Answering objections to creationist 'dinosaur soft tissue' age arguments

Carl Wieland and David Menton

Background

Scientists have recently made the startling discovery of a dinosaur skeleton that still retains well preserved soft tissue, including blood vessels, cells and connective tissue.[1] This came as a huge surprise to evolutionists, who believe that dinosaurs all died off at least 65 million years ago. It certainly stretches the long-age paradigm beyond belief to imagine that soft tissue and cells could remain so relatively fresh in appearance for the tens of millions of years of supposed evolutionary history.

Still, as we noted eight years ago, this is hardly the first report of amazingly preserved tissue—even cells—in dinosaur fossils.[2,3] Evidence of small blood vessels, microscopic red blood cells, and immunological evidence of hemoglobin have all been previously described.

In this latest report, not only have more blood cells been found, but also soft, fibrous tissue, and complete blood vessels (figures 1 and 2). One description of a portion of the tissue was that it is 'flexible and resilient and when stretched returns to its original shape'.[4]

Break a leg

The exciting discovery was made after researchers were forced to break the leg bone of a *Tyrannosaurus rex* fossil to lift it by helicopter. The bone was still largely hollow and not filled up with minerals as is usual.[4]

The March 25 issue 2005, of the journal *Science*[1] reported that the team led by Dr Mary Schweitzer of Montana State University[5] found flexible connective tissue and branching blood vessels, as well as intact cells that have the appearance of red blood cells and osteocytes (bone cells) in the femur (thigh bone) of a '68-million-year-old' *Tyrannosaurus rex* from the Hell Creek formation of Montana.

The dinosaur was deposited in sandstone of 'estuarine' origin, meaning that the animal was buried in rock layers laid down by water (no surprise here for creationists[6]). The bones were mostly detached from each other but well preserved.

Since the bone looked relatively unfossilized, researchers, using a mildly alkaline solution of EDTA (a strong chelating agent), dissolved the mineral from a piece of the dinosaur bone (much the same way as the common science class exercise where chicken leg bones are soaked in vinegar (a mild acid) for a week to make them rubbery). In fresh bones, the EDTA removes the hard mineral, leaving only organic material such as fibrous connective tissue, blood vessels and various cells. By comparison, if one were to demineralize a typical well-permineralized fossil, there would be nothing left.

The acid-treated *T. rex* bone fragment, however, produced a flexible and elastic structure similar to what you would get from a fresh bone. The fact that this really is unfossilized soft tissue from a dinosaur is, in this instance, so obvious to the naked eye that any scepticism directed at the previous discovery is completely 'history'.

When the demineralized *T. rex* bone was examined under the microscope, it revealed small branching translucent blood vessels with what appeared to be red blood cells inside. The interior walls of the blood vessels were examined in the scanning electron microscope and appeared to be lined with closely packed endothelial cells. These are the specialized cells that line all blood vessels and the heart. The bone also appeared to contain cells bearing numerous slender processes very much like the cells (osteocytes) one sees in fresh bone preparations.

Mary Schweitzer has been cited as saying that the blood vessels were flexible, and that in some instances, one could squeeze out their contents. Furthermore, she said, 'The microstructures that look like cells are preserved in every way'. She also is reported as commenting that 'preservation of this extent, where you still have this flexibility and transparency, has never been seen in a dinosaur before'.

Naturally, the investigators were puzzled how a '68-million-year-old' bone could have the appearance of essentially fresh bone after demineralization. They speculate that this remarkable preservation might be a special form of fossilization involving 'undetermined geochemical and environmental factors' that preserve fossils right down to the cellular level and perhaps beyond.

It appears that this sort of thing has not been found before mainly because it was never looked for. Schweitzer was probably alert to the possibility because of her previous serendipitous discovery of *T. rex* blood cells. (It appears that the fossils were sent to her to look for soft tissues, prior to preservative being applied, because of her known interest.) In fact, Schweitzer has since found similar soft tissue in several other dinosaur specimens!

