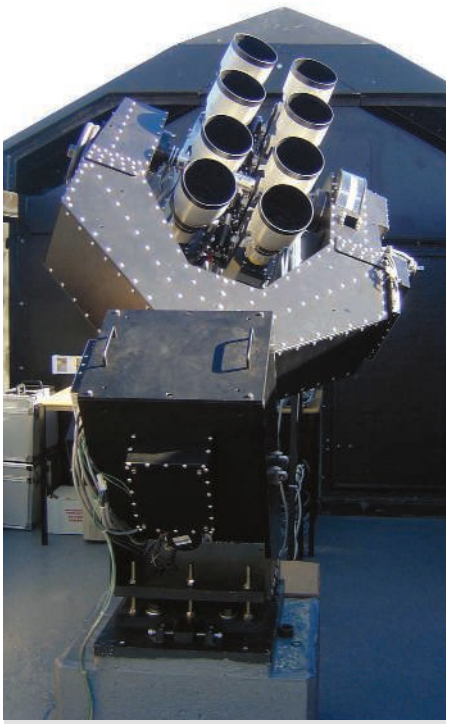


ASTRONOMY

Too Close for Comfort

More than 400 planets have been detected orbiting stars other than the Sun, often with properties radically different from those of the planets in our solar system. Many, termed 'hot Jupiters,' have a mass similar to or exceeding that of Jupiter but orbit much closer to their host stars. Researchers believe that these planets could not have formed so close to the stars, and so must have formed at larger distances and then migrated to their present positions. Some are dangerously close to their host stars and may ultimately spiral into them. Such is the case with WASP-19b, the planet with the shortest period yet detected. Its period is only 0.79 days and its mass and radius are 1.15 and 1.31 those of Jupiter. The data collected by Hebb *et al.* using the WASP-South telescope suggest that WASP-19b has been spiraling into its host star throughout its lifetime and has spun up the star in the process. The processes that end the inward migration of planets are not well understood. WASP-19b may contribute to our understanding of the evolution of close-in planets and may provide information about the properties of its host star. — MJC

Astrophys. J. **708**, 224 (2010).

CREDITS: (LEFT) DAVID R. ANDERSON, SUPERWASP; (RIGHT) KUBO *ET AL.*, *J. EXP. MED.* **206**, 2937 (2009)

PHYSICS

Clocking Single Photons

Quantum information processing requires a protocol for transferring data between memories comprising atomic energy states. Light, in the form of single photons, is the natural candidate for such applications: Photons can couple to the atomic memories, move fast, and remain relatively robust against noise. Though generating single photons is not a big problem, generating them on demand is. Melholt Nielsen *et al.* demonstrate a technique based on a modification of spontaneous parametric down-conversion, wherein two entangled photons are generated in a nonlinear optical crystal, and one of the photons is heralded by the detection of the other. Although such a process is usually stochastic, the authors show that by pumping an optical parametric oscillator under certain conditions, they can control the generation of single photons deterministically. The quality and properties of the heralded single photons, as well as the inherent tunability of the process, should make it simpler to implement quantum information protocols. — ISO

Opt. Lett. **34**, 3872 (2009).

GENETICS

Individual Differences

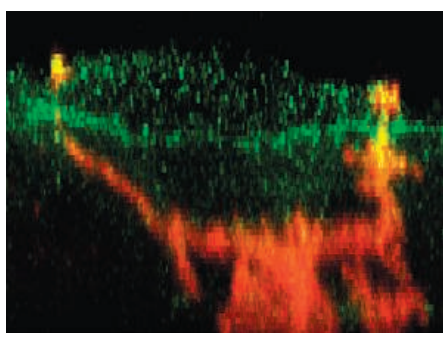
RNA splicing serves to stitch together the protein-coding regions of genes while snipping out the intervening noncoding sequences. As a consequence, RNAs may differ if the splicing machinery chooses one set of regions over an alternative set, and the resulting protein isoforms may vary in a genetically determined way. In a study of the amount of alternative splicing in humans, Coulombe-Huntington *et al.* have found that over 70% of genes show genetically controlled splice site usage that varied across individuals, and in some cases, they were able to identify the single-nucleotide polymorphism responsible. Understanding the underlying causes of variation in protein levels and isoforms may help to explain the genetic determination of phenotypic diversity. — LMZ

PLoS Genet. **5**, e1000766 (2009).

IMMUNOLOGY

Taking a Peek

Our bodies are covered by epithelial layers inside and out, which keeps the outside out and the inside in. How then can the immune system, which sits inside the wall of epithelial cells, sense potentially pathogenic antigens without making holes in this protective barrier? Kubo *et al*. show that during inflammation, epidermal Langerhans cells acquire external antigens by extending cellular protrusions, known as dendrites, through the tight seals between keratinocytes in the skin. Receptors on the tips of the dendrites bind to external antigens, which are then internalized and



Langerhans cell (red) punctures tight junction (green).

brought inward to the cell body for further processing. In order to maintain the seal despite breaching the tight junctions, the Langerhans cells form secondary junctions with the surrounding keratinocytes. This ability to screen incoming antigens provides an important first defense against attack. — SMH

J. Exp. Med. **206**, 2937 (2009).

MOLECULAR BIOLOGY

Activation from Within

The protein complexes that wrap DNA come in two flavors: core histones and variant histones. Although the H2A histone variant MacroH2A1 is known for its role in repressing transcription in the context of X chromosome inactivation, Gamble *et al.* describe an activating effect of this factor on autosomal gene expression. They have used chromatin immunoprecipitation and genomic tiling arrays (ChIP-chip) to map the distribution of MacroH2A1 in human primary fibroblasts and a breast cancer cell. MacroH2A1 associates with large chromatin domains (greater than 500 kb) with boundaries near transcription start sites; when MacroH2A1 sits within a transcribed region, repression is often the result, but some genes, such as those involved in responding to serum starvation, are instead protected from silencing. — BAP

Genes Dev. **24**, 21 (2010).