



ECOLOGY

Be Honest

Sexual signals, such as plumage color, are thought to reflect an individual's condition and thus to be a relatively honest indicator of quality to those seeking a mate. The condition of individuals, however, can change over time, leaving one to wonder if such traits only provide honest information about condition at a specific point in the past. Vitousek *et al.* tested whether signals themselves may influence an individual's condition and thus provide a more accurate indicator of current quality. Specifically, they experimentally darkened the underside of female North American barn swallows and measured indicators of physiological state, such as reactive oxidative metabolites and circulating testosterone. Manipulated birds had consistently lower levels than controls. Naturally darker birds have greater resistance to oxidative stress and reproductively dominate lighter birds. The authors suggest that darkening the birds led to altered social interactions, including fewer challenges and greater mating success. Further, they suggest that the reduced stress experienced by darkened birds left them in better condition, one more reflective of the high-quality trait they displayed. These results suggest that feedback between a signal, its bearer, and recipients may help keep both the signal, and the signaler, honest. — SNV

Biol. Lett. 9, 10.1098/rsbl.2013.0539 (2013).

GEOPHYSICS

Reconstructing Plate Tectonics

The modern-day distribution of Earth's tectonic plates is just a snapshot of an ever-changing process. Reconstructions of previous plate arrangements have resulted in the identification of the ancient supercontinents Pangea and Rodinia, but does this cycle follow any sort of predictable law or pattern? Morra *et al.* statistically analyzed the organization of large and small plates across Earth's surface over the past 200 million years, based on models of plate reconstructions. Small plates do not show much statistical variation in their distribution over time, because they are largely unstable and form from unrelated events. Large plates, however, tend to organize either into heterogeneous or homogenous states based on plate size distributions over ~100-million-year time scales. The rapid rate at which heterogeneous distribution states are stabilized suggests that these may be excited states, whereas homogeneous distribution states tend more toward equilibrium. In this case, the underlying driving force for the transition from one state to another depends on cycling between top-down and bottom-up mantle convection as a control on plate motion. — NW

Earth Planet. Sci. Lett. 373, 93 (2013).

ENVIRONMENTAL SCIENCE

Historic Hg Legacy

Industrial operations such as metal smelters and coal-burning power plants release mercury (Hg) into the atmosphere, where it can remain for up

to 2 years before it is deposited. Recent efforts to regulate these emissions have led to the Minamata Convention, an international treaty due to be signed in October 2013, which aims to address the toxic effects of mercury in the environment. Yet many aspects of the emission and dispersal of mercury remain unclear. Eckley *et al.* have undertaken a detailed study of local



ground-level air mercury concentrations near the Flin Flon, Manitoba, copper smelter. Until its closure in 2010, this was Canada's largest point source of mercury emissions. The closure provided the opportunity to study atmospheric mercury concentrations before and after the shutdown of a large point source. Although atmospheric mercury concentrations fell after

the closure, they remained higher than at other Canadian monitoring stations, both in the atmosphere and in precipitation. Surface-to-air flux from local polluted soils is thus the most likely source of the elevated atmospheric mercury concentrations after closure. — JFU

Environ. Sci. Technol. 10.1021/es401352n (2013).

DEVELOPMENT

Growing Pains

Humans, unlike most other mammalian species, have an extended slow childhood growth period between the relatively rapid growth stages of infancy and puberty. Examining gene transcripts in lymphoid tissue in humans spanning infancy, childhood, puberty, and adulthood, Stevens *et al.* identified gene expression networks of age, of which a subset were growth-specific, and related them to a human protein and genetic interaction networks. The highest levels of predicted gene interactions were in infancy, showing decreasing connectivity with increasing age. Examination of different age-associated networks identified conserved pathways related to growth, which were also identified in the transcriptomes of other tissues. Furthermore, interactions between genes and glucocorticoid receptor-mediated transcription implicated age/stage-specific networks. Of the genes with age-specific expression, several had previously been identified as associated with height and, surprisingly, diabetes. This study suggests that gene interaction networks change, and are rewired, in a predictable manner throughout human development and growth. — LMZ

BMC Genom. 14, 10.1186/1471-2164-14-547 (2013).