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Additional Records of the Rock Vole, *Microtus chrotorrhinus* (Mammalia:  
Muridae), in Virginia.

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In Virginia, the rock vole, *Microtus chrotorrhinus*, was known from a single locality in Bath County (Pagels, 1990). Here we report on an additional Bath County record and a record from Highland County. Two adult female *M. chrotorrhinus* were captured near the upper reservoir of the Bath County Hydroelectric Plant at approximately 1021 m elevation. Two adult female *M. chrotorrhinus* were captured at a site in Highland County in Kent

Simmons Hollow at an elevation of 976 m. The new records are 1.4 km north and 3.9 km northeast, respectively, of the original Bath County site, elevation 1036 m (Pagels, 1990). Both sites were among 353 sites sampled within the George Washington and Jefferson National Forests as part of a larger ongoing small mammal study.

All rock voles were adult females with visible mammae and were found dead in Sherman live traps baited with whole oats scented with peanut butter. Each sampling site also contained a pitfall array with four pitfalls connected by drift fences and a Tomahawk live trap. There were 69 trapnights (TN) of effort at the Highland County site from 28 May to 1 June 1997. The Bath county site was live-trapped for 69 TN followed by 65 TN with Museum Special traps in early summer 1996, and was live-trapped again for 69 TN in early summer 1997. Specimens were deposited in the Virginia Commonwealth University Mammal Collection (VCU # 12378 and 14034, Bath County specimens, VCU # 14031 and 14032, Highland County specimens).

Both sites were riparian habitats with steep slopes (28° at Bath County site, 31° at Highland County site). The sites were characterized by abundant vegetation, moss, talus- and rock-laden slopes typical of *M. chrotorrhinus* habitat (Kirkland and Jannett, 1982). Rock or talus at the sites ranged in size from less than 0.2 m to more than 1 m, and woody debris was abundant at each site. Herbaceous growth was prevalent at both sites, and consisted primarily of stinging nettle (*Urtica dioica*) and jewelweed (*Impatiens* spp.). Soil field capacity, a measure of the moisture-holding ability of the soil (Ball 1964) significantly related with soil organic content ( $r^2 = 0.98$ ), was high at the Bath county (409.4) and Highland county site (356.51), and was significantly greater than mean field capacity at the other 351 other sites sampled ( $\chi = 71.31 \pm 47.99$  s.d.,  $P < 0.001$ , t-test).

Woody tree species present at the sites were typical of rock vole habitat as found in the region (Kirkland, 1977; Pagels, 1990). Canopy tree species with diameter at breast height (dbh) greater than 10 cm in decreasing abundance at the Bath county site were American basswood, *Tilia americana*, yellow birch, *Betula alleghaniensis*, and a single standing dead tree (snag). Mean dbh of these trees was 37.8 cm  $\pm$  4.7 cm (n = 9). Subcanopy and shrub species in decreasing abundance at the site were witch hazel, *Hamamelis virginiana*, sugar maple, *Acer saccharum*, mountain maple, *Acer spicatum*, honeysuckle, *Lonicera* spp., *T. americana*, and white ash, *Fraxinus americana*. Canopy tree species at the Highland County site consisted of *T. americana*, snags, slippery elm, *Ulmus rubra*, striped maple, *Acer pensylvanicum*, *F. americana*, and cucumber magnolia, *Magnolia acuminata*. Subcanopy and shrub species at the site were *A. spicatum*, *Lonicera* spp., mountain laurel, *Kalmia latifolia*, hornbeam, *Ostrya virginiana*, *A. saccharum*, and hickory, *Carya* spp. Mean dbh of these trees was 20.6 cm  $\pm$  2.5 cm (n = 17). Tree communities at both sites were over 120 years old (U.S. Forest Service Continuous Inventory of Stand Condition data).

Other small mammals captured at the Bath County site were *Clethrionomys gapperi* (19), *Peromyscus maniculatus* (6), *Tamias striatus* (4), *Blarina brevicauda* (2), *Sorex cinereus* (2), *Peromyscus leucopus* (1), *Sorex fumeus* (1), and *Sorex hoyi* (1). Small mammals captured at the Highland county site were *P. maniculatus* (6), *S. fumeus* (6), *B. brevicauda* (2), *C. gapperi* (2), *Napaeozapus insignis* (2), *S. cinereus* (1), and *P. leucopus* (1). These species, especially *C. gapperi*, have frequently been found in sympatry with *Microtus chrotorrhinus* (Martin, 1971; Timm et al., 1977; Kirkland and Jannett, 1982; Pagels, 1990).

The occurrence of rock voles at only two of 353 sampling sites supports the contention of other researchers (Kirkland, 1977; Pagels, 1990; Handley and Pagels, 1991) that *M. chrotorrhinus* populations in the area exist in relative isolation. The relatively narrow niche breadth of *M. chrotorrhinus* may explain this distribution to some extent (Clough, 1987), although the true nature of the ecological restriction of *M. chrotorrhinus* is not fully understood (Kirkland and Jannett, 1982). Only one *M. chrotorrhinus* was captured during follow-up sampling at the Bath County site in 1996 and 1997 (VCU # 12378), suggesting that low abundance was common even in suitable habitat in the study area, in concurrence with the findings of French and Crowell (1985) and Guilday (1971). Although genetic studies suggest the *M. chrotorrhinus* may not be isolated in more northern regions (Kilpatrick and Crowell, 1985), if genetic exchange is occurring among populations in the study region, inbreeding and relatively low reproductive output (Handley, 1980) probably offset immigration-enhanced heterozygosity (Kilpatrick and Crowell, 1985).

Our findings suggest that *M. chrotorrhinus* distribution in the study area was not limited by suitable habitat, as habitats of similar composition were sampled, although such habitats were not abundant among the 353 sites sampled. The status of *M. chrotorrhinus* in West Virginia (Kirkland, 1977) suggests that source populations exist for recolonization of suitable habitat in the study region (Pagels, 1990), and our findings suggest that proximity to these source populations is an important consideration. It is likely that the highly managed landscape of the southern Appalachians is relatively devoid of suitable dispersal corridors and thus limits movement of *M. chrotorrhinus* into suitable habitats (Henein and Merriam, 1990; Anderson and Danielson, 1997). The discrete nature of vole populations in the study area and considerations of landscape structure and physiognomy

imply that the maintenance of viable, genetically diverse populations in the study area is contingent upon management decisions that minimize alteration of existing habitat and promote the existence of suitable dispersal corridors within the landscape.

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