

Sex



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Brian O'Meara
EEB464 Fall 2018

Learning objectives

Why is sex weird?

Why has it evolved?

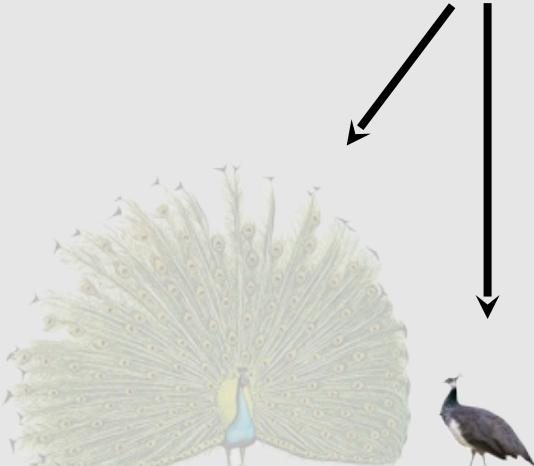
How does sex ratio evolve?

How does sexual selection evolve?

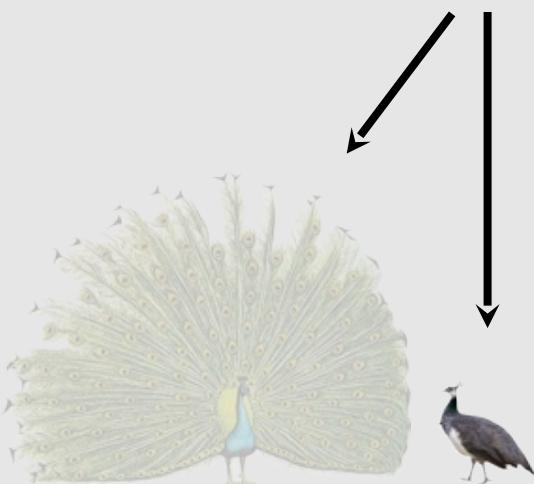
Sex



