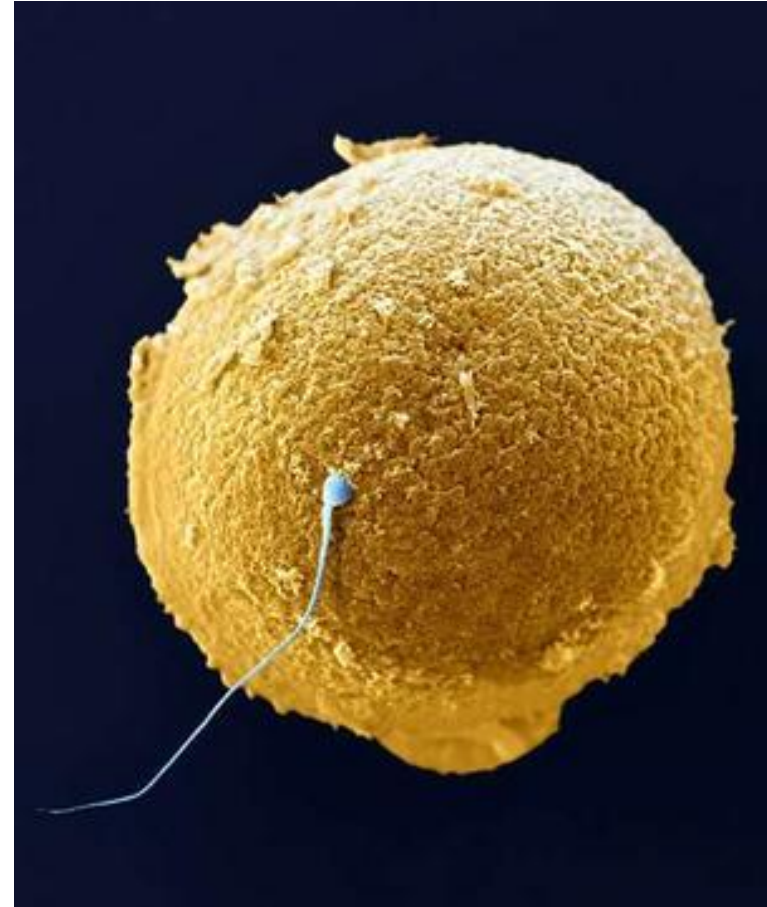


# The Race to Reproduce

Association for the Study  
of Animal Behaviour



**Dr Rob Thomas**  
**Cardiff University**



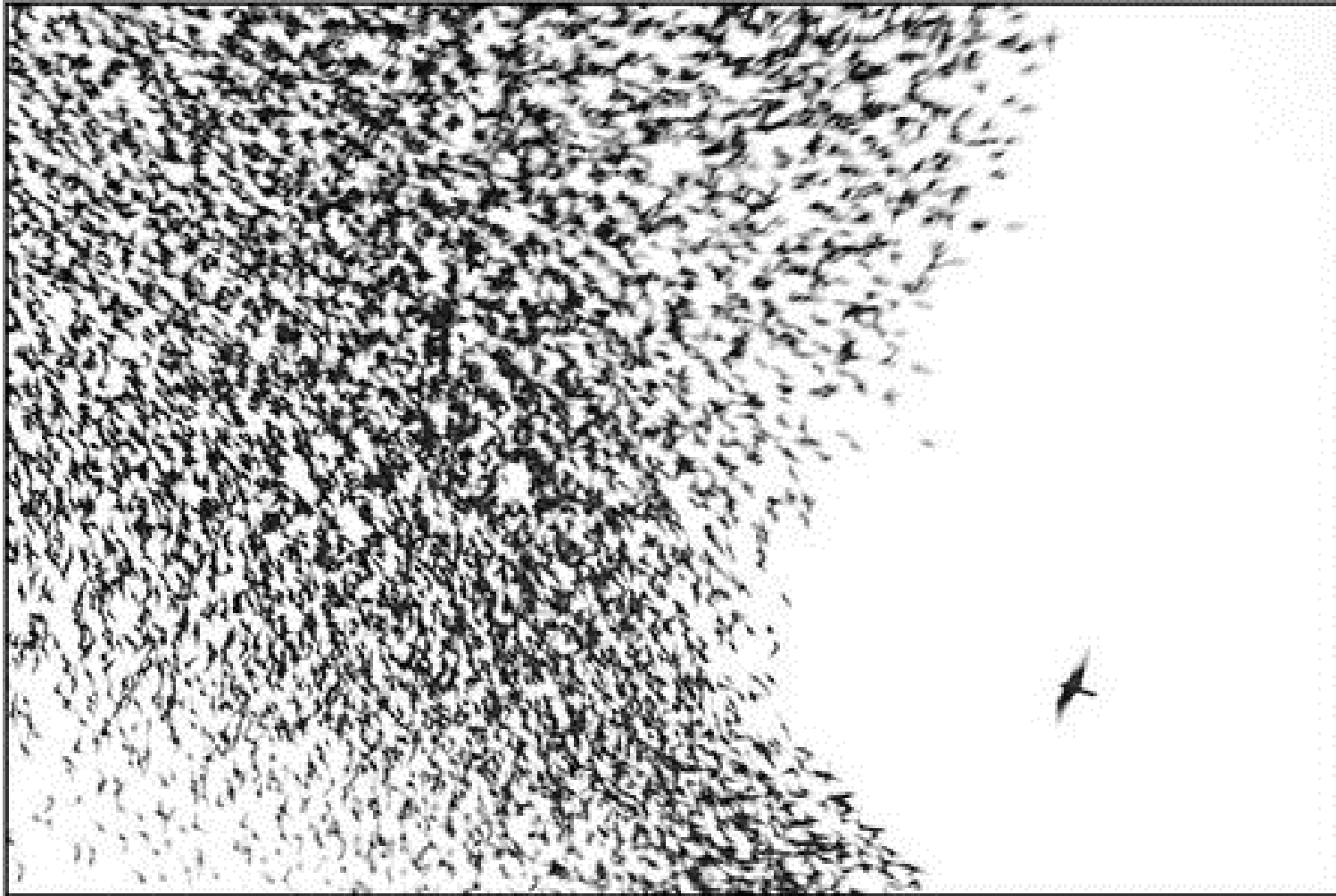