The reason that this possibility has long been overlooked seems obvious: the overriding belief in 'millions of years'. The long-age paradigm, i.e. the dominant belief system,

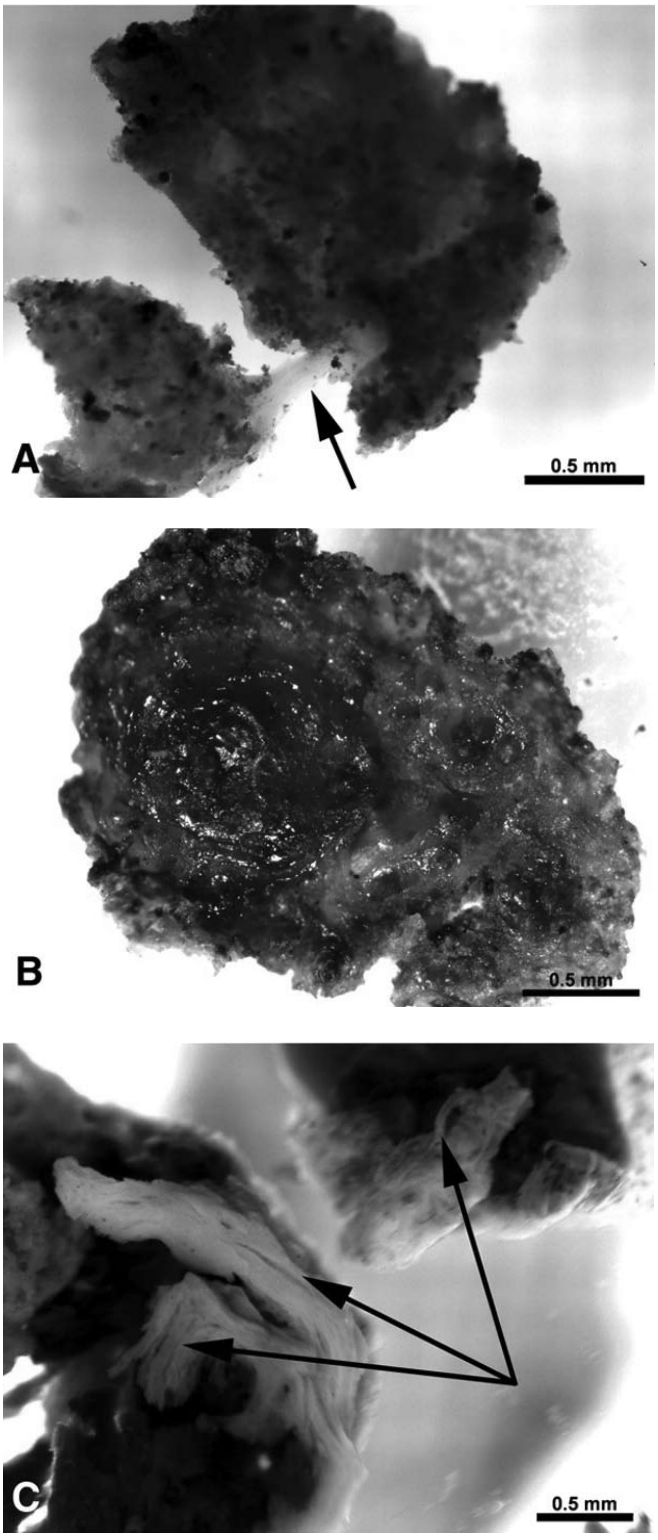

Figure 1. ***A.*** *The arrow points to a tissue fragment that is still elastic. It beggars belief that elastic tissue like this could have lasted for 65 million years.* ***B.*** *Another instance of 'fresh appearance' which similarly makes it hard to believe in the 'millions of years'.* ***C.*** *Regions of bone showing where the fibrous structure is still present, compared to most fossil bones which lack this structure. But these bones are claimed to be 65 million years old, yet they manage to retain this structure. (Photos by M. H. Schweitzer).*

has blinded researchers to the possibility, as it were. It is inconceivable that such things could be preserved for (in this case) '70 million years'.

