

GENETIC MAPPING

Narrowing down genetic loci of interest

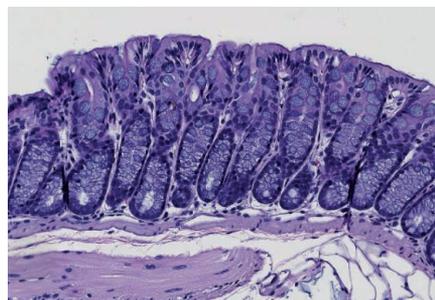
Often it can be difficult to identify a gene or genetic region that underlies a specific trait. Traditional mapping relies on naturally occurring recombination events but can be limited in resolution by the natural recombination frequency. Sadhu *et al.* used CRISPR technology to more easily map genomic sites of interest in yeast. The method systematically introduces local recombination events, allowing for the fine mapping of trait variants. They used their method to identify the causative mutation responsible for altered manganese sensitivity in yeast. — LMZ

Science, this issue p. 1113

MUCOSAL IMMUNOLOGY

Genes and microbes converge in colitis

Both host genetics and intestinal microbes probably contribute to a person's overall susceptibility to inflammatory bowel disease (IBD). The human gut microbe *Bacteroides fragilis* produces immunomodulatory molecules that it releases via outer membrane vesicles (OMVs). These molecules can protect mice from experimentally induced colitis. Chu *et al.* now find that OMV-mediated protection from colitis requires *Atg16l1* and *Nod2* genes whose human orthologs are associated with an increased risk for developing IBD. OMVs trigger an ATG16L1 and NOD2-dependent noncanonical autophagy pathway in dendritic cells (DCs). OMV-primed DCs, in turn, induce



Intestinal structures are disrupted in colitis.

regulatory T cells in the intestine that protect against colitis.

— KLM

Science, this issue p. 1116

CELL DIVISION

Forcing the spindle to the cell center

As a cell divides, the mitotic spindle segregates chromosomes to daughter cells. It does so while maintaining a centralized position; however, the mechanism for spindle placement is unclear. Garzon-Coral *et al.* used magnetic tweezers to show that the dynamical properties of the astral microtubules act as a force-generating machinery to keep the spindle at the cell center. The stiffness of the spring-like force increases during anaphase and also with decreasing cell size. This machinery is strong enough to quench thermal fluctuations to ensure precise localization of the spindle, but soft enough to allow molecular force generators to fine-tune the position of the mitotic spindle. — BAP

Science, this issue p. 1124

ATMOSPHERIC PARTICLES

From neutral to new

Many of the particles in the troposphere are formed in situ, but what fraction of all tropospheric particles do they constitute and how exactly are they made? Bianchi *et al.* report results from a high-altitude research station. Roughly half of the particles were newly formed by the condensation of highly oxygenated multifunctional compounds.

A combination of laboratory results, field measurements, and model calculations revealed that neutral nucleation is more than 10 times faster than ion-induced nucleation, that particle growth rates are size-dependent, and that new particle formation occurs during a limited time window. — HJS

Science, this issue p. 1109

IN OTHER JOURNALS

Edited by **Kristen Mueller**
and **Jesse Smith**



Legal hunting of protected wolves appears to increase poaching rather than tolerance.

CONSERVATION

Killing promotes killing

As a way to reduce poaching and promote tolerance of endangered species, some governments have implemented policies allowing the legal killing of large carnivores. Chapron and Treves investigated this controversial idea by studying the relationship between wolf population growth and announcements of legal hunting periods (either for individuals or as government-led culls) in the states of Michigan and Wisconsin. Contrary to the oft-stated argument that legal hunting reduces poaching, they found that population growth declined after both the announcements and the killing events. This suggests that legal killing may actually promote illegal killing, not tolerance. — SNV

Proc. R. Soc. London Ser. B, 10.1098/rspb.2015.2939 (2016).

PLURIPOTENCY

Pluripotency factor opens chromatin

All cells in an organism share the same genome. Differences in form and function arise from cells varying the specific genes they express. Temporal and spatial cues trigger changes in chromatin condensation: An open arrangement supports, whereas a closed conformation blocks, gene expression. Lopes Novo *et al.* report a chromatin-opening role for the pluripotency transcription factor NANOG, even in typically condensed areas of the genome, such as repetitive sequences. To do this, NANOG works with the SALL1, a protein associated with condensed chromatin. When embryonic stem cells differentiate, they compact their chromatin and simultaneously reduce NANOG expression. This work highlights how pluripotent cells link their pluripotency network with chromatin organization. — BAP

Genes Dev. **30**, 1101 (2016).

AUTOIMMUNE DISEASE

Lupus: subdivide in order to conquer?

For some diseases such as cancer, doctors routinely use molecular profiling to match patients to the most effective drugs, leading to improved patient care. With this goal in mind, Banchereau *et al.* explore the molecular heterogeneity of systemic lupus erythematosus, an autoimmune disease in which patients produce autoantibodies to nucleic acids. Through longitudinal profiling of blood samples from 158 children with lupus, they found a transcriptional signature in plasmablasts (a type of antibody-secreting cell) that strongly correlates with disease activity. Notably, a rise in neutrophil transcripts marked the onset of kidney inflammation. Overall, this approach revealed that lupus patients fall into seven subgroups, who conceivably would show different responses to treatment. — PAK

Cell **165**, 551 (2016).