Part of the *Biology in the Real World* lecture series

# Survival of the fittest...



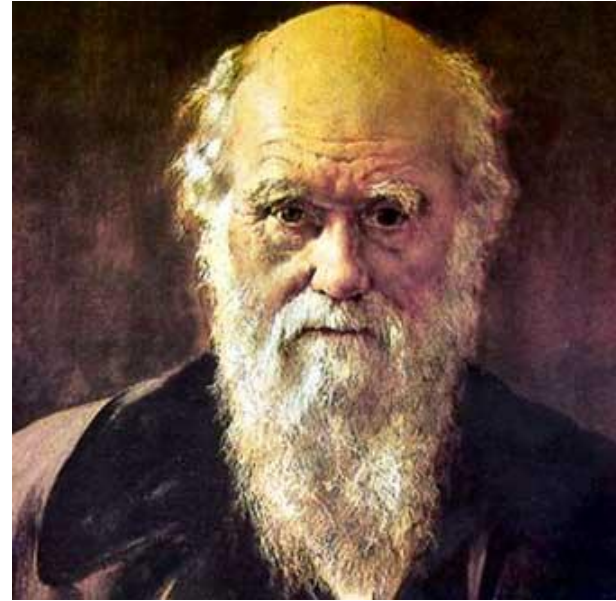
...or, reproduction of the fittest survivors?

# Survival of the fittest...



...or, reproduction of the fittest survivors?

