

PALEONTOLOGY

Is Dinosaur 'Soft Tissue' Really Slime?

In 2005, researchers made headlines when they reported that they had found intact blood vessels from a 68-million-year-old *Tyrannosaurus rex*. The discovery raised hopes that paleontologists could get their hands on the flesh and blood of vanished animals. This week, however, other scientists challenged the results, arguing that the dinosaur flesh was in fact just coatings of young bacteria. But the original researchers stand by their results, calling the new argument weak. "There really isn't a lot new here," says Mary Schweitzer of North Carolina State University in Raleigh.

In 2003, a crew led by Jack Horner of the Museum of the Rockies in Bozeman, Montana, dug up an exquisitely preserved *T. rex* fossil. Schweitzer dissolved a fragment in weak acid. With the bone gone, transparent vessels were left behind (*Science*, 25 March 2005, p. 1852). Other fossils yielded branched tubes, spheres that resembled blood cells, and what appeared to be bone-forming cells known as osteocytes. Later, Schweitzer and colleagues isolated what they identified as collagen proteins from the *T. rex* and from a mastodon fossil. The sequence of amino acids in the mastodon collagen was closest to that of elephants; the *T. rex* collagen was most similar to that of birds, its closest living relatives.

These results inspired Thomas Kaye, a research associate at the Burke Museum of Natural History and Culture in Seattle, Washington, to look for soft tissue. He set out to use scanning electron microscopes to find it without having to dissolve the fossils first. "I thought, 'We'll just crack the bones open and take a look,'" he says.

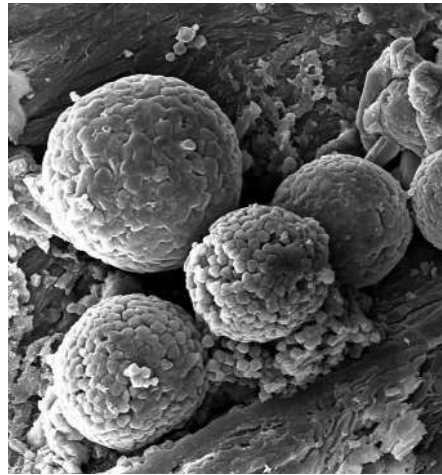
The researchers selected a well-preserved turtle fossil and quickly found cell-like balls that turned out to be located in tubes. "We actually did a happy dance," he said.

But the happiness turned to suspicion when Kaye kept finding the spheres in other fossils, even in badly degraded ones. "It was clear they weren't blood cells," he says. He and his colleagues suspect that the balls are geological formations called framboids.

Schweitzer's tubes and osteocytes, they argue, are not blood vessels or cells but biofilms formed by bacteria that invaded the fossils after death. In a paper published Monday in the journal *PLoS ONE*, Kaye and colleagues report that carbon dating of one sample shows that the tubes are at most a few decades old and that their infrared spectra give a closer match to bacterial biofilms than to collagen. Troughs in the walls of the tubes resemble the

track a microbe would make crawling through a biofilm, they note. "We think that's one of the smoking guns," Kaye says.

"This piece of work demonstrates just how careful we have to be when attempting to analyze fossil bones for traces of original molecules or biomarker molecules," says David Martill of the University of Portsmouth, U.K., a paleobiologist not involved in either study. Other researchers are less impressed. "There are a number of misinterpretations and lack of basic data in this paper," says Frances Westall, the director of the Centre de Biophysique Moléculaire-CNRS in Orléans, France.



Cell-out? Researchers mistook "framboids" in dinosaur fossils for corpuscles, a new paper contends.

Schweitzer says she welcomes skepticism but that Kaye and his team "only address aspects of our study that fit conveniently with their preconceived ideas." They did not explain how proteins from a bacterial biofilm could be similar to bird or elephant proteins, for example. "They pick and choose what to focus on," Schweitzer says, arguing that a rebuttal of her work must account for all of her evidence. She also doubts that bacteria could have formed the tubes.

Martill, however, thinks that the tubes might well be biofilms. He says his own experience shows how aggressively bacteria and fungi can invade fossils. Still, he considers Schweitzer's research "incredibly impressive" and believes that at least some of the dinosaur material is genuine collagen. "This is why we should not abandon hope," he says.

—CARL ZIMMER

Carl Zimmer is the author of *Microcosm: E. coli and the New Science of Life*.

Space Program Shakeup

The Italian Space Agency (ASI) has been thrown into turmoil by a wave of resignations and the appointment on 18 July of interim "commissioners" to its administrative council, says physicist Giovanni Bignami, ASI's president. He expects that the center-right government of Silvio Berlusconi may also dismiss him.

The resignation of six of seven administrative council members (Bignami being the eighth and chair) prompted the government to put Enrico Saggese, senior vice president for space operations of aerospace and defense company Finmeccanica, and University of Padua astronomer Piero Benvenuti in charge. As *Science* went to press, Bignami was still ASI's president but said the government may dismiss him after a Cabinet meeting on 8 August, if not before.

A spokesperson for Italy's education and research ministry said that the decision to appoint the commissioners was due entirely to "technical and administrative reasons."

—EDWIN CARTLIDGE

WikiPathways Debuts

The makers of GenMAPP, the popular online genetic data hub, have launched a site for sharing findings on metabolic pathways. Modeled after Wikipedia, WikiPathways (wikipathways.org) offers a way to integrate information on these complex networks, says creator and cell biologist Bruce Conklin of the University of California, San Francisco, who last week formally opened the project with colleagues at the University of Maastricht in the Netherlands. The site has more than 300 registered users and contains information on 500 metabolic pathways in seven species, including humans.

—RACHEL ZELKOWITZ

Warning on ITER

The "uncertain U.S. commitment to ITER," the key to fusion energy's future, is a matter of the "greatest concern," says a 29 July report from the National Academy of Sciences (NAS). Congress axed a proposed 2008 U.S. contribution of \$149 million for the project, which begins construction this year. The NAS panel concluded that "fluctuations in the U.S. commitment to ITER will undoubtedly have a large negative impact." Stephen Dean of the Gaithersburg, Maryland-based advocacy group Fusion Power Associates grasped at a straw in the fact that "the academies think the project is important," which might sway Congress.

—DANIEL CLERY