REPRODUCTION

Hybridization controls

Nature **553**, 337–341 (2018)

Some closely related species can interbreed and bear viable offspring, while others cannot. A recent study of *Xenopus* hybridization reveals new cellular clues as to why.

When the egg of *X. laevis* is fertilized with the sperm of *X. tropicalis*, all goes well. But in the reverse pairing, the hybrid can't make it past a blastula. With the help of fluorescent proteins, the research team saw that in nonviable crosses, chromosomes weren't segregating properly during mitosis. Genetic sequencing of embryos as they reached approached this developmental point revealed that two *X. laevis* chromosomes were missing. Cellular signs point to an incompatibility with the maternal cytoplasm that ends up deleting paternal genes needed for continued development, a barrier that doesn't arise when mom and pop frog species are switched.

EN

<https://doi.org/10.1038/s41684-018-0020-0>

IMAGING

Acoustic reporters

Nature **553**, 86–90 (2018)

Many bacteria have gas vesicles, protein shells around hollow interiors that permit gas exchange. Taking advantage of some genetic engineering and the sound-scattering properties of these structures, the Shapiro Lab at the California Institute of Technology has developed a new technique for noninvasive imaging of the microbiome, even in deep tissues.

The lab developed acoustic reporter genes (ARGs) that, once inserted into a bacterium's gas vesicle, can be detected and visualized via ultrasound. To test the potential in vivo, they compared images of mice containing a probiotic *E. coli* in their colons that was modified with either an ARG or a more traditional bioluminescent tag. The acoustic reporter picked up clearer signs of the bacteria and with greater localization inside the colon. The technique was similarly effective at imaging bacteria inside tumor xenografts.

EN

<https://doi.org/10.1038/s41684-018-0011-1>

GENETICS

Shrinkage in worm genomes

Science **359**, 55–61 (2018)

Can an organism's mode of reproduction change its genome content? To answer this question, Eric Haag from the University of Maryland, and colleagues, compared the genomes of two different strains of worms: *Caenorhabditis nigoni*, an outcrossing worm type, and *C. briggsae*, which self-fertilizes.

Compared to the outcrossing worm, *C. briggsae* had a smaller genome and lacked orthologous genes in *C. nigoni* expressed by males and related to sperm. Specifically, *C. briggsae* genomes are missing genes which encode sperm surface glycoproteins, which the team of researchers further showed are necessary for enhancing sperm competitiveness. Overall, the team concludes that sex can have a significant influence on the content and size of genome.

DG

<https://doi.org/10.1038/s41684-018-0017-8>

OBESITY

Loads take off the lbs

PNAS **115**, 427–432 (2018)

Can adding weight actually help remove it? In a new paper published in *The Proceedings of the National Academy of Sciences USA*, a team from the University of Gothenburg in Sweden proposes a second homeostatic regulator of body weight, the gravitostat.

The researchers loaded mice and rats with small weighted implants, and then monitored their actual body weight. Over the course of the experiment, the loaded mice ate less and lost weight, compared to controls; when the loads were removed, weight increased. The results were even observed in leptin-deficient animals, the only other known body mass regulator. Though the exact mechanism is yet unclear, they hypothesize that loading stress stimulates osteocytes in the bones that trigger weight loss. A letter in response to the paper suggests that these results align with those of previous mouse experiments in hyper- and micro-gravity.

EN

<https://doi.org/10.1038/s41684-018-0019-6>

Written by Dustin Graham, Ellen Neff

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