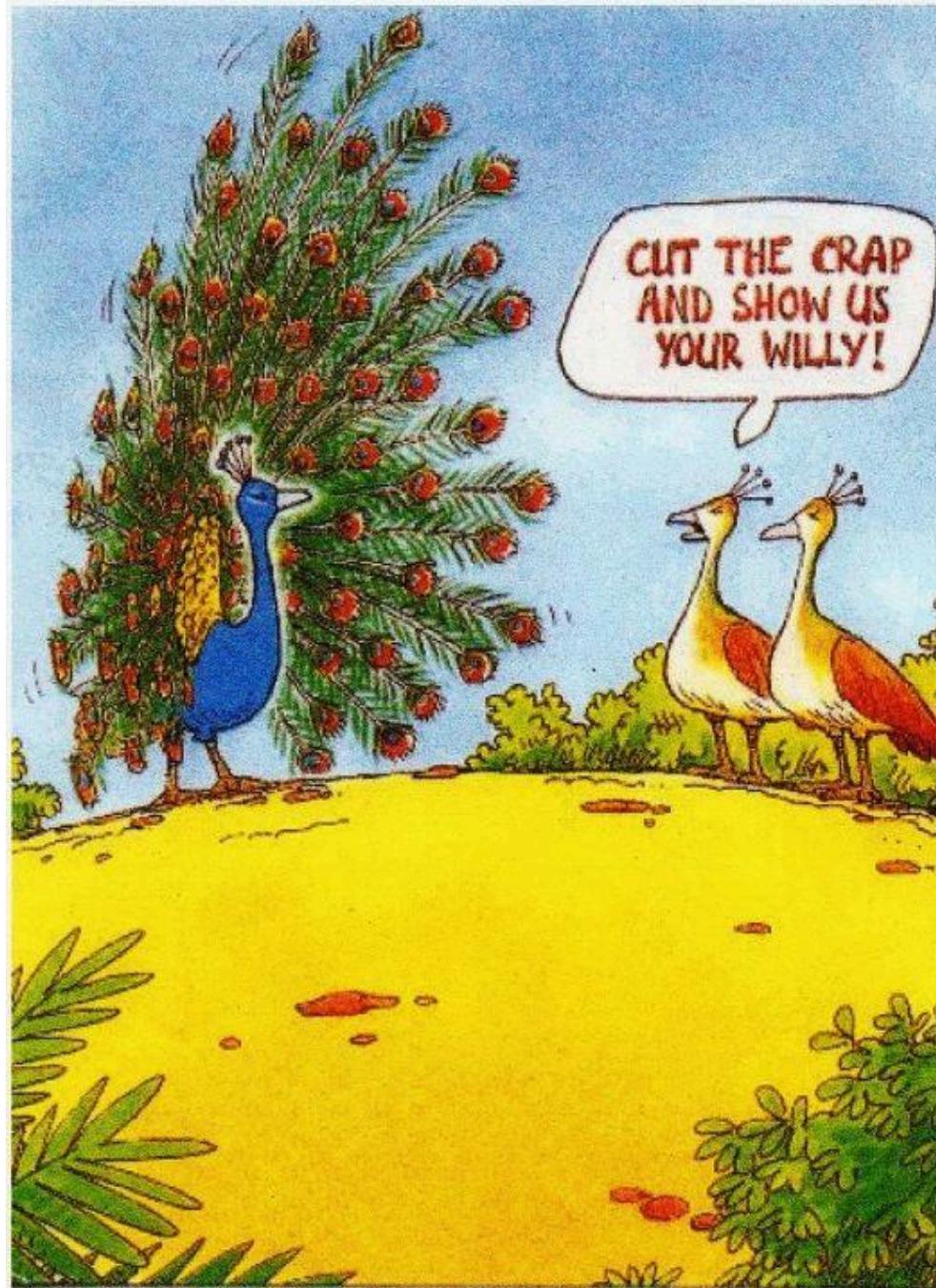


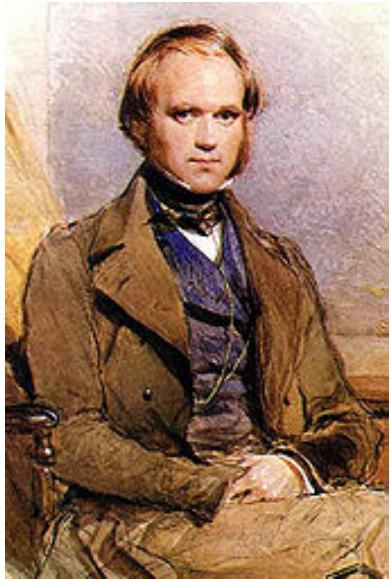
EVOLUTION & ADAPTATION (*EEB214S*) 2012

Lecture 10: Sex, and how it drives evolution

Public Announcement:

