



## ASTRONOMY

## Seeking Distant Companions

The Kepler satellite searches for planets around other stars by detecting the dimming of light that occurs when a planet passes in front of its star. Between 2 May and 16 September 2009, in its first 4 months of operation, Kepler looked at 156,453 stars in our galaxy, 1489 of which were considered of interest because their light curves—the graph of their brightness as a function of time—bore the signatures of planetary candidates. Testing for false positives, such as binary star systems, eliminated 492 stars, leaving 1235 planetary candidates around 997 stars: 827 in systems of single transiting planets and 408 in systems where more than one planet transits the same host star. Although not all the candidates have been confirmed through follow-up observations, the rate of false positives within the list of singles is thought to be 5 to 10% and that within multiples even lower. Latham *et al.* compared the properties of planet candidates in single and multiple systems. Systems with single transiting planets are more likely to include a planet larger than Neptune, suggesting that Jupiter-like planets in short-period orbits disrupt the orbital inclinations of smaller planets, making them less likely to preserve the flatness of the disk from which they originated and thus less likely to transit the star. — MJC

*Astrophys. J.* **732**, L24 (2011).

Dohme (MSD) together to participate in an environmental management project in coastal northeast England. Students, ages 13 to 14, spent a day in the field surveying flora of sand dunes and the rocky shore, small mammals, birds, and invertebrates and presented their findings to MSD employees. Students reported a rich and varied ecosystem but noted that an abundance of an invasive ragwort plant in the dunes was a cause for concern. Students also noted the effects of human impact, specifically the number of access points and the resulting paths where vegetation had been destroyed. MSD employees took seriously the management recommendations made by the students and, along with student assistance, brought one to fruition (reconstruction of a bird hide). All participants claimed that involvement in the project increased their awareness of environmental issues and motivated them to become involved in further conservation projects. As an additional incentive for other industrial firms looking to embark on similar education projects, students reported a more positive outlook on the ways in which companies act as environmental stewards. — MM

*J. Biol. Educ.* **45**, 13 (2011).

## ECOLOGY

## Elucidating Epiphyte Diversity

In tropical forests, an important fraction of the total plant species diversity is composed of epiphytes: plants that are rooted for part or all their life on the trunks and branches of trees and lianas. The patterns of epiphyte diversity are still poorly understood relative to those of trees, however, because of logistical challenges, such as tree height. Benavides *et al.* performed a comparative analysis of the epiphyte communities in lowland forest in Colombian Amazonia, aiming to understand how landscape unit (swamp forest, floodplain forest, and well-drained upland)

and host tree species influenced the composition of their epiphyte communities, using a combination of collecting by tree climbing and binocular observations. They recorded 154 epiphyte species on 411 tree species. There were clear associations between tree/liana species



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## OCEAN SCIENCE

## All Gassed Up

Ocean sediments contain an immense quantity of methane and thus play a key role in the global methane cycle. There are enormous fluxes of methane into and out of the sediments, even though most of the methane produced within the sediments is oxidized anaerobically before it can be released to the ocean water column. Estimates of sedimentary methane production vary between about 85 and 300 Tg per year, although analytical difficulties have made the supporting measurements too imprecise to tell where in that range the true value lies. Zhang *et al.* employed an in situ technique to measure methane concentrations in sediments, in order

to avoid the sampling issues that have plagued other methods. They find concentrations as much as 10 to 20 times higher than those determined by shipboard measurements and conclude that production rates are near the high end of past estimates. — HJS

*Geophys. Res. Lett.* **38**, L08605 (2011).

## EDUCATION

## All Together Now

The recent explosion of citizen science activities has been accompanied by informal science education efforts aimed at fostering partnerships between students, academics, and industrial scientists. Gebbels *et al.* brought students and employees from Merck, Sharp and

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assemblages and epiphyte species assemblages, but there were few significant associations between individual host species and epiphyte species. The high diversity of both groups of plants in the sampled plots made testing for individual host preferences difficult, suggesting the need for further studies. — AMS

*J. Trop. Ecol.* **27**, 223 (2011).