**Sexual selection =**  
natural selection for  
traits that increase  
**reproductive success**



## Natural selection

1. Variation between individuals
2. This variation affects **survival**
3. Variation is inherited

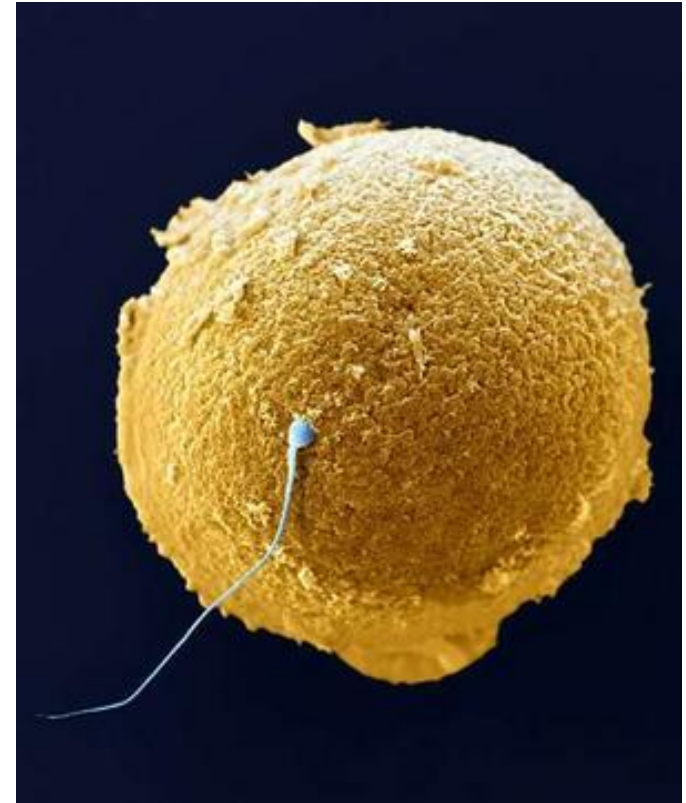
## Sexual selection

1. Variation between individuals
2. This variation affects **reproductive success**
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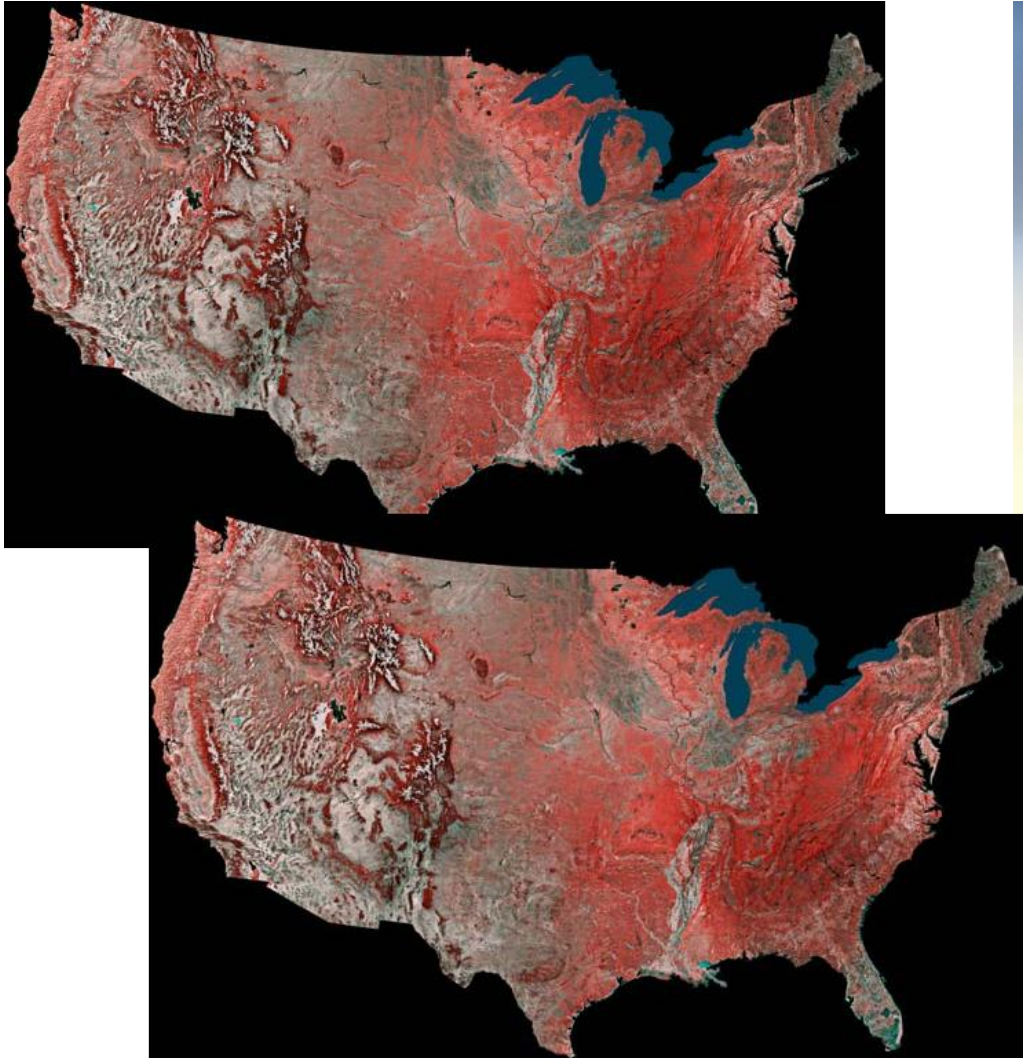
# “Anisogamy”

