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Colorimetric test for viral ligand

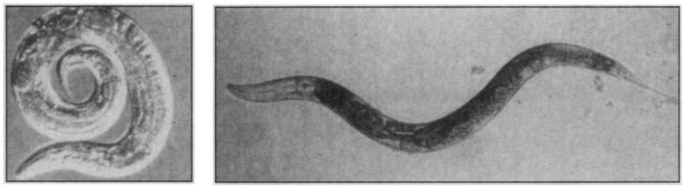
Langmuir-Blodgett films that incorporate polydiacetylene have a blue color, but at increased temperatures the conjugated backbone undergoes conformational changes and these films turn red. Charych *et al.* (p. 585) show that if a ligand receptor is incorporated into the film, binding of the ligand can also induce a conformational change, an effect they call affinitychromism. A sialic acid derivative incorporated into the film was used to detect influenza virus hemagglutinin. The blue-to-red color change was visible to the naked eye, and viral concentration could be quantitated by using visible spectroscopy. This approach could be generalized to a wide variety of other ligand-receptor systems.

Shear numbers

Under shear flow conditions, simple liquids such as water respond in a relatively simple "Newtonian" fashion, but complex fluids have internal structures that respond to the stress and that require additional terms to be introduced into the hydrodynamic equations. Safinya *et al.* (p. 588) studied the effect of shear on ordered fluids that have layered structures (smectic liquid crystals and lamellar surfactant membranes) using synchrotron x-ray scattering. At high shear, the layers of the lamellar phase were oriented parallel to the shearing plates, but a smectic-A liquid crystal oriented its layers perpendicular to the shearing plates. A numerical calculation suggests that this change of orientation minimizes the elastic deformation caused by flow distortion of thermal fluctuations.

Transporters and locomotion

Nerve cells package their transmitters into small packets that are stored until a signal needs to be sent. The storage compartments are small vesicles that contain transport proteins that allow the accumulation of transmitters, most of which are synthesized in the



cytoplasm of the cell. Alfonso *et al.* (p. 617) cloned the gene responsible for transporting acetylcholine in the nematode *Caenorhabditis elegans*. As in other organisms, the nerve cells which innervate muscles use acetylcholine as their transmitter, and mutations in this gene produced deficits in locomotion. The characterization of these mutants also will make it possible to look at other proteins that might interact with these transporters.

Meteorites under glass

Crater debris and far-flung ejecta in large asteroid impacts are formed predominantly from the target rock and not the asteroid, which usually vaporizes. Detection of the asteroid component has been particularly difficult for tektites, small glassy droplets formed when target rocks melt upon impact. Koeberl and Shirey (p. 595) show that rhenium-osmium isotopes can be used to fingerprint the involvement of the asteroid in tektite formation and clarify the impact process. This isotopic system is sensitive because meteorites have high abundances of osmium compared to Earth's crust, and the osmium isotopic values are also distinct. Analysis of the Ivory Coast tektites showed that 0.6 percent of the composition of the tektites was derived from a meteoritic parent.

T cell costimulation pathways

T cells have to be costimulated in order to activate all of their various immune responses. Binding of the B7 molecule to the CD28 receptor is the major known costimulatory pathway. Shahanian *et al.* (p. 609) established a CD28-deficient mouse strain and show that several T cell responses, including lectin stimulation of interleukin-2 production, T helper cell activity, and class switching of immunoglobulins, are impaired or reduced in these mice. However, some costimulatory responses, such as induction of cytotoxic T lymphocytes and delayed-type hypersensitivity, were still present, which suggests that alternative costimulatory pathways are present.

Mosquito map

In Africa, the primary malaria vector is the mosquito *Anopheles gambiae*. A detailed genetic map of the X chromosome of this organism had been obtained by Zheng *et al.* (p. 605), who used markers targeted to GA and GT microsatellite repeats (see news story by Aldhous, p. 546). Such a map is difficult to obtain because these mosquito breed in swarms. Backcrosses were obtained only by forcibly mating individual mosquitoes.

Early endocytosis

When epidermal growth factor (EGF) binds to its receptor on the surface of a cell, a signaling pathway is initiated that results in the internalization of the receptor and consequent desensitization of the cell to the growth factor. Sorkin and Carpenter (p. 612) describe experiments that begin to define the molecular mechanism by which receptors are localized into coated pits, which are then taken into the cell by endocytosis. Binding of EGF to its receptor enhanced binding of the receptor to AP-2, a protein complex associated with coated pits of the plasma membrane. Association of the receptor with AP-2 appears to occur before the coated pits are fully assembled.

Hand signals

Activation of the left motor cortex during hand movements is not a mirror image of the activation of the right motor cortex. Kim *et al.* (p. 615) used functional magnetic resonance imaging to quantify motor cortex activation in healthy right- and left-handed human subjects who performed hand movement tasks. Activation of the right motor cortex occurs mainly during contralateral movements, that is, when either right- or left-handed subjects moved their left hand. Unlike the right motor cortex, the left motor cortex shows substantial activation during ipsilateral movements, and, for right-handed subjects, is activated almost equally for movement of the right or left hand.