

By **Jef Akst**

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[Published 21st February 2011 03:37 PM GMT]

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This year's American Association for the Advancement of Science (AAAS) conference gathered researchers, educators, and policy makers from around the world to present on topics ranging from the state of US science to behavioral research in monkeys to possible new alternative fuel sources. Below are some highlights from the past weekend of talks and symposia.

### **US losing lead in science?**

The United States will lose its spot as the dominant leader in science and technology research as more countries increase their scientific output, according to Penn State researcher **Caroline Wagner**, who presented her findings on Friday (February 18). The proportion of papers authored by US researchers, Wagner reported, dropped by 20 percent from 1996 to 2008.

Not surprisingly, China is one of the biggest emerging players in the scientific community. The country is already publishing more papers in natural science and engineering, and some estimate that it will be more prolific in all fields by 2015. Furthermore, Chinese researchers will soon outnumber American scientists due to increased university enrollment in China.

"What is emerging is a global science system in which the U.S. will be one player among many," Wagner, an associate professor of international affairs, **said in a press release**.

### **Monkey uncertainty**

Macaques may be capable of assessing their own knowledge, as they choose to pass on a question to avoid the risk of answering incorrectly. Such metacognition -- awareness of one's own thoughts -- has long been argued to be a trait unique to humans.

**John David Smith** of the State University of New York at Buffalo and **Michael Beran** of Georgia State University trained macaques to look at a computer screen and determine if the pixels displayed were either "sparse" or "dense." If the monkeys chose correctly, they were rewarded with food. If they chose incorrectly, the game was paused. If the monkeys chose to pass, which they did by choosing the question mark instead of the S (for sparse) or D (for dense) answers, they simply moved on to

the next question -- no treat, no pause.

Sure enough, just like humans, the monkeys chose to pass on the more difficult trials. "Monkeys apparently appreciate when they are likely to make an error," Smith [told BBC News](#).

"They seem to know when they don't know."

### Constructing plant-inspired movement

Engineers often draw inspiration from nature: lizard movements have spawned new robot designs, [a worm adhesive holds promise for bone reconstruction](#), the iridescence of butterfly wings and beetles has yielded technologies for brighter cell phone screens and novel anti-counterfeiting techniques. Now, a plant, known as the Mimosa plant, whose leaves fold when touched is inspiring University of Michigan and Penn State researchers to create artificial structures that can twist, bend, stiffen and maybe even heal themselves.

The plant's movements are made possible by the process of osmosis. As the plant cells take in and release water, they collapse and expand, causing the plants to move and change shape. If the researchers can harness this mechanism artificially, they may one day be able to produce advanced robots capable of changing shape for increased maneuverability, or becoming rigid to grab objects. "This is really a unique concept inspired by biology," [Kon-Well Wang](#), chair of the mechanical engineering department at the University of Michigan, [said in a press release](#).

### Asthma-parasite resistance link

While studying a parasitic worm, *Schistosoma mansoni*, in rural fishing villages in Brazil, researchers at Johns Hopkins University identified a gene that's associated with resistance against it. But that resistance to infection comes at a cost -- an increased risk of asthma. The first hint that such a gene may exist came when the researchers administered medication to fight *S. mansoni* infection and noticed an increase in the incidence of asthma and allergy symptoms, [according to ScienceNOW](#). Sure enough, upon investigating blood and stool samples from the local people, the team found that IL-33, a gene associated with inflammation known to be overexpressed in the lungs of asthmatics, also seemed to be linked with worm resistance.

### Photosynthesizing for fuel

Mimicking photosynthesis may one day be able to produce inexpensive hydrogen for fuel to run automobiles and jet airplanes. While the technology is not yet cost or energy efficient, materials chemist [Thomas Mallouk](#) of Penn State University hopes that by continuing to improve the technology, which uses light to change water into hydrogen and oxygen, it will one day prove its worth. "We are creating an artificial system that mimics photosynthesis," Mallouk [said in a press](#)



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release, "but it will be practical only when it is as cheap as gasoline or jet fuel."