METHODS IN BRIEF

IMAGING

Raman imaging in 3D cultures

Raman spectroscopy-based imaging is a label-free approach that provides rich chemical information on imaged samples. Recent innovations in this area have included 3D confocal Raman imaging, which has improved the volumetric imaging capabilities of this technique. However, identifying and quantifying biomolecules in these 3D images remains challenging. Kallepitis *et al*. addressed this challenge by developing quantitative volumetric Raman imaging (qVRI). qVRI is a computational framework that handles hyperspectral data sets from volumetric confocal Raman imaging, allows the relative abundances of different biomolecules to be determined within each voxel of an image and enables 3D visualization and quantification. The researchers used qVRI to study cells such as pluripotent stem cells, cardiomyocytes, monocytes and macrophages grown in 2D and 3D culture, giving views of these cells with impressive biomolecular specificity.

Kallepitis, C. *et al*. *Nat. Commun*. **8**, 14843 (2017).

GENOMICS

Human lncRNA atlas

Long noncoding RNAs (lncRNAs) are abundant throughout the genome, but they are largely functionally undefined. For some lncRNAs it is not so much the actual transcript but the act of transcription that exerts regulatory function, for example, by recruiting nucleosome remodeling factors. Thus it is as important to define sequence features and evolutionary constraints at lncRNA loci as it is to sequence the lncRNA transcripts themselves. Hon *et al*. used the almost 28,000 human lncRNA genes with defined 5′ ends—as characterized by the FANTOM5 project—together with expression profiles to elucidate diversity, conservation and association of lncRNA genes with known regulatory regions or disease traits. Their lncRNA atlas contains over 19,000 human lncRNAs and their potential functions, and it provides a rich resource for researchers who wish to prioritize certain lncRNAs for further studies.

Hon, C. *et al*. *Nature* **543**, 199–204 (2017).

NANOBIOTECHNOLOGY

Measuring single-molecule charges

The electrostatic properties of biological molecules are functionally important, but the direct and precise measurement of molecular charge has remained a challenge. Ruggeri *et al*. describe single-molecule electrometry, a method to measure the electrical charges of single macromolecules, including proteins and nucleic acids. In this approach, a charged molecule labeled with two fluorescent dyes is electrostatically trapped in solution. The time it takes for the molecule to escape the trap is measured by fluorescence microscopy, and it is used to calculate the molecule's effective electrical charge. The authors demonstrate the application of electrometry for detecting single amino acid substitutions and chemical modifications, and they note that it could be employed more generally to probe the structure and interactions of single biomolecules.

Ruggeri, F. *et al*. *Nat. Nanotechnol*. http://dx.doi.org/10.1038/nnano.2017.26 (2017).

SYNTHETHIC BIOLOGY

A fully designed yeast genome

The project to modify and synthesize the entire genome of *Saccharomyces cerevisiae*, known as Sc2.0, is a global collaboration with labs in different countries assigned to the synthesis, assembly and debugging of the sixteen chromosomes of *S. cerevisae*. Richardson *et al*. now report the completion of the design of the entire genome, including the removal of repetitive DNA, the introduction of loxP sites to allow scrambling of loci, and the introduction of rare restriction sites to facilitate the swapping-in of segments. To date, over a third of Sc2.0 chromosomes have been built in discreet strains, and the consortium is working on combining them into a single strain. Sc2.0 will not only answer questions about chromosome structure and function, but it will also be the basis for new designs.

Richardson, S.M. *et al*. *Science* **355**, 1040–1044 (2017).