The content of today's lecture might not be suitable for all listeners, not only do I mention the existence of sex, but we are going to delve into how animals do it, again and again and again.

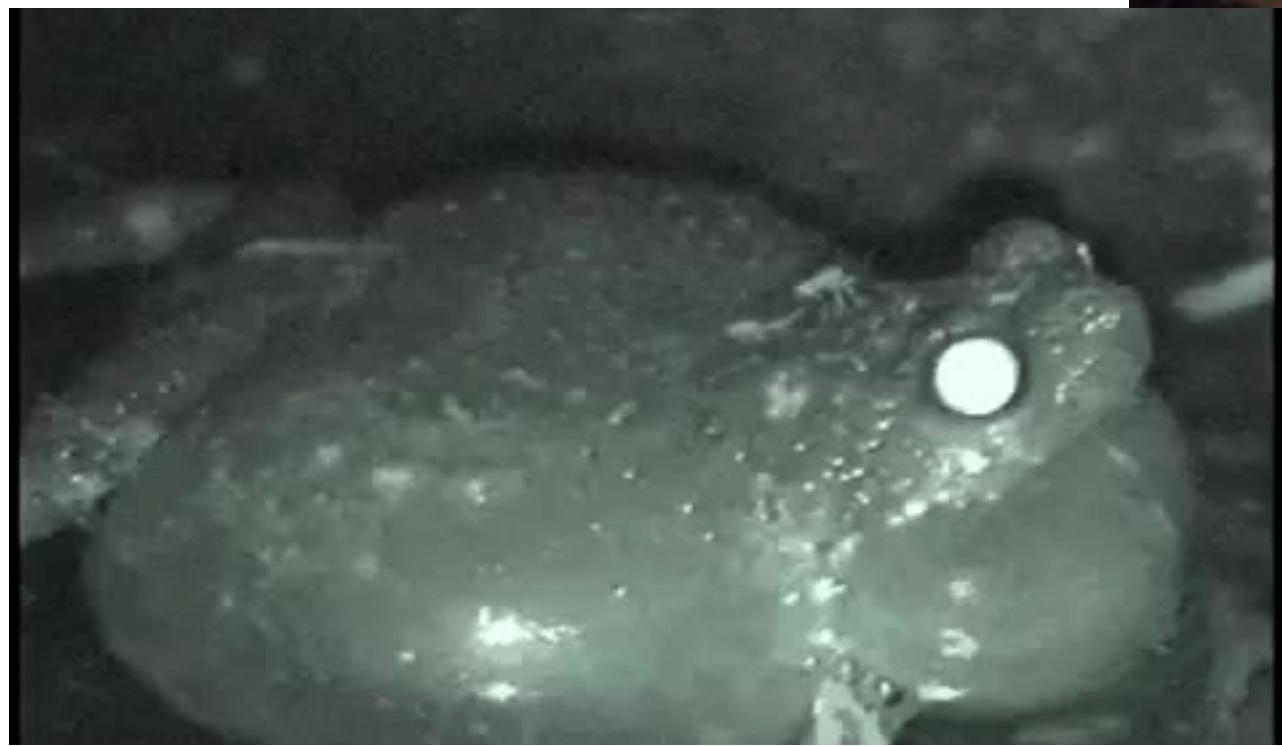




“I remember well the time when the thought of the eye made me cold all over, but I have got over this stage of complaint and now trifling particulars of structure often make me very uncomfortable. The sight of a feather in a peacock's tail, whenever I gaze at it, makes me sick!”