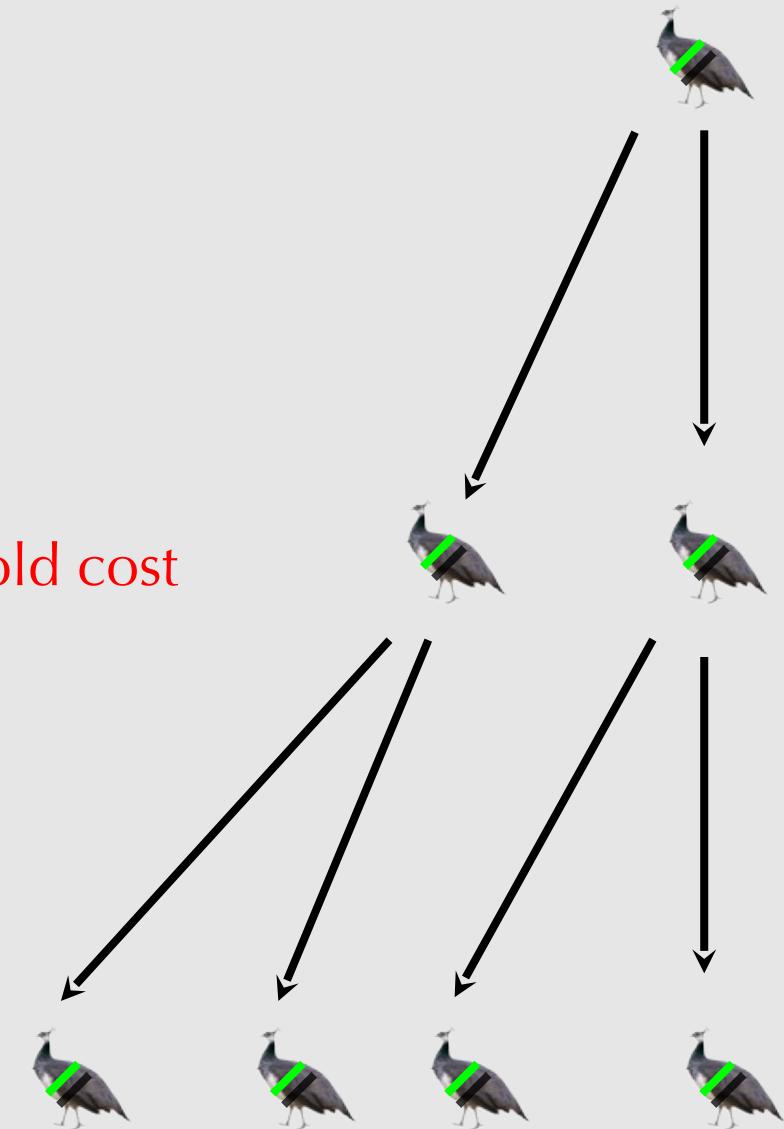
No Sex



Two-fold cost



Two-fold cost



Sex

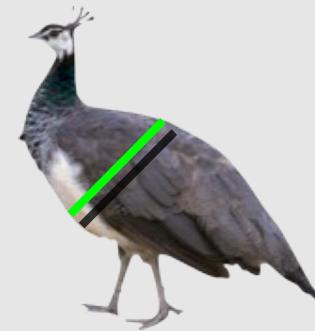


Half
mother's
genes

No Sex



All
mother's
genes



Groups with parthenogenetic species

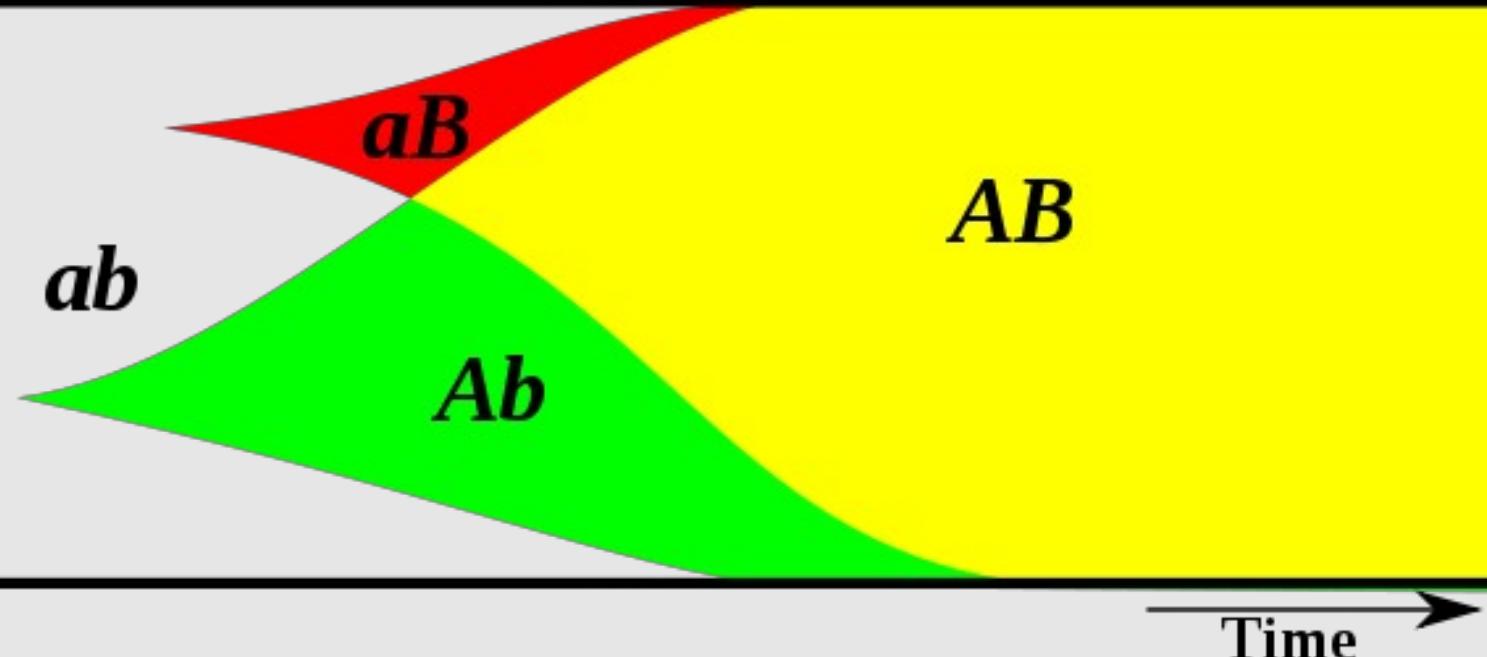
Stick insects
Many plants
Aphids
Lizards
Bees
etc...

