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A NOTE ON THE BREEDING OF THE RED-SPOTTED NEWT IN CAPTIVITY

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In a previous note (Verrell, 1982), I described a regimen for maintaining adult red-spotted newts *(Notophthalmus viridescens)* in breeding condition in the laboratory. I here describe a method for rearing juvenile newts, or efts, from eggs deposited in captivity.

This method was employed in the spring breeding season of 1982 as part of a larger investigation of the reproductive biology of this species. All of the adults used were derived from the same source and maintained under the same conditions as described previously (Verrell, 1982). Thirteen adult females were paired with adult males, and each was allowed to become inseminated with a single spermatophore. These females were then isolated in transparent plastic boxes measuring 20 x 12 x 12cm, and containing unaerated, aged tap-water at a temperature of about 20°C and fragments of a variety of water weeds. The females were fed daily with chopped-up earthworms, and all eggs deposited in the weed removed and placed in an opaque plastic trough measuring 27 x 24 x 15cm; this contained aerated, aged tap-water at about 20°C. Details of the breeding efforts of the 13 females are presented in Table 1. Although all were inseminated, three of the 13 females failed to lay any eggs. For the 10 females which did lay, the interval from the time of insemination to the onset of oviposition ranged from one to five days. There was a positive correlation between the number of eggs laid and female snout-vent length ($r = 0.7$, $P < 0.05$).

TABLE 1. The Breeding Efforts of the Thirteen Inseminated Female Newts

Female	Snout-vent length/mm	Number of eggs laid
1	43	None
2	44	20
3	45	56
4	46	21
5	46	23
6	46	48
7	47	52
8	48	34
9	49	None
10	49	58
11	49	101
12	50	78
13	51	None

A total of 491 eggs were produced by the 10 females. These eggs were checked daily and any tadpoles found were removed and placed in one of several plastic troughs as described above. These were filled with aerated, aged tap-water at about 20°C, and contained fragments of water

weeds and small piles of stones which broke the surface of the water. The tadpoles, which appeared to be wholly carnivorous, were given a liberal diet of zooplankton collected from local ponds.

The onset of metamorphosis was marked by a reduction in the size of the tadpoles' external gills. Metamorphosis took place between 24 to 73 days after hatching. Newly metamorphosed newts, juveniles known as efts, left the water and climbed onto the piles of stones provided. These efts were removed and placed in a transparent plastic container measuring 24 x 12 x 12cm, floored with damp tissue paper and kept at a temperature of about 10°C. They were given a liberal diet of live fruit flies.

Although 491 eggs were laid, only 26 efts were produced; 25 of these are still alive at the time of writing. Ninety two per cent of the total mortality observed occurred during the tadpole stage of development. For instance, on one occasion, there was mass mortality in one of the 'tadpole troughs', apparently caused by rapid fouling of water. It is hoped that, with more careful management, future attempts at breeding red-spotted newts will be more successful.

REFERENCE

Verrell, P.A. (1982). A note on the maintenance of the red-spotted newt in captivity. *British Herpetological Society Bulletin,* 5, 28.