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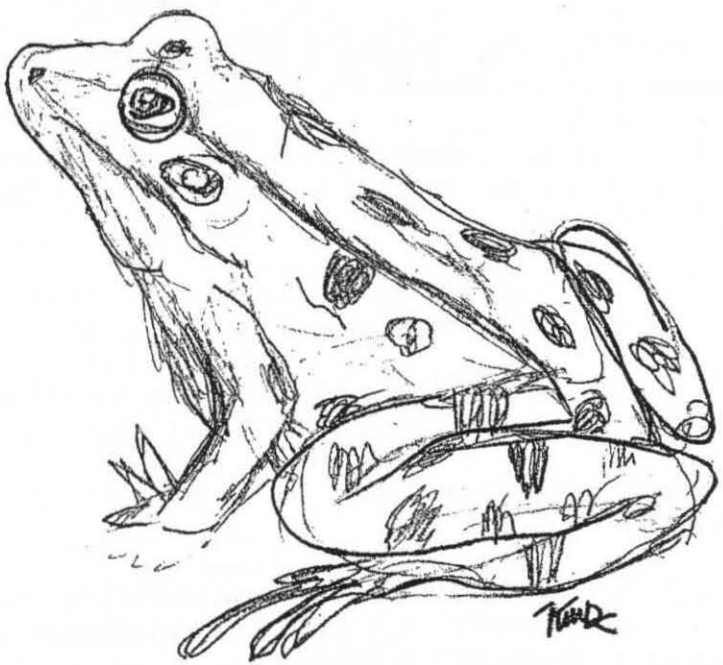

Southern leopard frog (*Rana sphenocephala*)
Drawing by Kimberly Dutton

Is the Red-backed Salamander (*Plethodon cinereus*) Encroaching upon Populations of the Peaks of Otter Salamander (*P. hubrichti*) ?

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The parapatric distributions of several species of *Plethodon* with the wide-ranging *P. cinereus* are believed to be due to competition (Highton, 1972; Jaeger, 1974). Several studies have been conducted to empirically determine if competition is occurring between *P. cinereus* and its sister species. For example, *P. shenandoah*, which inhabits talus areas of three mountains in Shenandoah National Park, may be competitively excluded by *P. cinereus* from the more moist and deep soil found in forested areas (Jaeger, 1970, 1971a, 1971b, 1972). *Plethodon hoffmani* occurs mostly allopatrically with *P. cinereus* in the western two thirds of the Ridge and Valley Province of the central Appalachian Mountains, the exception being a small sympatric area of *P. cinereus* and *P. hoffmani* in north-central Pennsylvania (Highton, 1972). After studying factors affecting interspecific competition, Jaeger et al. (2002) concluded that the contact zone between the two species was static, whereas Fraser (1976) felt that *P. cinereus* was slowly encroaching on *P. hoffmani*.

Plethodon hubrichti has a small geographic range of approximately 8 x 15 km in the Peaks of Otter area in the Blue Ridge Mountains of Virginia (Pague and Mitchell, 1990). Wicknick (1995) examined interspecific competition between *P. hubrichti* and *P. cinereus*. She found that although competition between the two species was likely, their competitive success was roughly equal, thus allowing the possibility of coexistence in contact zones. Due to the proposed similarity of competitive success, Jaeger et al. (2002) proposed that the boundary between *P. hubrichti* and *P. cinereus* might be static.

Ten years ago Wicknick (1995) examined a site sympatric for *P. hubrichti* and *P. cinereus* as well as an allopatric site for each species. We re-examined these sites in 2003 to determine if the proportion of *P. hubrichti* relative to *P. cinereus* had remained static.

Materials and Methods

Three field sites used by Wicknick (1995) in 1993 were relocated with the assistance of Dr. Wicknick. The three sites included two allopatric sites for *P. hubrichti* and *P. cinereus* as well as one sympatric site located between the two allopatric sites. All three locations are in the Blue Ridge Mountains of Virginia in the vicinity of Apple Orchard Mountain (Botetourt and Bedford counties; Arnold Valley, VA quadrangle).

