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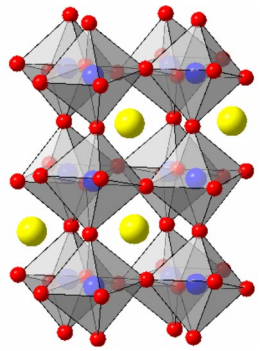
In This Issue

GEOLOGY

Earth's mantle oxides

Changqing Jin *et al.* have synthesized a new form of perovskite, which should allow more accurate modeling of the components of the earth's mantle. The authors created the cubic perovskite $BaRuO_3$ at a pressure of 18 GPa and temperature of 1000°C, which represents conditions similar to the boundary between Earth's upper and lower mantles. $BaRuO_3$ can be used to study the evolution of magnetism in $ARuO_3$ ruthenate compounds based on the size of the A-site atom (calcium, strontium, or barium) that corresponds to severely compressed, slightly compressed, and stretched perovskite structures.



Schematic of strontium perovskite.

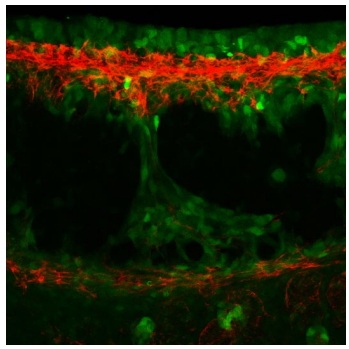
The oxide remains metallic to 4 K and has a ferromagnetic transition at 60 K, which is much lower than the critical temperature of the related oxide, $SrRuO_3$. When the authors examined how the critical temperature for perovskites varies based on the ionic size of the central atom, they found that the temperature does not increase as the cubic structure is approached, but has a maximum for orthorhombic $SrRuO_3$. Jin *et al.* say that two phenomena control the critical temperature: dilution of the ferromagnetic bond with the nonferromagnetic bonds on the smaller A side, and bandwidth-broadening due to electron orbit interactions on the larger A side. — P.D.

"High-pressure synthesis of the cubic perovskite $BaRuO_3$ and evolution of ferromagnetism in $ARuO_3$ (A = Ca, Sr, Ba) ruthenates" by C.-Q. Jin, J.-S. Zhou, J. B. Goodenough, Q. Q. Liu, J. G. Zhao, L. X. Yang, Y. Yu, R. C. Yu, T. Katsura, A. Shatskiy, and E. Ito (see pages 7115–7119)

DEVELOPMENTAL BIOLOGY

Gonad development close up

Mammalian gonads develop from the mesonephros, a transient embryonic kidney tissue. Male and female gonads appear identical up to 11.5 days postcoitum, when vascularization in the male gonad accelerates and the organ segregates 10 domains, each of which organizes into a testis cord. Whether the new blood vessels develop from branching of the preexisting network or are built from scratch has been an open question. Douglas Coveney *et al.* report studies from a whole-organ, live-cell imaging system. In male gonads only, the mesonephric vessels break down, and individual endothelial cells migrate into the gonad to generate new vasculature. The authors employed time-lapse imaging of transgenic GFP-labeled endothelial cells in explanted embryonic gonad tissue and observed that, in female tissue, endothelial cells are motile but do not move in a concerted manner. In male tissue, however, endothelial cells stream across from the disintegrating mesonephros to the coelomic domain, where a new microvascular network assembles. On the basis of higher magnification images, the authors say that endothelial cell migration, which results in the segregation of the testis cord domains, is likely directed by chemical cues. — K.M.



Blood vessel development in the male gonad.

"Four-dimensional analysis of vascularization during primary development of an organ, the gonad" by Douglas Coveney, Jonah Cool, Tim Oliver, and Blanche Capel (see pages 7212–7217)

EVOLUTION

Has ''intron sliding'' been overlooked?

