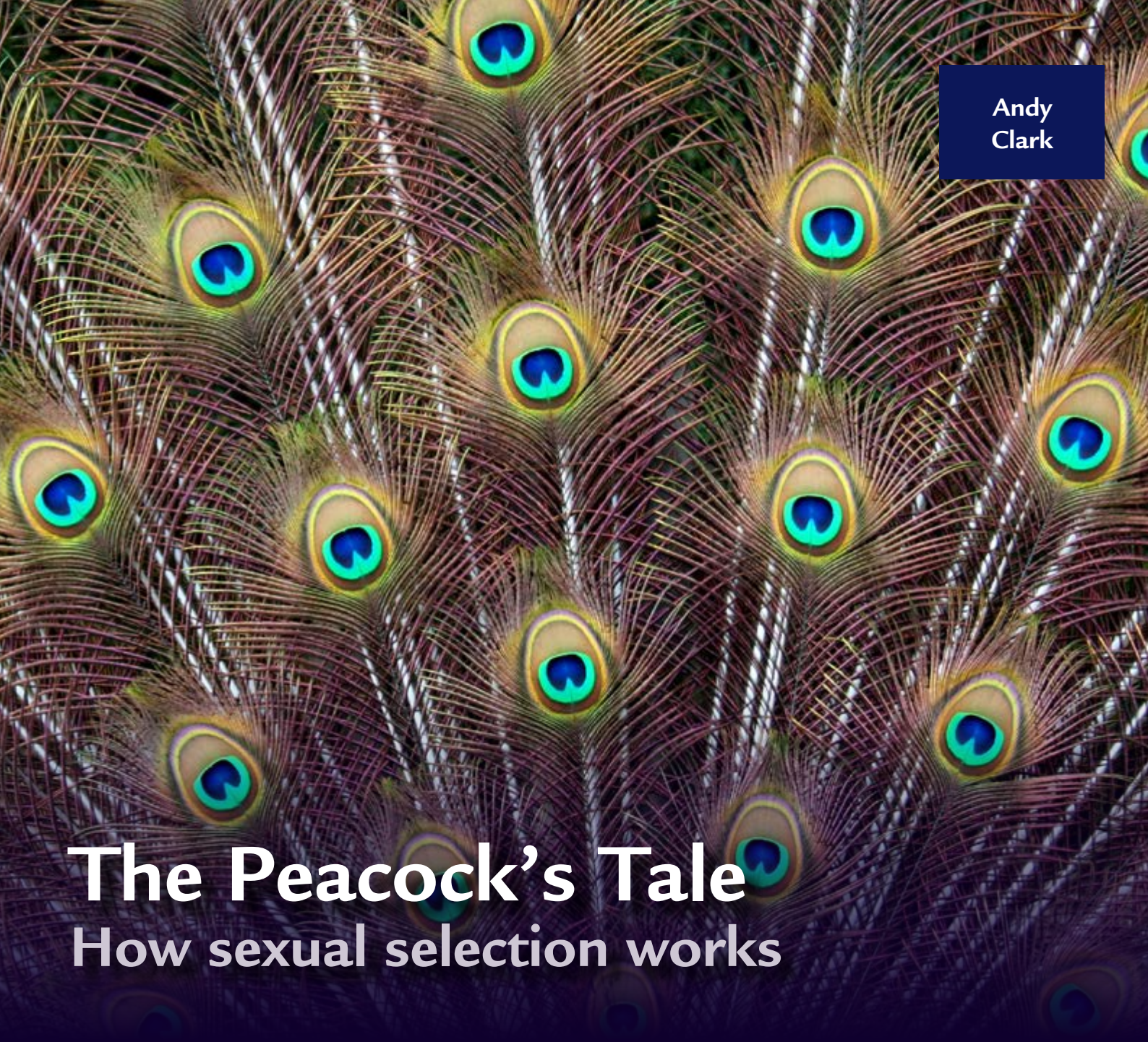

Andy Clark

The Peacock's Tale

How sexual selection works

Evolution occurs by natural selection, but this statement may make it appear deceptively simple when actually it is highly complicated. As ***Andy Clark*** *explains, natural selection operates in a number of ways and one fascinating mechanism is sexual selection.*

Key words
evolution
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An individual is given a set of genes at the start of its life, and if they are 'good' it might stay alive long enough to reproduce and pass on its genes to the next generation. In all sexually reproducing creatures, however, there comes a time when that individual must find a suitable mate to help it pass on its genes; this is hardly a romantic look at the proliferation of life. The fact is, reproduction is a selfish act.

What if those other genes let you down, and your offspring don't make the harsh cut under natural selection? This is where sexual selection comes in and is usually female-driven due to a higher investment in the process of reproduction. Female gametes store food for the developing embryo and consequently are bigger than the male gamete. Then in most species, she has to look after the offspring until they are mature.

Males, however, make a vast number of sperm – and quickly too! At its most basic, once a male has successfully got his sperm into the vicinity of an egg, his commitment is often over. The outcome of this imbalance of investment is a strategy which differs between the two sexes. Females have evolved a 'choosy' behaviour, where they select a mate who demonstrates that he is the 'fittest' around before she will invest in sexual reproduction with him. Whereas most males, due to their low investment, are not so choosy and operate a strategy which produces as many offspring as possible, i.e. through several matings.

