

versions of the same molecular structure is usually produced, causing problems for the pharmaceutical industry, which requires drugs to be of one particular form.

Toshiro Harada and Yusuke Muramatsu of the Kyoto Institute of Technology reacted Grignard reagents with aldehydes in the presence of a titanium complex. This generated only one of the two possible versions of the product, in fewer steps than other methods.

NEUROSCIENCE

Toxic length

Neuron 57, 27–40 (2008)

Huntington's disease, an inherited neurodegenerative disorder, is caused by genes that encode an abnormally elongated version of the protein huntingtin. Work by Juan Botas of Baylor College of Medicine in Houston, Texas, and his colleagues challenges the prevailing view that this protein does its damage only after it has been cleaved by enzymes and imported into the nucleus.

Botas and his co-workers transferred the expanded gene that describes the abnormal protein in humans into fruitflies. They observed toxic effects on the flies' brain cells before they could detect the protein inside those cells' nuclei.

They then pinned down the neurotoxicity to increased neurotransmitter release triggered by unusually high concentrations of calcium ions in certain brain cells. Tinkering with other genes that regulate neurotransmitter and calcium dynamics suppressed some of the mutant protein's deleterious effects, they add.

MATERIALS SCIENCE

His dark materials

Nano Lett. doi: 10.1021/nl072369t (2008)

A 'super-black' material has been made by researchers at the Rensselaer Polytechnic Institute in Troy, New York. It reflects just 0.045% of all the light of a certain wavelength and is therefore the darkest synthetic

material ever, according to the group, led by Shawn-Yu Lin.

The substance is composed of row upon row of vertically aligned carbon nanotubes of different lengths, most of which have multiple walls. This arrangement gives the material a rough surface with no repeating topology, and causes it to scatter light in random directions, which is what makes it extremely black.

The material is also very dark across the rest of the visible spectrum, with a reflectance ranging from 0.045% to 0.07% as the wavelength changes from 633 nanometres (red) to 457 nanometres (blue). Such properties could prove useful in devices to capture solar energy.

PALAEOPHYSIOLOGY

T. rex teen pregnancies

Proc. Natl. Acad. Sci. USA 105, 582–587 (2008)

A new means of establishing sexual maturity in dinosaurs could finally settle the argument about whether they grew like big versions of modern lizards, or faster than such scaling would imply.

Andrew Lee, now at Ohio University in Athens, and Sarah Werning, of the University of California, Berkeley, have worked out the age by which two female dinosaurs had reached sexual maturity by looking at the specimens' medullary bones. Today, these short-lived tissues are found only in birds, where they provide calcium for developing egg shells, forming in the marrow cavities of females a few weeks before ovulation.

In 2005, another group reported medullary bones in a *Tyrannosaurus rex*, which was about 18 years old when it died. Lee and Werning's measurements of a *Tenontosaurus tilletti* (pictured right) and an *Allosaurus fragilis* (below) show that these species had reached maturity by 8 and 10 years of age, respectively. Had they grown like big lizards, these half-grown specimens would not have been fertile. The findings suggest that dinosaurs grew at rates more akin to today's birds and mammals than to reptiles.

JOURNAL CLUB

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An immunologist marvels at dendritic cells.

Dendritic cells ingest and process all manner of bacteria and viruses, and display the invaders' distinguishing structures so that other cells of the immune system 'know' what to 'look for'. No adaptive immune response can begin without them. For years I have been fascinated by the internal details of dendritic cells that enable them to handle this task.

One set of details concerns how these cells manage protein production and disposal, given that breaking down and presenting sections of foreign proteins are the cells' primary jobs. Last month, Hugues Lelouard and his colleagues at the University of the Mediterranean in Marseille, France, discovered that dendritic cells fine-tune the translation of messenger RNAs to proteins when they are activated by inflammatory stimuli (H. Lelouard *et al. J. Cell Biol.* 179, 1427–1439; 2007).

The authors' stimuli of choice were lipopolysaccharides, signature molecules that indicate the presence of certain bacteria. Dendritic cells exposed to them showed a close correlation between the extent to which translation became more efficient and the increased formation of lumpy bodies similar to aggresomes, which is a prelude to the destruction of proteins. The authors then elucidated the biochemical steps that lead to enhanced translation of certain mRNAs when a dendritic cell becomes activated.

I consider it likely that the mRNAs in question are not randomly distributed throughout a dendritic cell's cytoplasm. If this is so, these cells may contain a 'translational hotspot' of requisite proteins and enzymes around each pathogen-containing vesicle, required for the orderly handling of the newly ingested microbe. The result might be the creation of an intracellular solid-state 'device' specifically for the processing and presentation of that microbe's antigens.

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