

In this roundup, Elsa Youngsteadt summarizes notable recent items about scientific research, selected from news reports compiled in Sigma Xi's free electronic newsletters Science in the News Daily and Science in the News Weekly. Online: <http://sitn.sigmaxi.org> and <http://americanscientist.org/sitnweekly>

Twist and Flap

Hummingbirds are known for their insectlike flight. They generate lift on both the downstroke and the upstroke by inverting their wings during the latter. How a bird's skeleton manages that movement has been a mystery. Now, high-speed x-ray videos have clarified the blur of wings and feathers. Biologists captured four ruby-throated hummingbirds (*Archilochus colubris*, pictured below) and glued 13 platinum beads to each bird to mark key joints. (The bones themselves were too fine to appear in the x-rays.) The resulting videos and analyses showed that the birds use a twist of the wrist—not the shoulder—to invert their wings. Their bones are so compact that even a wrist movement can tilt essentially the whole wing. (Photograph courtesy of Joe Schneid.)

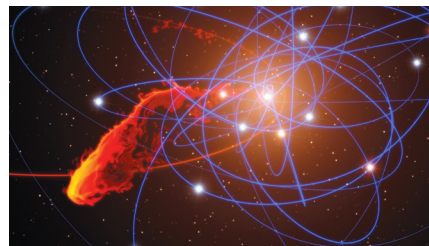


Hedrick, T. L., et al. Morphological and kinematic basis of the hummingbird flight stroke: scaling of flight muscle transmission ratio. Proceedings of the Royal Society B (published online December 14)

Cosmic Anticipation

Astronomers will soon have their first opportunity to watch matter fall into the Milky Way's own supermassive black hole. Images from the Very Large Telescope in Chile have revealed a solar system-sized gas cloud headed straight for the hole. The cloud has doubled its velocity in just seven years and has begun to elongate

from the pull of the black hole's gravity. Astronomers predict that by 2013, the cloud will break up and parts of it will fall into the hole, while other fragments continue to orbit. The image below simulates the expected positions of the gas cloud fragments (red orange) and neighboring stars (with blue orbits) in 2021. Although the entire cloud has a mass only three times that of the Earth, the radiation that it and the black hole will emit during the denouement could provide new insights into the environment at the center of our galaxy. (Image courtesy of ESO/MPE.)



Gillessen, S., et al. A gas cloud on its way towards the supermassive black hole at the Galactic Centre. Nature 481:51–54 (January 5)

Lingering Resistance

For bacteria, antibiotic resistance often comes at a cost, making cells less fit in other ways. In the absence of the drugs, natural selection should eliminate such costly resistance genes. But it's not that easy. On a farm that had been antibiotic free for two and a half years, researchers sampled gut bacteria from the feces of 10 hogs whose mother had also grown up antibiotic free. By the time the pigs reached slaughtering age, 69 percent of males' gut flora and 100 percent of females' were resistant to the common antibiotic chlorotetracycline. Some resistance genes may persist because they're physically linked to genes that help microbes cope with metals in swine feed. The consequences for human health are unknown, but the results suggest that combating antibiotic resistance will take time.

Pakpour, S., S. Jabaji and M. R. Chénier. Frequency of antibiotic resistance in a swine facility 2.5 years after a ban on antibiotics. Microbial Ecology 63:41–50 (January)

Chimpanzee Theory of Mind

Chimpanzees recognize ignorance among their companions, and actively combat it. Researchers drew this conclusion after

watching 33 wild chimpanzees react to realistic model vipers tucked away among the undergrowth. A chimp who detected a snake replica sometimes voiced a whimpery "alert hoo," a call that warns others of danger. The apes were about three times more likely to emit the call in the presence of ignorant chimps who had neither seen the snake nor heard an alert hoo than in the presence of those who already had. The study is among the first to address chimpanzees' understanding of each other's minds in the wild. It demonstrates that they may possess what's thought to be an important precursor to language: the motivation to inform.

Crockford, C., et al. Wild chimpanzees inform ignorant group members of danger. Current Biology 22:1–5 (January 24)

Teaching, Not Technology

Population growth and devastating droughts have left thousands of Ethiopian pastoralists in poverty and hunger. To help develop solutions, a group of researchers worked with residents of 12 pastoral settlements. The resulting discussions focused on literacy, business skills and microfinance, rather than new technologies. Community groups that emerged to lead the programs were composed mainly of women, such as the group pictured below. Their efforts worked. After a 2005–2008 drought, surveys showed that project participants maintained a higher quality of life—based on 18 attributes such as health, income and confidence in the future—than did similar individuals who had not participated. The programs that fostered this newfound resilience cost only \$1 per person per month over three years. (Photograph courtesy of Claudia Radel.)



Coppock, D. L., S. Desta, S. Tezera and G. Gebru. Capacity building helps pastoral women transform impoverished communities in Ethiopia. Science 334:1394–1398 (December 9)