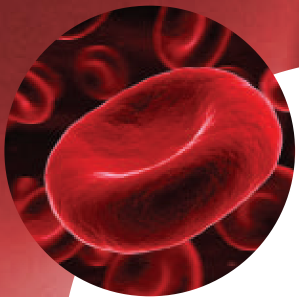

HEMOGLOBIN PARTLY PRESERVED IN DINO BONES

Jonathan Sarfati

SCIENTISTS HAVE discovered that *hemoglobin*, the molecule that transports oxygen in blood, is still partly intact in dinosaur bones. Hemoglobin contains a ring-shaped *heme* group that holds iron. The heme is attached to globin proteins.

The research team included Dr Mary Schweitzer, who has been studying soft tissue, proteins, and even traces of DNA in dinosaur bones for about 30 years. Her discoveries were unexpected at first and met with skepticism. After all, *measured* rates of chemical breakdown show that proteins should not survive even a million years. Yet dinosaurs supposedly became extinct 66+ million years ago.

But she is a careful researcher, and her discoveries have been vindicated. She has proposed various preservation methods to explain how they could survive so long. But none are satisfactory to date.[1]

Detecting heme

The scientists examined bones from the duck-billed dinosaur *Brachylophosaurus* and from *T. rex*. They were compared with ostrich blood vessels and human blood as controls. They used a technique called *Resonance Raman spectroscopy*.[2]

Raman spectroscopy is non-invasive. A low-power laser shines on the sample, and a tiny fraction of the light (about one-millionth of the original beam) scatters back at shifted frequencies. These shifts depend on the atoms and bond strengths in the molecules. So the technique is very helpful for identifying chemical groups—in this case, parts of the heme molecule.

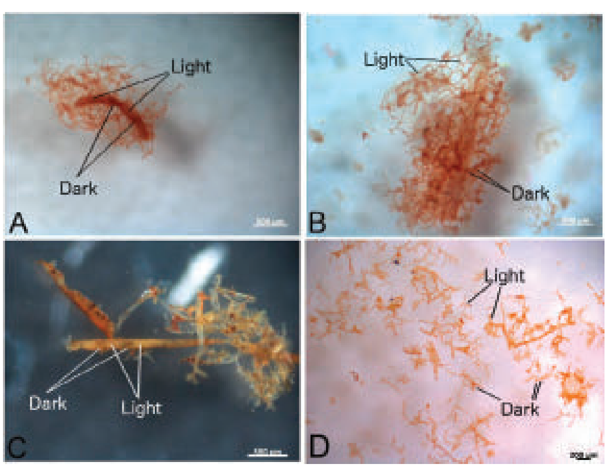

Fig. 1. Bright field images of vessels from **A)** ostrich, vessels soaked in hemoglobin in deoxygenating conditions; **B)** as for (A), but in oxygenating conditions; **C)** *Brachylophosaurus canadensis* bone; **D)** *T. rex* bone.

Resonance Raman goes one step further. If the laser is tuned near an electronic absorption of the molecule, the scattered signal can be enhanced hundreds to a million times. This selectively highlights the groups linked to that absorption.

With green light (532 nm), the researchers saw strong signals from heme bound to globin-like proteins—the type found in hemoglobin. Because bacteria don't make hemoglobin, this points to a dinosaur origin.[3]

As a control, they also used blue light (473 nm). This enhances signals from heme bound in cytochromes, proteins common in bacteria. No strong signals appeared. Thus bacterial contamination could not be the source.

The researchers also detected goethite, an iron oxyhydroxide mineral (FeOOH). Goethite is often found on 'ancient' blood vessel surfaces.[4]

How could they last millions of years?

Dr Schweitzer has proposed that certain iron reactions, called *Fenton chemistry,* might help cross-link and stabilize proteins. But Fenton reactions usually damage and destroy organic molecules. In fact, experiments show that dissolved iron *accelerates* the breakdown of the protein collagen.[5,6]

Instead, the researchers suggest that iron has a different role. While locked up in goethite, it may both shield proteins from decay and promote some cross-linking. But this remains to be demonstrated.[4]

Conclusion

Discovering soft tissue, including partially preserved hemoglobin, was surprising. But measured breakdown rates are compatible with a biblical timescale. In particular, dinosaur fossils were formed in the Genesis 7–8 global Flood, about 4,500 years ago. The molecules break down too fast to last millions of years. But those committed to long ages will continue to 'explain away' the observed proteins, soft tissues, and DNA in 'ancient' samples. ■

References and notes

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