A SECOND INSTANCE OF THE DEVELOPMENT OF RODENT-LIKE INCISORS IN AN ARTIODACTYL.

By Gerrit S. Miller, Jr.

Curator of the Division of Mammals, United States National Museum.

The rodent-like incisors of the extinct Balearic Island goat, *Myotragus balearicus* Bate,[1] have been regarded as the only instance of the development of such teeth by an even-toed ungulate. "The peculiar character of the incisors [of *Myotragus*] * * *," writes Dr. C. W. Andrews,[2] "has no parallel among the Artiodactyle ungulates, and the steps by which it has been acquired can only be surmised." Although this appears to be the generally accepted opinion on the subject, teeth whose structure nearly approaches that present in the incisors of *Myotragus* occur in a well-known living artiodactyl, the vicunia; and through the unusual conditions seen in these recent teeth the probable history of the still more specialized dentition of the fossil Balearic goat may be traced.

Photographs of incisors of *Vicugna*[3] and *Lama* are reproduced in the accompanying plate; those of *Vicugna* are at the left, and in each instance the upper three figures represent milk teeth. The characters are so very obvious that they scarcely require any detailed comment. In *Lama* the general outline of the tooth in both adult and young is strongly cuneate with the greatest width ranging from about one-fifth to about one-fourth the greatest length. The root tapers rapidly to a closed base; the enamel on the lingual side of the crown extends from the distal extremity at least one-third of the distance to the base. The milk (figs. 10–12) and permanent (figs.

[1] Geol. Magazine, ser. 5, vol. 6, p. 385. September, 1909.

[2] A description of the Skull and Skeleton of a Peculiarly Modified Rupicaprine Antelope (*Myotragus balearicus*, Bate), with a notice of a New Variety, *M. balearicus* var. *major*. Philos. Trans. Roy. Soc. London, ser. B, vol. 206, pp. 281–305, pls. 19–22. June 30, 1915.

[3] Gray, Cat. Rum. Mamm. Brit. Mus., p. 101, 1872, type *Camelus vicugna* Molina. Under the provisions of the International Code the availability of this name does not appear to be interfered with by the existence of the earlier *Vicunia* Rafinesque (Analyse de la Nature, p. 55, 1814), proposed as a substitute for *Lama* Cuvier. The peculiarities of the incisors are so great that I would separate the vicunia generically from the llama and guanaco.

13–15) teeth are therefore essentially alike in form and structure. In *Vicugna* the permanent teeth (figs. 5–9) are strikingly different from their predecessors (figs. 1–3). The milk teeth are more elongate than those of either adult or young *Lama* (greatest breadth about one-sixth or less of the greatest length), but their form is still obviously cuneate: the bases, however, remain open, and there is no enamel on the lingual side of the crown. The enamel of the labial side occupies slightly more than half the length of the tooth, a condition intermediate between that which is seen to occur in the milk and permanent teeth of *Lama*. The adult teeth of *Vicugna* have lost all trace of the cuneate form. They are parallel-sided, fully ten times as long as wide, armed with a rodent-like plate of enamel confined to the lingual aspect of the tooth and extending to within 2 or 3 millimeters of the widely open base. Apparently these teeth continue to grow through most of the animal's life; but in extreme senility (in a captive individual at least) growth may cease and the teeth may become completely worn down to stubs (fig. 4).

Comparison of the figures here published with Figure 8 of Doctor Andrews's Plate 20 will show the striking likeness which exists between the teeth of *Vicugna* and *Myotragus*. Aparently it is not definitely known whether the incisors of the goat were truly ever-growing as they are in rodents or whether they exhibit the same conditions with regard to maner of growth as those found in the vicunia. Assuming that they were strictly rodent-like in this respect they would represent a stage of development a step farther advanced than that exemplified by the adult incisors of *Vicugna*. The transitional conditions leading back from the structure present in the adult vicunia to the one normal to the incisors of artiodactyls in general may be seen in the vicunia's milk teeth. Here the original cuneate form has become elongated, the base of the root has been permanently opened, and the enamel has been eliminated from the lingual aspect of the crown. While the morphological elements of the problem of the development of rodent-like incisors in artiodactyls therefore no longer present any special obscurities the physiological impulse which may have initiated the change of form in the teeth of both the vicunia and the Balearic goat appears to be still entirely unknown.

EXPLANATION OF PLATE.

Incisor teeth of Vicunia and Guanaco. All figures slightly reduced.