Tungara frogs, Central America

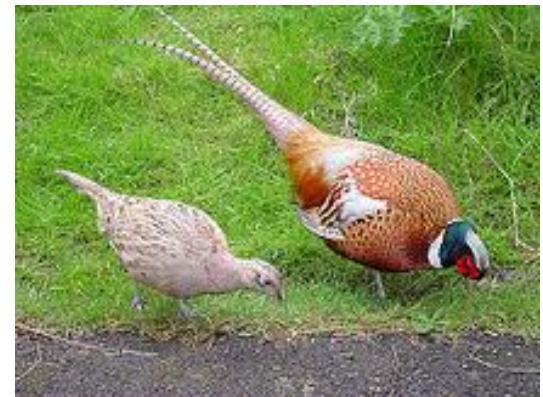


And we don't need to speculate that these behaviours and features reduce survival...



red collared widowbird

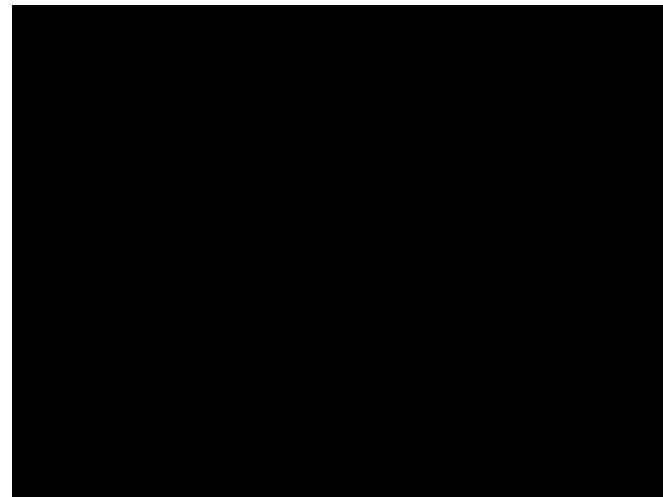
Traits that differ between males and females are called **sexual dimorphisms**



RECAP: Fitness is a measure of the ability of an individual's ability to survive and reproduce relative to other individuals in the population.

DARWIN THOUGHT THAT PERHAPS THERE IS A TRADE-OFF BETWEEN SURVIVAL AND REPRODUCTION

Selection could be optimising your chance of reproducing at the expense
of your survival, Darwin termed this **Sexual Selection**



Sexually selected traits evolve if they
more than offset the male's diminished
survival with an increase in his
reproduction...











Sexual selection comes in two forms:

Direct competition between males for access to females

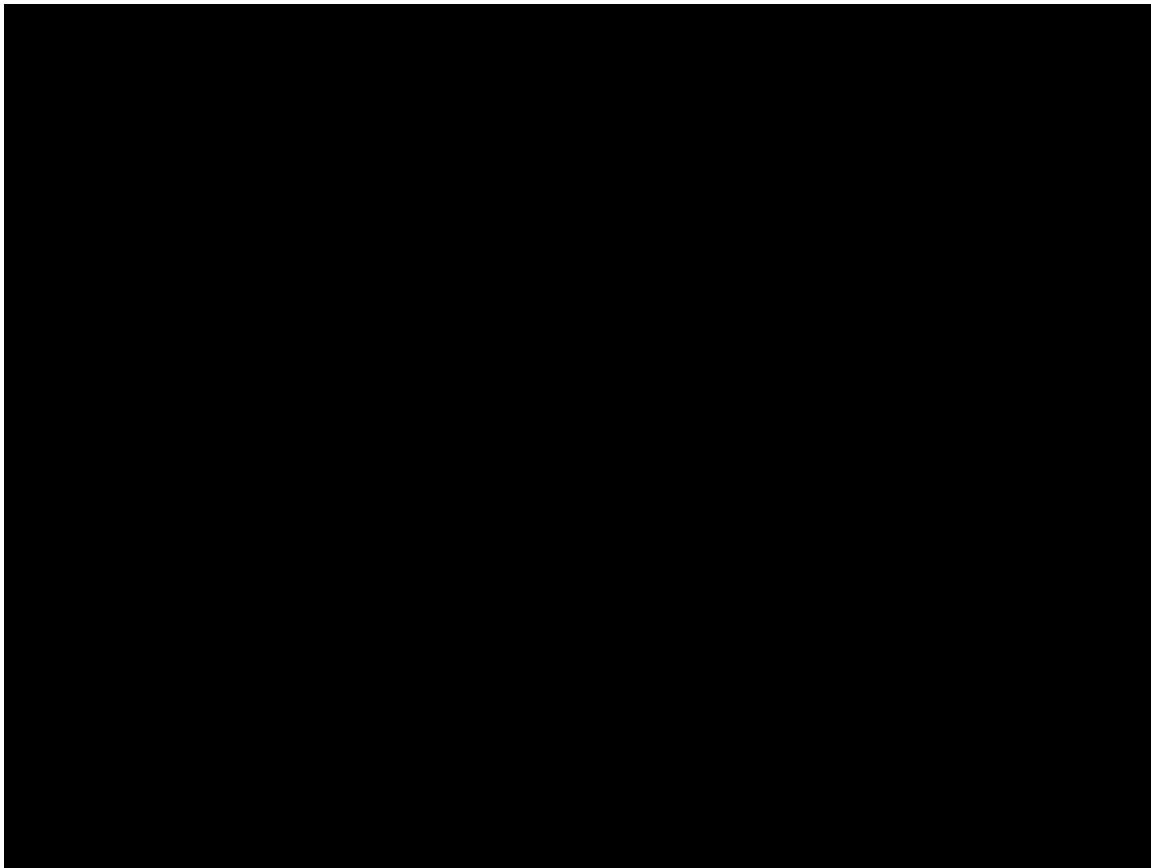


satin bowerbirds collect blue,
spotted, collect green



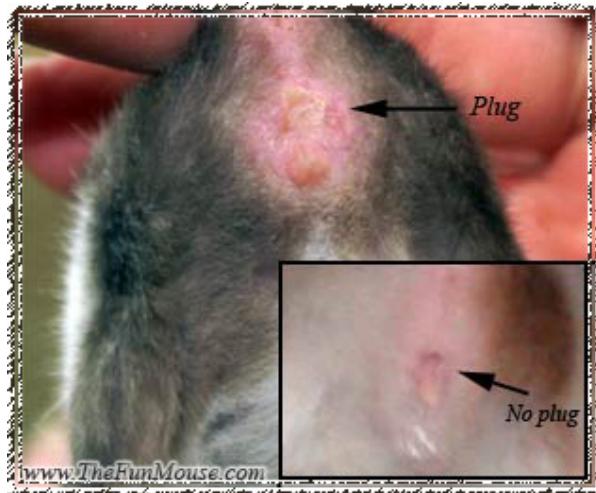
competition with other males to attract the choosy females

What is this?



And competition doesn't stop once you've mated.

All these adaptations have evolved because males are competing for females



Why is it that males are competing for access to females and not the other way around?

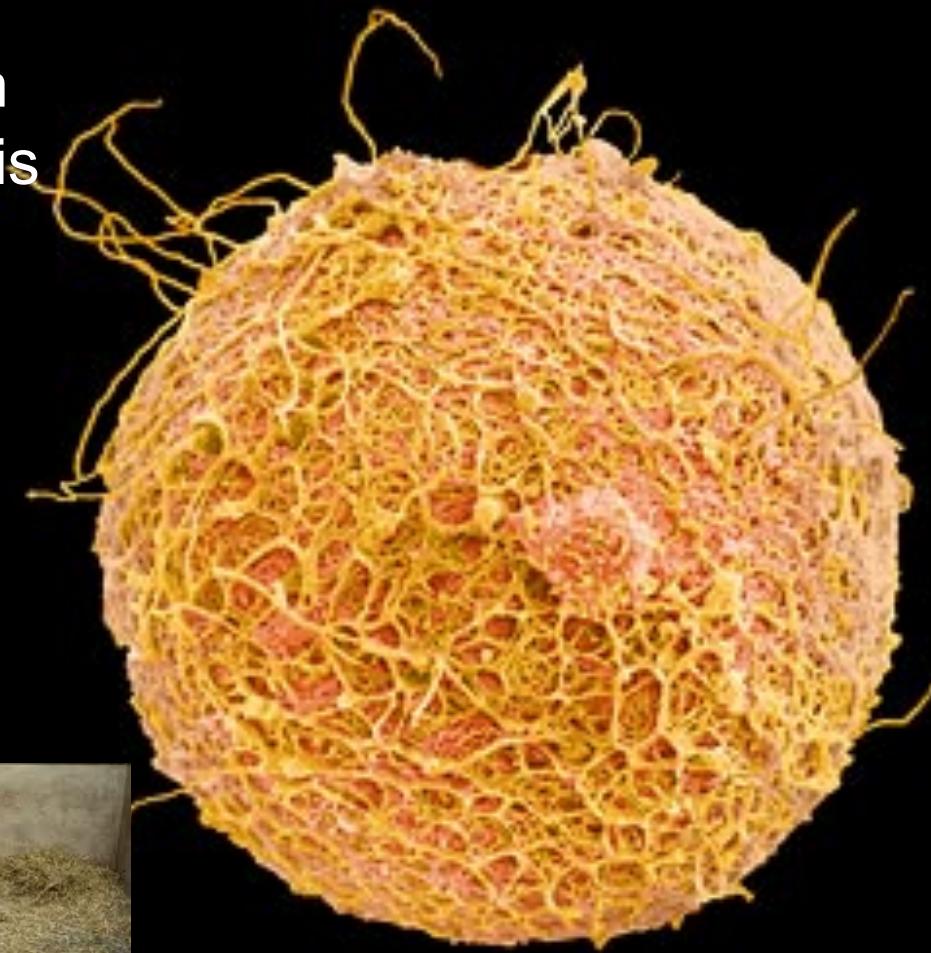
- Why are females generally the choosy one?

