AN EVALUATION OF EYE-LENS WEIGHT FOR AGE ESTIMATION OF *PEROMYSCUS MANICULATUS*

by

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BU-350-M February, 1971

Abstract

The use of the eye-lens weight as an index to the age of *Peromyscus* has been evaluated. This technique was not able to separate every individual 3 months old from those 1 year old. However, a comparison of the source of variation showed that only a small portion of the total variance was attributable to the technique. Thus improvements in the technique will not improve the index. The conclusion reached is that the weight of the eye-lens is not sufficient to estimate the age. However, the best other technique (i.e., tooth-wear class) is not sufficient either; but the two techniques used together are better than either one used alone.

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A major problem in studying the population dynamics of *Peromyscus* is the paucity of data on age structure and changes in age structure with changing conditions. These data are available only from mark-recapture studies extending over several years and requiring considerable amounts of work. While conducting such a study, I decided to try to compare the eye lens weight as an index to the age of *Peromyscus* with the other indexes available.

The color of the pelage is generally used as a simple way to separate adults from juveniles. Body weight can also be used as an objective way to separate juveniles from adults during the first 6 weeks of life.

The amount of wear on the teeth also serves as an useful index to the age (Sheppe, J. Mamm. 44:180-185, 1963). Sheppe found that his Class I animals were less than 30 days old. In this study two animals about 2 months old were placed in Class II, whereas two others were placed in Class III (Table 1). All of the Class IV animals to which I could assign probable ages were 8 months old or more. Class V contained some animals no more than 10 months old. Two animals estimated at more than 20 months old were in this class.

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The amount of tooth wear had some obvious advantages over pelage color or body weight as an age estimating technique, but added the problem of subjectively classifying a continuous variable into discrete classes. Moreover, the discrete classes do not represent equal intervals of time. Classes I and II represent only about a month on the time scale whereas Classes IV and V obviously represent many months.

The weight of the eye lens has been used as an index to the age of many mammals in the last 10 years (Friend, N. Y. Fish and Game J., 14:157-165, 1967.) (Askaner and Hansson, Oikos, 18:151-153, 1967.)

The eye lens of all of the Peromyscus killed in this study were weighed after drying in an oven. Some additional animals were raised in the laboratory. H. L. Schrag (Psychology Department, Washington State University) donated 30 laboratory-reared Peromyscus about 1-year old with some litters born in February and March; the juveniles were raised until May 28. The 1-year old animals had heavier average eye-lens weights than the 3-month old animals, but there was some overlap between these age groups (Fig. 1). Most of the overlap was from members of one litter which, since the exact date of birth was not known, may have been as much as 4 weeks older than some of the other litters.

Data on the eye-lens weight plotted against the minimum-known age of Peromyscus from the study plots are presented in Fig. 2. These figures show that the average weight may increase for several months, but the variation among animals of approximately the same age was high. Several sources of variation have been considered (Table 2). The variation between lenses from the same individual was used as a measure of how much tissue remained adhering to the lens. Some lenses were cleaned with a sonic cleaner (courtesy of the Anthropology Department at Washington State University) but this technique was abandoned when soaking in a

.3% H_2O_2 solution for 12 hours seemed to do equally well. However, the variance between manually cleaned lenses within animals was about the same when the lenses were cleaned with tweezers and a fine brush. The variance between the lenses of laboratory reared animals was smaller than with wild trapped animals. Postmortem changes between the time the animal died and the time the lenses were preserved probably accounted for the difference. The variance between lenses from an animal was still much smaller than the variation among animals from the same litter which indicated that further improvements in cleaning the lens would not yield a better index to the age of the animal.

The variation among individuals within litters born in the laboratory is 44 (Table 2). The variance among litters including the deviant litter discussed above was 374, but the variance among the other eight litters was only 117. The variation among litters appeared to be at least twice the variation within litters.

The bottom of Table 2 shows the variances associated with samples of wild mice from Southeastern Washington. The table shows the variation from all the animals removed from two 1-acre trapping grids in June, 1970. The variation shown here is indicative of what to expect in a natural population.

The data in Figs. 1 and 2 and Tables 1 and 2 indicate that the eye-lens technique is probably useful only for separating monthly age classes during the first 3 or 4 months of life. The lens weight of the *Peromyscus* in each tooth-wear class are given in Table 3. Tooth-wear classes were a simple way to separate over-wintered animals from young of the year in the June sample. The only overlap was in Class III which included animals showing just a little wear and some with the cusps of the third molar almost worn away but still visible. The eye-lens weight might be used to supplement the tooth wear classes. Class III can almost certainly be divided into smaller classes; the eye-lens weight might be the most precise way of doing so.

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TABLE 1.

Tooth-wear classes of wild *Peromyscus maniculatus* caught in June of 1970

Tooth-Wear Class	Minimum Age Estimates	
	No. Individuals	Range
I	1	Small juvenile
II	2	2 months
III	4[a]	2-6+ months
IV	5	8+-10 months
V	6	9-20 months

[a]Two of these animals were spring young on the II-III borderline and two were over-wintered adults on the III-IV borderline.

TABLE 2.

Variance associated with eye-lens weight

(.1 miligrams) of *Peromyscus maniculatus*

Source	df	Variance
Laboratory Reared Animals		
Between sexes of 1-year old animals	1	4
Between sexes of 3-month old animals	1	1
Among litters[a]	8	374
Among litters[b]	7	117
Among individuals within litters 3 months old	30	44
Among individuals 1-year old	27	164
Among males 1-year old or more	14	218
Among females 1-year old or more	12	98
Among males 3-months old	16	324
Among females 3-months old	24	766
Between lenses within animals (chemically cleaned)	42	2
June Sample		
Among all animals	26	818
Among males	11	820
Among females	14	886
Between lenses within an animal (manually cleaned only)	23	5

[a]Includes all litters raised from H. L. Schrag's animals.

[b]Does not include one litter with higher lens weights.

Fig. 1. -- Frequency distribution of eye-lens weight of known-aged laboratory-reared *Peromyscus maniculatus*.

Fig. 2. -- Minimum estimated age plotted against eye-lens weight of wild *Peromyscus maniculatus*.

Fig. 3. -- Eye-lens weight of wild *Peromyscus maniculatus* in each tooth-wear class.