Fresh doubts over T. rex chicken link

Critics call on researchers to disclose protein spectra data.

Rex Dalton

A claim by researchers to have extracted proteins from a *Tyrannosaurus rex* bone and matched these to proteins found in chickens has been attacked in the same journal that published the original research.

In a withering critique, computational biologist Pavel Pevzner and his colleagues at the University of California, San Diego, say that the protein claim cannot be supported by the analytical data released so far¹.

The original articles, published last year in *Science*, claimed that palaeontologist Mary Schweitzer of North Carolina State University in Raleigh and her colleagues had recovered fragments of collagen from inside a 68-million-year-old *T. rex* femur bone² — making the protein 100 times older than the previous collagen record holder, from a mastodon (*Mammut americanum*) that died up to 600,000 years ago.

A linked article described the analyses of the *T. rex* protein samples performed by John Asara, who runs a mass spectrometry research lab at Beth Israel Deaconess Medical Center in Boston, Massachusetts, and his colleagues. Asara was able to match sequences from all the collagen fragments to those of living species including chickens, better defining the evolutionary link between reptiles and birds³.

But Pevzner calls the article "computationally illiterate". He argues that the mass spectrometry data on the seven proteins recovered are not broad enough to prove a statistically significant match with chicken collagen. Because Asara's team has not revealed all the 48,000 mass spectra data generated, he says, it is impossible to rule out the 'false positives' that are routinely generated by the technique, and so tell whether the protein match is a mere coincidence like "a monkey typing random keys on a typewriter" that by chance spells words.

Spectra of all studied proteins are routinely published as supplementary data to enable scientists to replicate results, but Asara declines to release this data, saying that to do so would open the work to publication by others.

"I'm surprised; I don't understand how they went forward and published unless those data were publicly disclosed," says Richard Smith, head of the mass spectrometry lab at the Pacific Northwest National Laboratory in Richland, Washington.

Asara, whose rebuttal to the Pevzner critique appears in the same issue⁴, says his team conducted additional analyses that support their earlier results. "After being forced to go through evaluation of the data, we stand by the article even more so today," he says.

Asara's confidence belies the article's increasing troubles. The researchers withdrew one protein from the work as far back as September 2007, saying that it wasn't statistically significant⁵. Next, in January, *Science* published a technical comment on the article⁶, in which 27 authors reported that they could not verify the *T. rex* proteins, to which Asara and Schweitzer again replied⁷.

By June, Asara was publicly acknowledging that two other proteins were also not statistically significant. This, despite a short article in *Science*⁸ a month earlier, in which Asara, Schweitzer and their colleagues asserted that a comparison of the ancient proteins to existing species — such as crocodile and ostrich — helped to affirm their earlier work.

Even the *T. rex* protein samples have been questioned. On 30 July, Tom Kaye, a research associate at the Burke Museum of Natural History and Culture in Seattle, Washington, asserted that the collagen extracted from the ancient bone was in fact remnants of bacterial slime⁹. Schweitzer told *Nature* that she rejects the evidence, from scanning electron microscope images, because it came from other bones — Kaye says that his team was denied access to the original bone.

With the controversy over their original article unabated, Schweitzer says that she will hold a private meeting in November with invited scientific authorities to develop additional standards for publishing such work. But Pevzner is looking for a different response. "How many technical comments should there be before an article is withdrawn?" he says.

E. Lamm/Museum of the Rockies

Critiques of a *Tyrannosaurus rex* study on protein from its femur bone (below) have been as fierce as the dinosaur.

L. Psihoyos/Corbis

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