denmark, Copenhagen, Denmark (7); the Rotterdam Zoo, The Netherlands (1); the Ålborg Zoo, Denmark (1); and Odense Zoo, Denmark (1).

The specimens were divided into three age groups based on the eruptive status of the teeth; juveniles (no or only first molars), young adults (second molars), and adults (third molars). Furthermore, specimens were classified as free-range or captive. Each skull and mandible was examined visually and radiographically to evaluate lesions and other abnormalities as well as tooth wear. Fractures were classified as intravital only when the fracture edges were smooth, indicating wear after the fracture took place. All radiographs were taken using conventional radiographic plates and standard equipment. The significance of age and origin as a predisposing factor was investigated using exact logistic regression (Logistic procedure, SAS v. 9.1, SAS Institute, Cary, North Carolina 27513, USA).

Of the 46 examined specimens 20 were classified as juvenile, 13 as young adults, and the

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remaining 13 as adults. Nineteen animals were free-ranging, eight were captive, and the remaining 19 of unknown origin. Dental lesions were detected in 11/46 individuals (24%). Age was a highly significant predisposing factor for dental lesions; juveniles had significantly fewer lesions (0%) than did adults (69%, $P=0.009$). Prevalences of dental lesions among captive, free-ranging, and unknown origin populations were 50% (4/8), 26% (5/19), and 11% (2/19), respectively. While the difference between the captive and unknown population was significant ($P=0.04$), a difference between the captive and free-ranging population could not be detected ($P=0.75$).

The dental lesions identified could be divided into five categories:

1. **Fracture with periapical reaction.** Seven specimens (15%) had a total of 11 fractured teeth with an associated periapical reaction. Three of these were free-ranging adults, three were captive adults, and one was a young adult of unknown origin. This type of lesion was, with the exception of a single incisor, only detected in the large caniniforme maxillary third incisors and the mandibular canines. Both free-ranging and captive adult specimens were affected, with prevalences of 43% in both populations. The majority of the fractured teeth (9/11) had a wider pulp compared to the opposite tooth, likely due to ceased intraluminal laydown of dentin in the pulp chamber of the affected tooth. The remaining two teeth had uncomplicated crown fractures, still associated with a periapical reaction. Radiographs of all 11 fractured teeth revealed either a single focus or a diffuse area of reduced density in the root, the adjacent alveolar bone, or both. A macroscopically visible bone lesion was present in one specimen, where an area of mandibular exostosis and central osteolysis radiographically appeared connected to the fractured tooth.
2. **Fracture with no periapical reaction.** Two specimens (4%), a captive adult and a young adult of unknown origin, had complicated fractures in their large caniniforme teeth without evident periapical reaction. Gross inspection showed smooth edges, indicating some postfracture wear.
3. **Apical root resorption.** Six specimens (13%) had a total of 13 teeth with apical root resorption and concurrent periapical reaction. Three captive (38%) and three free-

ranging (16%) specimens were affected, all of them adults. This type of lesion was detected in the second ($n=2$), third ($n=3$), and fourth ($n=3$) premolar and the first molar ($n=5$) of both the mandible and maxilla. Macroscopically these teeth all had an intact crown, but radiographs revealed interrupted integrity of the periodontal space and reduced density of the dental root. In all cases, the loss of dental hard tissue extended into the pulp cavity, and in most of the affected teeth (9/13) the loss of dental hard tissue was so extensive that the roots had lost their integrity.

4. **Caries.** One specimen, a free-ranging adult, had four teeth with caries-like lesions, all of them mandibular premolars. These teeth were perforated through the enamel and dentin layers.
5. **Other.** Additionally, two specimens (4%) showed evidence of lesions in the mandibular bone unrelated to dental disease. In one of them, a free-ranging juvenile male, the right mandibular bone was very rough in structure and had multiple openings both on the lingual and buccal surface. Radiographs revealed a radiolucent zone, ranging from mid-diastruma until the last premolar, but no indications of dental ailments. The other specimen, a captive adult male, had multiple foci of new bone formation located on the lateral-ventral aspect of the mandible. Radiographically, these foci showed increased density of bone.

With a prevalence of 24% (11/46) in the study population, dental lesions were found to present a frequent problem in lowland tapirs, confirming ample anecdotal evidence.^{2,8,9} Age was a significant risk factor for the development of dental lesions, which is not surprising given that permanent dentition has an accumulative risk of injury due to the increasing exposure to risk factors over time, such as increasing tooth wear.

Although not statistically significant, the occurrence of dental ailments was about twice as high among captive lowland tapirs compared with the free-range subpopulation. Similarly, captive Malayan tapirs were nine times more likely to have dental lesions than were their wild counterparts.⁴ The gender of the specimens was inconsistently available and so we were unable to properly evaluate any gender differences.

Dental fractures associated with a periapical reaction were detected in 15% (7/46) of the

studied specimens. In complicated fractures the dental pulp is exposed to the oral environment, becomes inflamed and necrotic, and periapical lesions such as tooth resorption and abscesses might develop.¹⁰ Uncomplicated fractures may also result in inflammation and periapical reactions as exposed dentine tubules provide oral bacteria access to the dental pulp.¹⁰ The 11 fractured teeth studied all had periapical lesions characterized by various degrees of reduced density of focal or diffuse areas of the root, alveolar bone, or both. Such areas of radiolucency may correspond to dental abscesses or periapical granulomas or cysts,³ all representing different stages of a focal infectious process. This type of lesion was almost solely identified in the large caniniforme teeth, and the fractures initiating the process were most probably traumatic in nature, perhaps sustained through fighting or biting hard objects. An alternative hypothesis would be attrition or wear of the canines, as described in captive brown bears (*Ursus arctos* spp.).¹² However, only one of the animals examined vaguely matched this profile of contralateral attrition.

Apical root resorption with periapical involvement was another common finding that occurred in six specimens (13%). The majority of these lesions seemed to originate at the root apex, as there were no radiographically visible remains of the roots in question and the cemento-enamel junctions were much less affected by the resorptive process. This stands in contrast to the findings in the Malayan tapir, in which most of the resorptive lesions appeared to originate at the cemento-enamel junction with only a minor part of the root involved.⁴ These lesions could resemble external root resorptions occurring as a result of direct force trauma⁵ and abrasion, as five out of the six specimens in question also had fractured teeth.

It is interesting that, while highly related and occupying similar ecologic niches, the lowland and Malayan tapir appear to be affected by radically different dental lesions. In the Malayan tapir the only major type of lesion detected was of a resorptive nature somewhat similar to equine odontoclastic lesions⁴ and tooth resorptions in dogs (Canidae)¹ and particularly cats (Felidae).⁷ In contrast, the majority of dental lesions identified in the lowland tapirs fall under a complex of dental fractures and periapical lesions, all likely related to trauma.

This study was solely conducted on skulls from deceased tapirs, meaning that small dental changes as well as soft tissue lesions were not detected. Thus, the true prevalence of some of the lesions

investigated is likely higher than documented here. To truly determine the etiology and pathogenesis involved in the observed lesions, and to validate their nature, histopathologic examination of biopsy material as well as microbiologic investigations are required and strongly encouraged in future cases of dental disease in tapirs.

In conclusion, this study documents a high prevalence of both supra- and subgingival dental lesions in lowland tapirs. This emphasizes the importance of performing regular, thorough oral examinations and radiography on captive lowland tapirs, paying particular notice to fractures of the caniniforme teeth.

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