The power of the paradigm

Unfortunately, the long-age paradigm is *so* dominant that such facts alone will not readily overturn it. As philosopher of science Thomas Kuhn pointed out,[7] what generally happens when a discovery contradicts a paradigm is that the paradigm is not discarded but modified, usually by making secondary assumptions, to accommodate the new evidence.

That's just what has happened in this case. When Schweitzer first found what appeared to be blood cells in a *T. Rex* specimen, she said,

> 'It was exactly like looking at a slice of modern bone. But, of course, I couldn't believe it. I said to the lab technician: "The bones, after all, are 65 million years old. How could blood cells survive that long?"'[8]

Notice that her first reaction was to question the evidence, not the paradigm. That is in a way quite understandable and human, and is how science works in reality (though when creationists do that, it's caricatured as non-scientific).

Answering objections

So it is not surprising that those who hold to the belief in millions of years have tried to play down the implications of this amazing find.[9,10] The fact that they have so strenuously attempted to diminish the significance of the findings, including the earlier research by Schweitzer and others, underlines the problem that the finds present for long-age beliefs. The major objections against the claims in the main paper are as follows:

Objection 1

The soft tissue was not originally soft in the dinosaur bone but became soft only as a result of the demineralization and hydration process applied by the researchers.

Response

Note that bone—any bone, even the freshest of bone—has a 'matrix' of hard mineral. In order to be able to 'stretch' and 'squish' the soft tissues inside, such as the blood vessels running within a fresh bone, it is necessary to dissolve this mineral matrix.

The demineralization process does not produce soft tissue that is not already there. If one dissolves a fresh ostrich bone and is left with the stretchy soft tissue, that tissue was

in the bone all along. It won't appear 'soft' when the bone is broken open, of course, because it is being supported from all sides by the bony matrix.

The whole (and the obvious) point was that substantial amounts of tissue made up of fragile protein molecules (till otherwise demonstrated) have survived in this dinosaur bone, not just in some amorphous form, but in recognizable structures, even transparent ones, and recognizably containing red blood cells, for example.

Whether they would lose some of their 'stretchiness' should they be dried out again is in any case beside the point. If the original material of the soft tissue had not been preserved, then it would also not be capable of 'rehydrating' to any extent. If dry soft tissue that was unfossilized had been found in a dinosaur leg bone, and this only stretched when softened a bit in water, it would have been just as sensational. It is hardly likely that a section of dinosaur soft tissue that had been preserved by being replaced with minerals (i.e. petrified) would become flexible just from hydrating, i.e. soaking up water!

However, all that seems to be academic, anyway, because to clinch the point, Schweitzer's article says that the soft tissues were subjected to several cycles of dehydration/rehydration—without losing their elasticity! So they appear to have been elastic (soft and stretchy, not hard and brittle) in both the dry and wet state.

Objection 2

The objects are not intact blood vessels and cells, but blood vessel and cell remnants—degradation products that have undergone chemical transformation, or been replaced by mineralization.

Response

This does not seem to be the view of the researchers. Their stated conclusion (not speculative, wild guess) is a very confident and reasonable deduction from the observed facts. These facts, *inter alia*, are: soft, stretchy, transparent branching structures were found inside the bone of a long-dead animal after the bone was demineralized (by a substance that dissolves fresh bone matrix, too). These intricate structures appear identical to those in a recently-dead animal bone. Inside them are further structures which have all of the appearances of red blood cells, including the nucleus in the centre of each one.[11] The contents of these hollow branching tubes that have these red-cell-like structures inside them can still be 'squeezed out'. The onus of proof is on those who would claim that they are *not* what they overwhelmingly appear to be.

It must also be noted that the researchers found clear 3-D structures in the shape of osteoclasts—very characteristic-looking cells found in bone—that were once again identical to those in living creatures.

