

LIFE HISTORY STRATEGIES OF THE MONTANE VOLE, *Microtus montanus*

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Objectives

Emphasis in microtine rodent biology has historically been placed on population regulation and the population cycle. Until recently, little attention has been directed to behavior and sociality in microtine rodents, but work on the sociobiology of the montane vole (Jannett, 1978, 1980, 1981, 1982) is serving to integrate various aspects of the biology of this species so that its life history characteristics can be interpreted in an evolutionary framework. Work undertaken in 1983 continues previously initiated surveys of various topics, such as synchrony of population events in different populations, survivorship, scent gland development, patterns of cranial and dental variation, population trends in a sympatric species of vole (*M. longicaudus*), and reproduction in a primary predator, the shorttail weasel (*Mustela erminea*). In addition, work in 1983 was initiated on genic substructuring of populations as indicated by electrophoretic analyses of tissues.

Methods

Voles were trapped over a 3-week period in October in 10 sample lines and 2 gridded areas, each of which replicated samples from the same areas made in 1971-1977 and 1982. Most samples were run for only 2 days so that impact on the respective populations would be minimized. Eyes were removed for age determination upon lens weight (Gourley and Jannett, 1975). Tissues were frozen at the Research Center. A trap line for shorttail weasels was set over a very wide area, as in previous years.

Results

Microtus montanus: Population levels in this species were higher than in any previous year of trapping. There were too many voles in the densest population, amongst which traps were set in a gridded pattern, to be censused. A large sample made there conformed to patterns from high-density populations in previous years: early cessation of breeding and a relative paucity of adult males to adult females. No lactating or pregnant female was secured. The ratio of males with partially scrotal testes to parous females was 1:6.4. Only one juvenile vole (less than 16g) was taken in this gridded area.

In contrast, breeding continued in less dense populations as evidenced by numerous juveniles and reproductively active females. For example, the sample

from the last area to be trapped had 3 females, each of which was pregnant and/or lactating (October 28-30), and only 1 parous female neither pregnant nor lactating.

There appeared to be a relationship between continued late fall breeding and the ratio of males with largely scrotal testes to parous females (Figure 1). In samples where "adult" males were relatively common, breeding continued at various levels. Where there were relatively few adult males (or none), breeding had ceased by October.

(Because the movement patterns of males and females are very different (Jannett, 1978, 1981), further analysis of the relationship awaits synthesis of the recapture and behavioral data with the sampling and census data.)

Tissue samples of voles from the high density grid were forwarded to Dr. Robert Selander for laboratory analysis. Other materials (skulls, dried eye lenses, and organs) are still being processed, analyses to be presented at a later date in monographic form.

Microtus longicaudus: Numbers of voles at three sites were not appreciably different than in previous years.

Mustela erminea: No shorttail weasels were trapped in 1983.

Conclusions

As in previous years, very high density populations of M. montanus were characterized by a paucity of adult males and the early cessation of seasonal breeding (Jannett, 1981).

The finding of earlier cessation of breeding among higher density but not lesser density populations conforms to a recognized pattern in microtine demography in which breeding ceases earlier in years of very high density (Krebs and Myers, 1974). That the pattern was found during one year tends to falsify the hypothesis that local weather conditions and vegetation changes are the proximate factor(s) behind differences in the timing of the end of the breeding season (cf. Berger, et al., 1981; Jannett, in press).

Literature Cited

- Berger, P. J., Negus, N. C., Sanders, E. H., and Gardner, P. D. 1981. Chemical triggering of reproduction in Microtus montanus. *Science* 214:69-70.
- Gourley, R. S. and Jannett, F. J., Jr. 1975. Pine and montane vole age estimates from eye lens weights. *J. Wildl. Manage.* 39:550-556.
- Jannett, F. J., Jr. 1978. The density-dependent formation of extended maternal families of the montane vole, Microtus montanus nanus. *Behav. Ecol. and Sociobiol.* 3:245-263.

