Positive Feedback
The uncertain effect of feedback between climate and clouds is one of the largest obstacles to producing more confident projections of global climate. Clement et al. (p. 460) examined how clouds, sea surface temperature, and large-scale atmospheric circulation vary in the Northeast Pacific region. Change in cloud coverage was the primary cause of sea surface temperature variations, and clouds provided a positive feedback to temperature variations. Furthermore, regional atmospheric circulation patterns were linked to patterns of cloudiness. One model produced realistic covariability between cloud cover, sea surface temperatures, and atmospheric circulation for the 20th century.

String Theory and Condensed Matter
The complex interactions involving highly correlated electron systems can give rise to “exotic behavior” in electronic systems, such as quantum criticality and superconductivity. The usual theoretical tools, however, are limited when describing these states. String theory is a highly mathematical approach initially developed to describe gravity and high-energy particle physics. Certain aspects of string theory may be relevant to describe condensed matter systems. Cubrovic et al. (p. 439; published online 25 June) take one such approach, and show that the characteristic properties of a Fermi liquid can emerge from string theory. The formulation may provide an approach to describing the exotic states of matter that arise in condensed matter systems.

Threonine Required
Embryonic stem (ES) cells divide rapidly, raising the possibility that they might exist in a metabolic state that facilitates rapid growth. By monitoring the abundance of common metabolites in mouse ES cells, Wang et al. (p. 435; published online 9 July) found altered levels of metabolites involved in carbon metabolism. Measurement of messenger RNA levels revealed unusually high expression of the gene encoding threonine dehydrogenase. In addition, in growth experiments, mouse ES cells were critically dependent on the amino acid threonine.

Black Hole Energy Boost
More than 20 galaxies are known to emit photons with energies a trillion times higher than those of visible light, but it is not known where this emission originates. These galaxies are part of a class of active galactic nuclei believed to harbor supermassive black holes in their centers from which relativistic plasma jets emerge, reaching out many thousands of light years into the intergalactic medium. Acciari et al. (p. 444; published online 2 July; see the Perspective by Begelman) present simultaneous radio and very-high-energy γ-ray observations of the nearby active galaxy Messier 87, revealing very-high-energy flaring activity accompanied by a radio flare originating from the core of the galaxy. The findings imply that the highest energy emission from active galaxies has its origin in the immediate vicinity of the black hole.

Toucan Heat Exchanger
Toucans are instantly recognizable by their large bills, which in the toco toucan (Ramphastos toco) accounts for about one-third of the total body length. The toucan’s bill has been interpreted as a sexual ornament and as an adaptation for handling fruit. Tattersall et al. (p. 468) explore an alternative explanation in which the bill serves primarily as a thermoregulator. Infrared thermography techniques, which allow detailed observations with minimal disturbance to the birds, show that the birds alter blood flow to the bill according to ambient conditions, effectively using it as a radiator to “dump heat.”

Bright Shiny Beetles
The beautiful iridescent colors found on the wings of butterflies and on the bodies of beetles have attracted the attention of brilliant minds over the past centuries, starting with Newton, who understood that these colors must involve “thin film structures.” In 1911 Michelson described the metallic appearance of these beetles, and in the late 1960s Neville and Caveney discussed the optical properties in the context of cholesteric liquid crystals. Sharma et al. (p. 449; see the Perspective by Vukusic) examined the metallic green beetle Chrysina gloriosa, which selectively reflects left circularly polarized light when illuminated with unpolarized light. The underlying cellular structure of the beetle exoskeleton is organized primarily in a hexagonal pattern, with variations in the pentagonal and heptagonal arrangements depending on the local curvature. Thus, the ordering of the cells in concentric, nested arcs is indeed analogous to the ordering of the molecules in a cholesteric (or chiral nematic) liquid crystal.