= unequal gametes

- Eggs are large & expensive, sperm are small & cheap!
- Males produce huge numbers of tiny sperm
- Females produce a relatively small number of eggs
- Females (usually) invest more in growing & caring for each offspring
- **Ardent males** compete for **choosy females!**



e.g. 5ml of human semen could (theoretically) fertilise eggs of 2x the population of the USA\*



\*Don't try this at home!

...so females are a  
scarce resource

## **21-year-old fathers seventh child**

<http://news.bbc.co.uk/1/hi/england/wear/5138444.stm>



**A 21-year-old who fathered his first child at 13 is about to become a dad for the seventh time.**

Keith Macdonald, from Washington, Tyne and Wear has been branded a "reckless Romeo" after it emerged that all his children are by different women.

...Condom manufacturers report low sales in the Tyne & Wear region...

...Mr Macdonald said he did not want to have any more children and that his mother has strong views about the situation.

He said: "My mum's not happy about all these kids. She tells me to pack it in and keep it in my trousers."

# Emperor Mulai Ismail of Morocco

- Reportedly fathered more than 800 children (or 888 or 1042) from a harem of 500 women.
- Born 1646
- Died 1727

**Male:**  
800+ children

**Female:**  
16 children



"My mum's not happy about all these kids. She tells me to pack it in and keep it in my trousers."



# Male-male competition = intra-sexual selection

- Ardent males compete for access to females
  - Fighting
  - Ritualised contests
  - Guard your female(s)
  - Sperm competition



Ardent male elephant seals  
fighting



**Ritualised  
roaring contests**

**Very impressed  
females**

**Dangerous fighting**



**Secondary sexual characteristics**



# Ritualised roaring contests



# Ritualised roaring contests



# Dangerous fighting



# Very impressed females

Leave it Darren,  
he's not worth it!



“Cardiff by night” photos by Maciej Dakowicz

# Mate Guarding

- Damselflies
- Elephant seals

Prevents other males getting access to fertile females



# Forced matings

- Mallard ducks  
...sometimes to the  
point of drowning



- Hemipteran bug: *Xylocoris maculipennis*



Males inject sperm directly into the female through her body wall





# Sperm competition



**= Competition for inseminations between the sperm of rival males**

E.g. remove rival sperm using barbed penis

E.g. plug the female's genital opening

E.g. *Xylocoris maculipennis*

- Males inject sperm through the female's body wall
- Males inject sperm into rival males
- "Imposter" sperm migrate to the rival male's testes
- Rival male inseminates female with imposter sperm!

# Female choice = inter-sexual selection

Selection favours females who choose the best possible males to mate with.



