

Reproductive value

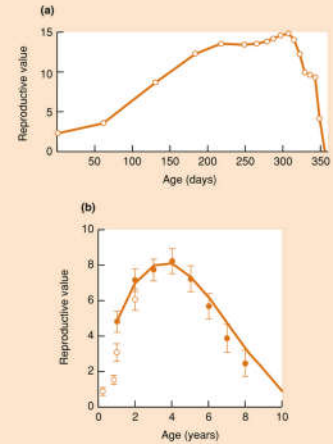
- R and r deal with populations, fitness acts on individuals...
- Reproductive value (Rv) = a composite measure of individual fitness
- Rv = sum of the current reproductive output and the residual reproductive output based on expected survival and fecundity schedules.

$$Rv_x = m_x + \sum_{y=x+1}^{y=y_{\max}} \left(\frac{l_y}{l_x} m_y R^{x-y} \right)$$

↑ Current birth rate
 ↑ Sum over expected remaining years...
 ↑ Expected reproduction at remaining age classes, modified by population net rate (R)

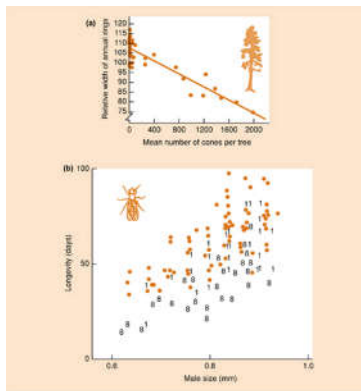
Reproductive Value

- Combines survivorship and reproductive output into a fitness equivalent for age categories.



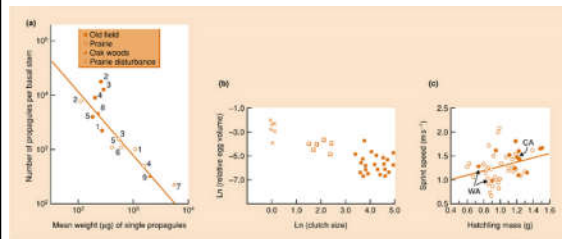
Trade-off – cost of reproduction

- **Life history trade-offs** – negative relationships between the effects of two life history traits on fitness.
 - Eg. growth and reproduction
- **Cost of reproduction** – allocating energy to reproduction must ultimately decrease survivorship, not necessarily fitness
- Thus, spending more on reproduction now reduces your future **reproductive value**



Trade-off - investment in individual offspring

- Few large offspring with greater individual fitness vs. many smaller offspring with lower individual fitness
- The evolution of life history strategies is largely determined by these trade-offs.



Evolutionary Trends in Life Histories

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THE IMPACT OF PREDATION ON LIFE HISTORY EVOLUTION IN TRINIDADIAN GUPPIES (*POECILIA RETICULATA*)

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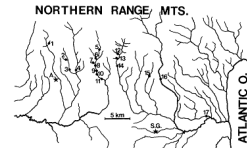


FIG. 1. Map of the study sites in northeastern Trinidad. Solid lines: rivers and streams. A: town of Arima. S.G.: town of Sangre Grande. Numbers refer to sampling sites and sites are named after the river systems in which they were taken: 1, Arima 6; 2, El Cedro 3; 3, El Cedro 1; 4, Guanapo 7; 5, Aripo 8; 6, Aripo 1; 7, Aripo I; 8, Aripo 11; 9, Aripo 6a and 9 (below and above a waterfall); 10, Aripo 6; 11, Aripo 10; 12, Quare 6; 13, Quare 3; 14, Quare 4; 15, La Selva 1; 16, Croguche 2; 17, Arena 1. See also Fig. 9 in Endler (1978).

- Predation gradient:
 - C – large predators targeting adults
 - R – moderate sized predators targeting juveniles
 - A – low overall predation on all size classes
- RA = reproductive allotment
- Bd. Interval – time between broods

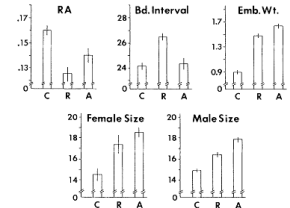


FIG. 3. Summary of results. RA, reproductive allotment. Bd. Interval, interbrood interval (days). Embryo Wt., mean embryo weight (mg). Female Size, mean minimum size class of gravid females (mm) (see text). Male Size, mean size of mature males (mm) (see text). C, Crenicichla localities. R, Rivulus localities. A, Aequidens localities. Vertical line encompasses mean \pm 1 standard error.

Environmental correlates

- Low reproduction and high growth favored:
 - Intense competition -> largest (most competitive) individuals can monopolize limiting resource and maximize reproductive value
 - Selective pressure against juveniles or small adults -> delayed reproduction to maximize growth increases reproductive value
- High reproduction and low growth favored:
 - High density independent mortality -> reproduce as soon as possible
 - Low competition, first come first serve -> reproduce as much as possible as soon as possible
 - Selective pressure against larger individuals -> stay small longer to reproduce more