The only way the tissue would not contain any 'original organic material' is if it had been 'replaced by mineralization'. But no magical mineralization process is known or conceivable which would result in soft, flexible tubes with all the appearance of the original blood vessels and showing red blood cells inside.

Note that proteins have been detected in dinosaur bone before, in specimens not even showing any soft tissue preservation like this one does. One example is proteinaceous material found in an *Iguanodon* 'dated' at 120 Ma, almost twice as old as the evolutionists claim this *T. rex* is.[12] So it is hardly overstated to claim that there is *no way* that this soft stretchy tissue contains *none* of the original protein materials, i.e. there would seem to be no way that it has, instead, been replaced 'brick by brick' by some inorganic mineral (which would itself have to be 'stretchy'). Remember, too, that even the original 1997 red-blood-cell find gave immunological evidence of one such protein, namely hemoglobin, which is found in living red cells.

Even the title of Schweitzer *et al.'s* paper in *Science* affirms the conviction of its evolutionist authors: it is *not* called, e.g., 'Unusual structures which sort of remind us of blood vessels and cells'. It is in fact called 'Soft-tissue vessels and cellular preservation in *Tyrannosaurus rex*'—the title alone seems virtually sufficient to 'blow away' this objection.

Objection 3

The discovery of unfossilized bone and soft tissue does not prove that dinosaurs did not live millions of years ago

Response

We do not argue that this (or indeed anything) can *prove* a young earth. However, we do claim that it is powerfully, overwhelmingly consistent with it. Certainly it 'taxes one's imagination' less to believe that such structures have survived a few thousand years, as opposed to 65 million or more.

Objection 4

The fossil record is capable of exceptional preservation, including feathers, hair, soft tissue and cellular structure.

Response

Most instances of exceptional fossil preservation (which all speak of rapid processes, incidentally) do not involve the tissue itself, or any remnant of it which is still flexible or even capable of hydration. For example, the preservation of feathers is often merely their imprint. 'Cellular structure'

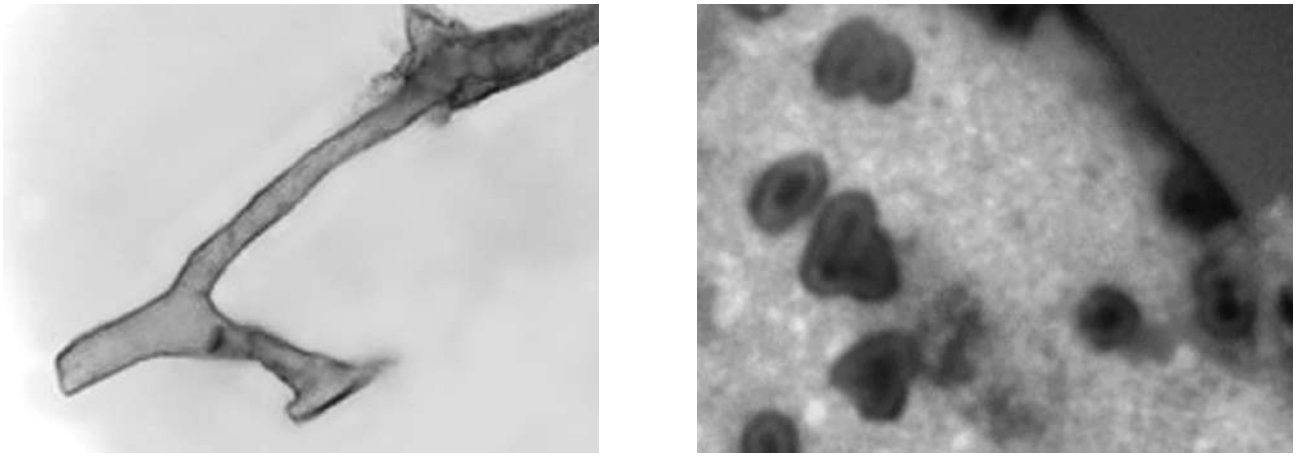

Figure 2. Left, *The flexible branching structures in the* T. rex *bone were justifiably identified as 'blood vessels'. Soft tissues like blood vessels should not be there if the bones were 65 million years old.* ***Right,*** *These microscopic structures were able to be squeezed out of some of the blood vessels, and can be seen to 'look like cells' as the researchers said. So once again there is scope for Dr Schweitzer to ask the same question she asked before, 'How could these cells last for 65 million years?' (Photos by M. H. Schweitzer).*