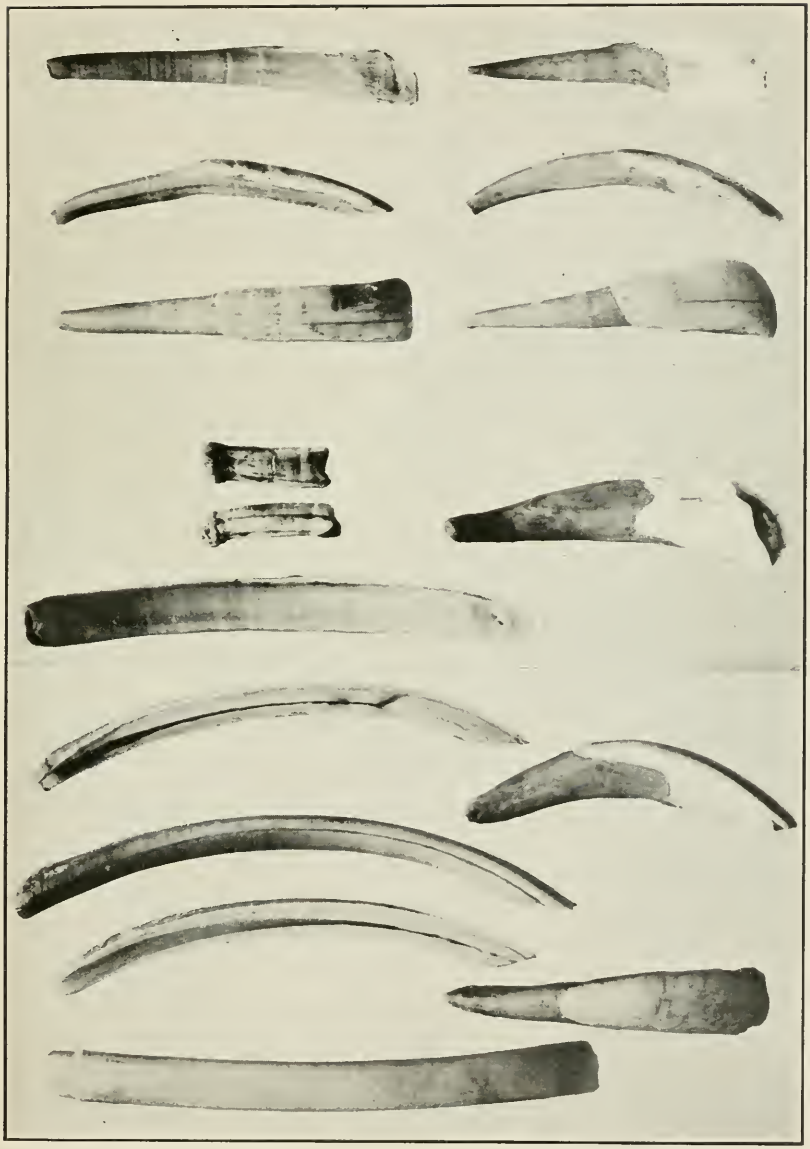
Vicugna vicugna.

FIG. 1. No. 38451. Milk dentition, i_2 left, lingual surface.
2. No. 38451. Milk dentition, i_1 left, lateral surface.
3. No. 38451. Milk dentition, i_1 right, labial surface.
4. No. 199253. Completely worn out stubs of i_1, right and i_1 left, in senile captive individual.
5. No. 194297. Permanent dentition, i_2 left, lingual surface.

FIG. 6. No. 194297. Permanent dentition, i_2 right, split longitudinally to show pulp cavity.
7. No. 194297. Permanent dentition, i_1 left.
8. No. 96611. Permanent dentition, i_1 right, split longitudinally to show pulp cavity. (A younger individual than No. 194297.)
9. No. 194297. Permanent dentition, i_1 right, labial surface.

Lama huanachus.

FIG. 10. No. 194291. Milk dentition, i_2 left, lingual surface.
11. No. 194291. Milk dentition, i_1 left, lateral surface.
12. No. 194291. Milk dentition, i_1 right, labial surface.
13. No. 194294. Permanent dentition, i_2 left, lingual surface.
14. No. 194294. Permanent dentition, i_1 right, lateral surface.
15. No. 194294. Permanent dentition, i_1 left, labial surface.



INCISOR TEETH OF VICUNIA (1–9) AND GUANACO (10–15)

FOR EXPLANATION OF PLATE SEE PAGES 3–4