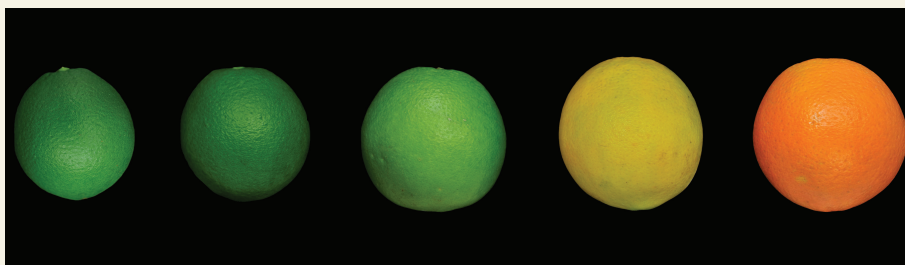


In this issue . . .

DNA methylation and orange fruit ripening

Tomatoes ripen according to a complex developmental process regulated by active DNA demethylation and an associated genome-wide loss of DNA methylation. Whether global DNA demethylation contributes to ripening in other fruits remains unclear. Huan Huang, Ruie Liu, et al. (pp. 1430–1436) used whole-genome bisulfite sequencing to generate single-base resolution maps of DNA methylation in nonclimacteric sweet orange fruits. Based on sequenced DNA methylomes and transcriptomes at five different stages of development, ranging from 90 days after bloom to the first appearance of fruit and ripening, the authors report that, unlike tomatoes, sweet oranges exhibit whole-genome increases in DNA methylation during ripening, most likely due to decreases in the expression of DNA demethylase genes. Furthermore, the study finds that the regions with DNA



Sweet orange fruits at 90–210 days after bloom (Left to Right).

hypermethylation are targeted by RNA-directed DNA methylation, suggesting that ripening in sweet oranges is caused by this DNA methylation pathway. The findings demonstrate that dynamic changes in DNA methylation influence fruit ripening, according to the authors. — T.J.

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Meaningful life tied to healthy aging

Assessing factors that contribute to a meaningful life, particularly among aging individuals, is a matter of public policy interest. To explore how self-assessments of life worth affect health and behavior, Andrew Steptoe and Daisy Fancourt (pp. 1207–1212) analyzed data from the English Longitudinal Study of Ageing, in which surveys were conducted among and biomarker data was collected from 7,304 individuals in England, ages 50–90 years, between 2012 and 2016. After controlling for age, sex, education, and occupational prestige, the authors found that compared with low ratings, high ratings for engagement in worthwhile activities were linked to a greater extent with strong personal relationships, healthy lifestyles, sound mental and physical health, affluence, and increased time spent exercising and socializing. High ratings were also associated with biomarkers such as high gait speed, strong hand grip, high-density lipoprotein cholesterol, high vitamin D concentrations, decreased obesity, low plasma C-reactive protein, and low white blood cell counts. High ratings in 2012 predicted healthy lifestyles, increased relationships and socializing, and reduced loneliness, depression, and health issues in 2016.

The findings suggest that a spectrum of behavioral, economic, health, and social variables may influence whether aging individuals believe they are leading meaningful lives, and that such beliefs affect future well-being, according to the authors. — M.S.