Cnemidophorus inornatus, *C. neomexicanus*, *C. tigris*

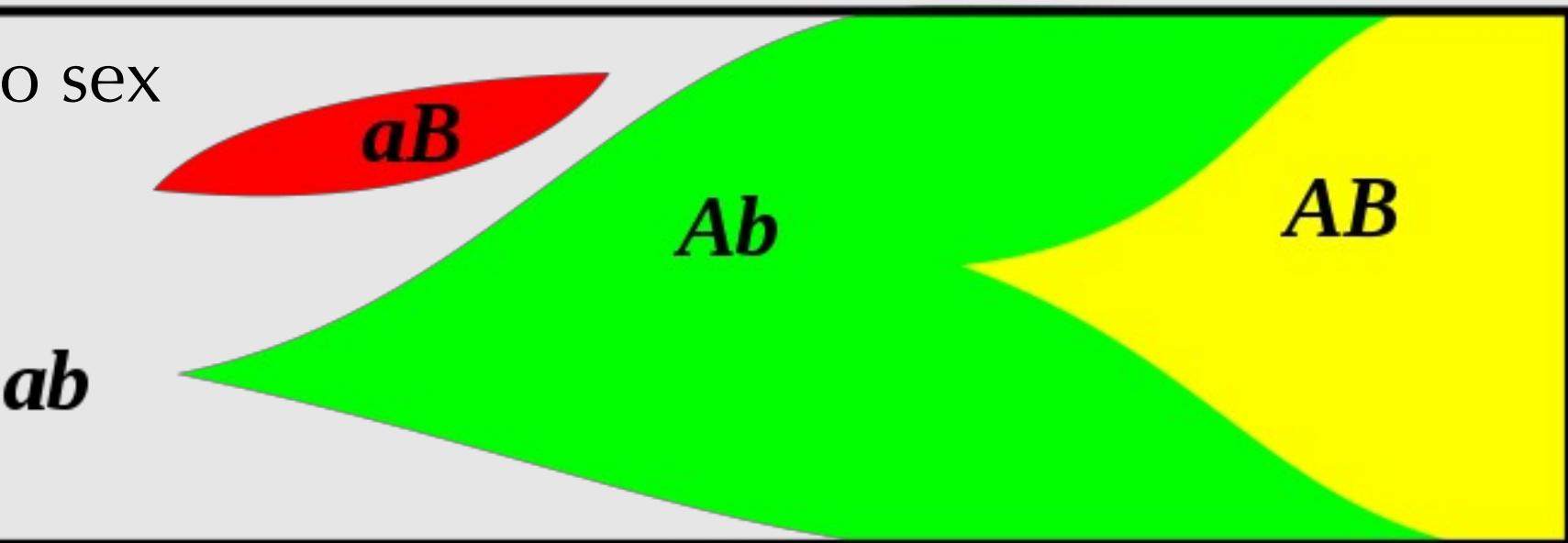


Alistair J. Cullum

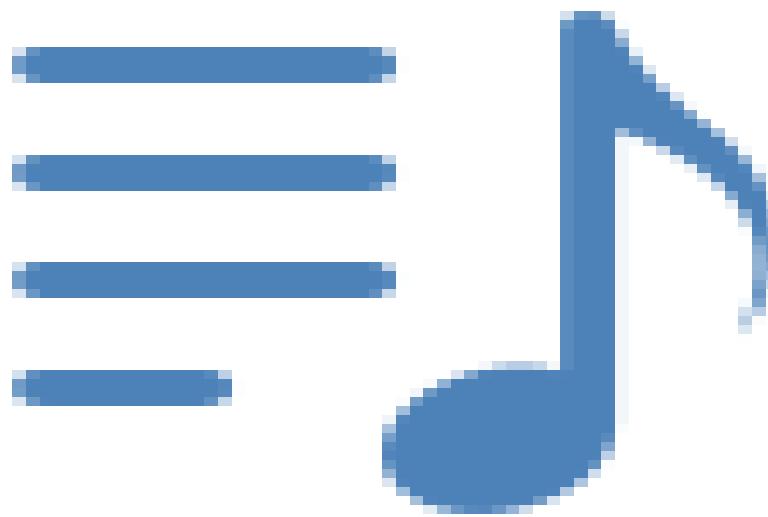
Sex



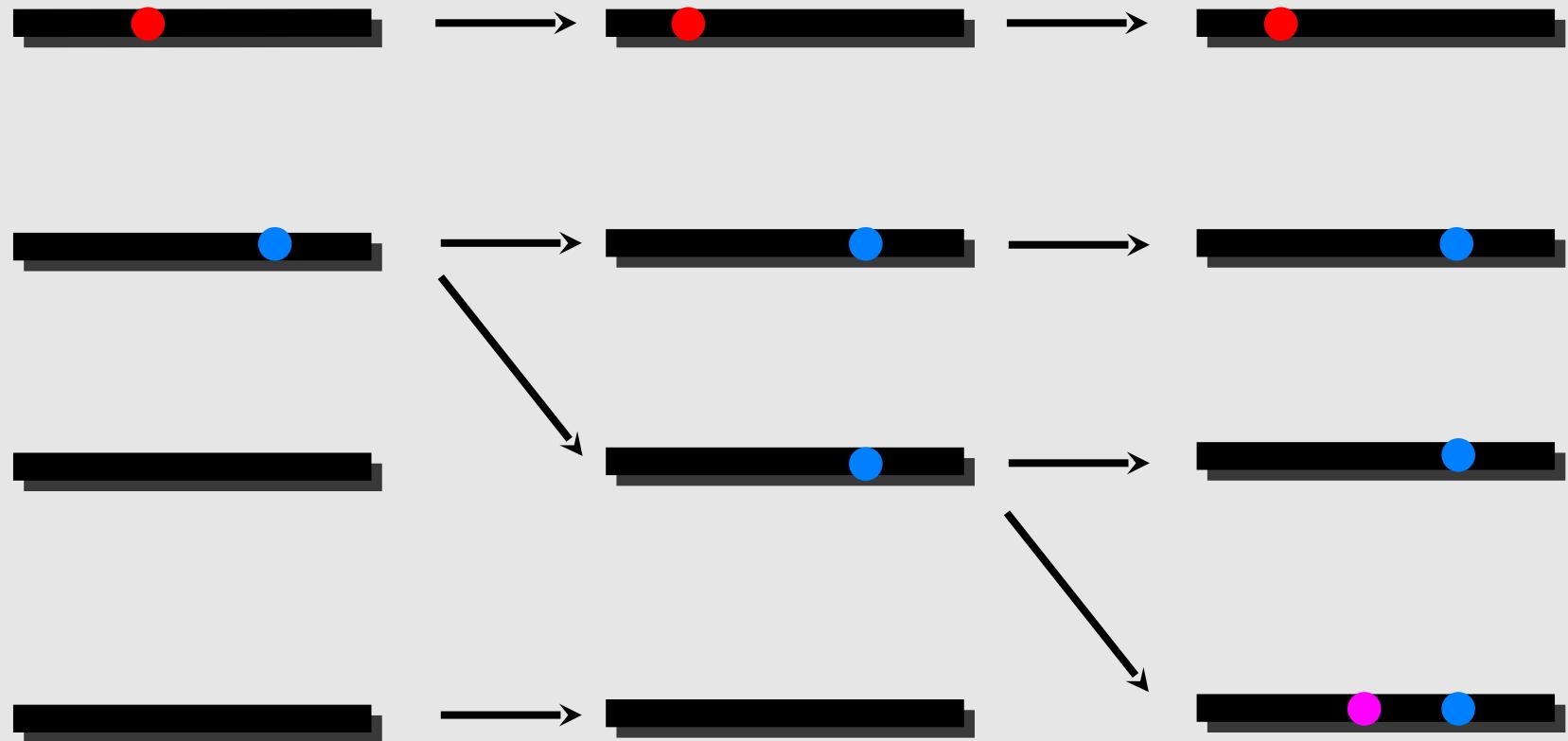
No sex



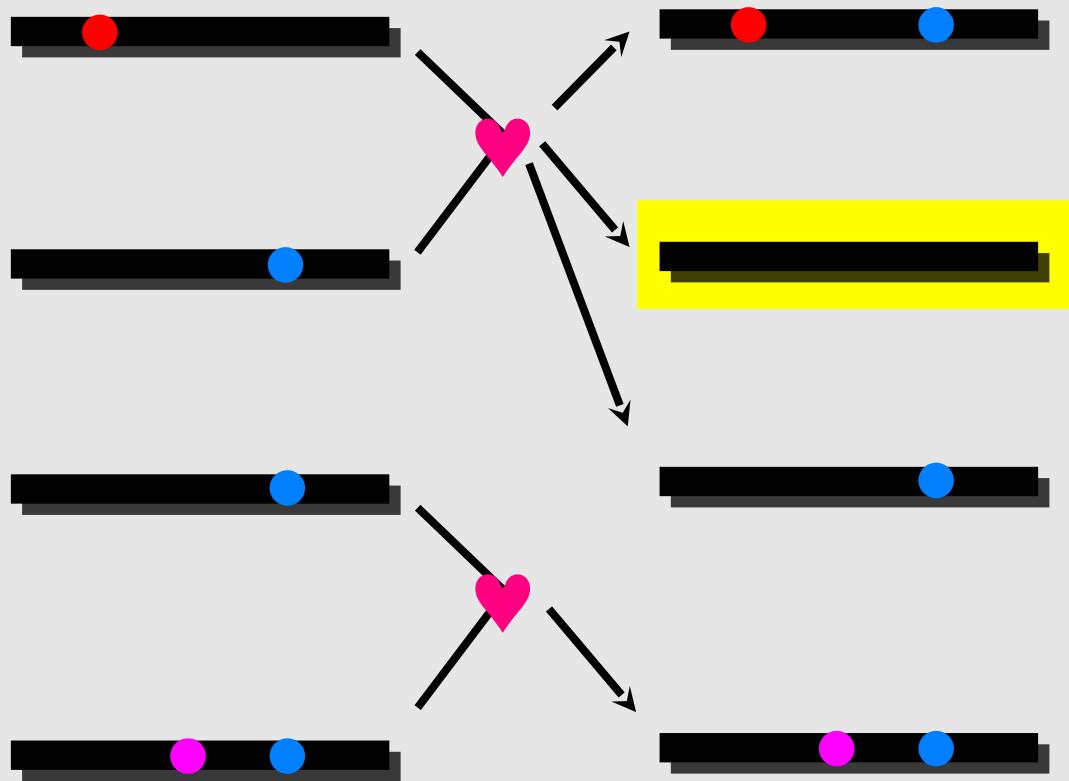
Muller's ratchet

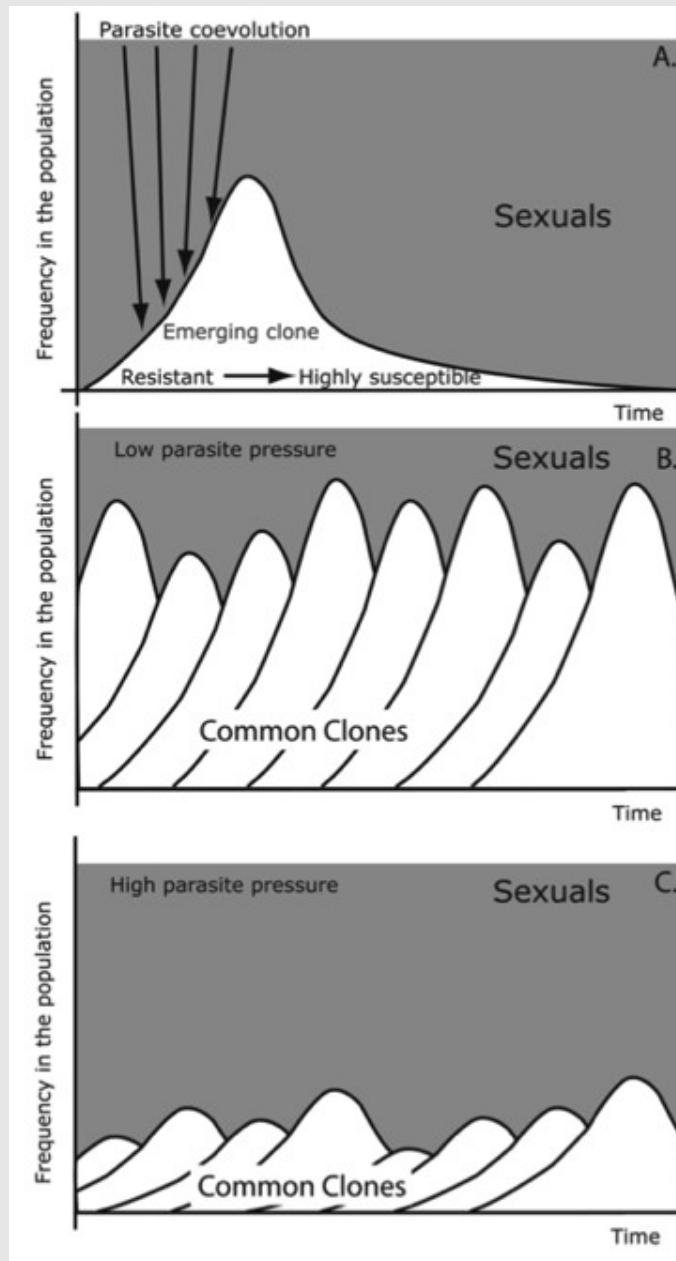


