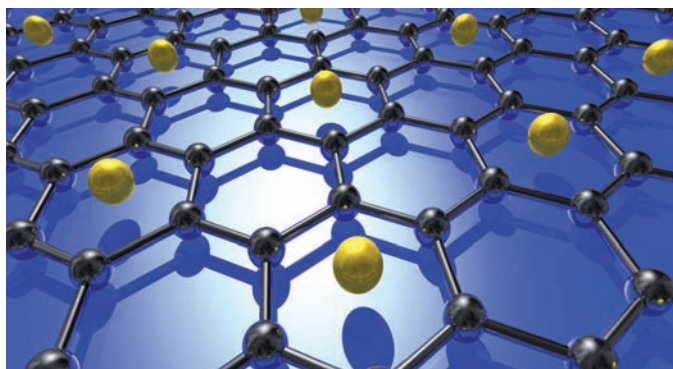




In This Issue

Superconductivity in monolayer graphene

Graphene, a one-atom thick nanomaterial derived from graphite, exhibits a combination of remarkable mechanical, optical, and electronic properties. However, researchers have been thus far unable to induce superconductivity in graphene, despite well-documented examples of the property in certain graphite compounds. Bart Ludbrook et al. (pp. 11795–11799) demonstrate that attaching a layer of lithium (Li) atoms to monolayer graphene



Monolayer graphene decorated with lithium atoms.

allows the material to achieve a stable, superconductive state at low temperatures. To apply Li through a process called decorating, the authors prepared the samples at 8 K in ultrahigh vacuum, guiding and verifying the process using high-resolution angle-resolved photoemission spectroscopy (ARPES). According to the authors, the Li atoms improve coupling between electrons and key vibrational states of the carbon atom lattice known as phonons, thus enhancing the quantum electron pairing that is ultimately responsible for superconductivity. Furthermore, the authors present ARPES measurements of a likely superconducting gap that suggests Li-decorated monolayer graphene shifts to a superconducting state at about 5.9 K. — T.J.

Human prion causes multiple system atrophy

Proteins that become self-propagating after adopting alternative shapes, prions are known to cause neurodegenerative diseases such as Creutzfeldt-Jakob disease. Stanley Prusiner et al. (pp. E5308–E5317) report the discovery of a human prion that causes multiple system atrophy (MSA), a progressive neurodegenerative disease. A distinguishing feature of MSA is the formation of cytoplasmic inclusions by the protein α -synuclein, and the newly discovered prion was found to be composed of this protein. The authors found that inoculating mice or cells genetically engineered to express human α -synuclein with brain extracts from 14 people who had died of MSA resulted in MSA transmission to both

cells and mice. Nearly all the mice developed progressive neurological disease within about 120 days, accompanied by deposition of α -synuclein within neurons. In addition, brain extracts from the mice infected with MSA were also infectious to genetically engineered mice and cell cultures. In contrast, brain samples from six patients with Parkinson's disease (PD) were unable to transmit prions to the mice or cells, suggesting that any putative α -synuclein prions that may be involved in PD are different from those causing MSA. The authors conclude that MSA is a transmissible neurodegenerative disease caused by α -synuclein prions, suggesting that α -synuclein is the first new prion to be discovered in the last 50 years. — S.R.

Ancient DNA links Basques to early farmers

Compared with the richness of information regarding the Neolithic transition in other parts of Europe, little is known about this period of human history in Iberia. Torsten Günther et al. (pp. 11917–11922) examined ancient genomic DNA extracted from the remains of eight Chalcolithic humans in the El Portalón cave at the Sierra de Atapuerca, Spain, and found insight into the origin of modern Basques. The authors sequenced DNA extracted from bones and teeth that were determined through radiocarbon dating to be 3,500–5,500 years old, a period after the human transition to farming. The authors compared the genomes with those of ancient Europeans from other regions as well as with those of modern-day Europeans. The results suggest that the Iberian farmers, like other early European farmers, may have emerged from a common ancestral group, as migrating farming populations intermixed with local hunter-gatherer groups. Next, the authors used population genetics methods to infer the relationship between early Iberian farmers and modern-day Europeans. According to the authors, the results challenge the assumption that Basques are continuous descendants



Burial of 6-year-old boy "Matojo" is rich with grave goods.

