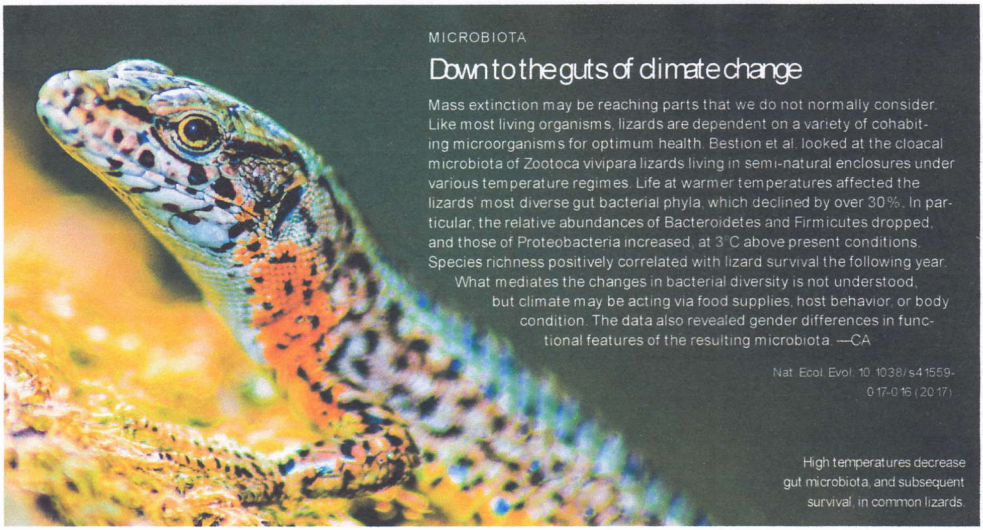


MICROBIOTA

Down to the guts of climate change

Mass extinction may be reaching parts that we do not normally consider. Like most living organisms, lizards are dependent on a variety of cohabiting microorganisms for optimum health. Bestion et al. looked at the cloacal microbiota of Zootoca vivipara lizards living in semi-natural enclosures under various temperature regimes. Life at warmer temperatures affected the lizards' most diverse gut bacterial phyla, which declined by over 30%. In particular, the relative abundances of Bacteroidetes and Firmicutes dropped, and those of Proteobacteria increased, at 3°C above present conditions. Species richness positively correlated with lizard survival the following year. What mediates the changes in bacterial diversity is not understood, but climate may be acting via food supplies, host behavior, or body condition. The data also revealed gender differences in functional features of the resulting microbiota. —CA

Nat. Ecol. Evol. 10.1038/s41559-017-0166 (2017)

High temperatures decrease gut microbiota, and subsequent survival, in common lizards.

EDUCATION

A learning environment designed for experts

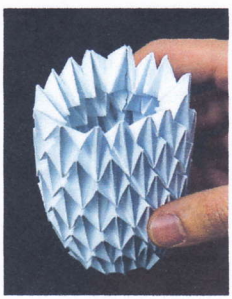
Expert-like thinking is a difficult skill to measure. SLEED-Q, an instrument developed by Elvira et al., aims to evaluate expert-like thinking by measuring the extent to which educators create a supportive learning environment for expertise development. To develop SLEED-Q, the authors conducted a literature review of instructional practices that promote the development of professional expertise. Sixty-five relevant practices were identified, further clustered into 10 main principles, and finally reflected in 10 scales. Ultimately, SLEED-Q was shown to assess seven factors, including epistemological understanding, teaching for understanding, and supporting learning for understanding. SLEED-Q provides a quantitative approach for examining learning environments and begins a dialogue about how to create an environment that is conducive to developing professional expertise. MM

Learning Environ. Res. 10.1007/s10984-015-9197-y (2016)

ROBOTICS

Wheels do more than go round and round

Travel on stepped, bumpy, or rocky terrain can require oversized wheels and independent power delivery to each wheel, which can necessitate a larger vehicle. Lee et al. turned to ideas from origami to design a variable-diameter wheel. By using a folded, patterned sheet, they avoided the need for complex assembly or a large number of parts. The wheels are a combination of a stiff polymer film glued to a flexible mesh, so that the difference in stiffness controls the shape change. The wheel can double in diameter, with a corresponding reduction in thickness that allows a two-wheeled robot to climb steps, pass under a low ledge, and go through narrow gaps. MSL



A variable-diameter origami wheel in prolate spheroid conf guration

Soft Robot. 10.1089/soro.2016.0038 (2017)

CANCER THERAPY

Old cancer drugs with a modern mechanism

Some cancer drugs are rationally designed on the basis of their known interaction with specific target molecules that drive tumorigenesis. Others are mechanistically poorly understood but are developed because they display anticancer activity with low toxicity in preclinical models. Uehara et al. have identified the mechanism underlying the anticancer activity of a class of drugs in the latter category. The sulfonamides. They find that three different sulfonamides, E7820, indisulam, and CQS, induce formation of a complex between a specific RNA-splicing factor and a specific E3 ubiquitin ligase. This interaction promotes selective degradation of the splicing factor. Interestingly, selective protein degradation also explains the activity of an unrelated cancer drug called lenalidomide. PAK

Nat. Chem. Biol. 10.1038/nchembio.2363 (2017)

THEORETICAL CHEMISTRY

A checkup on density functional theory

Density functional theory has extended the reach of computational chemistry to a large range of compounds that were previously intractable to simulation. However, a recent study on a test set of neutral and charged atoms suggested that new functionals have lately been targeting more accurate energy calculations at the expense of the electron densities. Brorsen et al. extended this comparison to a set of 14 diatomic molecules of clearer relevance to ambient reaction chemistry. They found once again that improved energy calculations did not always correlate with density improvements, although the weakest-performing class of functionals in the atomic study fared considerably better with molecules. JSY

J. Phys. Chem. Lett. 8, 2076 (2017)

PHOTOS: (TOP) ERIKKARITE/ISTOCKPHOTO; (BOTTOM) NU SOFT ROBOTICS RESEARCH CENTER

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