FOREST ECOLOGY

The perils of pests

Introduced and invasive insects can cause extensive damage to native forests, either by direct consumption or as vectors of pathogens. Fei *et al.* quantified the effects of non-native pests, such as the emerald ash borer, Dutch elm disease, and chestnut blight in forests of the United States. They found that the 15 most damaging pests (of 83 recognized non-native pests) cause an estimated annual loss of 5.5 teragrams of carbon through tree death. Overall, the authors estimated that more than 40% of the live forest biomass in the United States is at risk from these invasions. Thus, efforts to combat non-native pests (including the prevention of future invasions) will have benefits in terms of reducing carbon losses. —AMS

Proc. Natl. Acad. Sci. U.S.A. **116**, 17371 (2019).

The emerald ash borer (*Agrilus planipennis*) is a small, invasive bark-boring insect that causes ash trees (*Fraxinus excelsior*) to die within 2 to 3 years of infestation.

SCIENCE WRITING

To boldly claim

The data should speak for themselves, but writers want a broad swathe of readers to appreciate the significance of the signal they interpret in complex, noisy data, whereas editors want authors to be both concise and to acknowledge the limitations of the data. Analyzing more than 1000 psychology papers, DeJesus *et al.* found that student readers were most influenced by the amount of generic language used in research summaries. However, phrases like "juvenile male offenders are deficient in emotion processing" tell us nothing about sample size, variations in ethnicity, reason for incarceration, educational achievement, and so on. The risk is that generic language glosses over exceptions to a general rule and distracts from the limitations of the data. Unrepresentative claims can become magnified through the lenses of press releases, reportage and, not least, by editorial summaries like this, in high-profile journals. The consequences may cause harm. —CA

Proc. Natl. Acad. Sci. U.S.A. **116**, 18370 (2019).

CATALYST DESIGN

Experimental oxygen redox energetics

Electrochemical conversion involving water and oxygen molecules is one of the most important directions for future clean and renewable energy production and storage. However, existing technologies require improvement of oxygen evolution and reduction kinetics and stability of catalysts. Theoretical design of heterogeneous catalysts for oxygen electrocatalysis usually is based on first-principles analysis of elementary steps in oxygen surface redox on well-defined catalytic surfaces. Tao *et al.* propose an alternative methodology to extract the energetics of surface oxygen redox from kinetic modeling of electrochemical experimental data, which provides mechanistic understanding of oxygen electrocatalysis under real working conditions. The authors also provide an example of how the proposed methodology can be used to predict optimized oxygen reduction reaction activity with manganese oxides. —YS

J. Am. Chem. Soc. **141**, 13803 (2019).

ECONOMICS

Modeling trade to discover lost cities

The locations and characteristics of ancient cities are often disputed. Barjamovic *et al.* developed a comprehensive dataset of trading routes among cities in the Bronze Age originally recorded by Assyrian merchants. They then used the data to build a model that captures the locations and trade flows among those cities, which can be extrapolated to provide probable locations of undiscovered cities. In some cases, the model corroborates qualitative hypotheses by historians, while in others, the model supports one hypothesis over another. They are also able to model the likely size, density, and network importance of these cities. These results have implications for our understanding of ancient trade and how cities have changed over time. —TSR

Q. J. Econ. **134**, 1455 (2019).

GEOPHYSICS

A mineral solution for LLSVPs

The deepest regions of Earth's rocky mantle have poorly understood areas with suspiciously low seismic velocities called large low-shear-velocity provinces (LLSVPs). Thomson *et al.* suggest that the abundant but often neglected mantle mineral calcium silicate perovskite might have much lower shear-wave velocity when it holds a bit of titanium in the structure than previously believed. Adding this new velocity to a mineralogical model of recycled ocean crust makes the crust a candidate to explain the low velocities of the LLSVPs. —BG

Nature **572**, 643 (2019).