American Museum Novitates

PUBLISHED BY THE AMERICAN MUSEUM OF NATURAL HISTORY
CENTRAL PARK WEST AT 79TH STREET, NEW YORK, N. Y. 10024

NUMBER 2351 NOVEMBER 19, 1968

Variation in Dental Structures of the Florida Mouse, *Peromyscus floridanus*

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Patterns of accessory dental structures have been widely used in rodent taxonomy, although intraspecific variation in such characters has received relatively little attention. The present paper concerns a preliminary analysis of variation in selected molar tooth structures in four populations of the Florida mouse, *Peromyscus floridanus* (Chapman). This species comprises the sole representative of the subgenus *Podomys* and is limited to Florida in its distribution. The specific objectives of this study were to gain some indication of the extent to which variation in dental patterns and their temporal stability in different populations may be related to such factors as the degree of geographic isolation, habitat type, and population trends. Hooper (1957) described interspecific and intraspecific variation in molar patterns of 17 species of *Peromyscus* but did not include *P. floridanus.* Bader (1959) compared the accessory dental structures of three additional species, including *P. floridanus,* but did not consider variation within species.

This research was supported in part by National Science Foundation Grants G3215 ("Biology of the Florida Deer Mouse, *Peromyscus floridanus*") and G13240 ("Comparative Population Ecology of *Peromyscus floridanus*") to the junior author.

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POPULATION CHARACTERISTICS

The four populations included in this study are designated as the Alachua, Levy 10, Levy 19, and Highlands populations. The localities at which collections were made are as follows:

ALACHUA: Ten miles northwest of Gainesville, Alachua County.
LEVY 10: Fifteen and a half miles southwest of Otter Creek, Levy County.
LEVY 19: Eighteen miles southwest of Otter Creek, Levy County.
HIGHLANDS: Archbold Biological Station, 8 miles south of Lake Placid, Highlands County.

The Alachua and Levy stations are situated in the northern part of the peninsula approximately 60 miles apart. The Highlands locality is at the southern limit of the range of the species in the central highlands region of the state, approximately 200 miles from the other localities. The two Levy populations are within 3 miles of each other. On the basis of the pronounced habitat specificity of *P. floridanus* and the distribution of suitable habitat types (Layne, 1963), there is probably relatively free or slightly restricted gene flow between the two Levy populations, and little, if any, between the Levy and Alachua and Levy and Highlands populations. Despite the distance separating the Alachua and Highlands populations, opportunity for gene exchange through a more or less continuous avenue of suitable habitat types probably existed until the fairly recent past. However, as a result of habitat destruction for citrus groves, housing developments, and other land uses in the region between the two populations, they are now probably essentially isolated.

The Alachua population inhabits relatively open pine-oak woodlands with sparse ground cover, whereas the vegetation of the Levy and Highlands stations is dense and scrublike. These habitats have been described in greater detail elsewhere (Layne, 1963). The Alachua and Levy populations differ in many aspects of ecology, one of the most conspicuous differences being their density patterns. Extensive trapping in these localities over a 10-year period indicates that the Alachua population exists at a generally low level, with dramatic short-term increases in abundance correlated with the bumper acorn crops that occur irregularly at intervals of several years. In contrast, the Levy populations average generally higher and exhibit a more marked and regular annual cycle of abundance. Less is known about the Highlands population, but present evidence suggests that it resembles the Levy populations in its density characteristics.

METHODS

Random samples of 50 skulls from each population were used in the study. These samples were selected from a large series assembled between the years 1957 to 1965. Skulls with molars worn enough to obscure the dental patterns were eliminated. Rudimentary dental accessory structures are most easily detected in newly erupted teeth of young animals. We used young adult animals because not enough juveniles were available from each population for comparative purposes.