can be preserved within a rock-hard, completely mineralized specimen (which structure would therefore disappear if those minerals were dissolved, by the way). That is *not* what the report on the find of dinosaur soft tissue is talking about.

Objection 5

Under the right conditions biomolecules are very resistant and could survive for millions and millions of years.

Response

This objection was in a paper that on the one hand insisted that the original structures are not preserved, i.e. 'not the original blood vessels', and then later argued that the find was not an indicator of youth because the biomolecules are extremely durable, and were probably preserved in a special chemical environment. Of course, they can't have it both ways. But in any case the main 'evidence' that biomolecules can last that long is that they have allegedly lasted that long! However, *known* rates of chemical breakdown[13,14] show that this is allowing the presupposition to rule the data. It is obvious to all that any 'remnants' that 'retain some elasticity and resiliency' are a powerful 'alert' to the public at large that something could well be drastically wrong with the millions of years.

It is worth noting that tissue in a fossil bone that is not well mineralized is not going to be anywhere near as well protected from the forces of decay as tissue inside a mineralized bone. But complex biomolecules, such as proteins, are thermodynamically destined to fall apart eventually (from the random motion of molecules) even were they to be protected from all outside influences such as air, moisture, bacteria, etc. This is why it is so astonishing to think of soft tissue structures, not minerally protected, lasting for millions of years.

The fact is that some of the biomolecules had already degraded, as expected in 4,000 years since the Flood, and some had not. The astonishing thing was not that there had been degradation of biomolecules in that time, but that some had survived. But 'astonishing' becomes 'unbelievable' when the alleged timescale is 65 million years or more.

Many long-agers have openly expressed their astonishment. E.g. Derek Briggs, a paleontologist at Yale University said it was a 'totally novel discovery', while Dr Tsujita said such preservation is 'improbable but obviously not impossible'. Note that this is a veiled admission that he was surprised by such tissue preservation over alleged millions of years, but since preserved tissue has been found, then to a long-ager, it's obviously proof that it *can* be preserved over such eons![15]

The point is that the stretchy, pliable stuff that was in the shape of blood vessels, etc. was regarded by Schweitzer, and by all other reasonable people who have read the paper concerned, as remarkably preserved soft tissue, i.e. it has not been replaced by minerals. As quoted in our main article, she said that 'preservation of this extent, where you still have this flexibility and transparency, has never been seen in a dinosaur before'.

Schweitzer was clearly motivated by her serendipitous (and totally unexpected, thanks to the long-age belief system[16]) discovery of the red blood cells in dinosaur bone to start looking for such things. When the leg bone was broken open, it was sent to her because other dinosaur researchers knew of her interest, subsequent to the red cell find, in looking for such things. Evolutionists are now saying that, because of the discovery, museums should consider looking again at their specimens with a view to breaking open some bones, as they have probably overlooked many such specimens all along. Many are looking forward to now being able to test various evolutionary theories on such specimens (i.e.

now that we 'know' that soft tissues must be able to survive millions of years). To reinforce the point, Schweitzer has apparently found a number of other such specimens since this one. In other words, now that we know that it's worth looking, we can easily find such specimens. So why wasn't it done before? Because no one expected to find such things because they did not expect them to last millions of years. How much more obvious could it be?

Will they now be convinced?

So will this new evidence cause anyone in the halls of academia to stand up and say there's something funny about the emperor's clothes? Not likely. Instead, it will almost certainly become an 'accepted' phenomenon that even 'stretchy' soft tissues must be somehow capable of surviving for millions of years. (Because, after all, 'we know' that this specimen is '70 million years old'.) See how it works?