- **Benefits of choosing good quality mates**
  - Good resources & parenting ability
  - Good genes (sexy parents have sexy offspring)
- How can females identify the best male?  
**(female choice)**
- How can males improve their chance of being chosen?  
**(female attraction)**

# How to impress females

- Defeat the opposition
- Defend a high quality territory
- Provide “nuptial gifts” = courtship feeding
  - Proves ability to find food
  - Provides energy to female
  - Increases male’s cost of mating



**Direct benefits  
to females**



Little tern offering a fish



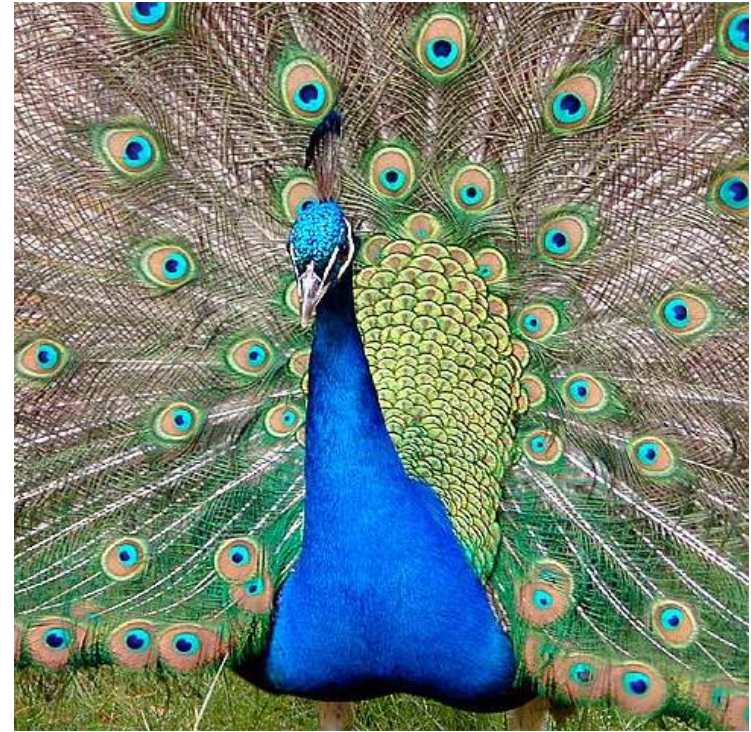
Katydid offering a spermatophore

# How to impress females

Advertise the genetic benefits of a good choice

- Have a trait that females find “sexy”,  
to pass on to your sons  
(= runaway sexual selection)
- Have a strategic “handicap”  
(a trait that only high quality  
males can afford to possess)

E.g. the peacock’s tail...



**Impairs survival but attracts females!**

# Sexual conflict

= Conflicts of interest between males & female

**E.g.  
Infanticide**



**E.g. sexual  
cannibalism**

female mantids  
sometimes eat the  
male during mating!

- Male lions slaughter the cubs when they take over a new pride
- Females come back into oestrus
- New male fathers new cubs

# Sexual conflict over parental care



Kentish plovers



Female incubating eggs

- Males and females both incubate the eggs at first
- Either sex can desert in order to start a new nest with a new mate
- The deserted mate is left to raise the family

# In some unusual situations, females compete for males

- When males invest more in parental care than females

- Moorhens
- Phalaropes
- Jacanas



- Females lay eggs and start a new nest
- Males incubate the clutch
- Ardent females & choosy males