CITIZEN SCIENCE

Crowd-sourcing craters on the Moon

Citizen science harnesses thousands of volunteers to perform tasks that are difficult to automate but too large for individual researchers. Bugiolacchi *et al.* present results from Moon Zoo, a website that asks users to identify the positions and sizes of lunar craters. Unfortunately, it is necessary to discard the majority of users' data during quality control, because most didn't correctly classify enough craters to become reliable at the task. Nevertheless, the project did result in crater counts comparable to those from experts, and it identified methods for future citizen science projects, such as how to weight users' expertise and combine all their results into a single catalog. — KTS

Icarus **271**, 30 (2016).

PHYSICS

Watching phonons propagate

In crystalline materials, atoms are arranged in an ordered lattice but can still wiggle around their equilibrium positions in concert with one another. These collective oscillations—phonons—are easy to describe in perfect crystals. In the real world, however, materials have nanoscale defects that can influence how phonons move through the crystal. To see these effects directly, Cremons *et al.* optically excited phonons in samples of WSe₂ and Ge and watched them propagate. The phonons caused minute rearrangements of the lattice, which were captured by an ultrafast electron microscope. The resulting movies indicate that the phonons were generated at the step edges of the samples and that their motion was influenced by the local morphology. — JS

Nat. Commun. **7**, 11230 (2016).

GLOBAL FRESH WATER

The wet and the dry

If predicting the availability of water during the next century were as easy as the phrase “the wet get wetter and the dry get drier” would seem to suggest, then planning for it also would be easy. However, although that simple formulation is useful when considering latitudinal averages, detailed predictions are more difficult, because atmospheric circulation patterns will change as the world warms, and so moisture will be delivered to different areas on a regional scale. Willis *et al.* examine this issue in more detail and conclude that moisture flux variations in the tropics will occur mostly because of changes in stationary-eddy circulations, whereas transient eddies will be most important in the extratropics. — HJS

Geophys. Res. Lett.

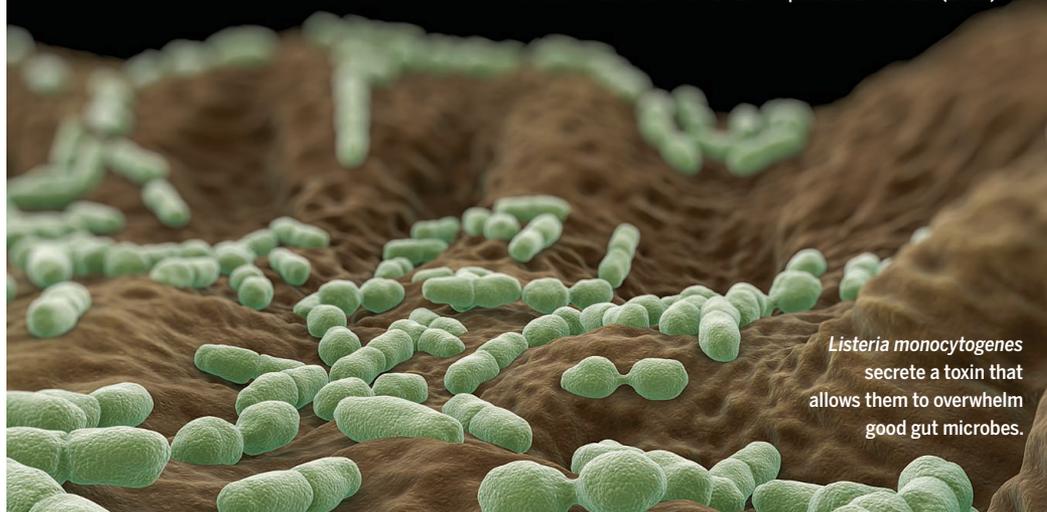
10.1002/2016GL068418 (2016).

MICROBIOLOGY

A secret(e) weapon for food poisoning

Trillions of microbes reside in our gut, producing essential nutrients and defending gut integrity. So how do a few incoming pathogens compete against these masses to establish an infection? Some strains of the bacteria *Listeria monocytogenes* cause gastroenteritis, which can be fatal in the immunocompromised and in pregnant women. Studying mice, Quereda *et al.* found that a virulent strain of *L. monocytogenes* produces a toxin called listeriolysin S, but only when it is in the gut. The toxin led to changes in the abundance of acetate- and butyrate-producing gut resident microbes in *L. monocytogenes*-infected mice. These short-chain fatty acids can inhibit *L. monocytogenes* growth, implying that *L. monocytogenes* expresses the toxin to overwhelm resident microbial competition. — CA

Proc. Natl. Acad. Sci. U.S.A. **10.1073/pnas.1523899113** (2016).



Science

The wet and the dry

H. Jesse Smith

Science **352** (6289), 1072-1073.
DOI: 10.1126/science.352.6289.1072-f

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