EDITED BY KRISTEN MUELLER AND JAKE YESTON

ANTHROPOLOGY

Island Arrivals

One of the last major human expansions was the Polynesian colonization of the South Pacific Islands, extending from New Zealand to Hawaii in the north and several remote islands thousands of kilometers to the east. This colonization had a huge impact on the flora and fauna of the region. The timing and duration of this migration have been debated, and estimates and radiocarbon dates range over thousands of years. Wilmshurst *et al.* assessed more than 1400 radiocarbon dates from the various islands and grouped them on the basis of which materials were analyzed and how well they represented human occupation (for example, short-lived seeds in archaeological contexts versus marine shells, which carry additional uncertainties). Their grouping of the most reliable materials and ages implies that colonization proceeded in two short episodes, first in the Society Islands from 1025 to 1120 CE, then elsewhere to the east from 1190 to 1290 CE. These ages are later and briefer than many previous assessments for this expansion. — BH

Proc. Natl. Acad. Sci. U.S.A. 10.1073/pnas.1015876108 (2010).

CELL SIGNALING

Deadly Insulin Receptors

A new way of signaling has been detected for one of the most highly studied hormone receptors: the insulin and the related insulin-like growth factor receptors. These receptors, when activated by ligand binding, initiate signaling mechanisms that protect cells from apoptosis and favor cell survival. Thus Boucher *et al*. were surprised to find that in mouse brown adipose tissue cell lines, the loss of both receptors in the same cell actually made cells resistant to stimuli that normally promote apoptosis. Ligand deprivation of receptor-expressing cells, however, did not cause this effect. This suggests that the receptors, in the absence of hormone binding, are not "turned off" but rather appear to be producing a signal that is permissive for cell death. The receptors thus join a family known as "dependence receptors" because in their presence, a cell is addicted to the presence of growth factor in order to prevent the proapoptotic effect of the unliganded receptor. — LBR

Sci. Signal. **3**, ra87 (2010).

NEUROSCIENCE

Less Is More

In the vertebrate central nervous system, intercellular junctions (synapses) that form between neurons control the transmission of information associated with learning, memory, and behavior. Forging this network is a dynamic process, involving proteins at the synaptic cleft that function in the formation, maturation, and remodeling of these connections. Robbins *et al*. genetically engineered mice to overexpress or lack SynCAM1, a cell adhesion molecule that links synaptic neurons. Electron microscopy revealed a decrease in the number of excitatory synapses that formed in the forebrain of postnatal and adult SynCAM1-deficient mice as compared to normal mice. Conversely, an increase in excitatory synapses in the same region was observed in animals overexpressing SynCAM1. The surprise was that activity-dependent decreases in synaptic strength were impaired when SynCAM1 expression was increased, indicating a loss of this plasticity mechanism when there are more neuronal connections. Mice overexpressing SynCAM1 also performed poorly in spatial learning and memory tests. The authors propose that too much SynCAM1 may stabilize synapses to an extent that prevents the elimination of ineffective connections, a pruning process that supports synaptic plasticity. — LC

Neuron **68**, 894 (2010).

GENETICS

Separation in Hybridization

Hybridization between two plant species followed by a chromosomal doubling can lead to new species such as the allopolyploid species *Arabidopsis suecica*. Such hybridization requires genomic silencing and deletion because of functional redundancy among homoeologs (genes that encode proteins that perform similar functions among species). Using microarrays, Chang *et al.* determined the relative contribution of the parental strains to the transcriptome of *A. suecica*. They found that the retention of homoeologous genes that are translated into interacting pairs of proteins tended to belong to one parent or the other and that protein networks arising from genes originating in both of the hybrid parents were underrepresented. On the basis of these results, the authors surmise that the bias against genetically mixed complexes may contribute to a greater phenotypic diversity within the hybrid species and may explain the evolutionary success of polyploid species. — LMZ

Genome Biol. **11**, R125 (2010).

CREDITS (TOP TO BOTTOM): JIM ZUCKERMAN/CORBIS; CAROLINE JOSEFSSON AND LUCA COMAI

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MOLECULAR BIOLOGY

Un-ruley Translation

Several inherited neurodegenerative diseases are referred to as "triplet repeat disorders" because they are caused by the aberrant expansion of three consecutive nucleotides near or within specific disease genes. CAG and CTG repeats, for example, are found in certain forms of myotonic dystrophy, spinocerebellar ataxia, and Huntington's disease. Numerous hypotheses have been proposed to explain how these DNA repeats contribute to disease pathogenesis, including toxic or inhibitory interactions of the expanded encoded RNA or protein with the normal protein.