Natural selection

Darwin's real achievement was to suggest the simple but very powerful idea of natural selection. This idea relies on just a few simple steps:

- Living things produce more offspring than are needed to replace themselves, but populations stay about constant.
- Members of a species vary, and this variation can be passed on from parents to offspring.
- Those with advantages tend to survive better and so leave more offspring who carry their advantageous features.

Only skin deep?

How can an animal tell the quality of its potential partner's genes? The challenge for the partner is to somehow prove that they have got the best genes. Nature ensures this happens in many ways that can be very bizarre; a good illustration of this is the peacock's tail. Male peacocks are highly colorful, but the female peahens are drab by comparison.

A peacock displays his tail to catch the attention of a peahen.

A male peacock's extravagant tail has no benefit whatsoever for its physical survival – in fact, it's far more of a hindrance. It doesn't help him to fly, catch his food or escape predators. but it takes a lot of energy to produce and then it has to be carried around behind him everywhere. The fact is that a male who is able to spend so much of his energy on growing that tail, and still be fighting-fit and not be eaten by a predator, shows that he must have 'good' genes for the other things that matter, i.e. general strength and health.

If there were any other advantage to survival of having elaborate tail plumage, the females would have it too. In this way, sexual selection goes against what would logically be 'weeded out' by natural selection. Females look for a male who has actively gone against the odds but has still survived.

Role reversal

In some species the males are the choosier sex. A good example of this is illustrated by the African Jacana bird *(Actophilornis africanus)*. The males are responsible for nest building, incubation and care of the young. In this case it is the male who makes the biggest investment in the young and the females are more brightly coloured and compete for the attention of the males.

The African Jacana (Actophilornis africanus)

Looks may not be everything

So what if males are willing to do more than just provide the genes? (This is where the romance comes back into it.) In some species, the female not only has to assess the quality of her mate's genes, but also how useful he'll be in helping look after the young. A male becomes attractive if he's more than just a sperm bank. Having him involved in raising the young reduces the cost to the female, and gives the offspring a better chance of survival, a double win for the female.

In the Olive Baboon *(Papio anubis)* some males behave 'paternally' toward infants they could not have sired as a way of currying favour with a female. This behaviour toward a mother and her infant can gain the male preferential access to that mother when next she mates.

A male Olive Baboon with young (photo copyright)

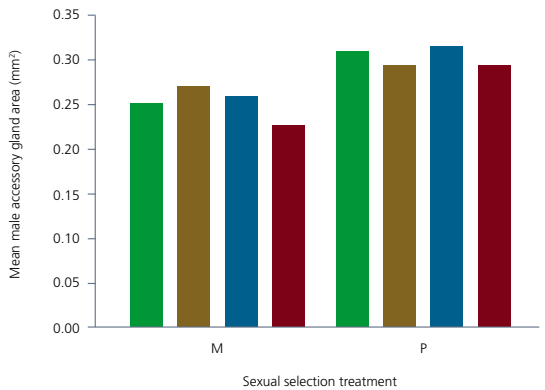
Some recent research

Some of the early work on sexual selection was carried out on fruit flies (*Drosophila* sp.). Recent research at Sheffield University on these flies has highlighted some of the costs and consequences to the male of engaging in the competition for females.

Males possess a pair of accessory glands associated with the testes, which produce a range of chemicals (accessory gland proteins), which are involved in reproduction.

These chemicals have been known to increase ovulation (egg-production) and oviposition (egg-laying) rates in females upon transfer. One such chemical called Acp70A also induces rejection behaviour towards subsequent males by the female. Exerting these kinds of effects on females can dramatically increase the number of offspring a male can sire in his lifetime. So these glands are crucial in the competition between males to father as many offspring as possible.

At Sheffield they have set up monogamous tubes (each containing only one male and one female) and promiscuous ones (one female and several males). This leads to a variation in the level of competition between males and, as predicted, the promiscuous situation results in larger accessory glands, as shown in the graph.



Sexual selection treatment has a significant effect on the size of the accessory glands of virgin male fruit flies. M = results for 4 trials of monogamous flies; P = results for trials of promiscuous flies.

The human case

How does sexual selection operate in humans? Which sex, if any, has the most investment in the reproductive process? Is either sex more choosy in selecting their partners and what characteristics do humans use in their selections? All these questions are material for current research. So far scant observations of human courtship have shown many characteristics displayed by both men and women.

For example, recent work on male beards has shown that both men and women view a beard as a sign of masculinity. The growth of a beard has no advantage and in fact requires energy, just like the peacock's tail.

Is Jude Law more attractive with stubble or a beard?

However, surveys show that women tend to prefer heavy stubble to a full beard as a sign of attractiveness. The researchers hypothesise that this is because picking a mate who is too masculine isn't necessarily a good thing. They may be more likely to get into fights, take risks and wind up widowing the wife and leaving her to raise his beardy babies alone. Going for a stubble-sporting mate may be a safer bet.

So from the bearded head to the extravagant tail, sexual selection seems to be a general driving force of evolution in the living world.

Andy Clark is an ecologist at heart because, he says, "the world is a vast, complex and brilliant place." Having recently graduated from reading biology at the University of St Andrews, he works in conservation with Operation Wallacea and so is able to share his love of the natural world with others, while actively being a part of protecting it.