On October 12, 18, and 19, 2003, daytime searches were conducted using Wicknick's (1995) method of turning cover objects. During the surveys, moisture was present under most cover objects. Captured *P. hubrichti* and *P. cinereus* adults were counted and then released in their capture location.

Results and Discussion

At the allopatric site for *P. hubrichti*, 36 *P. hubrichti* were found while no *P. cinereus* were captured. The allopatric *P. cinereus* site produced one *P. hubrichti* and 31 *P. cinereus*. The sympatric site produced 29 *P. hubrichti* (71%) and 12 *P. cinereus* (29%). Although an increased fraction of *P. hubrichti* was found when compared to the 1993 survey (61%; Wicknick, 1995), the change between the two time periods was not statistically significant (x^2=1.37, df=1, p=0.24, Table 1).

Table 1. Counts of *P. hubrichti* and *P. cinereus* found at each site.

Sites	Sept. 1993[a]	Oct. 2003
Allopatric *P. hubrichti*		
P. hubrichti	68	36
P. cinereus	0	0
Allopatric *P. cinereus*		
P. hubrichti	0	1
P. cinereus	71	31
Sympatric		
P. hubrichti	93	29
P. cinereus	60	12

[a] Data from Wicknick (1995)

The absence of a significant shift in the number of salamanders in these three sites over the ten-year period provides support to the proposal that because of the two species' similarity in competitive success, the boundary between *P. hubrichti* and *P. cinereus* may be static (Jaeger et al., 2002). Additional areas need to be examined to determine if our preliminary results are representative of the entire contact zone for the two species.

In the three areas examined, no significant environmental changes such as logging or damage of the canopy due to gypsy moth defoliation occurred. Such changes might result in one species being favored, most likely *P. cinereus,* due to its use of a wider variety of habitats relative to *P. hubrichti* (Petranka, 1998). Nevertheless, in our study area, which had relatively undisturbed forest, it is encouraging to see that *P. cinereus* has not encroached upon the distribution of *P. hubrichti*.

Acknowledgments

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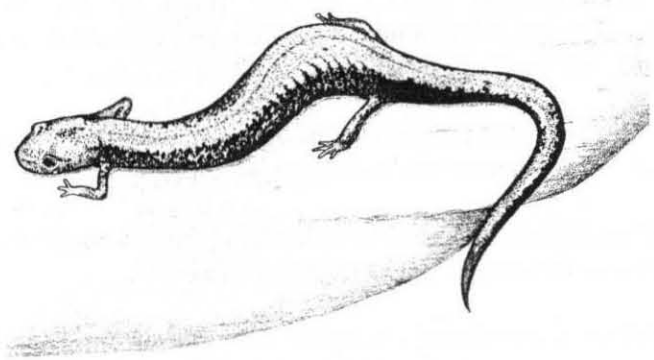

Gordon Wilson
June, 2002

Field Notes

***Thamnophis sirtalis sirtalis* (Eastern Gartersnake).** VA: Fairfax Co., Town of Clifton, 12718 Chestnut Street (ca. 1.6 km (1 mi) W of Southern Railroad bridge over Bull Run). 2-4 November 2003. Nate Simpson, Mark Khosravi, and others.

At approximately 1500 h on 2 November 2003, my 11-year old neighbor Nate Simpson called and asked me to come observe a bundle of gartersnakes he had spied in a bush in his backyard. Immediately upon my arrival I realized that we were witnessing a mating ball. Beside a house and shed I observed 4 or 5 slim male eastern gartersnakes (*T. sirtalis sitrtalis*) approximately 35+ cm long wrapped around an equally long female that appeared to be about twice the diameter of the males. I checked on the snakes periodically during the next three days (2-4 November), during which time they remained engaged in the mating ritual and were photographed multiple times. Several neighbors also witnessed this event. The weather during this 3-day period was sunny and unseasonably warm, with daytime high temperatures in the mid 70s to low 80s (°F) and overnight lows in the mid 40s to mid 60s (°F).

Mating ball of *Thamnophis sirtalis*. Photo by Mark Khosravi.