



ECOLOGY

Unlocking the Secrets of a Lost World

The ancient sandstone table mountains, or tepuis, of the tropical South American Guayana Shield are legendary “lost worlds” renowned for their inaccessibility, mystery, and isolation. Rising hundreds of meters vertically from the surrounding savannas and forests, the summits of individual tepuis are known to harbor high percentages of endemic species of plants and animals that have evolved in isolation over millions of years. Or do they? Kok *et al.* helicoptered onto the summits of 17 tepuis to take tissue samples from amphibian species for genetic analysis. Phylogenetic analysis of mitochondrial gene fragments indicated surprisingly close affinities between many of the taxa on separate peaks, indicating that the barriers to gene flow may have been less complete than hitherto thought. The genetic data suggest that dispersal between summits may have been taking place through the Pleistocene and into the Holocene, so that substantial elements of the fauna may be less than 1 million years old—far less than the forbidding nature of the tepuis would seem to predict. — AMS

Curr. Biol. **22**, R589 (2012).

CHEMISTRY

Sugar Placement

Chemical bonds vibrate at frequencies that depend on the masses of the linked atoms. Because bond scission and formation are essentially extreme sorts of vibration, their rates also vary when the atom masses change, giving rise to kinetic isotope effects that offer insight into the order and extent of bond rearrangements underlying a reaction. The easiest, and thus most common, effects to study involve deuterium/hydrogen substitutions, given the factor of 2 mass difference. The 13/12 mass ratio of stable carbon isotopes induces a smaller rate distinction that is nonetheless discernible—even at the low natural abundance of ^{13}C —using current nuclear magnetic resonance (NMR) technology. Huang *et*

al. applied this technique to elucidate the precise mechanistic details of substitution reactions at the anomeric carbon of simple sugars, which bear on the selectivity attainable in the generating particular oligosaccharides for targeted biological studies. Specifically, they examined rate distinctions for ^{12}C versus ^{13}C centers in the displacement of trifluoromethanesulfonate by isopropanol to form the α and anomers of manno- and glucopyranoside. For three of the four reactions, comparison of the NMR data to theoretical simulations supported a loosely associative mechanism, with the bond-cleaving and α -forming events perhaps just shy of simultaneous. The β -mannopyranoside was unusual in appearing to form through initial bond scission before isopropanol binding. — JSY

Nat. Chem. **4**, 663 (2012).

EDUCATION

Making Use of Misconceptions

Ironically, educators themselves hold misconceptions on how best to deal with their students' preexisting ideas. Instead of categorizing misconceptions as mistakes needing to be managed, is it possible to use them as a resource for learning? Larkin surveyed 14 preservice science teachers in different teacher preparation programs and found that their views on student misconceptions fell into five general categories: evidence of content coverage, obstacles to understanding, tools to encourage thinking, elements of a positive classroom environment, and the raw material of learning. Over the course of learning to teach, preservice teachers adjusted their view of student misconceptions, and most grew to recognize the teaching potential of misconceptions. These results suggest that teacher educators should encourage preservice teachers to incorporate misconceptions into their teaching as learning platforms to build on, instead of obstacles to learning. — MM

Sci. Educ. **96**, 927 (2012).

PLANT SCIENCES

How Bananas Weather a Drought

Agriculture is a thirsty business. Despite being grown in the humid tropics, bananas (genus *Musa*) are susceptible to even mild drought and



can require irrigation. A few strains dominate commercial banana production, but much greater banana biodiversity is represented in the Musa International Germplasm collection. Analyzing the genetics driving drought resistance in bananas is challenging, however, because of their growth requirements. To overcome this, Vanhove *et al.* analyzed *in vitro* banana plantlet growth rates in response to mild osmotic stress. The results