IMMUNOLOGY

Baby's first bacteria

J. Exp. Med. 203, 973–984 (2006)

When babies encounter bacteria in the birth canal, it may teach them that the body's bugs are harmless.

Mathias Hornef of the University Clinic of Freiburg and his colleagues show in mice that epithelial cells lining the gut react to a bacterial endotoxin and release inflammatory molecules before birth — but the same cells do not do so in newborns or adults.

The authors present evidence that endotoxin from the mother's microflora, possibly from the vaginal tract, passes through the mouths of babies. This briefly stimulates the gut cells and teaches them to tolerate certain bugs, something not seen in babies born by caesarean section. The process may help useful bacteria to set up shop in babies' intestines after birth.

MATERIALS SCIENCE

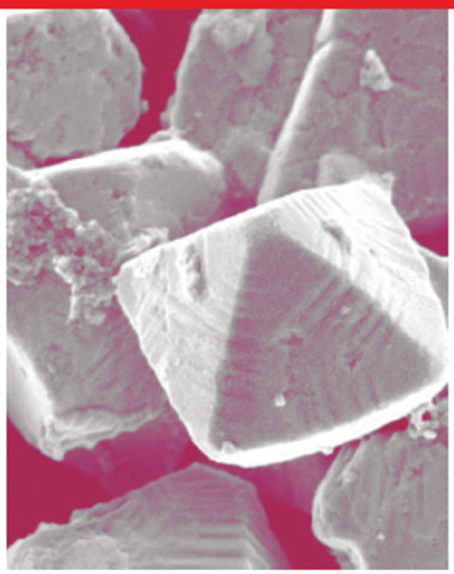
Modern alchemy

Science 312, 420–424 (2006)

Materials scientists have come up with a modern-day twist to the alchemists' dream of turning base metals into gold. They have turned gold and silver into diamond — or at least, diamond-like crystals.

Bartosz Grzybowski of Northwestern University in Evanston, Illinois, and his colleagues started with an aqueous solution of gold or silver nanoparticles capped with a single layer of organic molecules. By evaporating the water from the solution, they grew crystals in which the particles were arranged like the carbon atoms in diamond. Binary superlattices containing both gold and silver nanoparticles also showed diamond-like packing.

The structure is unusual because the forces between such particles generally make them close-packed: here, weak attractive interactions allow for a more spacious arrangement. Each micrometre-sized crystal (pictured) contains millions of nanoparticles.



B. A. GRZYBOWSKI

MICROBIOLOGY

Parasitic rodeo

Cell 125, 261–274 (2006)

Researchers have found that the common food-borne parasite *Toxoplasma gondii* uses a cowboy trick to rustle nutrients from its host.

Isabelle Coppens of Johns Hopkins University in Baltimore, Maryland, and her colleagues show that the parasite co-opts the host cell's microtubule network to lasso nutrient-rich lysosomes. The parasite wraps the lysosome in a protein called GRA7 before engulfing it. The role of the protein is not clear, but parasites engineered to lack it could not corral the lysosomes, leading to their death.

CHEMISTRY

No flop means less flip

J. Am. Chem. Soc. 128, 5332–5333 (2006)

Thanks to the violation of mirror symmetry, or parity, in processes involving the weak nuclear force, the two enantiomers of a chiral molecule — mirror-image molecules that cannot be superimposed — should have different vibrational energies. The difference is so tiny that it has never been detected, but Andrey Fokin of the Justus Liebig University in Giessen, Germany, and his co-workers are not ready to give up.

The researchers have made chiral molecules that they say are well suited to searching for the effect.The molecules have four different halogens at the corners of a carbon-cube (cubane) framework. The molecules' rigid framework would help to reduce noise in the measurement because, unlike the floppier molecules tested so far, the configuration is less likely to switch between enantiomers.

CELL BIOLOGY

The missing link

Cell 125, 327–341 (2006)

A missing link in a key biochemical signalling pathway has been identified. The Wnt pathway is one of a handful of cell-to-cell signalling systems that control embryonic development and maintain adult tissues. Defective Wnt signalling is linked to cancer.

Konrad Basler and his colleagues at the University of Zurich in Switzerland studied how β-catenin, a component of the Wnt pathway, transfers signals from a cell's membrane to its nucleus. They identified an unexpected link in the chain. They show that the protein parafibromin — previously identified as a tumour supressor in parathyroid glands — binds β-catenin as well as an RNA polymerase enzyme that transcribes genes.

Correction

A picture of a mouse blastocyst was incorrectly described as a one-cell embryo in 'Assume the position' (*Nature* 440, 973; 2006).

JOURNAL CLUB

Yoshinori Watanabe
University of Tokyo, Japan

A geneticist reveals an unexpected pattern of chromosome segregation.

Recent experiments have reshaped my ideas about how chromosomes behave in the two types of cell division — mitosis and meiosis.

Chromosomes in cells exist in pairs. Human cells have 23 pairs, for example. One chromosome in each pair is derived from dad, the other from mum. When the cell divides, these chromosomes are copied and then shared out between the daughter cells.

Mitosis produces identical daughter cells — with one copy of each 'mum' chromosome and one of each 'dad'. I had thought, wrongly as it turns out, that the way mum and dad chromosomes divide in mitosis was always independent of each other.

Sometimes, genetic material is shuffled between the mum and dad chromosomes in a pair. This process is known as recombination. Pentao Liu and his colleagues from the National Cancer Institute in Frederick, Maryland, showed that recombined chromosomes in mouse embryonic stem cells always segregated into different daughter cells (P. Liu *et al. Nature Genet.* 30, 66–72; 2002), whereas I had supposed it should be random.

A further blow to my preconceived notions came from Athanasios Armakolas and Amar Klar of the National Cancer Institute (A. Armakolas & A. Klar *Science* 311, 1146–1149; 2006). They found that the segregation pattern of recombined chromosomes changes as the stem cells differentiate into more specialized cells.

This hints to me how meiosis, which I study, evolved from mitosis. In meiosis, the chromosomes are divided so that one daughter cell gets both mum chromosomes, the other both dads. Recombination, which may take place even during the repair of an injured chromosome, seems to have an intrinsic ability to shift mitosis towards splitting mums and dads, the hallmark of meiosis.