

Evidence for feathered dinosaurs?

Feathered dinosaur specimens are becoming common (table 1). In a recent article, Dr Emil Silvestru critiqued evidence for feathered dinosaurs presented in a Royal Ontario Museum exhibit.¹ While creationists should address these specimens, it was disappointing to find factual errors and unsupported assertions in this article.

Silvestru claims that since the Chinese province of ‘Liaoning is the only site where “feathered dinosaurs” have been found’ (abstract, p. 42), the dinosaurs preserved there probably only appear to be feathered due to the conditions under which they were fossilized. However, feathered dinosaurs have also been found elsewhere: *Jinfengopteryx* was discovered in the Chinese province of Hebei,² *Pedopenna* in the Mongolian Autonomous Region,³ and *Shuvuuia* in Mongolia.⁴ Also, one should expect the Liaoning deposits to preserve details of dinosaurian soft tissue that were hitherto unknown since hair, feathers, scales, internal organs and even colour patterns of other

animals are also preserved there.⁵

Silvestru asserts that anatomical similarities between theropods found with feathers and those preserved without feathers should not be used to assume that the latter had feathers (abstract, p. 47). However, the fossils of most small theropods preserve no integument whatsoever.⁶ Thus, arguing that absence of preserved feathers is evidence for a lack of feathers is erroneous. Absence of evidence for feathers is not evidence of their absence. The same argument could be applied to the featherless fossils of some birds,⁷ yet these birds were unquestionably feathered. When a feathered theropod is discovered, creationists should expect other members of that baramin to be feathered as well, regardless of where they are found or whether or not feathers were preserved.

One such theropod is *Juravenator*,⁸ which is similar to the feathered *Sinosauropteryx* but preserved without feathers and with patches of scales on its tail and hind legs. This was unexpected due to its presumed close relationship to *Sinosauropteryx*. Although viewed by Silvestru as confirming his assertions, the lack of feathers

in *Juravenator* does not substantiate a lack of feathers in all dinosaurs. *Juravenator* may have had feathers that were not preserved or *Juravenator* and *Sinosauropteryx* may belong to separate baramins.

Silvestru argues that the presumed feathers of Liaoning theropods were not their own. He speculates that these structures were either ‘bird feathers which are preserved with the dinosaur fossils’ or ‘the remains of a water plant that grew in those ancient lakes’ (p. 44). An examination of the feathers of most of these specimens renders such ideas incredible, because their arrangement coincides with that of modern feathered animals. They consistently project out from the skin in semiparallel fashion. The pennaceous structures visible in certain specimens⁹ are oriented so that they round off at their distal ends. The simple fibres of other specimens¹⁰ thin from their bases to their tips.¹¹ Their length varies depending on location, with longer structures consistently on the trailing edges of the forelimbs. The chances of bird feathers or plants being preserved this way are incredibly small, especially in multiple specimens.

Furthermore, these structures do

Table 1. Feathered dinosaur specimens.

Taxon	# Feathered Specimens	Reference
<i>Sinosauropteryx</i>	3	Currie, P.J. and Chen, P., <i>Canadian Journal of Earth Sciences</i> 38 (12):1705–1727, 2001.
<i>Shuvuuia</i>	1	Schweitzer, M.H. et al., <i>Journal of Experimental Zoology</i> 285 :146–157, 1999.
<i>Protarchaeopteryx</i>	1	Ji, Q. et al., <i>Nature</i> 393 :753–761, 1998.
<i>Caudipteryx zoui</i>	2	Ji, Q. et al., <i>Nature</i> 393 :753–761, 1998.
<i>Caudipteryx dongi</i>	1	Zhou, Z. and Wang, X., <i>Vertebrata Palasiatica</i> 38 (2):111–127, 2000.
<i>Beipiaosaurus</i>	1	Xu, X. et al., <i>Nature</i> 399 :350–354, 1999.
<i>Microraptor zhaoianus</i>	1	Xu, X. et al., <i>Nature</i> 408 :705–708, 2000.
<i>Microraptor gui</i>	6	Xu, X. et al., <i>Nature</i> 421 :335–340, 2003.
<i>Cryptovolans</i>	2	Czerkas, S.A. et al.; in: Czerkas, S.J. (ed.), <i>Feathered Dinosaurs and the Origin of Flight</i> , The Dinosaur Museum, Blanding, Utah, pp. 97–126, 2002.
<i>Sinornithosaurus</i>	1	Xu, X. et al., <i>Nature</i> 410 :200–204, 2001.
NGMC 91 (juvenile <i>Sinornithosaurus</i> ?)	1	Ji, Q. et al., <i>Nature</i> 410 :1084–1088, 2001.
<i>Scansoriopteryx</i>	1	Czerkas, S.A. and Yuan, C.; in: Czerkas, S.J. (ed.), <i>Feathered Dinosaurs and the Origin of Flight</i> , The Dinosaur Museum, Blanding, Utah, pp. 63–95, 2002.
<i>Epidendrosaurus</i>	1	Zhang, F. et al., <i>Naturwissenschaften</i> 89 :394–398, 2002.
<i>Yixianosaurus</i>	1	Xu, X. and Wang, X., <i>Vertebrata Palasiatica</i> 41 (3):195–202, 2003.
<i>Dilong</i>	1	Xu, X. et al., <i>Nature</i> 431 :680–684, 2004.
<i>Jinfengopteryx</i>	1	Ji, Q. et al., <i>Geological Bulletin of China</i> 24 (3):197–205, 2005; <staff.washington.edu/eoraptor/Troodontidae.htm#Jinfengopteryxelegans>.
<i>Pedopenna</i>	1	Xu, X. and Zhang, F., <i>Naturwissenschaften</i> 92 (4):173–177, 2005.

