PALEOBIOGEOGRAPHY

## Dating the history of a biotic connection

The closure of the Panama isthmus enabled the dispersal of terrestrial organisms between South and Central America and prevented the dispersal of marine creatures between the Caribbean and Pacific oceans. This Great American Biotic Interchange is generally held to have begun about 3.5 million years ago. Bacon *et al.* analyze fossil and molecular sequencing data that indicate some significant and much earlier dispersal events for terrestrial organisms and separation events for marine organisms, at 6 to 7 and 23 to 24 million years ago. Together with recent geological evidence for earlier land emergence, these results suggest a more complex history for the biogeographic events shaping the biota of the Americas. — AMS

*Proc. Natl Acad. Sci. U.S.A.* 10.1073/pnas.1423853112 (2015).

The land bridge connecting South and Central America may have formed millions of years earlier than thought

was statistically significant, suggesting that PLTL workshops almost entirely closed the achievement gap for students without access to a lab. Although successful, the authors caution against using PLTL workshops as a replacement for laboratory experience. — MM

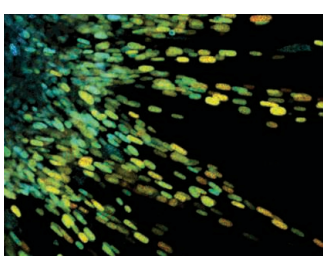
*CBE Life Sci. Educ.* **14**:ar2 (2015).

CANCER BIOLOGY

## Creating a safe haven for tumor cells

Melanomas with certain mutations often respond dramatically to drugs inhibiting a protein kinase called BRAF. This is because BRAF is part of a signaling pathway that, when mutationally activated, drives melanoma growth. Unfortunately, the response is often short-lived because tumor cells develop resistance to the drugs. Hirata *et al.* make the surprising observation that melanoma cells do not acquire resistance to BRAF inhibition on their own but rather receive help from neighboring fibroblasts. BRAF inhibitors cause fibroblasts to remodel the extracellular matrix. Signals from the remodeled matrix then reactivate the growth signaling pathway in the melanoma cells. Thus, the tumor microenvironment can provide a safe haven for tumor cells that allows them to tolerate certain drugs. — PAK

*Cancer Cell* **27**, 574 (2015).



Neighboring fibroblasts help cancer cells tolerate certain drugs

CHEMISTRY

## Water helpful but not needed to fold DNA

DNA has found a range of applications in chemistry and materials science, from acting as a link that connects other materials to forming complex structures. DNA structures are formed in water and cannot be transferred to organic solvents without a loss of order or change in helical structure. Gállego *et al.* show that a deep eutectic solvent composed of a 4:1 mixture of glycerol and choline chloride enables DNA assembly under room-temperature conditions. When water was added to the mix to lower the viscosity, the assembly time was reduced from 6 days to 20 min, thus providing a method for kinetic control of the assembled structures. — MSL

*Angew. Chem. Int. Ed.* 10.1002/anie.201412354 (2015).

SYSTEMS BIOLOGY

## Signaling at the heart of blood pressure regulation

Genetic variants, detected in large genome-wide association studies (GWASs) of blood pressure regulation in humans, account for only about 1% of the variability observed between individuals. Thus, better understanding of complex regulatory networks is necessary to find causal events and potential therapeutic targets. Huan *et al.* used integrative analysis that included transcriptional profiling and coexpression network analysis, GWASs, and molecular network modeling to tease out "key driver" genes that are central to regulatory modules that control blood pressure. One of these was SH2B3, a cell signaling adaptor protein previously detected in GWAS studies. The analysis further suggested that SH2B3 may function by altering inflammatory responses and T cell functions. — LBR

*Mol. Syst. Biol.* 10.15252/msb.20145399 (2015).

MEMBRANE SCIENCE

## Probing antifouling by graphene oxide

Graphene oxide (GO) surfaces have antibacterial properties, but they are not due to any known specific physical interactions with cells. Because GO is toxic to bacteria, it has been proposed as an antifouling material for membranes during water purification. To test the hypothesis that GO physically disrupts or binds to cells, Romero-Vargas Castrillón *et al.* measured the physical interactions between GO-coated atomic force microscope probes and *Escherichia coli* cells. Other than occasional lipopolysaccharide binding events, the forces of interaction are mostly repulsive. Other modes of action, such as oxidative stress, therefore are likely to be responsible for GO toxicity. — NW

*Environ. Sci. Technol. Lett.* 10.1021/acs.estlett.5b00066 (2015).