First, Find Fish>>

While salmon, cod, and tuna fisheries are regularly monitored and assessed, this is not the case for about 80% of the fish species harvested throughout the world. **Costello *et al.*** (p. 517 published online 27 September; see the Perspective by **Pikitch**) used a model that integrates harvest, population, and ecological data to estimate the status of unassessed fisheries, based on ecologically analogous, regularly assessed fisheries. Generally, unassessed fisheries are in worse condition with declining fish stocks compared with regularly assessed fisheries.

Myelination Redux

Failures in myelination result from accident, disease, or normal aging, and can severely debilitate those affected. **Goldman *et al.*** (p. 491) review knowledge about oligodendrocytes, the cells that myelinate axons, and describe possibilities for replacing them after damage or decline.

Building a Fluorescent Hotspot

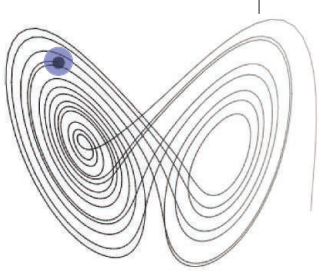
When two gold nanoparticles come close together, their overlapping plasmonic fields can create a region that acts as a nanoantenna that can enhance the fluorescent emission of a molecule. **Acuna *et al.*** (p. 506) used a surface-anchored DNA origami structure to assemble one or two gold nanoparticles next to a dye trapped within the structure. A > 100-fold enhancement in fluorescent emission was observed when the dye molecules were located in a 23-nm gap between two 100-nm gold nanoparticles.

Fancy Feathers

In the past few decades, an increasing number of dinosaurs have been shown to have possessed feathers. While it seems likely that feathers themselves may have evolved for thermoregulation, the original function of wings has been less clear and remained a matter of debate. Based on examination of three Theropod specimens from the genus *Ornothomimus*, **Zelenitsky *et al.*** (p. 510) conclude that the feathered wing may have evolved not for locomotion or prey capture (the animals were herbivores), but rather as a courtship display. All of the individuals examined had a covering consisting of short filamentous feathers, but the adult specimens, which would have reached sexual maturity, also had long shafted feathers on their forelimbs.

Cause or Correlation?

Three centuries ago, Bishop Berkeley's 1710 classic "A treatise on the nature of human knowledge," first spelled out the "correlation vs. causation" dilemma. **Sugihara *et al.*** (p. 496, published online 20 September) present an approach to this conundrum, and extend current discussions about causation to dynamic systems with weak to moderate coupling (such as ecosystems). The resulting method, convergent cross mapping can detect causal linkages between time series.



Climbing Like an Ape

Recently, studies of several early human leg and foot fossils have implied that in some early species—even after humans became bipedal—climbing may have still been important. Shoulder bones, which would provide important complementary information, are scarce, however. One of the few examples is from *Australopithecus afarensis* skeleton (DIK-1-1), which includes both scapula. **Green and Alemseged** (p. 514; see the Perspective of **Larson**) provide an analysis of the fossil's shoulders and show that, unlike modern humans, they retain several traits that are common in climbing apes, which may indicate that *A. afarensis* was an active climber.

Mastering Early Divisions

The regulation of canonical mitotic cell cycles is well understood, but the basic principles of the rapid, synchronized early mitotic divisions in embryos remains a mystery. Early embryos lack key mitotic regulators such as checkpoints, the anaphase-promoting complex/cyclosome (APC/C)–inhibitory protein Emi1, and the inhibitory phosphorylations of cyclin-dependent kinase 1 (Cdk1). Working in *Xenopus* embryos, **Tischer *et al.*** (p. 520, published online 27 September) identified XErp1/Emi2 as a mitotic APC/C-inhibitor essential for early mitotic divisions. The mitotic APC/C-inhibitory activity of XErp1 is positively regulated by protein kinase A (PKA) and protein phosphatase IIA (PP2A), which antagonizes Cdk1's inhibitory effect on XErp1. Thus, Cdk1 and PP2A/PKA appear to act antagonistically to control XErp1 activity, which results in the oscillatory activation and inactivation of the APC/C required for fast and synchronous mitotic divisions.

Switching on HIV

Newly assembled human immunodeficiency virus (HIV) virions bud from the host cell as immature particles. Proteolysis of the Gag protein, which forms a structural lattice below the viral membrane, leads to the formation of mature infectious HIV. Fusion of mature HIV virions with a target cell is mediated by viral envelope (Env) proteins that occur in trimeric "spikes" on the surface of the virion. **Chojnacki *et al.*** (p. 524) used subdiffraction microscopy to show that the spikes were dispersed on the immature virion but clustered into a single focus on the mature virion. The clustering was important for infectivity. Coupling Gag proteolysis with clustering may ensure that only particles whose interior has switched to the entry mode are competent for membrane fusion.