69 children by one Russian woman in 18th century



Historians believe that Mulai Ismail,(1646-1727), second ruler of the Moroccan Alaouite dynasty may have sired well over 800 children through 500 wives.

In more than 90%
of mammals,
male's only
investment in
offspring is his
sperm



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This differential in investment leads to a conflict....

In males, selection favours genes that make them promiscuous



Females, because of their higher investment in eggs and offspring, take the tactic of being picky, trying to choose the best possible father to fertilise their limited eggs



And some cheat...



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The exception proves the rule...



Phalarope



Seahorses



Pipefish

There are some cases where there is no competition because both sexes are monogamous...but it is rare.

Splendid fairy wren – mates for life, but then why the sexual dimorphism?



Splendid fairy wren – mates for life, but then why the sexual dimorphism?



Females mate more with males outside
their social bond.

In birds where 90% of birds pair monogamously, it turns out that three quarters of them mate outside their couplings.

But what is the female really choosing?

Direct benefits - picking males that will help her raise many, healthy young

Mutation occurs that gives a female preference for males on better territories.

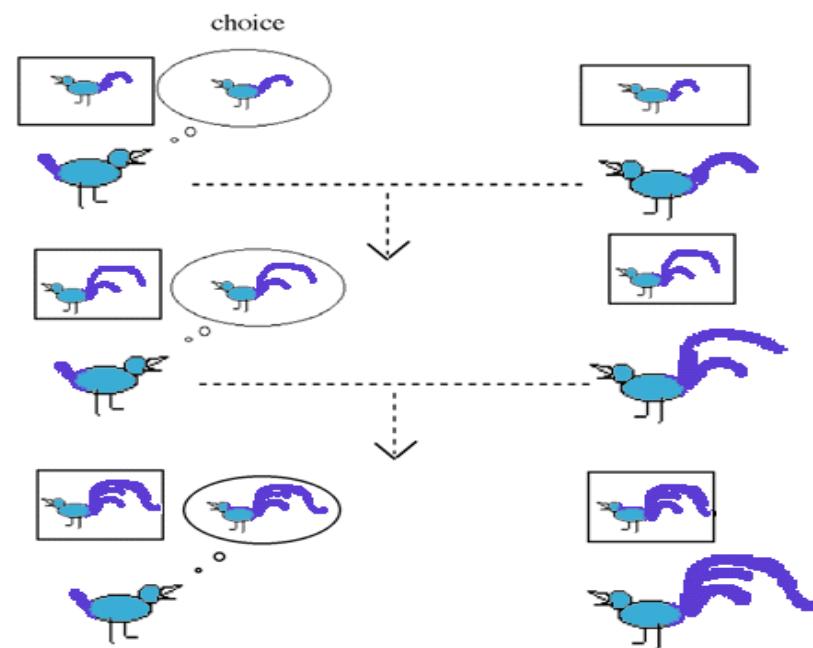
More food for young, more young survive.

