remaining protective. Generally, WNV antibodies were less disease-enhancing than DENV antibodies, and, in macaques, yellow fever vaccination had very little effect. —CA

**STRUCTURAL BIOLOGY**

**Nucleosomes in contact**

In eukaryotic cells, genomic DNA must be compacted to fit inside the nucleus. A key player in DNA packaging is the nucleosome, which comprises a segment of DNA wrapped around an octamer of histone proteins. During replication and transcription, nucleosomes must reposition themselves on the DNA. In this process, nucleosomes can collide to form a dinucleosome. Kato et al. report a high-resolution crystal structure of a dinucleosome. One of the octamers has lost a histone dimer so that the dinucleosome comprises an octamer and a hexamer. The structure may represent an intermediate during chromatin remodeling. —VV

**PHYSIOLOGY**

**A target for preventing kidney damage**

Proteinuria, the appearance of protein in the urine, results when podocytes in the kidney are damaged. Rinschen et al. found that the activation of the transcriptional coactivator YAP and the expression of YAP target genes preceded proteinuria in rats with chemically induced nephrosis. YAP activity can be stimulated by mechanical stress, and activation of YAP in cultured podocytes depended on the stiffness of the substrate. A YAP inhibitor ameliorated proteinuria and damage-induced mechanosignaling in the nephrotic rat kidneys. —AV

**SOCIAL SCIENCES**

**The negative impact of EU enlargement**

National borders and restrictions on immigration can strongly hinder international scientific work. Arrieta et al. used detailed data on scientific productivity, collaboration, and mobility before and after the 2004 enlargement of the European Union (EU) to estimate the impact of EU integration on cross-border collaborations. The results suggest that the 12 new EU nations would have experienced higher rates of cross-border collaboration without integration. This effect is driven by high-skill migration to Western EU nations through cross-border competition for the newly mobile scientists. —AC

**DEF AUNA TION**

**Quantifying hunting-induced defaunation**

As the human population grows and increasingly encroaches on remaining wildlife habitat, hunting threatens many species. Benítez-López et al. conducted a large-scale meta-analysis of hunting trends and impacts across the tropics (see the Perspective by Brashares and Gaynor). Bird and mammal populations were considerably lower in areas where hunting occurred. Although commercial hunting and proximity to roads and urban centers were the most damaging factors, all hunting had worrying impacts, even in protected areas. Protection and alternative approaches for sustainable subsistence hunting must be implemented soon if we are to prevent further, rapid defaunation. —SNV

**GENETIC VARIATION**

**Near and far effects on gene expression**

The genes in the human β-globin cluster are co-regulated by a single control region or master cis-regulatory site. Surprisingly, few other master regulators have been identified, although they are suspected to be important in disease. In the past, variants in master regulatory sites have been used to identify defects in the expression of single genes. Further analysis of the three-dimensional structure of the genome showed that chromatin looping brings the master regulators adjacent to the genes that they appear to affect. The looping pattern seems to be broadly conserved among mammals. Variation in such regulatory hubs has multiple downstream effects on both genes and noncoding regions that may have shaped genome evolution and complex disease associations. —LMZ

**CELL BIOLOGY**

**TB exploits zombie cells**

*Mycobacterium tuberculosis*, the bacterium that causes tuberculosis (TB), mainly grows within host cells. Lerner et al. studied the lifestyle of *M. tuberculosis* within human macrophages by inspecting them with a combination of live-cell imaging, correlative light and electron microscopy, and single-cell analysis. After infection, some of the macrophages became necrotic and had damaged plasma membranes, although they still supported mycobacterial proliferation. Indeed, inhibiting necrosis compromised the macrophages’ ability to support mycobacterium replication. Eventually, such cells ruptured to release progeny mycobacteria to infect new host cells. The ability of this microbe to exploit necrotic macrophages as a nutrient-rich
**BIOCHEMISTRY**

**Heavy metals? No problem for this snail**

Snails and slugs can accumulate and detoxify heavy metals with the help of metallothioneins, small sulphur-rich proteins that can bind ions of heavy metals such as cadmium. Baumann et al. now report the solution structure of a metallothionein from the common periwinkle, a small species of sea snail that lives on the rocky shores of the Atlantic Ocean. In contrast to the two-domain structure of previously characterized metallothioneins, the protein forms a larger three-domain structure and can bind nine cadmium ions. By binding more metal atoms in this way, the snails can cope efficiently with heavy metals in their environment. —JFU


**INFLAMMATION**

**Protectin and resolvin gut inflammation**

Even when laced with syrup, cod-liver oil is disgusting, but it is an important source of omega-3-docosapentaenoic fatty acid (DPA). After being swallowed, DPA is converted into specialized proresolving lipid mediators (SPMs), including protectin and resolvin. SPMs are naturally produced by leukocytes and are essential for repairing the damage caused to tissues by inflammation, such as during inflammatory bowel disease (IBD). Gobbetti et al. found that mice with induced IBD have up-regulated protectin and resolvin pathways. If mice were treated with SPMs, their colons lengthened and ulceration was reduced (independently of the anti-inflammatory cytokine interleukin-10). Protectin and resolvin almost appear to lubricate neutrophils by preventing them from sticking to the lining of blood vessels and escaping to invade the colon. The next step is to find out what causes normal inflammatory repair to fail during IBD. —CA


**NUCLEAR PHYSICS**

**Smashing ions to test a theory**

The strong interaction that binds together quarks in a nucleus appears to respect the symmetry of parity. However, physicists have hypothesized that smashing heavy ions against each other in a particle collider can cause the parity symmetry to be violated locally. The presence of a magnetic field then can cause charge separation, the so-called chiral magnetic effect (CME). Khachatryan et al. (CMS Collaboration) compared charge-dependent correlations among particles produced by proton-lead ion collisions with those produced by the collisions of two lead ions. In the former case, the CME would be expected to be negligible—but the researchers found the two signals to be strikingly similar.


**DEVELOPMENT**

**YAP is crucial for lung branching morphogenesis**

Lung morphogenesis is a complex process involving rearrangements of various cell types to achieve the branched patterning necessary to maximize gaseous exchange. Lin et al. found that YAP, a component of the Hippo pathway known to be important for organ size regulation, is required for branching. YAP is expressed throughout the murine lung epithelium. Local inhibition of YAP decreases local cell proliferation, which means inadequate force is produced to move cells and form airway branches. Genomic analysis showed that YAP regulates levels of pMLC (phosphorylated myosin light chain), which is required for cells to produce mechanical force. The YAP mechanism may also be involved in branching in other tissues. —MKE


Regulation of motor proteins forces developing tissues to branch.

The observed oxygen isotope ratios are similar to those found in some grains present in meteorites; perhaps those grains originally formed in material ejected from AGB stars. —KTS


The findings challenge the interpretation of earlier heavy ion collision experiments in terms of the CME. —JS


**STELLAR ASTROPHYSICS**

**Mixing up isotopes in evolved stars**

The elements carbon, nitrogen, and oxygen (CNO) are involved in nuclear fusion reactions in the cores of stars, which affect the relative abundances of their isotopes. As a star ages, changing conditions can cause convection to bring material from the core to the surface, modifying the isotope ratios that are visible to astronomers. Abai et al. measured CNO isotope ratios in a sample of evolved objects known as asymptotic giant branch (AGB) stars and compared them with stellar evolution simulations.

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Julia Fahrenkamp-Uppenbrink

Science 356 (6334), 150-151.
DOI: 10.1126/science.356.6334.150-a