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Fully formed first lower premolars in a White-tailed deer (*Odocoileus virginianus Zimmermann*, 1780)

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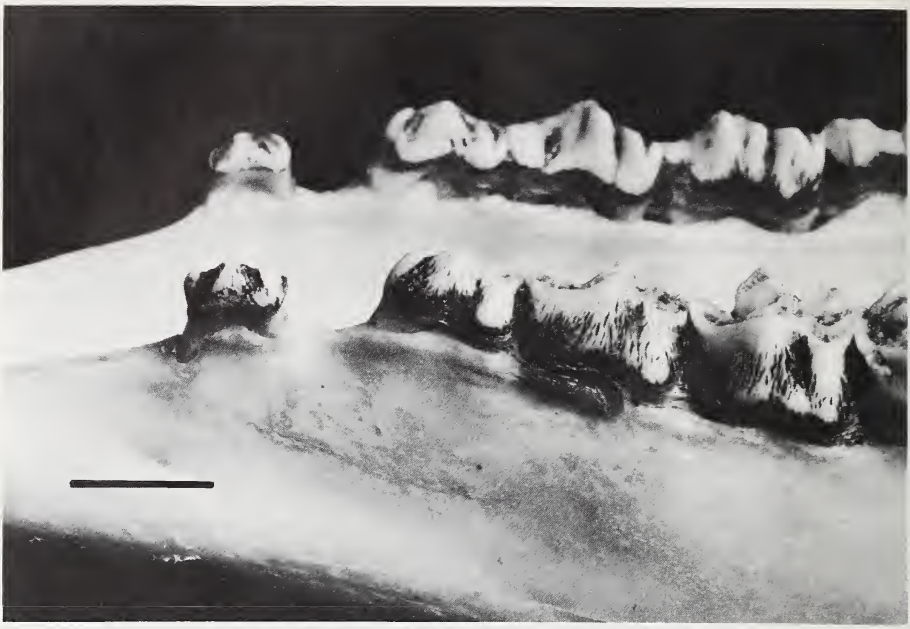
The first artiodactyls (e.g. *Diacodexis*) from the lower Eocene of North America, Europe and Asia, had a full dentition (I 3/3, C I/I, P 4/4, M 3/3), without diastema (Carroll 1988). The first ruminants (e.g. *Archaeomeryx*) from the upper Eocene of Asia had already lost P^1, were on the way to losing their upper incisors, and P_1 was caniniform and located in a short diastema separating P_2 from the lower canine (Viret 1961). Then in the lower Miocene, from *Blastomeryx* onwards, P_2 had disappeared almost completely being seen in only a few specimens of *Blastomeryx* itself, then not at all afterwards (Matthew 1908; Frick 1937). Ever since that time, i.e. for the last 20 million years, most artiodactyls (i.e. the bovids and cervids) have had a tooth formula reduced to I 0/3, C 0/1, P 3/3, M 3/3, with a long diastema between P_2 and the incisiform lower canine.

Even though this has been the condition for about 20 million generations, one occasionnally sees one of the long lost tooth being expressed in the phenotype of a present-day artiodactyl. This is the case for P_1 for instance that has been reported for some nine species of bovids and cervids (*Gazella thomasii:* Robinette and Archer 1971; *Sylvicapra grimmia:* Child and Riney 1964; *Bison bison:* Fuller 1954; *Capra pyrenaica:* Vigal and Machordom 1987; *Odocoileus virginianus:* Mech et al. 1970; *O. hemionus:* Robinette et al. 1977; *Rangifer tarandus:* Banfield 1961; Miller and Tessier 1971; *Cervus elaphus canadensis:* Moran and Fairbanks 1966; and *Capreolus capreolus:* Bubenik and Wurtzinger 1967; Meyer 1985). From 15 studies that have reported on supernumerary teeth in bovids and cervids (including the ones listed above), I could compute that the overall frequency of occurence of P_1 in the two families is less (and sometimes considerably less) than one in 3000 individuals.

The case described here is a young adult male *O. virginianus,* hit by a car north of Montréal (45° 45′ N, 74° 45′ W) during the winter 1988. The animal was healthy, weighing 78.5 kg, and having a total length of 181 cm. Its skull has a condylobasal length of 289 mm and a bizygomatic width of 116 mm. Its upper tooth row measures 74 mm while the lower (excluding P_1) is 81.1 mm long.

This case is particularly interesting not only because of its rarity, but because both its permanent P_1 are very similar to what those teeth looked like in pre-cervid artiodactyls. In most of the cases reported above the first premolars are small, peg-like, single rooted, and sometimes limited to one side, i.e. it is not only a vestigial tooth but a rather stunted form of it. On the contrary, the P_1 of the specimen presented here, are symmetrical in size, shape, and placement, have two fully formed roots (both measure 7.4 mm long on the left P_1 that came loose after the drying of the jaw), and have the size and shape that one would predict by extrapolating the trend seen from P_4 to P_2 in any normal white-tailed deer (Fig.). The length and height of the crown of the P_1 are 6.7 and 3.7 mm on the right side, and 7.3 and 3.5 mm on the left. Finally, each P_1 has three cusps in a straight line (Fig.).

On both sides P_1 is separated from P_2 by 6.5 mm, a placement very similar to the one seen in some modern suids like *Sus scrofa,* one of the few present artiodactyls that have



Vestigial P_1 in an adult male white-tailed deer seen from the left side. The black bar is 10 mm long

retained their P_1. The diastema separating P_2 from the lower canine is 78.5 mm long, 96.8 % of the length of the lower tooth row (excluding P_1). That is about the same value as in white-tailed deer without P_1 (mean ± S.D. for 5 males and 5 females = 94.3 ± 5,3 %). Thus P_1 has not caused a lengthening of the diastema, it merely occupies a short segment of it. The form of the P_1 of this white-tailed deer is premolar-like. They are not the caniniform P_1 seen in living camelids or suids, in *Archeomeryx,* or in the Oligocene *Hypertragulus* (Carroll 1988; Viret 1961).

A specimen such as the one described here lends concrete support, from a contemporary animal, to Riney's (1951) proposal to consider the first premolar present in a deer jaw as being P_2. It is also a stricking case of genetic atavism. It is however unclear whether the genes responsible for the production of P_1 are present in only a few contemporary deer, or else are present in all, but are being repressed in some way. Finally, the present case gives us a chance to examine, in a fresh specimen, what the dentition was presumably like millions of years ago.

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