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THE DECIDUOUS DENTITION OF THE FISH-EATING BAT, *PIZONYX VIVESI*

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DATA concerning the structure of deciduous or milk teeth of bats are not common. The numbers of milk teeth and their general structure in various genera may be found listed by Miller (1907), Winge (1941), and Weber (1927). Leche (1875, 1877, 1878) described the deciduous dentition of many species in more or less detail. He was one of the first to emphasize the importance of the study of milk teeth in determining interrelationships of genera and families. Since the work of Leche few original observations of this type have been made. It is important to know that the milk teeth of bats are not used primarily, if at all, in the comminution of food but appear to function solely in aiding the newborn young to remain attached to one of the mother's pectoral teats during flight. The character of these teeth seems to have changed little during the phylogenetic development of bats, and the structure of the milk teeth may be conservative, with little modification by selection, thus being directly indicative of the broader relationships of the higher chiropteran taxonomic categories. Accumulation of detailed information regarding the structure of milk teeth is therefore desirable in order that a definitive comparative study may at some time be made.

A series of juveniles of the fish-eating bat *Pizonyx vivesi* Menegaux has been studied. As a result of an especially fruitful collecting trip to Isla Partida in the Gulf of California, D. R. Dickey, in 1928, collected at least 22 adults and 19 immature *Pizonyx,* which were prepared as skins with skulls. These specimens are now in the D. R. Dickey collection of the University of California, Los Angeles. For the use of these specimens, I am greatly indebted to Dr. Thomas R. Howell, of that institution. The skulls of the immature specimens were cleaned with especial care. Nearly complete deciduous dentitions are present in most specimens, and the entire skull of most of the specimens is in good condition.

There are 38 teeth in the adult *Pizonyx,* the maximum number found in bats. The dental formula is $I\frac{2}{3}$, $C\frac{1}{1}$, $PM\frac{3}{3}$, $M\frac{3}{3}$ = 38. Thus the I^1, PM^1, and PM_1 are lacking from the assumed primitive formula of placental mammals. The deciduous teeth of *Pizonyx* are 22 in number, which also represents the maximum known for deciduous dentitions in bats; the milk formula is $di\frac{2}{3}$, $dc\frac{1}{1}$, $dpm\frac{2}{2}$ = 22. As far as is known, the adult I_1, $I\frac{2}{2}$, $I\frac{3}{3}$, $C\frac{1}{1}$, $PM\frac{3}{3}$, and $PM\frac{4}{4}$ have predecessors in the milk series. Milk teeth representing $PM\frac{2}{2}$ have never been found, although these teeth are to be seen in adults.

Plate I illustrates the lingual aspect of the deciduous teeth of *Pizonyx*. Great variety of shape is found in this milk series. The incisors are found to be trifid; dc^1 and dpm^3, however, are simple but slightly spoonlike and recurved. The dc_1 and dpm_3, heavily recurved, form distinct posterointernal notches, but the $dpm\frac{4}{4}$ are nearly cuspidate in character. None of the deciduous teeth are simple spicules in this genus. I wish to express my deepest gratitude to Mr. William Brudon, of the University of Michigan Museum of Zoology, for careful preparation of this plate.

The sequence of loss of the deciduous teeth can be partly determined in the present series. The first milk tooth to be lost is undoubtedly di_1. In only two specimens is this tooth still imbedded. In all specimens adult incisors are exserting and are found protruding above the bone. The second tooth to go is probably dpm^4. In five of 17 specimens this tooth is absent, twice when only di_1 is absent, twice when all lower incisors are absent, and once when only di^2 and di^3 are present. The permanent molar teeth of the upper jaw push through rapidly and early, inducing the loss of dpm^4.

The di_2 and di_3 are absent three and four times, respectively, out of 17 specimens. The three specimens lacking di_2 also do not possess di_3. The single case where di_3 is lacking and di_2 is present seems to be an artifact due to cleaning, since dpm^4 is present in that specimen and the alveoli of the anterior part of the jaw are broken out. The second and third lower permanent incisors exsert simultaneously from the jaws, after the breaking through of I_1; the loss of the corresponding deciduous incisors may take place at nearly the same time. Unfortunately, only one of the specimens of the series is developed to the extent of losing more than the three lower incisors and the posterior upper premolar. In this specimen the deciduous upper incisors are present. The left upper canine is present, but almost completely forced out by the growth of the permanent left upper canine. All deciduous teeth have been shed from the right lower jaw; in the left, however, the two premolars are

still in place and apparently firmly anchored, although the permanent teeth are well above the gum, and the space necessary for the crowns of the deciduous teeth will not long remain. In no specimen is either deciduous upper incisor missing. Thus, although the evidence for the sequence of the central teeth of the rows is lacking, the following appears to be the approximate sequence of loss in the deciduous teeth: di_1; dpm^4; either di_2 or di_3, immediately followed by the other of the pair; dc_1 and dpm^3, either of the pair being lost first; in an unknown order, dpm_3, dpm_4, and dc^1; lastly di^2 and di^3 in unknown order.

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PLATE I

Lingual aspect, deciduous dentition of *Pizonyx vivesi,* D. R. Dickey collection, 14946 ♂, right tooth rows.

Figs. a–e, upper teeth; Figs. f–k, those of the mandible.

Fig. a, di^2; b, di^3; c, dc^1; d, dpm^3; e, dpm^4; f, di_1; g, di_2; h, di_3; i, dc_1; j, dpm_3; k, dpm_4. The comparable upper and lower teeth are not occlusal.

PLATE I