# Which species has the largest testicles? Big secret revealed by researchers

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A Tuberous Bushcricket (Platycleis affinis).

(PhysOrg.com) -- Researchers at the University of Derby and colleagues at the University of Cambridge believe they have found which species has the largest testicles in relation to body weight on the planet – and why!

Yet the research team also discovered that large testes did not necessarily relate to a larger amount of sperm produced – which goes against traditional thinking in the science world.

Biologists at the University of Derby, which led the research project, say that the Tuberous Bushcricket (*Platycleis affinis*) produces testes which are 14% of the male body mass, according to research published today in *Biology Letters*, a Royal Society Journal.

It compares to a species of fruit fly (*Drosophila bifurca*), whose testes to body weight ratio has been recorded as 10.6%.

Lead researcher Dr Karim Vahed, Reader in Behavioural Ecology at the University of Derby, said: "We couldn't believe the size of these organs, they seemed to fill the entire abdomen.

Handout photo released on November 8 by the Royal Society shows a tuberous bushcricket (Platycleis affinis) that has the biggest testes in relation to body mass in relation to any creature on the globe. The tuberous bushcricket (Platycleis affinis) has testes that amount to 14 percent of its body mass -- the equivalent of an adult man hauling around testicles weighing some 10 kilos (22 pounds).

"We are also interested in the reason why they are so large. An almost

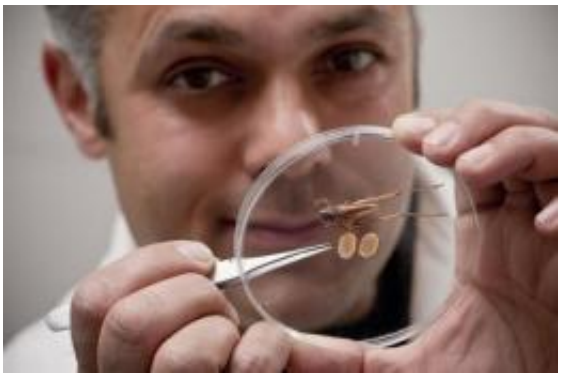
universal evolutionary rule appears to be that such variation in relative testes size is linked to female mating behaviour; testes tend to be larger in species where females are more promiscuous, as has been demonstrated in various species in fish, birds, insects and mammals.

"But at least two hypotheses could account for this pattern – sperm competition on the one hand and male mating rate on the other.

"Yet our study appears to be the first study to show that, in the case of the Tuberous Bushcricket, bigger testes don't necessarily produce more sperm per ejaculate."

As part of the Derby-led study, Dr Vahed, Darren Parker (a recent Derby Biology graduate now studying a PhD at St Andrews University) and Dr James Gilbert at the University of Cambridge, compared relative testes size across 21 species of bushcricket. As with other studies, they found testes were proportionately larger in species where females mated with more males – female Tuberous bushcrickets mate with up to 23 different males in their two-month adult life.

However, the surprise was that the Tuberous bushcricket did not produce more sperm: in fact they produced less voluminous ejaculates.



Dr Karim Vahed holding a specimen of a male Tuberous bushcricket together

with its testicles.

Dr Gilbert said: "Traditionally it has been pretty safe to assume that when females are promiscuous, males use monstrously-sized testicles to deliver huge numbers of sperm to swamp the competition - even in primates. Our study shows that we have to rethink this assumption. It looks as though the testes may be that big simply to allow males to mate repeatedly without their sperm reserves being exhausted."

Dr Vahed said: "This strongly suggests that extra large testes in bushcrickets allow males to transfer relatively small ejaculates to a greater number of females. Males don't put all their eggs (or rather sperm!) in one basket."

Traditionally, the assumption is that larger testes produce more sperm per ejaculate and thereby provide males with an advantage in sperm competition (when males are vying for the fertilisation of the female's eggs).

Sperm competition is most intense when the female of the species mates with many males; the male that has produced the most sperm is often assumed to be at an advantage, hence the development of larger testes in such species.

But more promiscuous females also increase the number of mating opportunities available for the male. It is therefore possible that larger testes have evolved in more polyandrous species because they allow an increased rate of ejaculate production, enabling the male to engage in a greater number of successive matings, as indicated by this latest study.

The researchers suggest these findings offer food for thought about the

links between endowment, promiscuity and reproduction within insects in the biological world.

Provided by University of Derby