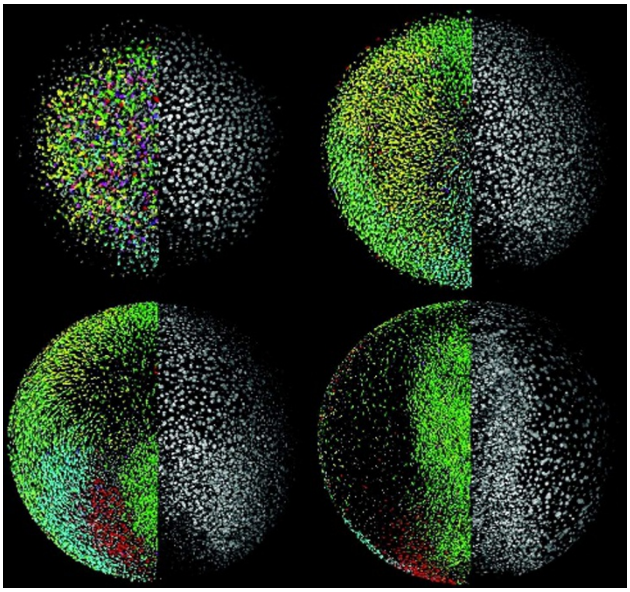
RESEARCH HIGHLIGHTS

SCIENCE

Zebrafish cell zipcodes



Science doi:10.1126/science.1162493 (2008)
A new type of fluorescent microscopy has allowed biologists to reconstruct the early development of the tropical freshwater zebrafish (*Danio rerio*), a model organism used in labs around the globe.

Philipp Keller, Joachim Wittbrodt and their colleagues developed digital scanned laser-light-sheet fluorescence microscopy at the European Molecular Biology Laboratory in Heidelberg, Germany. The technique involves labelling nuclear proteins at the one-cell stage, and moving an extremely thin laser beam vertically and horizontally through specimens, which is less harmful to them than conventional techniques and can thus be used to study cells over longer time periods.

Keller's team mapped the nuclear positions and movement of every single cell in normal and mutant zebrafish embryos during the embryos' first 24 hours (pictured). They then built a model of germ layer formation, and identified a maternally defined break in symmetry — the future body axis — as the cell ball grew.

CHEMISTRY

Prion progress

Angew. Chem. Int. Edn **47,** 8215–8219 (2008)
The details of how a non-pathogenic prion protein becomes the agent of Creutzfeld–Jakob disease are obscure, but they may hinge on an 'anchor' made of sugar and lipid by which the prion attaches to a cell membrane. This anchor has been manufactured in a laboratory by Peter Seeberger of the Swiss Federal Institute of Technology in Zurich, Christian Becker at the Max Planck Institute for Molecular Physiology and their colleagues.

The researchers started with a sugar molecule containing five subunits and a lipid chain of 18 carbon atoms. Adding the amino acid cysteine allowed the synthetic chemical to react with a sulphur-containing group called a thioester on the prion protein. An 'anchor' thus attached, the prion could stick to vesicle membranes.

MATERIALS SCIENCE

Iron option

Adv. Mater. doi:10.1002/adma.200801883 (2008)
In the world of data storage, smaller is undoubtedly better. The field of single-molecule data storage has so far focused on complexes containing 12 manganese atoms. These have many unpaired electrons, the 'spins' of which make the molecules magnetic. But they lose their strong magnetism when deposited on the surface of other materials.

Roberta Sessoli at the University of Florence in Italy and her colleagues have shown that a molecular cluster based on four iron ions is more robust. Using X-rays as a probe, the team found that a layer of these molecules retains its magnetic behaviour even when sitting atop other substances. The authors believe that further research into molecules like this one could pave the way to quantum computing.

NANOTECHNOLOGY

Leveraging antibiotics

Nature Nanotech. doi:10.1038/nnano.2008.275 (2008)
The antibiotic vancomycin kills bacteria by disrupting their cell walls. To study this process, Rachel McKendry of University College London and her colleagues have designed an array of tiny cantilevers coated with molecules similar to those found in bacterial cell walls.

When their arrays were exposed to vancomycin, the antibiotic bound to the cantilevers, altered their surface properties, and caused them to bend. Measuring the bend provided a sensitive assay for antibiotic binding. The researchers also used these data to calculate how surface stress caused by antibiotic binding percolates through membranes, eventually causing cells to burst. They hope that the new method will speed the search for weapons against antibiotic-resistant 'superbugs'.

CHEMISTRY

Sugar coated

J. Am. Chem. Soc. **130,** 13465–13470 (2008)
Metal wires one atom thick are ideal for exploring quantum effects in electronics and might one day supply ultrasensitive chemical sensors. But first they must be prevented from adsorbing molecules indiscriminately from their surroundings. Jean Christophe Lacroix and his co-workers at Paris Diderot University in France believe they have succeeded in doing this by giving atomic wires a protective 'jacket'.

Lacroix and his team grew copper wires that are one atom thick at the thinnest point. When they generated these wires in a solution of tubular cyclodextrin molecules, many of the wires showed little fluctuation in conductance compared with those generated in pure water. Moreover, the wires in solution were disrupted little by an organic salt that breaks wires in pure water.

Other tests imply, but have not yet proved, that the cyclodextrins are threaded around the wires (illustrated below).

CHEMICAL BIOLOGY

Double trouble

Nature Chem. Biol. doi:10.1038/nchembio.117 (2008)
'Promiscuous' chemicals that can inhibit two different classes of enzymes could aid in the design of new cancer therapies.

Kevan Shokat of the University of California, San Francisco, and his colleagues screened a library of substances, hunting for any that block both tyrosine kinases and phosphatidylinositol-3-OH kinases — enzymes that cancer drugs in development often target.

Two inhibitors fitted the bill. They belong to a category of chemicals called pyrazolopyrimidines and seem to work by

AM. CHEM. SOC.