ECOLOGY

A Steady Supply of Food

The environmental and anthropogenic factors affecting leatherback turtle populations are generally unknown and cannot explain why populations are increasing in the Atlantic yet declining in the Pacific. By analyzing reproductive success rates, migratory patterns, and oceanographic variables, Saba *et al.* demonstrate that turtle populations are most likely regulated by the abundance of zooplankton where they forage, as measured by the net primary productivity (NPP) estimated from satellite data. NPP was shown to vary among oceanic regions and to be affected by regime shifts that typically enhance ocean productivity; however, both the total NPP and overall consistency in NPP over time were much lower in the Pacific regions examined than in the Atlantic. In turn, these differences in local resources appear to affect turtle size and overall egg production—larger females that have matured faster lay more eggs than smaller females. These differences, coupled with anthropogenic impact and the effects of climatic shifts on NPP, may explain the discrepancy in demography between the Atlantic and Pacific leatherback populations. — LMZ

Ecology **89**, 1414 (2008).

APPLIED PHYSICS

Tracking Gyrating Memories

Whereas the bits in present magnetic memory storage media are written using electrical current pulses in a write head, recent work has shown that the spin-polarized current in a ferromagnetic medium can impart a spin-transfer torque to the magnetization, resulting in its motion. Such a wired-up memory architecture would allow yet higher storage density and provide faster access times than present hard drives offer. Understanding how the spin current affects the dynamics will help in developing memory storage devices based on this effect. Bolte *et al.* provide a direct view of the dynamics of the process. They use time-resolved x-ray imaging to track the motion of the magnetization, showing how magnetic vortices in permalloy dots gyrate and jiggle in response to the injected spin-polarized current. The technique is sufficiently sensitive to uncover the various contributions to the dynamics, thereby offering the opportunity to fine-tune the process. — ISO

Phys. Rev. Lett. **100**, 176601 (2008).

CHEMISTRY

Does Saltwater Wobble?

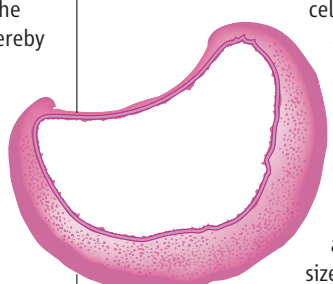
When ionic salts dissolve in water, the resultant solution tends to become more viscous than the pure liquid. This observation can be broadly understood based on a picture in which the web of hydrogen bonds holding the water molecules together rigidifies around solvated ions. However, the molecular details appear much more complicated, because time-resolved vibrational spectroscopy has suggested that most individual water molecules continue to rotate freely regardless of how much dissolved salt is present. Turton *et al.* explore this discrepancy using two related spectroscopic techniques to probe the molecular structure of aqueous salt solutions. The first, dielectric relaxation spectroscopy, is sensitive to individual molecules' orientations, and confirms the rotational freedom previously observed. The second technique, optical Kerr effect (OKE) spectroscopy, reflects polarizability and so is more sensitive to intermolecular changes that stem from translation. The OKE data reveal increasing translational restriction with rising salt concentration, as the ion solvation shells crowd against one another. The authors note that such a decoupling of rotation and translation is analogous to the jamming that occurs during transitions from a liquid to a glass upon supercooling. — JSY

J. Chem. Phys. **128**, 161102 (2008).

BIOMEDICINE

Engineering a Healing Environment

In respiratory conditions such as asthma and chronic obstructive pulmonary disease, the airways narrow, leading to impaired oxygen exchange. Tissue engineering affords one approach to reverse such damage: Endothelial cells embedded in a polymer matrix adopt normal morphologies and, when implanted close to sites of damage, promote vascular tissue repair without triggering an immune response. Zani *et al.* have applied this method by embedding into a denatured collagen matrix both the epithelial cells that line airways and the endothelial cells from surrounding tissue layers. Wrapping injured trachea in this cell-containing matrix enhanced recovery as measured by the size of the lumen and extent of the injury. Either cell type alone had beneficial effects, but both together synergized to improve luminal size and epithelial area more effectively. Measurements of cytokine and growth factor secretion from the endothelial and epithelial cells



Trachea lumen surrounded by epithelium, mesenchyme, and cartilage.

Continued on page 989

CREDITS (TOP TO BOTTOM): DANIEL PYNE/GETTY IMAGES; ADAPTED BY ZANI *ET AL.*, *PROC. NATL. ACAD. SCI. U.S.A.* **105**, 7046 (2008)