Adding further complexity to the issue is the new discovery that triplet repeat sequences do not always obey canonical rules of protein synthesis. Studying RNA constructs harboring expanded CAG and CTG repeats, Zu *et al*. found that the repeats were translated in all three reading frames, thereby generating aberrant proteins containing polyglutamine, polyalanine, or polyserine. Synthesis of these proteins occurred in the absence of an ATG start codon (normally a prerequisite for translational initiation), possibly because the repeats form hairpin structures that allow initiation to occur at suboptimal sites. These results suggest that such proteins may play a role in the pathogenesis of CAG and CTG expansion disorders and, in a more general sense, they raise the possibility that other repeat sequences in the genome once thought to be silent may in fact be translated into proteins. — PAK

Proc. Natl. Acad. Sci. U.S.A. 10.1073/pnas.1013343108 (2010).

CHEMISTRY

Supports for Mechanisms

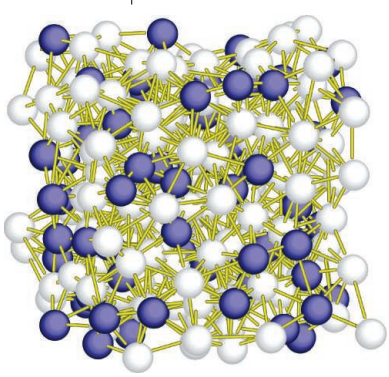
The mechanism of the low-temperature oxidation of CO by gold nanoclusters on oxide supports could depend on whether the oxide is a reducible metal, such as iron or titanium, or a nonreducible one, such as zinc. Carley *et al*. studied the oxidation of CO by gold nanoparticles supported on Fe_2O_3 and ZnO. The catalysts were exposed to a transient pulse of reactants (CO and O_2) in an argon carrier at room temperature. When the catalysts were predosed with ^{18}O-labeled water to form labeled surface hydroxyl groups, the initial CO_2 product that formed on the zinc oxide support carried all three possible isotope distributions, but on iron oxide support, the initial CO_2 product was fully ^{18}O-labeled. These results are consistent with the formation of a nondissociative bicarbonate intermediate on the zinc oxide support, contrasting with a CO dissociation mechanism on iron oxide, where the adsorbed carbon reacts with surface hydroxyls. This dissociative mechanism is supported by x-ray photoelectron spectra, which showed the formation of adsorbed carbon after exposure to CO and O_2 (but not CO alone). Density functional theory calculations show that oxidation of the gold atoms at the edge of the adsorbed clusters, along with the formation of surface bonds, can compensate for the high energy input needed to cleave CO and O_2. — PDS

Phys. Chem. Chem. Phys. **13**, 10.1039/c0cp01852j (2011).

MATERIALS SCIENCE

Order of a Sort

In amorphous solids and liquids, there is no long-range translational or rotational ordering of the atoms, whereas in crystalline materials, the positions of all the atoms can be ascertained by symmetry from knowing the positions of only a few of them. In between these extremes are glassy materials, which have short- and medium-range order that spans from nearest neighbors to about 100 nm. The nature of this ordering has been a mystery and is very hard to probe experimentally, because any interference peaks that might be generated from a small volume are smeared out under normal diffraction conditions. Hirata *et al.* studied the structure of a $Zr_{2/3}Ni_{1/3}$ metallic glass using nanobeam electron diffraction combined with ab initio molecular dynamics simulations. The electron beam could be tuned in size down to a minimum diameter approaching 0.3 nm. At a diameter of 0.72 nm, the authors were able to see distinct diffraction spots; these took on a twofold symmetry similar to that of a crystal when probed with a 0.36-nm-diameter beam. Voronoi polyhedra were used to design a local atomic environment from which the authors were able to compare their diffraction data with simulations, including the case of a pair of clusters that shared a common face. The overlapping of these data appears to confirm the recently proposed cluster model for the description of short- and medium-range order in a metallic glass. — MSL



CREDIT: HIRATA *ET AL., NAT. MATER.* **10**, 28 (2011)

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Deadly Insulin Receptors

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