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Does quality affect growth rate and age at maturity in species with indeterminate growth?

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ABSTRACT

Background: Life-history theory uses optimality models to predict among-population variation in age and size at first reproduction. To predict within-population variation in these traits, however, models should take into account the frequency-dependent effects of life-history strategies.

Hypotheses: Growth rate costs that differ between individuals according to their quality are responsible for variation in life-history traits within a population. Theory incorporating such different costs will predict aspects of age and body size among male Tyrrhenian tree frogs, *Hyla sarda* (Anura: Hylidae), in a wild population.

Mathematical method: Two-player, non-zero-sum game.

Key assumptions: Growth is biphasic and decreases after sexual maturity. Males vary in their size and age at first reproduction. Growth imposes different survival costs on higher- and lower-quality males. Males of either higher or lower quality can choose to grow fast or slow, and to reach maturity early or late. Independent of their quality, larger males experience higher mating success.

Theoretical predictions: Higher-quality males should grow faster than lower-quality males. Faster-growing males should mature sooner than slower-growing males.

Field method: We measured the age and the body size of two groups of reproductive males: males that were first captured at the breeding site in 2007 and recaptured in 2008 (recaptured males), and males that were first captured in 2008 (newly captured males).

Result: As predicted, recaptured males were larger than newly captured males of both the 2008 and 2007 age classes.

Keywords: amphibian, game theory, life-history theory, lifetime reproductive success, mate choice, sexual selection, skeletochronology.

INTRODUCTION

Age and size at maturity are among the most important determinants of individual lifetime fitness (for reviews, see Roff, 1992; Stearns, 1992). Whether fitness is expected to correlate negatively with age at maturity, because the lower the age the higher the probability of surviving to

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