not resemble plants; they look like feathers. Their preservation is often so good that distinct quills, rachises, and vanes with individual barbs may be discerned.¹² They are also virtually indistinguishable from the undisputed feathers of fossil birds such as *Confuciusornis*.¹³

Regarding the specimens preserved with simple fibres covering the body, the possibility of plants masquerading as feathers has been ruled out in at least one instance. The fibres surrounding *Shuvuuia* are uncrushed, three dimensional, and hollow. High-resolution electron microscopy and chemical analysis of the beta-keratin within the fibres has shown them to be some form of epidermal structure, feathers being the most likely candidate.¹⁴

Describing a *Psittacosaurus* specimen, Silvestru states that it is said to have “strand-like bristles” (primitive feathers) on its tail.’ He then scoffs at this interpretation: ‘It must have been quite a fashion in those days!’ (p. 45). Ridicule is no substitute for argument. Regardless of whether the bristles are simple feathers, paleontologists who studied these structures concluded that they are genuine. The soft tissue preservation on this specimen is exquisite, authenticating the porcupine-like quills and revealing other details previously unknown in *Psittacosaurus*: its body was covered in plate-like scales surrounding roundels and quadrangular tubercles, and a horny sheath covered the horns on the side of the skull.¹⁵

Silvestru points out that the exhibit does not explain ‘how and why scales would evolve into feathers’ (p. 45), observing that its version of feather evolution begins with a filament. This is easily explained: some paleontologists no longer consider scales precursors to feathers. It is now proposed that feather evolution was similar to modern feather development, beginning with a thickening of the outer layers of skin, followed by the formation of a bud that lengthened into a tubercle and then a filament.¹⁶

Silvestru also criticizes the exhibit for not explaining why pterosaurs, ‘although having “evolved” feathers, never evolve into birds’ (p. 46). This

question is unnecessary from an evolutionary perspective. Unlike birds, pterosaurs did not rely on feathers for flight; each wing was composed of a membrane that stretched from a greatly elongated fourth finger back to the body.¹⁷ Recent studies have concluded that pterosaurs were excellent fliers.¹⁸ Why would they need to evolve a new flight system to replace one that was already highly effective?

In an attempt to explain dinosaur and pterosaur extinction, Silvestru states that the post-Flood environment ‘favoured the warm-blooded birds and mammals, while the dinosaurs and pterosaurs were very quickly demised’ (p. 47). However, the Bible does not explain how these animals went extinct, and numerous studies have concluded that many dinosaurs¹⁹ and all pterosaurs²⁰ were likely warm-blooded.

The evidence for feathered theropods is very strong. I suggest that, rather than focusing primarily on morphological differences between theropods and birds as whole groups, creationists should use similarities and differences between specific theropods and between specific birds to determine their various baramins. A picture should eventually emerge that, rather than confirming evolutionary expectations, is in perfect accord with the Bible’s account of the amazing diversity designed by our creative God.