Schweitzer's mentor, the famous 'Dinosaur Jack' Horner (upon whom Sam Neill's lead character in the *Jurassic Park* movies was modelled) is already urging museums to consider cracking open some of the bones in their existing dinosaur fossils in the hope of finding more such 'Squishosaurus' remains. He is excited about the potential to learn more about dinosaurs, of course. But—nothing about questioning the millions of years—sigh!

Let's step back and contemplate the obvious. This discovery gives immensely powerful support to the proposition that dinosaur fossils are *not* millions of years old at all, but were mostly fossilized under catastrophic conditions a few thousand years ago at most.[17]

From Wikipedia.org, the free encyclopedia

As a result of Dr Mary Schweitzer's remarkable discovery of soft tissue in the femur of a Tyrannosaurus rex*, museums around the world may now be taking a closer look at the dinosaur bones in their collections.*

Appendix

An 'Ostrich-osaurus'—really?

In an obvious effort to capitalize on the current 'birds are dinosaurs' craze in evolutionism, the authors of the *Science* report[1] compared the microscopic anatomy of their well-preserved dinosaur bone to a bone from a bird. For some unexplained reason, they chose an unidentified area of an unidentified bone from a recently deceased ostrich.

Using a light microscope and scanning electron microscope, they gleefully reported that the general appearance of blood vessels, connective tissue and cells from both the dinosaur and the ostrich are 'virtually indistinguishable'. Specifically, they reported that the blood vessels have the same branching tubular appearance and appear to be lined with the same type of cells with nuclei. The nearly transparent vessels contain the same presumed red blood cells. The bones of both have the same presumed osteocytes, with the same cytoplasmic processes embedded in the same fibrous connective tissue. The unstated conclusion is that this similarity in microscopic structure proves that dinosaurs and birds are closely related through evolution.

Similarities are to be expected

One cannot help but wonder if this was the first time these paleontologists looked at soft tissue or bone through the microscope. All of the similarities they describe would be expected in essentially any amphibian, reptile, bird or mammal. All small blood vessels are tubular and branched. All blood vessels, as well as the heart, are lined with special cells called endothelial cells. Among other things, these cells are necessary to avoid clotting of the blood inside the vessel. And of course, all blood vessels contain … blood cells.

Nearly all bones are produced by special cells called osteoblasts that secrete a special organic matrix that attracts minerals to deposit in close association with connective tissue fibers (collagen) and other bone-specific organic components. In most bones, these cells develop long processes and become buried in the very matrix they secrete (prior to mineralization), at which time they are called

osteocytes. Although osteocytes are found in essentially all bone (with the exception of some fish), their function is not well understood.

While the authors report what appear to be red blood cells in both the dinosaur and the ostrich, they do not mention the presence of nuclei in the red blood cells. Erik Stokstadt, however, reporting on this study in *Science*, claims that 'inside these [dinosaur red blood cells] are smaller objects similar in size to the nuclei of the blood cells in modern birds.'[18] If indeed, the dinosaur red blood cells do contain nuclei, this would hardly be surprising for a reptile, and certainly would not prove their presumed evolutionary relationship to birds. All amphibians, reptiles and birds have nucleated red blood cells. Even mammals have nucleated red blood cells in their bone marrow.

Why not use a reptile bone?

Sadly, we have become accustomed to reading published reports pertaining to evolution and its millions of years in both the popular and scientific literature that are highly biased and lacking in scientific substance. And this report by Schweitzer and co-workers, by using ostrich bone as a comparison, is lacking in merit even by evolutionary standards. Certainly the report of yet another dinosaur fossil with evidence of soft tissue is interesting in itself. But why did the authors choose to compare the histology (microscopic anatomy) of this bone to an unidentified bone from a bird—and why an ostrich? Why not compare the histology of the dinosaur bone to that of some living reptile? After all, dinosaurs *are* reptiles.