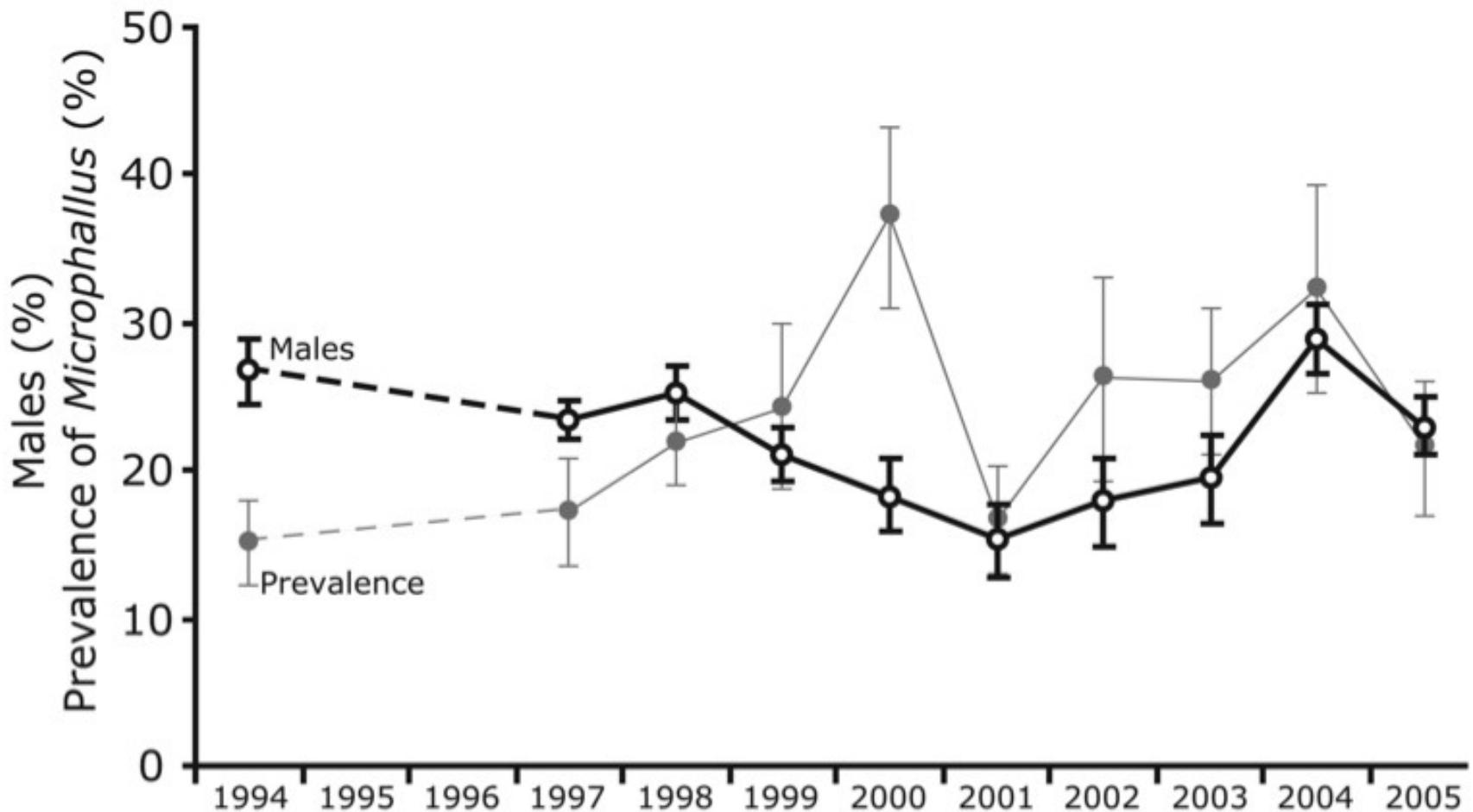
Muller's ratchet



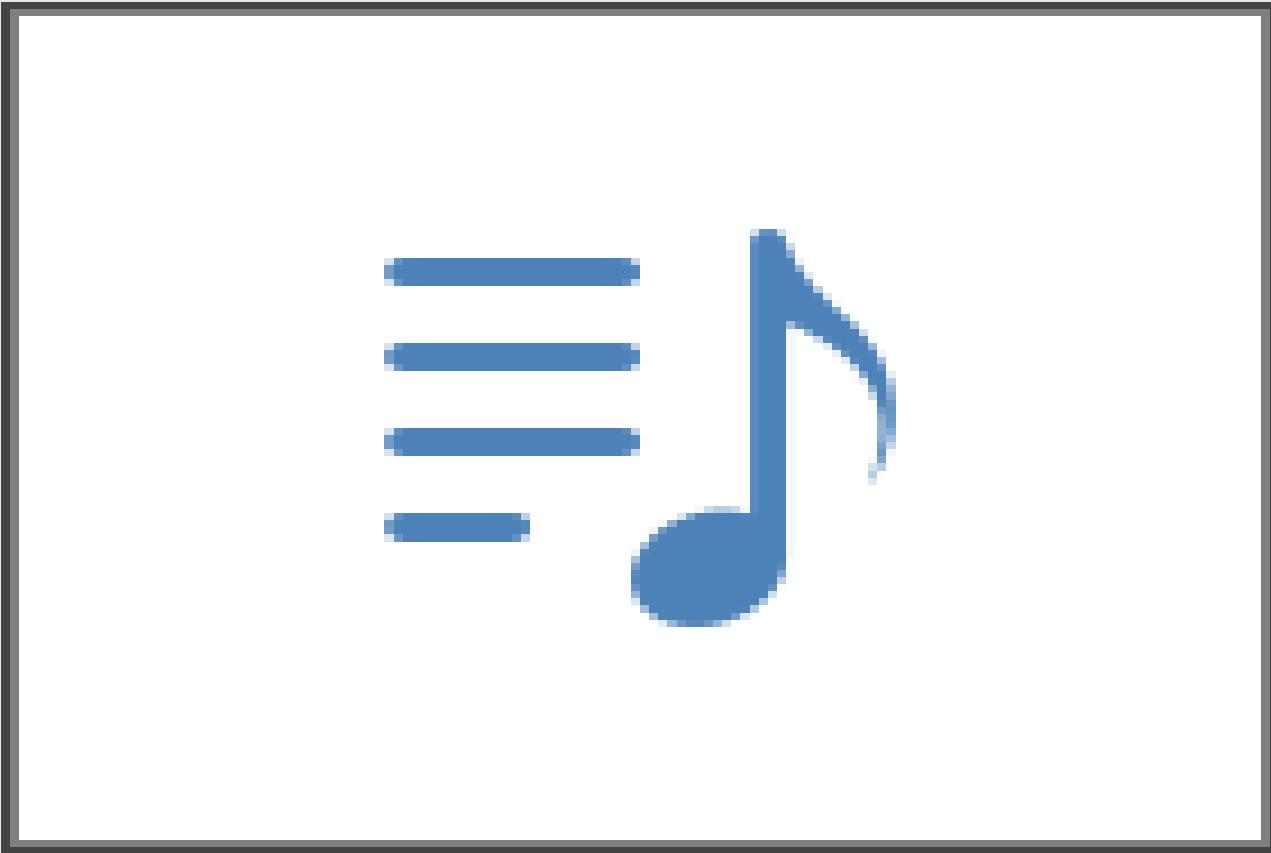
Muller's ratchet





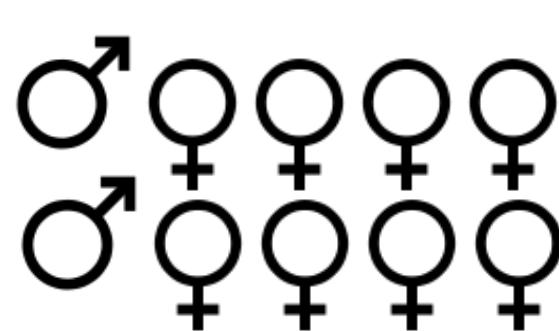


Mean (\pm SE) proportion of sexual snails (male %) in the shallow-habitat zone of Lake Alexandrina (black) and mean (\pm SE) prevalence of infection by *Microphallus* sp. (gray) between 1994 and 2005. Proportion of males corresponds closely to proportion of asexual females and can be used as a surrogate of frequency of sexuals in the population (Jokela et al. 2003).



<http://www.youtube.com/watch?v=hHdaEbcIOSM>

Even sex ratio



What is expected fitness of each of these?



Table 1. Offspring sex ratios in *Ozopemon*. Each row represents a single brood

Species	Population	Males	Females	Ratio	Source
<i>O. brownei</i>	Malaya	1	20	0.050	Browne (1959)
		2	21	0.095	
<i>O. brownei</i>	Brunei	1	17	0.059	RAB
		1	23	0.043	
		1	22	0.045	
		1	23	0.043	
<i>O. obanus</i>	Brunei	1	73*	—	RAB
		1	16	0.063	
		1	23	0.043	
<i>O. uniseriatus</i>	PNG	1	11	0.091	BHJ

