



TECHNOLOGY

Social Transfers

Under pressure to demonstrate economic returns on public investments in research, universities often point to evidence that the knowledge they generate can spill over and stimulate regional economies that are based, at least in part, on innovation. Yet, despite studies of technology transfer practices, university funding, and other factors, there is much to be learned about why places that aspire to become the next Silicon Valley might not attain their dreams. Casper examines regional social networks in which universities are embedded as potential modulators of the economic impact of research. He compared biotechnology communities in the San Francisco and Los Angeles regions, both of which include multiple universities that share similar characteristics. Whereas San Francisco attracted only 30% more research funding than Los Angeles over a 25-year period, Bay Area universities obtained more than twice as many biotech



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patents and spun out three times as many biotech firms. By tracking which people were linked as co-inventors on patent applications, Casper found that social networks were larger and more cohesive in San Francisco than in Los Angeles, spanning universities and firms, with upticks in network size and connectivity over time correlating with growth in patenting. This work suggests that community social networks can modulate the ability of universities to transmit and receive knowledge benefits. — BW

Res. Policy **42**, 10.1016/j.respol.2013.04.005 (2013).

PHYSIOLOGY

Next Generation

Many signaling factors and tissues interact to enable successful fertilization, gestation, and delivery. Failure of any one of a number of these elements can result in a failed pregnancy. The *Lrh-1* gene encodes an orphan nuclear receptor, liver receptor homolog-1. When Zhang *et al.* knocked out this gene in the ovarian follicle of mice, females displayed regular mating and successful ovulation but were infertile. Analysis of the corpora lutea of these mice showed that transcripts from genes involved in steroidogenesis decreased after ovarian stimulation, and hence progesterone levels were reduced, with resultant implantation failure. The defect in implantation could be rescued by the administration of progesterone, but other problems

ECOLOGY

Pay Attention

Males of many species display elaborate sexually selected traits, with the peacock's train as a classic case. We might presume that peahens would perceive a trait as we would, but the intricacy of the train suggests that its appeal could be considerably more complicated than it might seem at a glance. Yorzinski *et al.* take advantage of the development of gaze-tracking technology to look at the peacock train from the vantage point of the hen. Specifically, they trained females to wear a gaze-tracking device and then let them interact with males. They found that during the majority of the time the females were with the males, they weren't even looking at them, although males could attract their attention by shaking their wings. Further, when they did pay attention to the males, they looked not at the showy top of the fan, but at the feathers at the bottom and at the male's feet and legs. Though these results might at first suggest that the fan is perhaps a byproduct of selection for the lower feathers, subsequent experiments showed that the tops of the fans were in fact useful for attracting females at long distances. Overall, these results show that multicomponent male displays are the cumulative result of an attraction dance, and they suggest that to understand the evolution of such traits, we should study them through the eyes of the intended target. — SNV

J. Exp. Biol. **216**, 3035 (2013).

remained, including an improper spacing of embryos and differences in fetoplacental size. In addition to being expressed in the corpus luteum, *Lrh-1* is also expressed in the endometrium of mice and humans. Without it, abnormal expression of endometrial genes results in uterine dysfunction and aberrant gestation. This work shows the critical roles that *Lrh-1* plays in successful pregnancy via activities in both luteal function for decidualization and the formation of the placenta. — BAP

Nat. Med. **19**, 1061 (2013).

HUMAN GENETICS

Slide Show

Countless freezers and cabinet drawers are filled with fixed specimens on slides, whole organisms in some cases, tissue slices in others. In order to probe the specifics of gene expression within fixed cells and tissues, Ke *et al.* have developed a method to apply single-cell RNA sequencing *in situ* and show that they can see mRNA molecules

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that differ by a single nucleotide between cells. Although the sequencing is limited to stretches of four nucleotides, the authors are able to detect cell-specific mutations within KRAS genes, and they demonstrate multiplex expression profiling with different genes within breast tissue. Further development and application of this technique may yield dividends in developmental biology, epigenetics, and tumor and stem cell research. — LMZ

Nat. Methods **10**, 10.1038/nmeth.2563 (2013).

MATERIALS SCIENCE

Mesoporous Oxides via Carbonates

Mesoporous oxide materials have potential applications in light harvesting and catalysis and as electrode materials. Thin films of these materials are most often formed through a soft-templating process in which a precursor gel is patterned by nanoscale micelles that form from diblock copolymers during solvent evaporation. This route has proven difficult with some oxides, notably zinc oxide (ZnO) and cobalt oxide (Co_3O_4), because of problems with the three main types of precursors (alkoxides, nanoparticles, and thermally decomposed precursors). Eckhardt *et al.* show that both mesoporous zinc and cobalt oxides can be formed from soft templates by first forming mesoporous metal carbonates. These materials were formed with triblock poly(ethylene) oxide (PEO)—poly(butadiene) (PB) copolymer (PEO-PB-PEO) micelles and used metal nitrates and citric acid in mixed ethanol/water solvent as the precursor. This solution was dip-coated on substrates at room temperature and then heated for 1 hour at 250°C for zinc and 200°C for cobalt to form the carbonates. Additional heating (25 min at 400°C for zinc and 20 min at 300°C for cobalt) formed the oxides. For zinc, the amorphous wall of the mesoporous carbonate transformed into the crystalline oxide and increased the surface area. For cobalt, the carbonate appeared to retain the micelle template, and mesoporosity developed only in the final thermal processing step as spinel oxide phase walls formed. — PDS
Chem. Mater. **25**, 2749 (2013).

EDUCATION

Active Investment

Traditional classrooms, where rows of students face an instructor, may be an obstacle as science education moves toward inquiry-based learning. However, is reconfiguring these classrooms to encourage active and team-based learning worth the cost? Looking at introductory biology courses where the same syllabus, exams, and

instructors were used, Cotner *et al.* compared student performance in a traditional (TC) versus active learning classroom (ALC). Observational data was collected on 50% of randomly selected students in both classrooms, with the amount of time appearing to be “on task” and actions of both the instructor and the students being recorded. Additionally, students responded to a survey detailing their experiences and perceptions once the course had finished. Results showed that the same instructor spent more time encouraging and consulting in group activities in the ALC environment than in the TC setting. ALC students reported a higher level of engagement and more room flexibility in regard to in-class activities and perceived a higher alignment between the room and the course itself than did their counterparts in the TC. Taken together, the results show that students in an ALC are able to outperform their peers in a TC, suggesting that ALC environments positively enhance student learning and are worth the investment. — MM
J. Coll. Sci. Teach. **42**, 82 (2013).

GEOLOGY

Megafloods from Tibet

In between the Tibetan plateau and the Himalaya runs the Yarlung-Tsangpo River. In general, the balance of tectonic uplift and erosion—usu-



ally caused by rivers that carry abraded bedrock downstream—controls the elevation of such mountainous regions. Lang *et al.* used U-Pb dating to record the source of zircon grains in sediments deposited downstream of the Tsangpo Gorge, a steep, narrow canyon cut by the Yarlung-Tsangpo River as it enters the Eastern Himalaya. The ages and composition of these grains suggest they were deposited by large flood events from rapid drainage of glacial lakes in Tibet in the past few million years. Although these historical events may be infrequent, they probably contribute substantially to the overall evolution of the landscape. One megaflood alone could erode more material than the baseline erosion rate typically removes in 1000 to 4000 years. — NW
Geology **41**, 1003 (2013).