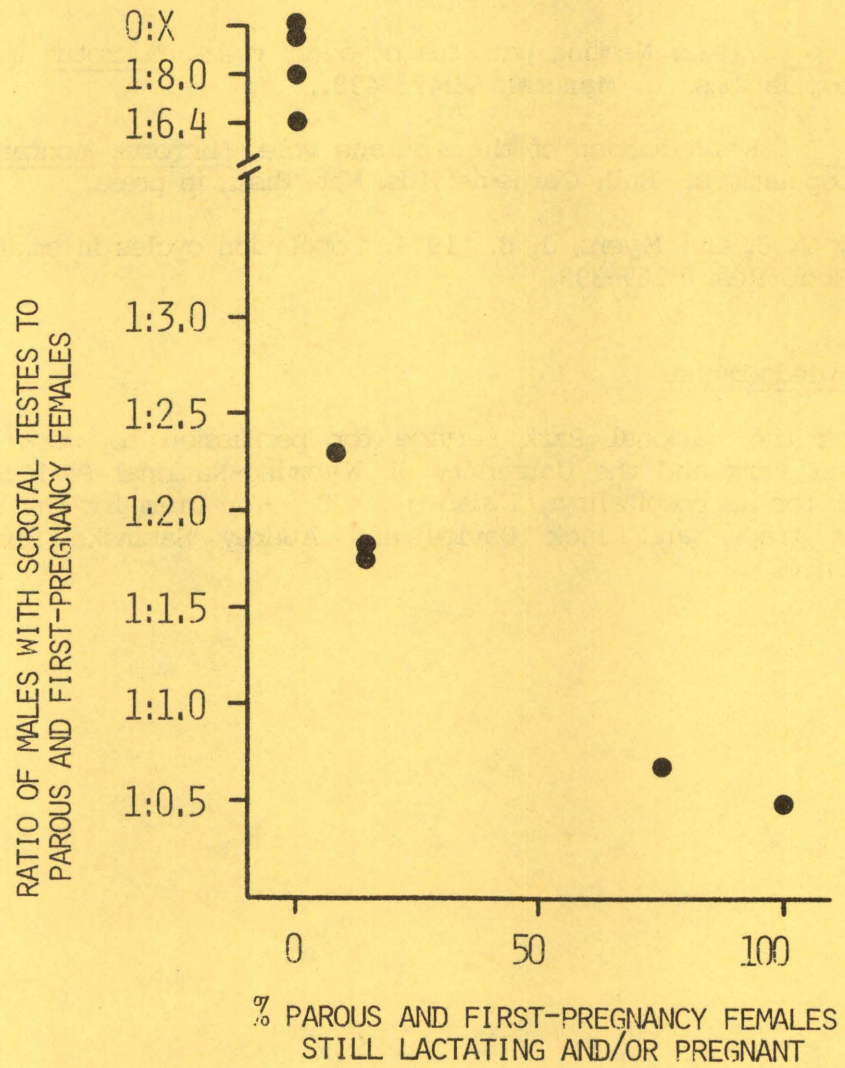


FIGURE 1. OPERATIONAL SEX RATIOS VERSUS PERCENTAGES OF "ADULT" FEMALES STILL BREEDING IN OCTOBER, BASED ON INITIAL GROSS EXAMINATIONS OF SPECIMENS.

- _____. 1980. Social dynamics of the montane vole, Microtus montanus, as a paradigm. *Biologist*, 62:3-19.
- _____. 1981. Sex ratios in high-density populations of the montane vole, Microtus montanus, and the behavior of territorial males. *Behav. Ecol. and Sociobiol.* 8:297-307.
- _____. 1982. Nesting patterns of adult voles, Microtus montanus, in field populations. *J. Mammal.* 63:495-498.
- _____. Reproduction of the montane vole, Microtus montanus, in subnivean populations. *Bull. Carnegie Mus. Nat. Hist.*, in press.
- Krebs, C. J. and Myers, J. H. 1974. Population cycles in small mammals. *Adv. Ecol. Res.* 8:267-399.

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