Because the arrival of a new intron—a noncoding section of DNA—in the middle of a gene is likely to render that gene nonfunctional, the evolutionary origin of new introns is a topic of great interest. In some species, new introns apparently continue to be generated, but genomic searches have failed to find their sources. Rosa Tarrío *et al.*, in a review of the field, conclude that the phenomenon of "intron sliding" has generally

been underestimated. In intron sliding, an intron gradually shifts its position along the genome, rather than jumping wholesale by transposition. The authors note that many methods for identifying new introns by comparing distantly related species overlook incidences of introns that differ by only a small number of base pairs. What these methods do not take into consideration, Tarrío *et al.* suggest, is the evolutionary role played by alternative splicing. "Weak" splice sites can appear by mutation in genomic DNA and remain largely immune to negative selection. These sites can, over evolutionary time, become "strong," if the change in the gene is not too extreme, and the intron will have effectively shifted. Comparison of closely related species is likely to reveal intron sliding in action, the authors say. — K.M.

"Alternative splicing: A missing piece in the puzzle of intron gain" by Rosa Tarrío, Francisco J. Ayala, and Francisco Rodríguez-Trelles (see pages 7223–7228)

MEDICAL SCIENCES

SNP in microRNA raises risk of papillary thyroid carcinoma

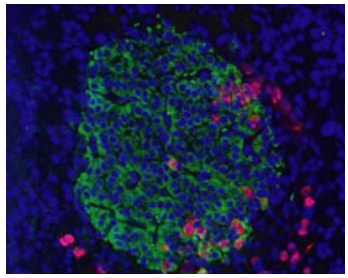
Papillary thyroid carcinoma (PTC) is the most common form of thyroid cancer, accounting for 80% of cases in the United States. Although the disease has a strong genetic component—first-degree relatives have a 3- to 8-fold increased risk of developing the disease—a genetic factor that predisposes to PTC has not been found. Krystian Jazdzewski *et al.* speculated that microRNAs, which influence gene expression, might be involved because previous research had shown that levels of *miR-146a* are 19-fold higher in PTC tissues. The authors sequenced the region flanking *miR-146a* and discovered a common G/C polymorphism. In cell culture, the lower levels of *miR-146a* failed to inhibit genes in Toll-like receptor and cytokine signaling pathways, which promote tumor formation. Jazdzewski *et al*. genotyped PTC patients and controls and found that individuals who had one copy of the C allele and one of the G allele were at higher risk for PTC. The authors say that this is the first example of a genetic predisposition to PTC. — B.T.

"Common SNP in pre-miR-146a *decreases mature miR expression and predisposes to papillary thyroid carcinoma" by Krystian Jazdzewski, Elizabeth L. Murray, Kaarle Franssila, Barbara Jarzab, Daniel R. Schoenberg, and Albert de la Chapelle* (see pages 7269–7274)

MEDICAL SCIENCES

Fighting adenovirus infection

Adenoviruses can cause a wide array of diseases, ranging from tonsillitis to pneumonia, and can lead to deadly infections in severely immunocompromised patients. Unfortunately, no antiviral drugs are available to treat these infections. Karoly Toth *et al.* developed a new animal model for studying adenovirus infection and found a drug that appears to combat such infection. Adenoviruses are species-specific, so studying the human viruses in an animal model is difficult and limited. Seeking to develop a model that mimics the immunocompromised patient, the authors treated Syrian hamsters with an immunosuppressive drug and exposed the animals to a human adenovirus strain. Their analysis showed that the virus replicated successfully in multiple organs, most abundantly in the liver, and the hamsters developed an illness similar to that seen in humans. The authors found that CMX001 successfully repressed adenovirus replication, as evidenced by decreased mortality in the hamsters, even if the drug was not administered until 2 days after infection. They suggest that CMX001 merits clinical investigation because no U.S. Food and Drug Administration-approved drugs currently exist to treat adenovirus infection. — T.H.D.



Ad5-positive fiber cells (red) colocalized with insulin (green) in pancreatic islets.

"Hexadecyloxypropyl-cidofovir, CMX001, prevents adenovirus-induced mortality in a permissive, immunosuppressed animal model" by Karoly Toth, Jacqueline F. Spencer, Debanjan Dhar, John E. Sagartz, R. Mark L. Buller, George R. Painter, and William S. M. Wold (see pages 7293–7297)