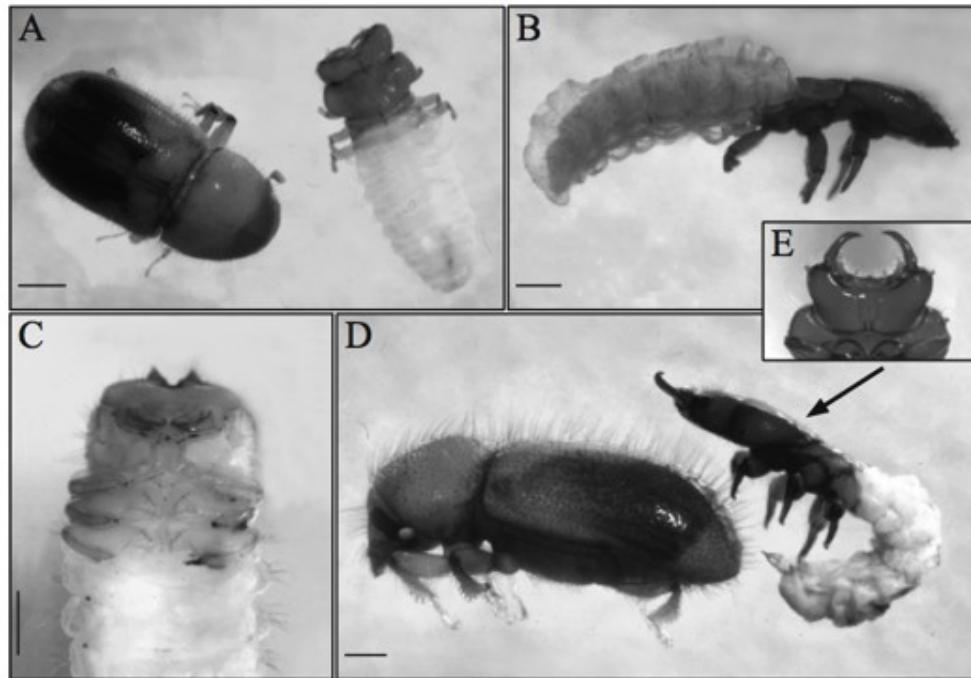


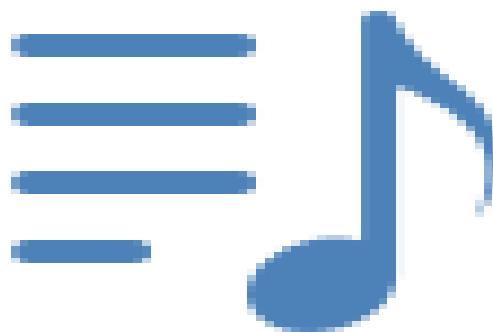
Figure 1. Females, males and pupa of *Ozopemon* spp. (A) *Ozopemon brownei* siblings; (B) *Ozopemon obanus* male; (C) *Ozopemon obanus* male pupa, ventral view; (D) *Ozopemon uniseriatus* siblings, with inset (E) showing ventral side of male head and thorax. Scale indicates 0.5 mm.

Sexual selection

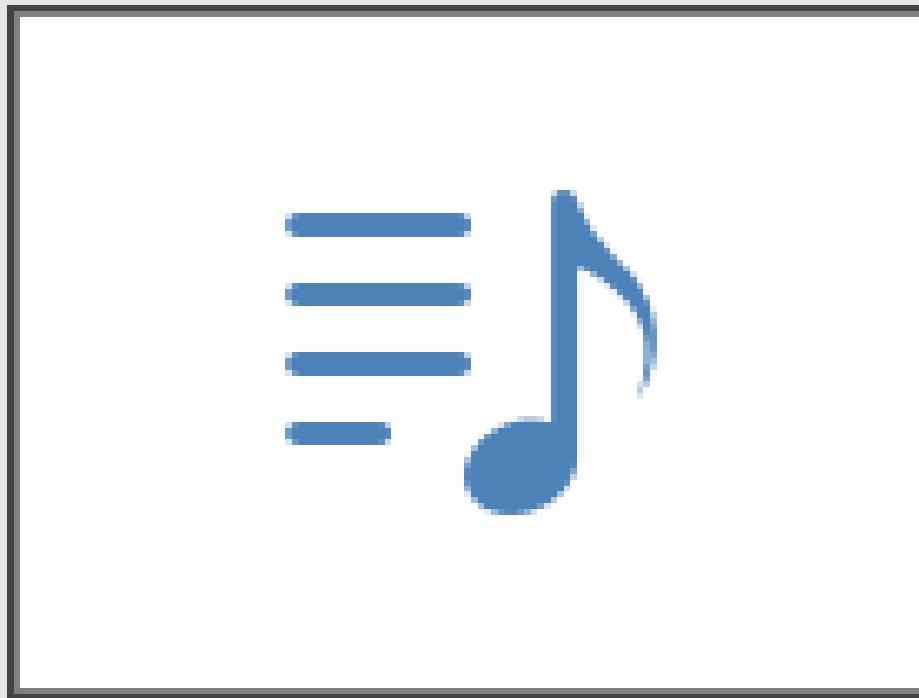
Male-male competition



Dave Frazier
[https://www.youtube.com/watch?
v=BtR6Rqh02Oo](https://www.youtube.com/watch?v=BtR6Rqh02Oo)