## EPIDEMIOLOGY

## Knowlesi Enters the Malaria Mix

What if a new and devastating form of malaria emerges? This scenario may be occurring in Southeast Asia, where a significant number of reported malaria cases were identified as being caused by *Plasmodium knowlesi*, until recently thought to be a monkey infection. This parasite has recently been recognized to cause a wide spectrum of human diseases that can result in complications and death. Lee *et al.* surveyed monkeys in Sarawak, Malaysia, and found very high levels of *P. knowlesi* infection in long-tailed macaques. Genetic analysis of human cases and macaques did not show any clustering or distinct lineages associated with host species. A relatively recent population expansion of the parasite occurred about 30,000 to 40,000 years ago, roughly coincident with major human settlement in Southeast Asia. The genetic data thus indicate that this is a previously unrecognized parasite rather than a newly emerging one, and that infection is zoonotic, arising when humans penetrate macaque habitats during forestry activities. Caution is necessary because further forest destruction might prompt the parasite and its mosquito vector to adapt to a future more numerous primate host species. — CA

*PLoS Pathol.* **7**, e1002015 (2011).

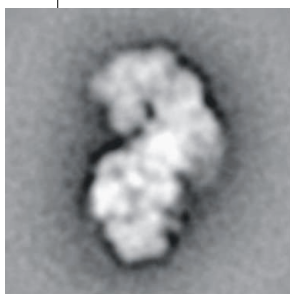
and Puf6p, implicated in escorting *ASH1* mRNA from the nucleus to the cytoplasm, were found to display little specificity for cargo RNAs. Instead, She3p, which was previously identified as an adaptor that brings the motor myosin V into the mRNAP, bound to She2p and also bound weakly to cargo RNAs. The RNA binding of She2p and She3p was synergistic, so that together the two form a specific ternary complex with the mRNA, stabilizing the She2p:She3p interaction. These data suggest that the mRNA cargos are bound with only limited specificity for nuclear export. A stable and specific transport complex then forms in the cytoplasm and mediates appropriate localization of the cargo mRNA. — VV

*PLoS Biol.* **9**, e1000611 (2011).

## STRUCTURAL BIOLOGY

## Seahorse Versus Pathogen

Just like us, prokaryotes—bacteria and archaea—must also protect themselves against pathogenic microbes, such as viruses and plasmids. Prokaryotes use the CRISPR (clustered regularly interspaced short palindromic repeats) system, an adaptive immune response whereby sequence snippets from the invading pathogen's genome are collected and stored by the host, which then uses them to target the pathogen for destruction.



Jore *et al.* have analyzed the composition and low-resolution structure of the Cascade complex, which lies at the heart of the CRISPR immune response. The snippets of invader sequence are transcribed and converted into CRISPR RNA (crRNA), which is bound by the Cascade complex. Thus loaded, the Cascade complex is able to bind sequences complementary to the crRNA either as double-stranded (ds) DNA or single-stranded DNA. With a dsDNA target, Cascade-complex binding displaced the noncomplementary target strand as an R loop, in an ATP-independent reaction. The overall structure of the Cascade complex surprisingly resembled the shape of a seahorse, with the spine and head consisting of a tightly curved polymer of six CasC protein subunits, which might bind the crRNA. — GR

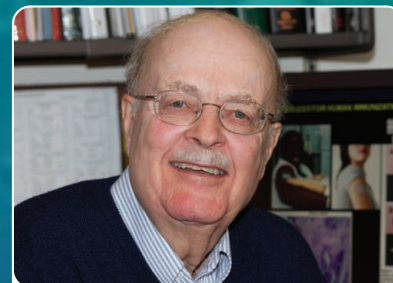
*Nat. Struct. Mol. Biol.* **18**, 10.1038/nsm.2019 (2011).

## CELL BIOLOGY

## Tagged for Delivery

Localized translation of mRNA in eukaryotes is essential for regulating gene expression. Localized mRNAs contain specific sequences that target them for recognition and incorporation into messenger ribonucleoprotein particles (mRNPs) and also recruit motor proteins; however, how selective transport is achieved remains unclear. Müller *et al.* used *in vitro* reconstitution assays and *in vivo* experiments to investigate how *Saccharomyces cerevisiae* *ASH1*-mRNA, which is transported from the mother to the daughter cell during mitosis, is incorporated into mRNPs. Surprisingly, two RNA-binding proteins, She2p

# “A dream told me to do it.”



Carl R. Alving, M.D.  
Chief of the Department of Adjuvant & Antigen Research, Division of Retrovirology at the Walter Reed Army Institute of Research  
AAAS member

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# Science

## All Gassed Up

H. Jesse Smith

*Science* **332** (6030), 641.

DOI: 10.1126/science.332.6030.641-b

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