More individuals in population that carry the preference for males on good territories

Over time, this encourages males to compete more for territories

Females

Males



Indirect benefits - picking males who have better genes

Males with slightly longer tail, can afford to invest because they have slightly better immune system, therefore less parasites

Female who mates with him has healthier kids, and those kids also carry preference for longer tail

The genes for long tail, piggyback along with genes for fewer parasites

An example of an direct benefit:

Direct benefits

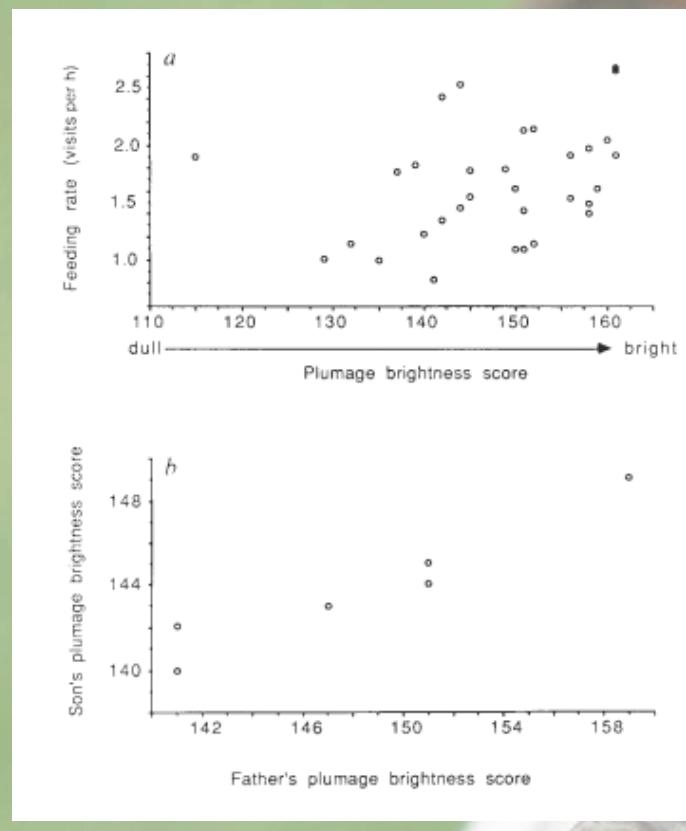
House finch

Researchers found that some populations males vary in colour, and wanted to see if redness was associated with parental care.

By painting yellower males, Hill showed that brighter, redder males had more matings.

Direct benefits

- Why do brighter males provide more food?



Plumage coloration is a sexually selected indicator of male quality

Geoffrey E. Hill

Museum of Zoology and Department of Biology, University of Michigan,
Ann Arbor, Michigan 48109, USA

FEMALE choice of mates based on the expression of characters that correlate with male quality remains a controversial and largely untested idea¹. By choosing quality males, females stand to gain resources², genetic benefits for their offspring^{3–5}, or both. In the house finch (*Carpodacus mexicanus*), male plumage coloration is a function of dietary intake of carotenoids^{6,7}. Here I present results of field studies that indicate that females prefer to mate with colourful males and that plumage brightness correlates with a male's capacity for parental care and perhaps its genotypic quality. Artificially brightened males paired more quickly and frequently than sham control or lightened males. Among unmanipulated males, plumage coloration was correlated with nest attentiveness and overwinter survival. In addition, there was a positive correlation between the coloration of fathers and sons.

An example of an indirect benefit:



Indirect benefit

- Researchers took egg from the females and fertilised half with long-calling male sperm and half with short.
- Offspring from long-callers survived better and grew faster.