Female choice



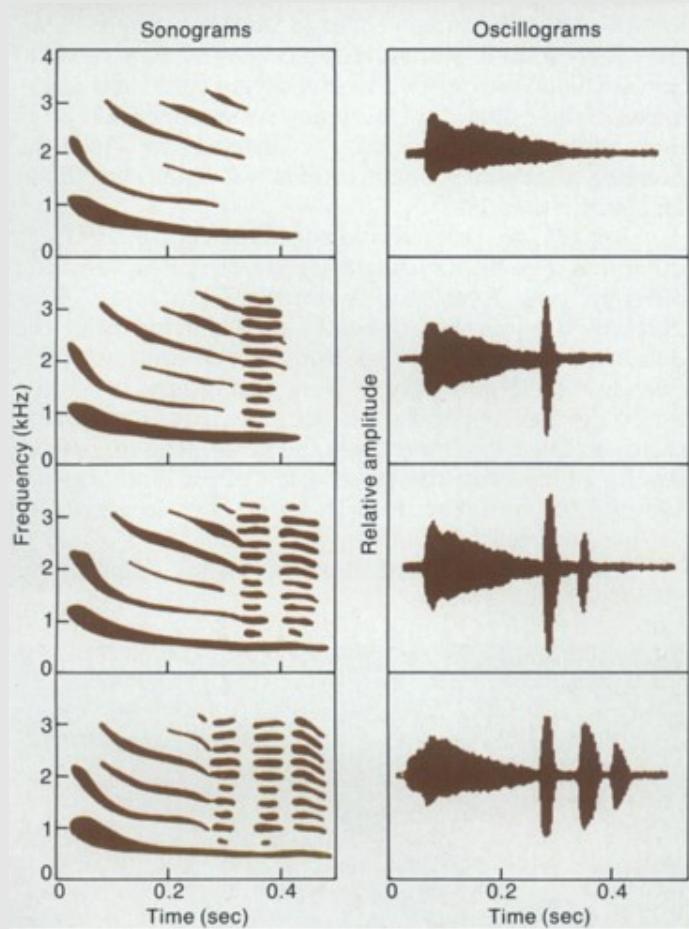
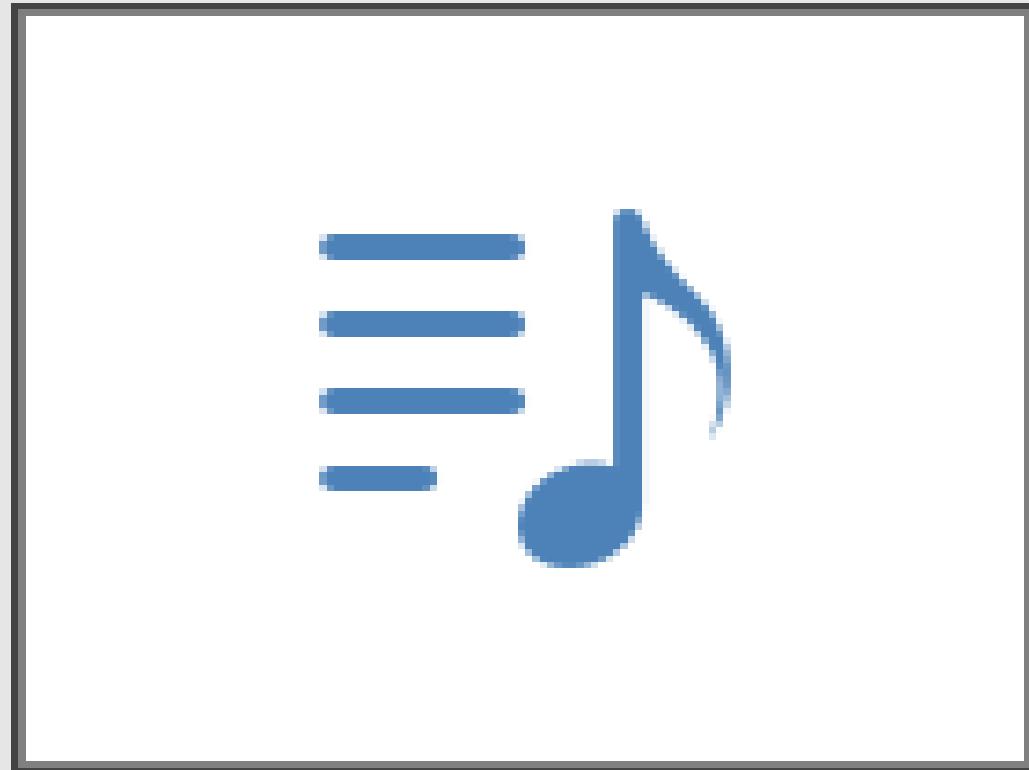


Figure 1. The mating call of the male túngara frog, *Physalaemus pustulosus*, comprises combinations of a "whine" and a number of "chucks." The whine is necessary and sufficient to attract the female; however, when competitors are present, the male adds chucks to his call. Sonograms and oscillograms reveal the structures of a simple call containing only a whine (*top graphs*) and more complex calls containing chucks (*proceeding down*).

Ryan 1990



<http://www.youtube.com/watch?v=Wz9h-5z60Xc>

Table 1. Some of the mechanisms of sexual selection, and traits likely to be favoured in the competing sex^a

Mechanism	Characters favoured in the competing sex
Scrambles	Early search for and swift location of mates; well-developed sensory and locomotor organs
Endurance rivalry	Ability to remain reproductively active during a large part of the season
Contests	(1) Traits that improve success in fights, such as large size, strength, weaponry, agility or threat signals (2) Alternative mating tactics of inferior competitors, avoiding contests with superior rivals
Mate choice	(1) Behavioural and morphological traits that attract and stimulate mates (2) Offering of nutrition, territories, nest sites or other resources needed by the mate for breeding (3) Alternative mating tactics, such as forced copulation
Coercion	(1) Similar traits as for contests (1) (above) (2) Morphological and other adaptations for forced copulation and other coercive behaviour
Sperm competition	(1) Mate guarding, sequestering, frequent copulation, production of mating plugs or other means of preventing rivals from copulating with the mate (2) Ability of displacing rival sperm; production of abundant sperm to outcompete those of rivals
Infanticide	Similar traits as for contests (1) (above)

^aModified from Ref. 1.