The answer to this question is obvious. It wouldn't be very interesting to report the well-known fact that unsectioned blood vessels, blood cells, bone matrix and bone cells of most vertebrates look similar at the level of detail observed in this study.

One must assume that the standards for publication in even the most prestigious scientific journals like *Science* are quite different for evolution than for any other branch of empirical science. Evolutionary paleontology appears to be the branch of science in which so many of its proponents are so dug-in with their beliefs that their thinking promises to remain buried in the sand, regardless of where the facts lead.

References

1. Schweitzer, M.H., Wittmeyer, J.L., Horner, J.R. and Toporski, J.K., Soft-tissue vessels and cellular preservation in *Tyrannosaurus rex*, *Science* **307**(5717):1952–1955, 2005.
2. Wieland, C., Sensational dinosaur blood report! *Creation* **19**(4):42–43, 1997; <www.answersingenesis.org/creation/v19/i4/blood.asp>.
3. Evolutionist questions AiG report—Have red blood cells really been found in *T. rex* fossils? <www.answersingenesis.org/docs2002/0325RBCs.asp>.
4. Scientists recover *T. rex* soft tissue: 70-million-year-old fossil yields preserved blood vessels, <www.msnbc.msn.com/id/7285683/>, 24 March 2005.
5. Also at North Carolina State University.
6. McIntosh, A.C., Edmondson, T. and Taylor, S., Genesis and catastrophe: the Flood as the major biblical cataclysm, *TJ* **14**(1):101–109, 2000.
7. Kuhn, T.S., *The Structure of Scientific Revolutions*, 3rd edition, University of Chicago Press, Chicago, IL, 1996.
8. Morell, V., Dino DNA: the hunt and the hype, *Science* **261**(5118):160, 1993.
9 Hurd, G.S., Dino blood redux, <www.talkorigins.org/faqs/dinosaur/flesh.html>, 15 August, 2005 (atheist).
10. Moore, G., Dinosaur blood revisited, <www.reasons.org/resources/apologetics/other_papers/dinosaur_blood_revisited.shtml>, 15 August, 2005 (progressive creationist relying heavily on the atheist, Hurd).
11. Remember this is not human tissue; our red blood cells lose their nucleus as they mature.
12. Embery, G., Milner, A.C., Waddington, R.J., Hall, R.C., Langley, M.S. and Milan, A.M., Identification of proteinaceous material in the bone of the dinosaur *Iguanodon*, *Connect Tissue Res.* **44** Suppl 1:41–46, 2003; <www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=12952172&dopt=Abstract>
13. Lindahl, T., Instability and decay of the primary structure of DNA, *Nature* **362**(6422):709–715, 1993.
14. Pääbo, S., Ancient DNA, *Scientific American* **269**(5):60–66, 1993.
15. Perkins, S., Old Softy: Tyrannosaurus fossil yields flexible tissue, *Science News* **167**(13):195, 2005.
16. Affirmed by the quote attributed to her in *Science* **261**:260, 1994: 'It was exactly like looking at a slice of modern bone. But, of course, I couldn't believe it. I said to the lab technician: "The bones, after all, are 65 million years old. How could blood cells survive that long?"'
17. Some dinosaur fossils could have formed in post-Flood local catastrophes.
18. Stokstad, E., *Tyrannosaurus rex* soft tissue raises tantalizing prospects, *Science* **307**(5717):1852, 2005.

Carl Wieland has degrees in medicine and surgery from Adelaide University. He practised medicine in Australia until 1986 when he commenced with what is now Answers in Genesis, Australia. In 1978 he founded *Creation* magazine and is still actively involved editorially. He has authored and co-authored many articles, papers and books. He is currently CEO of Answers in Genesis International and Answers in Genesis Australia.

David N. Menton received his Ph.D. in biology from Brown University, Providence, Rhode Island, USA. He has been involved in biomedical research and education for more than 30 years. Until recently David was an associate Professor of Anatomy at the Washington University School of Medicine in St Louis, Missouri. David is a speaker with Answers in Genesis, USA.