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News in science

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Magic number tells when to change sex

Anna Salleh

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ABC Science Online

From tiny shrimps to massive fish, many species change sex once they reach a certain size, and British researchers have now discovered an amazing universal rule: that they all tend to do this at the same relative size.

David Allsop and Stuart West of the [University of Edinburgh](#) report their findings in the current issue of *Nature*.

Many species - including polychaete worms, crustaceans, molluscs, echinoderms and fish - swap from being male to female or female to male at a certain stage in their growth.

Scientists presume this is because it maximises the number of offspring they have. For example, males might change to females at a certain size because as a male, their ability to reproduce is not size-dependent, but as a female they can carry more eggs when they are bigger. Such animals are believed to pick the sex that has the greatest reproductive advantage at the size they are.

U.S. researchers previously predicted that within a single species, the size at which individuals switched sex would be a constant. Allsop and West decided to test the theory that a constant applied across a number of different species.

Incredibly, upon looking at 77 sex-changing species, they found that every single one switched gender once the individual reached 72% of its maximum size.

"A very wide spectrum of species, spanning polychaete worms, crustaceans, molluscs, echinoderms and fish, all fit the same general rule for the timing of when to change sex," Allsop told ABC Science Online.

"This is quite staggering and possibly one of the first studies to find such a tight fit of data to theory across so many species from such diverse phyla."

According to Allsop, the findings have broad philosophical implications for the evolution of biological diversity.

"I think the findings in this work give strong support for the reductionist scientific philosophy that employs 'Ockham's razor' (the simplest explanation possible) to make sense of the apparent chaos we see when we look out at the universe," he



From 2 mm long shrimps to 1.5 m long fish, species seem to change sex at the same relative size.

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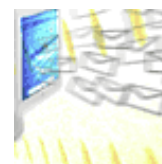
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says. "It looks like it is possible for simple general rules to explain adaptive events occurring across broadly different biological systems."

Professor Rick Shine of the [University of Sydney](#) was impressed by the findings: "It's an exciting result," he told ABC Science Online. "It reaffirms, if you like, a faith in the power of evolutionary processes to overcome the differing constraints in different types of animal groups and end up with the same general result."

Like Allsop, he is not a member of the club of biologists who believe nature is so complex that it is unlikely to have simple rules: "I tend to fall within the camp that loves simple general explanations if you can find them."

"I'm convinced that there is a very powerful pattern in the data [of this study] that indeed there is a consistency in the proportion of maximum size at which animals change their sex," he says.

"And that surprises me. I would have thought the diversity of animals involved was so great that you'd get incredible amounts of noise in that sort of variable but you don't - and that's wonderful and exciting."

He said further research was needed to probe the underlying reason for convergence on the magic number of 72.

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