that memory can persist are unknown. Hervas et al. report the structure of a synaptic translation regulator called Orb2 isolated from the brains of adult fruit flies that is important for the maintenance and recall of memory. Orb2 forms an amyloid and changes its activity from a translation repressor to an activator. The amyloid core is composed of polar hydrophilic residues, as opposed to the hydrophobic ones found in nonfunctional or pathological amyloids. The structure provides insights into how amyloids could be a stable yet malleable substrate of memory. —SMH

**T CELLS**

**Revisiting memory**

Certain T cell subsets express a receptor that makes them susceptible to nicotinamide adenine dinucleotide (NAD)—induced cell death (NICD), which can occur during isolation from tissues. This susceptibility has complicated our understanding of what cells are present and active both during and after the acute response. Künzli et al. used an NICD blocker to study the persistence of T follicular helper (T<sub>FH</sub>) cells in mice after infection with a virus. They report that T<sub>FH</sub> cells persisted for more than 400 days after infection and that long-lived T<sub>FH</sub> cells are glycolytic and marked by high expression of folate receptor 4. Upon reinfection, these “memory” T<sub>FH</sub> cells were capable of self-renewal and could also give rise to effector and central memory cells. —AB


**SPECTROSCOPY**

**Reading a molecule without destroying it**

Achieving efficient quantum control of ultracold molecular systems may open opportunities in molecular precision spectroscopy, quantum information, and related fields. Sinhal et al. report a quantum-nondemolition protocol for the detection of the spin-rovibronic state of a single trapped cold molecular ion co-trapped with an atomic ion. They show that monitoring the motion of Ca<sup>+</sup> under coherent motional excitation of the Ca<sup>+</sup>–N<sub>2</sub> string makes it possible to detect the N<sub>2</sub><sup>+</sup> state without destroying either the molecule or the state itself. The procedure can be repeated multiple times while preserving the high readout fidelity. —YS

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**TISSUE ENGINEERING**

**Strategic lumbar support**

Diskectomy is a common treatment for herniated or slipped intervertebral disks that can help to alleviate symptoms but does not prevent reherniation or progression of disk degeneration. Sloan et al. developed a two-part, acellular tissue-engineered therapy to prevent degeneration after diskectomy. Injecting hyaluronic acid into the inner region of the disk and applying a photo-cross-linked collagen patch to the outer ring of fibrous tissue healed disk defects and maintained biomechanical support in the lumbar spines of sheep for 6 weeks after diskectomy. —CC


**GENETIC DISEASE**

**Contracting disease-causing repeat expansions**

Ongoing CAG/CTG expansions in the gene encoding huntingtin in the brains of Huntington’s disease (HD) patients result in pathological accumulations of protein aggregates. It is possible that targeting these somatic expansions could be therapeutically valuable. Nakamori et al. investigated these genetic instabilities in a highly specific way by using a small molecule called naphthyridine-azaquinolone (NA). NA binds selectively to the unusual structures formed by the expanded DNA in the gene encoding huntingtin. NA injections into the striatum of a HD mouse model induced contractions of the expanded repeat and reduced levels of the mutant protein aggregates, with no effects genome-wide. Thus, targeting the root cause of expanded-repeat diseases is possible and could be a valuable strategy for tackling many similar diseases. —SMH


**AUTOIMMUNITY**

**Cells gone rogue**

Autoantibodies are proteins produced by the immune system that attack a person’s own tissues and organs, leading to autoimmune disease. Autoantibodies can be present in the serum years before the clinical onset of autoimmunity, but it is not understood how they cause disease. Singh et al. used multi-omics single-cell technology to trace the evolution of “rogue” cell clones responsible for producing pathogenic autoantibodies in the blood of patients with the autoimmune disease cryoglobulinemic vasculitis. The researchers found that a benign antibody can transform into one that causes inflammation of blood vessels in the skin, kidney, nerves, and joints. The gene mutations that accumulate in the rogue cells during the early stages of autoimmune disease have also been identified in cancer cells from patients with lymphoma. —PNK

FOREST ECOLOGY

Tree diversity relieves drought impacts

The relentless progress of current climate warming creates concerns about the impacts of drought on forest ecosystems. Fichtner et al. show that drought impacts on trees can be reduced when the species diversity of trees is higher. In experimental plots in a subtropical forest in China, they found that the growth of saplings of drought-sensitive tree species over a 6-year period resulted in more species-diverse neighborhoods. This effect might result from more effective partitioning of water resources where interspecific diversity is higher because of a greater variety of rooting habits and strategies. If these effects apply to forests more generally, then productivity and carbon sequestration may improve under conditions of higher local tree diversity. —AMS


PLANT SCIENCE

Self-organizing floral pigmentation patterns

Petals of Mimulus flowers are decorated with anthocyanin spots in patterns that cue pollinators. Ding et al. show how, following the rules of a reaction-diffusion system, a self-activating transcription factor called NECTAR GUIDE ANTHOCYANIN (NEGAN) interacts with a mobile repressor to organize pigment patterns on flower petals. Among the genes regulated by NEGAN is RED TONGUE (RTO), which encodes a transcriptional repressor. RTO is transcribed in anthocyanin spot cells, but the RTO protein moves to adjacent cells, where it limits anthocyanin production. Model simulations explored how NEGAN and RTO together construct a variety of pigmentation patterns on the flower petals, which in turn affect bumble bee visitations. —PJH


NANOMATERIALS

An atomic view of dealloying

The dealloying of metals to create nanoporous materials with bicontinuous surfaces is often modeled as a surface dissolution and diffusion process, but many of the details lack experimental verification. Liu et al. used liquid-cell high-resolution scanning transmission electron microscopy to follow the nitric acid–driven dissolution of silver from gold-silver alloy (Au_{x}Ag_{1-x}) nanospheres, nanocubes, and fivefold twin nanorods. Whereas the nanoparticles had more surface defects than the nanorods and began to dissolve immediately, the nanorods had an induction period in which surface dealloying created defects that then allowed bulk silver to dealloy. Dealloying led to large decreases in particle volumes that were attributed to the inward movement of exterior atoms, creating a denser, less porous outer shell. —PDS

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POLYMER SCIENCE

Tying together common plastics

Two challenges to overcome when recycling postconsumer waste are the need to sort and separate mixed waste streams and the presence of multilayer packages such as food wrappers that cannot be separated into individual plastic components. Nomura et al. synthesized copolymers of poly(ethylene terephthalate) (PET) and polyethylene (PE), dissimilar polymers that do not readily mix or have common solvents but which represent two of the dominant materials found in high-volume waste streams. They found that these PET-PE multiblock chains can act as an adhesive to tie together the two polymers, such that a 0.5% addition to a PET:PE (80:20) mixture generates a blended polymer with strain and stress at a break that exceeds that of the pure PET. —MSL


AIR POLLUTION

Catalyzing heavy haze

Intense regional haze events periodically affect many heavily polluted urban areas, causing adverse effects on human health and possibly affecting local climate. The reasons that these episodes occur are not entirely clear. Zhang et al. present a combination of field measurements, laboratory experiments, and model simulations to show that black carbon particles are central components of haze development. They demonstrate that the frequency of heavy haze events declines significantly with the reduction of sulfur dioxide and that sulfur dioxide oxidation is efficiently catalyzed on black carbon particles in the presence of nitrogen dioxide and ammonia. This unexpected finding implies that reduction of sulfur dioxide alone will not reduce the frequency of heavy-haze events in these environments. —HJS


Visibility at the Forbidden City in Beijing during, from left to right, clean or light-haze, moderate-haze, and heavy-haze periods.