Mating systems

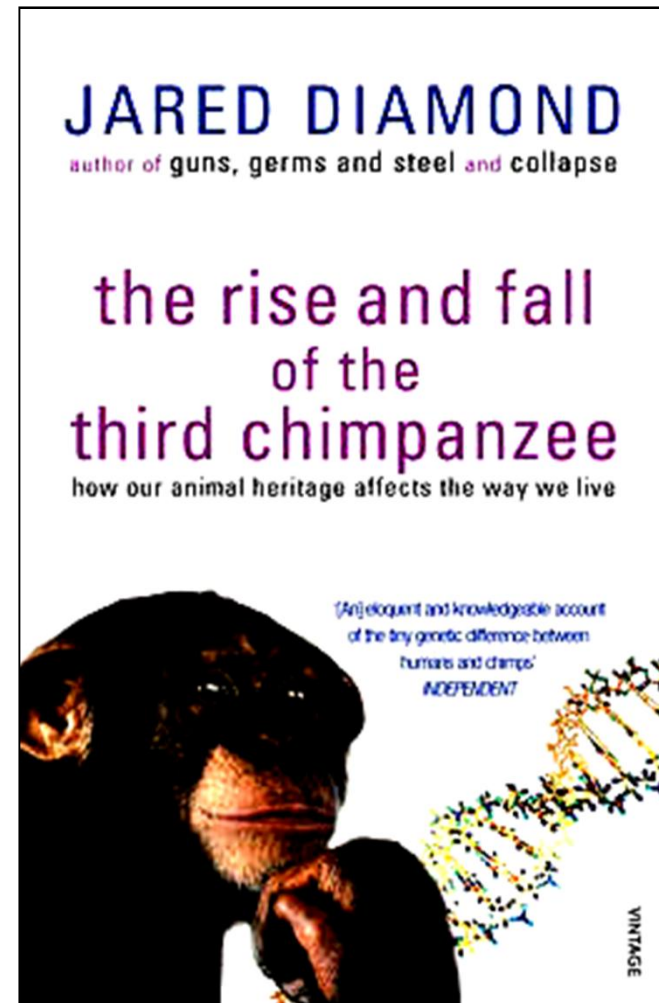
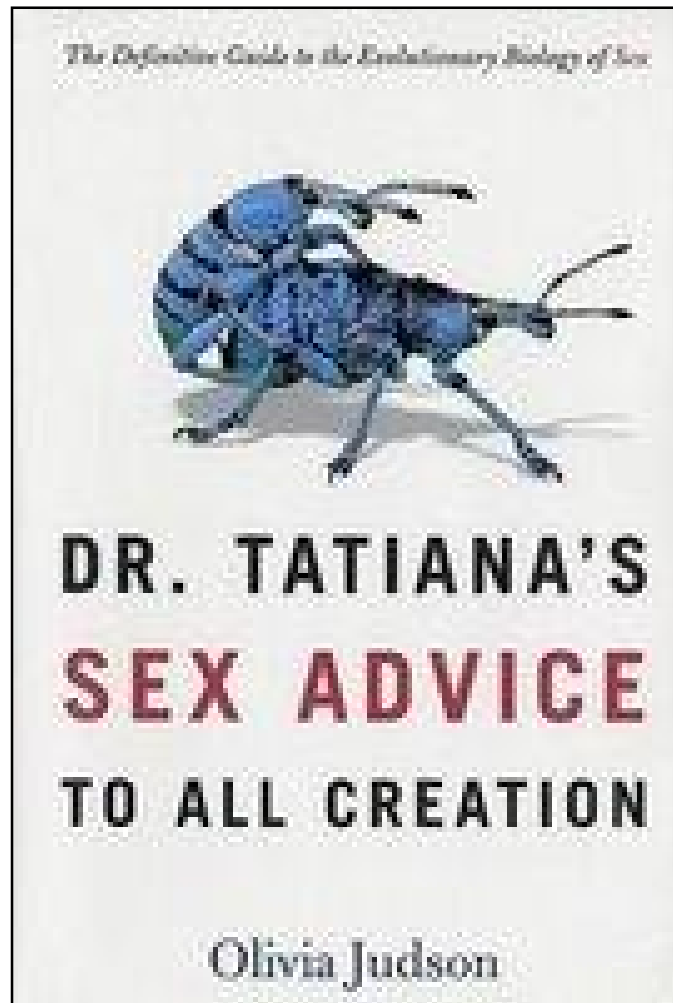
Monogamy

Polygyny

Polyandry

Polygynandry

# Further ideas





# Association for the Study of Animal Behaviour

## ASAB Education Resources

- DVDs & videos
- Books
- Posters
- *Feedback* e-newsletter
- Facebook updates
- Curriculum-linked activities
- Education Officer support



Google “**ASAB Education**”, or come and visit our stand  
in the **exhibition marquee**