The dental characters studied included the mesoloph, the mesostyle, and the mesolophostyle (a structure formed by the fusion of the mesoloph and mesostyle) on the first two upper molars, and the mesostylid and the ectostylid on the corresponding lower molars. In some cases the structure recorded as a mesostyle actually may have been a paralophule or "pseudomesoloph" (Hershkovitz, 1962), but these and the true mesostyle were low in frequency, and it would not have been meaningful for our purposes to distinguish between them. The mesoloph was in all cases a true mesoloph emerging from the mure between the paracone and metacone. A method of expressing mesoloph development similar to that devised by Hooper (1957) was utilized. The degree of mesoloph development was ranked according to the following scale: 0, mesoloph absent; 1, mesoloph present but not extending halfway to the margin of the tooth; 2, mesoloph extending more than halfway to the margin of the tooth but not extending completely to the margin and fused with the mesostyle to form a mesolophostyle; 3, mesolophostyle present. To insure consistency of interpretations, a series of skulls representing each of these conditions was set up for reference. The mesostyle, mesostylid, and ectostylid were recorded as being present or absent.

Examinations were made at 4X magnification through a binocular microscope. Skulls from the different populations were examined in random order in an effort to eliminate possible bias on the part of the observer. Chi-square tests were used in statistical comparisons of the populations. Differences resulting in chi-square values corresponding to probability levels of .05 and .01 are regarded as significant and highly significant, respectively.

RESULTS

MESOLOPH: Depending on the population, the mesoloph was not detectable in 6 to 22 per cent of the first upper molars examined (table 1). It was absent from the second upper molar much more frequently, ranging from 42 per cent at Levy 10 to 70 per cent at the Highlands

TABLE 1

STATUS OF THE MESOLOPH AND MESOSTYLE ON THE FIRST TWO UPPER MOLARS IN FOUR *Peromyscus floridanus* POPULATIONS

(See text for explanation of mesoloph index.)

Population	M1 Mesoloph Index				M1 Mesostyle Frequency	M2 Mesoloph Index				M2 Mesostyle Frequency
	0	1	2	3		0	1	2	3	
Levy 19	.06	.46	.42	.06	.24	.48	.30	.14	.08	.30
Levy 10	.06	.36	.32	.26	.30	.42	.28	.04	.26	.46
Alachua	.22	.66	.10	.02	.04	.60	.36	.02	.02	.12
Highlands	.08	.60	.30	.02	.14	.70	.16	.04	.10	.16

locality. The two Levy populations show the greatest degree of mesoloph development (table 1) and do not differ significantly from each other. Differences between the combined Levy populations and both the Alachua and Highlands populations are, however, highly significant. The Alachua population differs significantly from the Highlands population in the condition of the mesoloph on M1, but not of that on M2.

MESOSTYLE: The highest mesostyle frequency on both M1 and M2 was observed in the Levy populations (table 1). In all populations the structure is more frequent on M2 than on M1. There are no significant differences in occurrence of the mesostyle between Levy 10 and Levy 19, or between the Alachua and Highlands populations in the case of either tooth. Differences in mesostyle frequency on both M1 and M2 between the combined Levy sample and the Alachua series are highly significant. The Levy populations also differ significantly from the Highlands population in this character with respect to M2, but not M1.

MESOSTYLID AND ECTOSTYLID: The frequency of occurrence of these structures in each population is summarized in table 2. They are better

TABLE 2

FREQUENCY OF THE MESOSTYLID AND ECTOSTYLID ON THE FIRST TWO LOWER MOLARS IN FOUR POPULATIONS OF *Peromyscus floridanus*

Population	Mesostylid		Ectostylid	
	m1	m2	m1	m2
Levy 19	.86	.46	.66	.40
Levy 10	.98	.76	.72	.54
Alachua	.72	.42	.18	.22
Highlands	.54	.32	.46	.40

developed on m1 than on m2 in all populations except Alachua. The frequency of the ectostylid is lowest in the Alachua and Highlands populations. These populations also show the least amount of difference between m1 and m2 in the frequency of the ectostylid. There is no significant difference between the two Levy populations in either character on either tooth. The difference in mesostylid frequency does, however, closely approach significance on m2. The difference in ectostylid frequency between the combined Levy samples and the Alachua sample is highly

