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Appendix A. Estimating the effect of egg-predation on larval densities with photographs of the field site, *Hyperolius spinigularis* and egg-stage predators.

Establishing the egg-predation mediated density effect: N_{-EP} and N_{+EP1}, N_{+EP2} --Initial tadpole densities in the experimental trials were based upon field estimates of average clutch size, clutch density, the number of clutches attacked by each predator type, and the average survivorship of undisturbed versus attacked clutches. These parameters were estimated by monitoring reproductive effort and clutch survival along two randomly located 3 × 30 m transects in Amani Pond between October 2001 and the start of the experiment in April 2002.

The density of tadpoles in the absence of egg predators (N_{-EP}) was estimated from the mean clutch density (Φ; clutches/ m^2), the average clutch size (μ; egg/clutch), and the mean proportional survival to hatching of embryos in clutches that are not attacked [σ_E; thus, $N_{-EP} = (\Phi)(\mu)(\sigma_E)$]. The density of tadpoles in the presence of egg predators (N_{+AF}, N_{+TY}) was estimated by including the proportion of the total clutches attacked by each predator ($\psi_{+AF,}$ (ψ_{+TY}) and the expected survival of embryos in clutches attacked by that predator (σ_{+AF}, σ_{+TY}). For example, initial density given the effects of *A. fornasini* (N_{+AF}) was the larval contribution of clutches that are not attacked [$(\Phi)(1-\psi_{AF})(\mu)(\sigma_E)$], plus the contribution of clutches that are attacked [$(\Phi)(\psi_{AF})(\mu)(\sigma_{AF})$]. Standard deviations for initial densities were calculated from the standard deviations of each of the estimated parameters, using standard rules for error propagation (Lyons 1991).

Hyperolius spinigularis breeding activity during the long rainy season 2002 began on 4 March. From the start of breeding to the start of the experiment, *H. spinigularis* clutch densities (Φ) in Amani Pond averaged 0.49 ± SD 0.27 clutches per m^2 and 10-day period. *Hyperolius spinigularis* clutch size (ϕ) for the same period averaged 83.94 ± SD 21.9 embryos/clutch (n = 123), and the average proportional survival of embryos in clutches not attacked by egg-stage predators (σ_E) was 0.91 ± SD 0.20 (n = 29). Thus, field estimates of larval density in the absence of predators were 37.43 ± SD 24.18 larvae/m^2; in our experimental tanks N_{-EP} densities were set at 38.8 larvae/m^2 (i.e., 35 larvae/ tank). *Afrixalus fornasini* are known predators of arboreal frog eggs (Drewes and Altig 1996), and at this site attacked (ψ_{AF}) an average of 0.73 ± SD 0.18 clutches 10/brood. Survival of embryos in the attacked clutches (σ_{AF}) averaged 0.14 ± SD 0.19 (n = 86). Thus, the field estimate for initial larval density in the presence of *A. fornasini* predation was 14.1 ± SD 11.27 larvae/ m^2. In our experimental tanks N_{+AF} densities were 11.11 larvae/m^2 (10 larvae/tank).

Ephydrid flies of the genus *Typopsilopa* prey upon the arboreal eggs of several East African hyperoliid species (Vonesh 2000) including *H. spinigularis* in Amani (Vonesh 2003). However, early in the 2002 breeding season, when this experiment was being set up, egg-predation by *Typopsilopa* was rare and only increased late in the breeding season (Vonesh 2003). Thus, experimental densities reflecting *Typopsilopa* predation (N_{+TY}) were based on predation estimates for four *Hyperolius* species from two ponds in Kibale National Park (Vonesh 2000) and *H. spinigularis* in Amani in late spring 2000 (Vonesh, *unpublished data*). Based on these data, *Typopsilopa* flies attacked (ψ_{TY}) an average of 0.27 ± SD 0.14 (n = 9 site × species combinations) of the available clutches. Proportional survival of embryos in attacked *H. spinigularis* clutches (σ_{TY}) averaged 0.21 ± SD 0.3 (n = 10 clutches from spring 2002). Thus, field estimates for initial larval density in the presence of fly egg-predation were 29.3 ± SD 18.6 larvae/m^2. In our

experimental tanks N_{+TY} densities were 27.8 larvae/m^2 (25 larvae/tank).