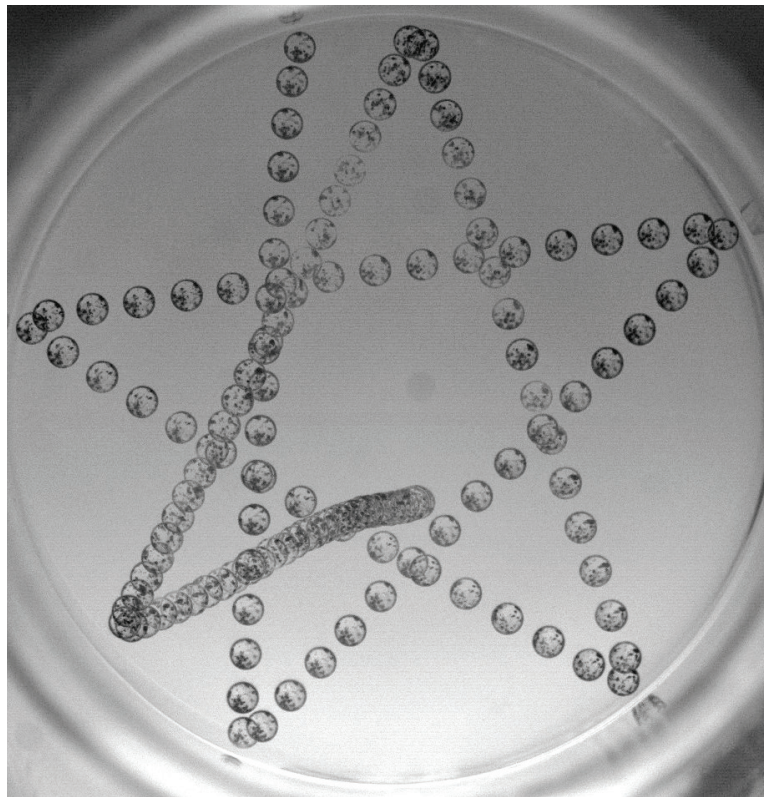


Living a meaningful life. Image courtesy of Pixabay/PICNIC_Fotografie.

Self-propulsion of levitated droplets

Volatile liquid drops on a sufficiently hot solid can hover above the surface on a cushioning layer of their

own vapor. This phenomenon is known as the Leidenfrost effect, and drops levitated in this manner are free from the constraints of friction to glide, bounce, and oscillate across the surface. Anaïs Gauthier et al. (pp. 1174–1179) investigated an inverse Leidenfrost scenario, in which oil droplets at room temperature levitate above a cryogenic liquid on vapor generated by the bath. The authors demonstrate that ethanol and silicone oil droplets, initially at rest on a pool of liquid nitrogen, begin to self-propel after a few seconds, gliding in a straight line until disrupted by interactions with the edge of the container. In addition, the self-propulsion persists even after the droplets freeze and cool to the temperature of liquid nitro-



Successive positions of a self-propelled ethanol drop on a cryogenic bath.

gen, lasting for 10 minutes or longer. According to the authors, this motion is driven by an asymmetry between the front and back of the drop that emerges in the thickness of the supporting film. — T.J.

Putative signature of monogamy

Monogamy in vertebrates is thought to have evolved multiple times and marked by pair bonding, heightened territoriality, and offspring care by both parents. However, the neural and molecular basis of monogamy remain unclear. Rebecca Young et al. (pp. 1331–1336) compared gene expression profiles in forebrain and midbrain tissues in monogamous and nonmonogamous reproductive-age males of 10 species



In the nonmonogamous strawberry poison frog (*Oophaga pumilio*), females provide offspring care, transporting freshly hatched tadpoles to pools of water. Image courtesy of Yusan Yang (University of Pittsburgh, Pittsburgh).

from five evolutionary subgroups, or clades, of vertebrates—cichlid fishes, dendrobatid frogs, Passeroid songbirds, common voles, and deer mice. Each of the clades harbors both monogamous and nonmonogamous species. Across the clades, the authors identified common gene expression signatures potentially associated with monogamy, including 24 candidate genes. In monogamous males, genes implicated in neural development, synaptic activity, learning, memory, and cognitive function exhibited heightened expression, whereas genes implicated in gene expression were downregulated, suggesting enhanced neural plasticity in the face of tight gene regulation in monogamous males. Genes with heightened or reduced expression in monogamous males of one clade also showed correspondingly heightened or reduced expression in monogamous males of the other clade. Together, the findings suggest a common putative gene expression signature of monogamy in some vertebrate species, according to the authors. — P.N.

Monitoring sustainable development goals with remote sensing

Monitoring annual progress toward the United Nations' Sustainable Development Goals (SDGs) using household surveys is prohibitively expensive, costing up to \$253 billion globally during the SDGs' lifetime. Gary Watmough et al. (pp. 1213–1218) explored whether remotely sensed (RS) satellite data could be used to monitor rural poverty in low-income and middle-income countries. Human well-being in