Making a Move

Structural Maintenance of Chromosome (SMC) complexes act ubiquitously in chromosome processing in all domains of life, but their mode of action in living cells has remained an enigma.

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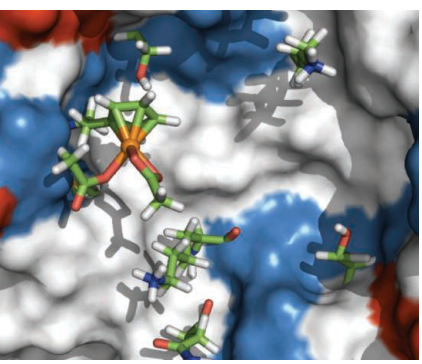
Badrinarayanan *et al.* (p. 528) used noninvasive millisecond single-molecule imaging to understand SMC complex molecular biochemistry in living bacterial cells with super-resolution spatial precision. *Escherichia coli* SMC complexes, which are important for chromosome segregation, formed dimers that bound to DNA in an adenosine triphosphate (ATP)–dependent manner and that could be released upon ATP-hydrolysis. By functioning in pairs, the complexes are likely to be able to undergo multiple cycles of ATP-hydrolysis without being released from DNA.

Treg-ulating Immune Responses

There are many checks and balances to keep the immune system from running amok. One of the most critical is a specialized population of T cells, called regulatory T cells (T_{regs}). In their absence, a lethal autoimmune disease develops in both humans and mice. Although T_{regs} are well known for their suppression of autoimmune responses, how they modulate responses to infectious agents is less well understood. Using inducible deletion of T_{regs} in mice, **Pace *et al.*** (p. 532) showed that T_{regs} are important for shaping the avidity of $CD8^+$ T cell responses. In the absence of T_{regs}, $CD8^+$ T cell responses were of lower avidity, and the $CD8^+$ T cells were more responsive to lower-affinity antigens. When T_{regs} were absent, stable interactions between T cell and antigen-presenting cells were increased as a result of higher amounts of chemokine expression in the lymph nodes. T_{reg} depletion also resulted in a lower-avidity $CD8^+$ T cell response to infection with the bacterial pathogen *Listeria monocytogenes*.



Forced Asymmetry in Cp

The cyclopentadienyl (Cp) ligand—a pentagon of carbons—is a common feature in transition metal catalysts, but chiral variants of the structure have rarely been applied to asymmetric reactions. Two studies now demonstrate distinct approaches to rendering a Cp-derived rhodium catalyst enantioselective in a tandem carbon-hydrogen activation-ring closure reaction that couples olefins with benzamides (see the Perspective by **Wang and Glorius**). **Hyster *et al.*** (p. 500) tethered a biotin derivative to the Cp ligand to enable docking in a chiral streptavidin protein cavity, which in turn was engineered to further optimize catalytic performance. **Ye and Cramer** (p. 504) appended chiral substituents on the Cp framework to bias the rest of the coordination environment around the metal center.

On the Receiving End

One type of neuron, the hippocampal pyramidal neuron, forms two different types of synapses with two different downstream partners. When the partner is an oriens-lacunosum moleculare (O-LM) interneuron, the pyramidal neuron only releases its synaptic vesicles with a low probability. When the cell on the receiving end is a parvalbumin (PV)-positive interneuron, the likelihood of synaptic vesicle release is high. How can the postsynaptic cell change the release characteristics of the presynaptic cell? **Sylwestrak and Ghosh** (p. 536, published online 4 October; see the Perspective by **McBain**) describe how the extracellular leucine-rich repeat fibronectin containing 1 (Elfn1) protein in the postsynaptic OLM interneurons affects vesicle release probability in the presynaptic pyramidal neuron. Misexpression of Elfn1 in PV interneurons converted vesicle release to the OLM pattern. Thus, a regulator located in the postsynaptic cell can modulate the function of the synapse.

Social Neuropeptides in Nematodes

The neuropeptides oxytocin and vasopressin stimulate maternal, reproductive, aggressive, and affiliative behaviors in mammals. They are implicated in behaviors ranging from ewe-lamb bonding in sheep to pair bonding in voles (see the Perspective by **Emmons**). Now, **Garrison *et al.*** (p. 540) and **Beets *et al.*** (p. 543) extend the evolutionary reach of these social neuropeptides to the invertebrate nematode worm, *Caenorhabditis elegans.* A similar neuropeptide was found to function in mating and also to modulate salt-taste preference, based on prior experience, suggesting an ancient role in associative learning.

CREDIT: HYSTER *ET AL.*