FIG. A1. (A). Amani Pond, Amani Nature Reserve, East Usambara Mountians, NE Tanzania. (B). Cup placed under *H. spinigularis* clutch to catch hatchlings.

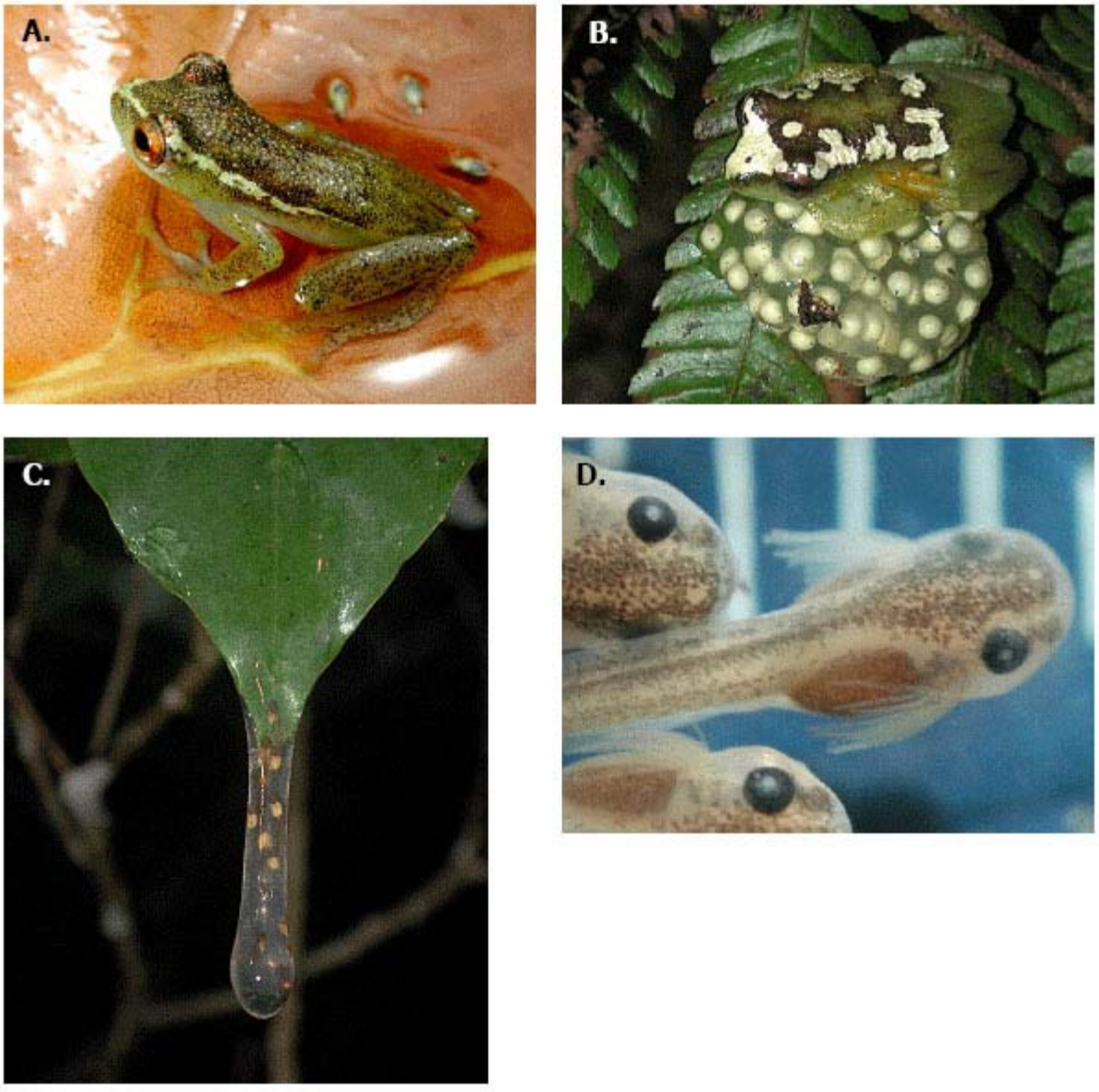

FIG. A2. Life history of *Hyperolius spinigularis*. (A). An adult male. (B). An adult female on a recently oviposited clutch. (C). A clutch in the process of hatching, larvae dropping into the pond. (D). Newly hatched larvae.

