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Today, the animal world amazes, inspires, frightens and delights us. First up: new insights into small dinosaurs **from a big bone**, and experiments on elephants educate us about **dinosaur exercise**. Plus, a look at how a hairy tongue **helps bats lap liquid**, how an insect eye has inspired **a new kind of compound camera**, how a tiny worm can devour **a whole whale carcass**, and how our brains help us see **faster than the eye can follow.**

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Bone Head Dinosaur Diversity

Reconstruction of the new pachycephalosaurid dinosaur Acrotholus audeti. © Julius Csotonyi.

The discovery of a new species of *Pachycephalosaurus* in Alberta may shed new light on the diversity of small dinosaurs. This particular fossil is the heavy, remarkably thick skull dome of this dog-sized herbivore, which is thought by some paleontologists to have been used in head-butting competitions for dominance or mates. But because this skull is so substantial, it is well preserved in the fossil record, and we know of more than a dozen other species from this group of herbivores. This is an unusually large diversity of small dinosaurs, as the fossil record generally is poor in small animals. **Dr. David Evans**, Curator of Vertebrate Paleontology at the Royal Ontario Museum in Toronto, thinks that the diversity of *Pachycephalosaurus* might suggest there were more small dinosaurs than the fossil record would indicate.

Related Links

- **Paper** in *Nature Communications*
- Royal Ontario Museum **release**
- **Dr David Evans**

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Using Elephants to Study Dinosaur Metabolism

Dr. Mike Rowe, formerly at Indiana State University in Terre Haute, Indiana, wanted to test the question of whether dinosaurs were cold-blooded, like modern reptiles, or warm-blooded, like modern mammals. And he approached the question by asking whether being cold-blooded or warm-blooded would make a difference to how a really big dinosaur would handle the heat. For his study, he chose to look at *Edmontosaurus* - a dinosaur that was about the size of an elephant, and was believed to migrate long distances. In the absence of an actual dinosaur, he used an actual elephant to do his experiment. What he found was that it made little difference to the animal's thermal regulation whether it was cold or warm blooded - if it exercised during the day, it would quickly overheat, either way. Although he did not settle the question of the dinosaur's physiology, he did conclude that *Edmontosaurus* likely migrated at night, in order to cope with the over-heating problem.

Dr. Rowe's Elephant Experiments

Related Links

- **Paper** in *The Journal of Experimental Biology*
- *JEB* news **story**
- *Laelaps* **blog** about the study
- *Science Now* **story**

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Hairy Bat Tongues Lap Liquid

Dr. Cally Harper, a biomechanist at Brown University in Providence, Rhode Island, has discovered a unique adaptation in nectar-feeding bats that allows them to slurp up nectar with high efficiency. The bats hover like hummingbirds at flowers to lap nectar, and this is so energetically expensive that dawdling would be disadvantageous. The bats have developed erectile hairlike structures on their tongue, which spring erect when the bats extend their tongues, increasing the surface area of their tongue tip, and allowing them to capture more liquid than they would be able to otherwise. This happens in under 40 milliseconds, and suggests new ideas for biomimetic medical devices that might copy the bat's technique.

01:50 HD BROWN

Video courtesy Brown University

Related Links

- **Paper** in *PNAS*
- Brown University **release**
- *National Geographic* **story**
- *Scientific American* **story**

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Compound Eye Camera

The compound eye of an insect operates very differently from the vertebrate eye. It has hundreds or thousands of individual lenses, each focusing on its own photoreceptor. Compound eyes can be very sensitive to motion, have a very wide field of view, and don't need focusing - they have near infinite depth of field. **Dr. John Rogers**, a professor of Materials Science and Engineering at the University of Illinois at Urbana-Champagne, and his colleagues, have developed an electronic camera based on the insect's compound eye.

Compound Eye camera and model. Courtesy J. Rogers/University of Illinois

Related Links

- **Paper** in *Nature*
- University of Illinois **release**
- **Rogers research group**
- *Nature* **News**
- *Not Exactly Rocket Science* **blog**
- *Popular Science* **story**

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Bone Worm Devours Whale Skeletons

In 2002, an unusual deep sea worm was first discovered by researchers scouring the Monterrey Canyon off California. What makes this small worm unusual is that it has no mouth and no gut, yet feasts on the bones of whales and fish on the ocean floor. The mechanism by which it is able to feed remained unclear until a new study by **Dr. Martin Tresguerres**, a Marine Biologist from The Scripps Institution of Oceanography at the University of California, San Diego. The worm attaches itself to the bone, then secretes a powerful acid in order to drill or bore into the surface. This allows the worm to gain access to the nutritious materials inside the bone, including collagen and lipids. It is thought that bacteria living symbiotically within the worm may help absorb the bone nutrients, then metabolize them into other organic compounds that the worm can then digest. Over time, this process helps break down the bones.

The lower end of this worm attaches to a whale bone. Greg Rouse

Related Links

- **Paper** in *Proceedings of the Royal Society: B*
- Scripps Institution Of Oceanography **release**
- **Dr. Martin Tresguerres**
- *U-T San Diego* news **story**

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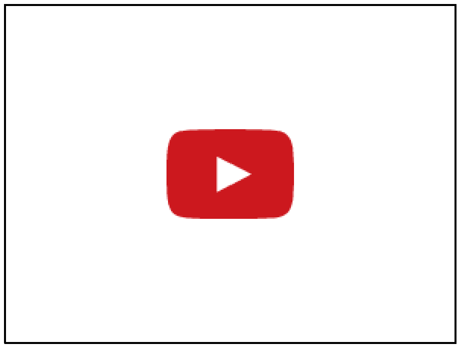
Seeing Faster than the Eye can Follow

One of the remarkable abilities of the human brain is its ability to track objects moving quite literally faster than the eye can follow. The time it takes for images rendered on the retina to reach our perception can be as long as a tenth of a second, and for fast moving objects, like baseballs or hockey pucks, this means that our brains are way behind the object. The brain accommodates this by calculating where the speeding object is going to be, and presenting this as our perception - in other words, showing us a reality we can't actually see. **Dr. Gerrit Maus**, a post-doctoral scholar in Psychology at the University of California, Berkeley, has been studying this phenomenon, using an illusion called the "flash-drag" effect, and brain imaging techniques, to show where and how the brain constructs this perception.



The Flash-drag effect animated

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- **Paper** in *Neuron*
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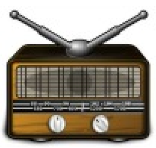

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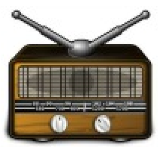

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