TABLE 3

TEMPORAL VARIATION IN MESOLOPH DEVELOPMENT IN TWO *Peromyscus floridanus* POPULATIONS

Population and Year	*N*	Mesoloph Index (M1)				Mesoloph Index (M2)			
		0	1	2	3	0	1	2	3
Levy 10, 1957	37	.03	.32	.38	.27	.30	.24	.14	.32
Levy 10, 1961	25	.08	.24	.44	.24	.32	.28	.16	.24
Alachua, 1957	53	.09	.83	.08	0	.62	.30	.06	.02
Alachua, 1965	13	.08	.76	.16	0	.84	.16	0	0

significant in the case of m1 and significant in the case of m2. There is no significant difference in mesostylid frequency between these populations. The Levy and Highlands populations show a significant difference on both m1 and m2 in mesostylid frequency, but not in ectostylid frequency. The only character that differs significantly in a comparison of the Alachua and Highlands populations is the frequency of the ectostylid on m1.

TEMPORAL VARIATION: Mesoloph development in samples collected in 1957 and 1964 from the Alachua population and in 1957 and 1961 from the Levy 10 locality is compared in table 3. The differences for either M1 or M2 between years are not statistically significant in either population. The temporal variation in the Alachua population seems more pronounced, however, and approaches statistical significance in the case of M2.

DISCUSSION

Some discrepancies exist between the frequency of occurrence of certain dental structures reported here and values given by Bader (1959). Bader noted the presence of the mesoloph on M1 in all 101 skulls that he examined, whereas this structure was absent from variable proportions of our population samples. Bader also indicated a higher frequency of the mesoloph on M2 than we found. There is general agreement be-

tween our data and Bader's as to the frequency of occurrence of the mesostyle, whereas our values for the occurrence of the mesostylid and ectostylid are slightly higher. As Bader's samples included material from some of the populations used in this study, the discrepancies may be the result of a difference in methods of examination, interpretation of structures, or the nature of the material. Bader may have selected young individuals, in which chances of detecting rudimentary accessory structures may be more likely than in the older specimens with essentially unworn teeth that we used in this study.

On the basis of the present data, the two Levy populations exhibit the closest similarities in the dental characteristics studied of any of the populations and together differ appreciably from both the Alachua and Highlands populations, although showing a somewhat closer approach to the latter. The dental pattern of the Highlands population, however, still shows a greater over-all resemblance to the Alachua. The relationships between these populations suggested by tooth structure are thus consistent with the presumptive evidence for amount of gene flow between them.

For the most part, the similarities between the Levy and Highlands populations reflect greater complexity of molar patterns as compared with the Alachua population. These differences appear to be correlated with environmental factors, the population (Alachua) existing in the open woodland habitat having a less complex molar pattern than the populations (Levy and Highlands) from the more densely vegetated scrublike habitats. A similar correlation between habitat type and complexity of dental patterns has been reported for other species of *Peromyscus* as well as other cricetine genera (Hershkovitz, 1962; Hooper, 1957).

The limited data on temporal variation in dental characters suggest that the pattern within a given population tends to be stable over at least a short span of years. Although the differences in M1 and M2 within each population between years are not statistically significant in any case, there is a stronger indication in the data for M2 of the Alachua samples of a shift in the dental pattern between 1957 and 1965. This may simply reflect the longer time interval between the Alachua samples or may be indicative of a greater probability of alteration of the gene pool of the Alachua as compared with the Levy population as a consequence of its more unstable density pattern.

SUMMARY

Variation in the development of the mesoloph and frequency of occurrence of the mesostyle, mesostylid, and ectostylid on the first and second

molars were studied in four populations of the Florida mouse, *Peromyscus floridanus*. Degrees of similarity between populations based on these characters correlated well with presumed amount of gene flow between them. The molars of a population from an open woodland habitat showed a tendency toward simplification as compared with populations inhabiting dense, scrublike vegetation. No significant differences in mesoloph development occurred in samples of two populations collected four and eight years apart.

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