FIG. A3. (A). *Afrixalus fornasini* adult female. (B). *A. fornasini* preying upon a *H. spinigularis* clutch.

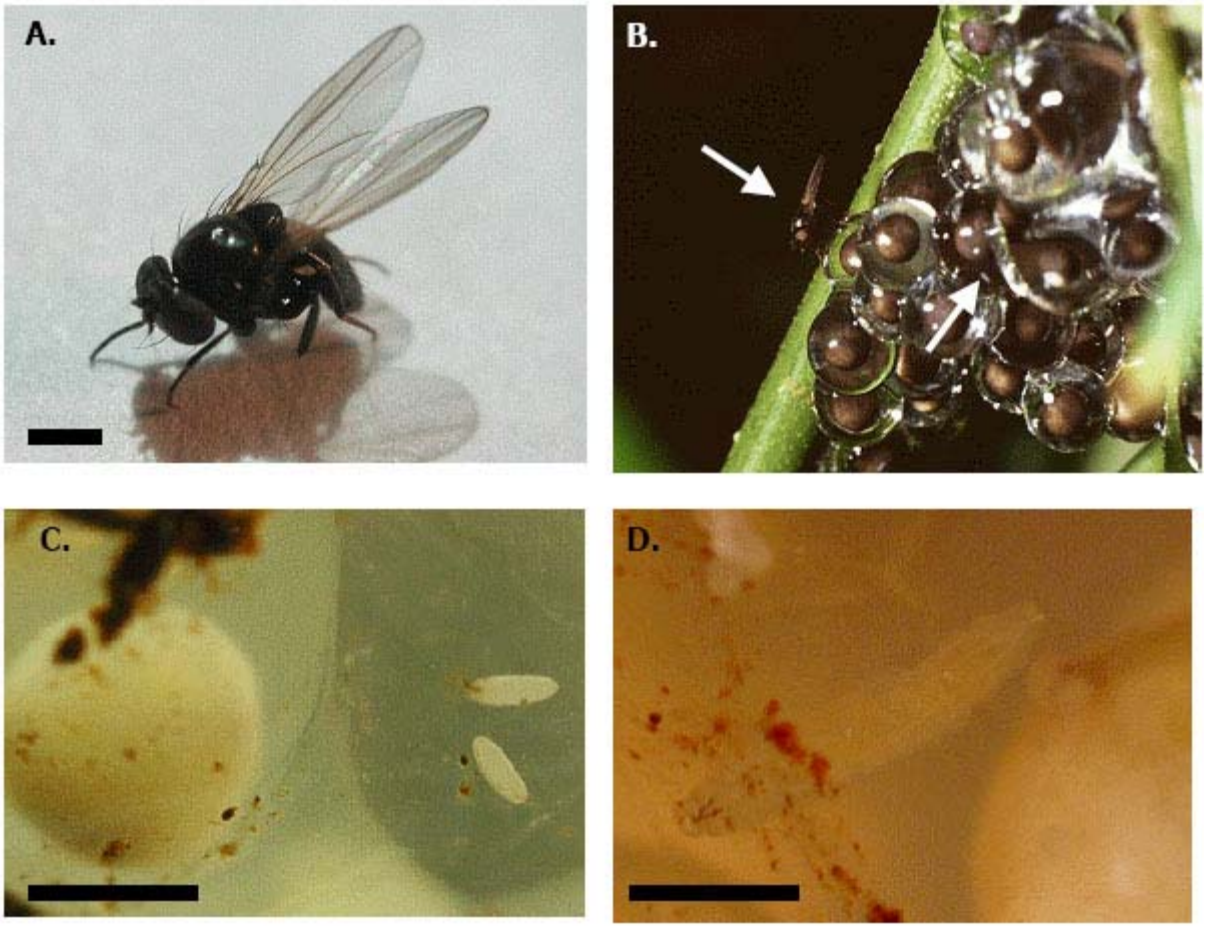

FIG. A4. *Typopsilopa* sp. dipteran predator. (A). Adult fly. (B). Adult female fly ovipositing *Hyperolius puncticulatus* clutch. (C). Close-up of *Typopsilopa* eggs next to *H. spinigularis* embryo (~ Gosner stage 10). (D). Close-up of *Typopsilopa* larvae in *H. spinigularis* clutch. A 1-m scale is provided for approximate reference.

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