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Grace V. Doty · Allison M. Welch

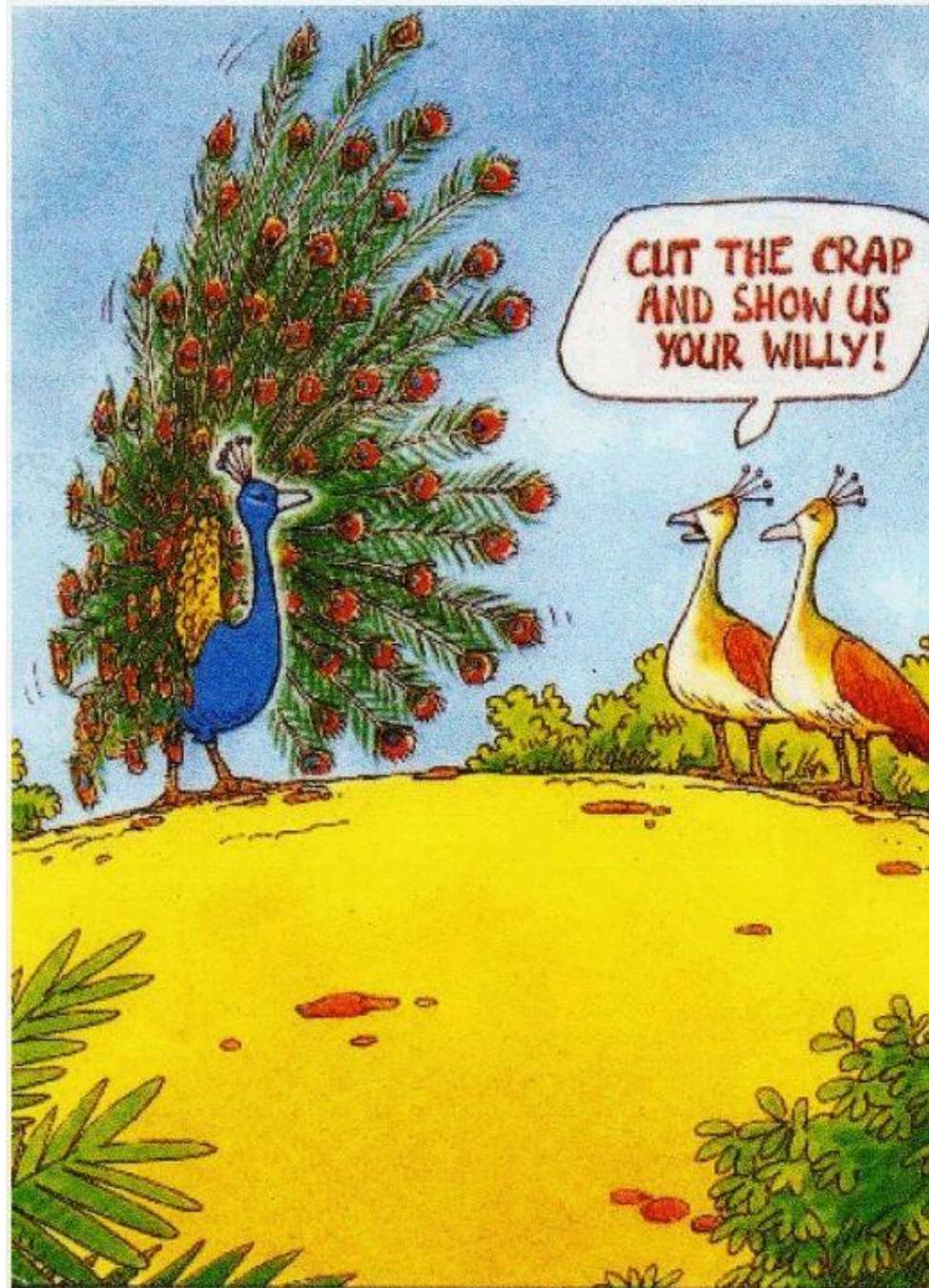
Advertisement call duration indicates good genes for offspring feeding rate in gray tree frogs (*Hyla versicolor*)

Received: 15 February 2000 / Revised: 24 September 2000 / Accepted: 16 October 2000

Abstract Indicator or "good genes" models of sexual selection predict that mating preferences allow females to choose mates that are genetically superior. Female gray tree frogs (*Hyla versicolor*) prefer male advertisement calls of long call duration, which can be indicators of enhanced offspring growth performance. We tested mating with a long-calling male may depend on the conditions encountered by the offspring.

Keywords Activity · Anurans · Growth · Indicator trait · Mate choice

More eyespots
= grow fast
and survive
better





Animal Love



» By Stuart Wigby

http://www.zoo.ox.ac.uk/egi/people/researchfellows/stuart_wigby.htm