Packing Bananas and Boomerangs
Assembling achiral molecules typically generates achiral domains. However, odd things can happen when the molecules are banana- or boomerang-shaped—their cores can twist out of plane to form left- or right-handed helices, which can then pack into chiral domains that will polarize light (see the Perspective by Amabilino). Hough et al. (p. 452) show that if you make the situation even more complex by frustrating the packing of adjacent layers, you can create a material that appears to be macroscopically isotropic with only very local positional and
orientational ordering of the molecules but still shows an overall chirality. In a second paper, Hough et al. (p. 456) also show that if you change the chemistry of the molecules to allow for better overall packing, you can create a situation where helical filaments form that also tend to pack in layered structures. However, the frustration between the two types of packing leads to macroscopically chiral and mesoporous structures.

Little Lambs
In changing environments, ecological and evolutionary dynamics are intimately intertwined. However, understanding the dynamics of phenotypic traits under natural conditions is still rudimentary. Ozgul et al. (p. 464; published online 2 July) dissected the dynamics of a phenotypic trait in the context of the contributing ecological and evolutionary processes. In a wild population of Soay sheep where mean body size has fluctuated substantially over the past 25 years and has, on average, gotten smaller, an ecological response to environmental variation is the major driver of the dynamics; evolutionary change has contributed relatively little: The sheep have become smaller because climate change has modified the way that density-dependence influences lamb growth rates.

“Swine Flu” Pathology
The clinical spectrum of disease caused by the swine-origin 2009 A(H1N1) influenza virus and its transmissibility are not completely understood. Munster et al. (p. 481; published online 2 July) and Maines et al. (p. 484; published online 2 July) used ferrets, an established model for human influenza, to evaluate the pathogenesis and transmissibility of a selection of 2009 A(H1N1) virus isolates compared with representative seasonal H1N1 viruses. The results help explain the atypical symptoms seen so far, including the gastrointestinal distress and vomiting observed in many patients. Although results were variable, it seems that the 2009 A(H1N1) virus may be less efficiently transmitted by respiratory droplets in comparison to the highly transmissible seasonal H1N1 virus, suggesting that additional virus adaptation in mammals may be required before we see phenotypes observed in earlier pandemics.

Making Connections
Endoplasmic reticulum (ER)–mitochondria connections have been implicated in many physiological processes, including calcium homeostasis, signaling, membrane biogenesis, and apoptosis. Kornmann et al. (p. 477, published online 25 June; see the Perspective by Wiedemann et al.) looked for a proteinaceous link between the ER and mitochondria and, using combinations of synthetic biology and classical yeast genetics, found a protein complex that tethers the two organelles. A large-scale genetic interaction map suggests that these ER-mitochondria connections are important for interorganelar phospholipid exchange.

All Together Now (Sometimes)
Motile cilia and flagella protrude from the surface of many eukaryotic cells. Understanding how cilia and flagella operate is important for understanding ciliated cells in metazoans, the ecology and behavior of motile microorganisms, and the mechanisms of molecular motors and signal transduction. Using very-high-speed video microscopy, Polin et al. (p. 487; see the Perspective by Stocker and Durham) discovered that the biflagellated cells of the single-cell alga Chlamydomonas rheinhardtii switch between synchronous beating, which keeps the cells traveling forward, and asynchronous beating, which allows the organisms to make sharp turns. This random progression occurs in the dark and allows cells to diffuse, and it may underpin directional movement toward light in the same way that the run-and-tumble behavior of prokaryotes allows them to move up chemical gradients.

Keeping Calm
Benzodiazepines are the most prescribed anxiolytics and are used by a broad population. However, benzodiazepines can cause unwanted side effects, including sedation, development of tolerance, and withdrawal symptoms after long-term administration. Rupprecht et al. (p. 490; published online 18 June) now find that a translocator protein (18-kD) ligand, XBD173, is a fast-acting anxiolytic agent, both in animals and humans, which lacks the unwanted side effects of benzodiazepines and provides a promising target for novel clinically effective anxiolytic drugs.