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3. Xu, X. and Zhang, F., A new maniraptoran dinosaur from China with long feathers on the metatarsus. *Naturwissenschaften* 92(4):173–177, 2005.
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6. Paul, G.S., *Dinosaurs of the Air*, The Johns Hopkins University Press, Baltimore, Maryland, p. 65, 2002.
7. For example: Zhou, Z. and Zhang, F., Anatomy of the primitive bird *Sapeornis chaoyangensis* from the Early Cretaceous of Liaoning, China, *Canadian Journal of Earth Sciences* 40:731–747, 2003.
8. Göhlich, U.B. and Chiappe, L.M., A new carnivorous dinosaur from the Late Jurassic Solnhofen archipelago, *Nature* 440(7082):329–332, 2006.
9. I am referring specifically to *Microraptor gui*, *Cryptovolans*, *Jinfengopteryx*, *Pedopenna*, *Protarchaeopteryx* and *Caudipteryx*.
10. Here I am referring to *Sinosauropteryx*, *Dilong*, *Beipiaosaurus*, *Microraptor zhaoianus* and *Shuvuuia*.
11. Paul, ref. 6, p. 68.
12. Details of such complex feathers are preserved with *Microraptor gui*, *Cryptovolans*, the unnamed NGMC 91, *Jinfengopteryx*, *Pedopenna*, *Protarchaeopteryx* and *Caudipteryx*.
13. Chiappe, L.M., Ji, S., Ji, Q. and Norell, M.A., Anatomy and systematics of the Confuciusornithidae from the late Mesozoic of northeastern China, *Bulletin of the American Museum of Natural History* 242:1–89, 1999.
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20. Unwin, ref. 18, pp. 135–138. Shipman, ref. 17, pp. 219–244.

Emil Silvestru Replies:

I would like to thank Mr Clark for critically reading my article. It is most encouraging for me to know that our work is scrutinised—not only read and left on shelves. I have erroneously stated in the abstract, as Mr Clark pointed out, that feathered dinosaurs were only found in the Liaoning province. In this I did contradict myself, since in the paragraph called ‘History’ I also mentioned that the real star of the exhibit came from Inner Mongolia.

Although I have stated from the beginning of the article that it was meant to offer the perspective of the visitor to one particular exhibit, Mr Clark is extending his critique to the general case of feathered dinosaurs. Hence I am forced to use some arguments that I have not presented in the article proper.

I would like to address first a classical type of argument Mr Clark is using: he is summing up a case I made based on recent discoveries from Germany using the following: ‘Silvestru asserts that anatomical similarities between theropods found with feathers and those found without feathers should not be used to assume that the latter had feathers.’ The classical case of ‘lack of evidence is not evidence for lack’ concludes Mr Clark.

Well, I totally agree with this principle if applied in congruent circumstances. Nice as it may sound (vastly abused in my view by many evolutionists), I believe this adagio should be preceded by ‘in poor conditions of preservation’. But in the cases invoked in my article, the conditions of preservation are exquisite. So one may safely assume that if *Juravenator* was preserved without feathers *it did not have feathers*. Mr Clark states that ‘the fossils of most small theropods preserve no integument whatsoever.’ Correct if one adds: ‘because of poor preservation conditions.’ Yet Mr Clark simply asserts that ‘*Juravenator* may have had feathers that did not preserve or *Juravenator* and *Sinosauropteryx* may belong to different baramins.’ Yet the discoverers of the *Juravenator*

were surprised that despite the excellent preservation conditions (similar to the ones at Liaoning or nearby Solnhofen where the *Archaeopteryx* feathers have been preserved) there were no feathers preserved on *Juravenator*. As for the two fossils being different baramins, the assumption in the article (based on the references) is that in fact they were the same baramins.

Mr Clark rebuts my suggestion that some of the feather-like features in the exhibit may not be feathers after all. In doing so he refers to other fossils, making a general case. Once again, my article was explicitly written as an alternative guide to a particular exhibition and the specimens exhibited there did not convince me. I would have expected Mr Clark to refer to that specifically and the exhibits on display.

I was quite surprised by Mr Clark’s indignation with my use of what I see as a sarcastic comment (primitive feathers being ‘... quite a fashion in those days’) of which he says ‘ridicule is no substitute for argument’. To start with, that was never intended to be an argument, simply a sarcastic remark. Christ has taught us to be humble but not in the face of ridicule and hypocrisy! After all, He called Pharisees and Sadducees ‘generation of vipers’ (Matthew 3:7). I would invite Mr Clark to read some of the vitriol and ridicule that passes for much anti-creationist reasoning and continue to use against us and hope his indignation will match when considering them.

I am now getting to the most important (for me at least) statement that Mr Clark is making in his critique, this time regarding the evolution of feathers from scales. He states:

‘This is easily explained: some paleontologists no longer consider scales precursor of feathers. It is now proposed that *feather evolution* was similar to modern feather development, beginning with a thickening of the outer layers of the skin followed by the formation of a bud that lengthened into a tubercle and then a filament [emphasis added].’

First I would like to remind Mr Clark again that the text I wrote refers

to the exhibit at the Royal Ontario Museum where the case was made for feathers having evolved from scales. It’s hardly as if this evo-devo theory that Mr Clark explains was news to me—indeed, *did he even check my Note 9 which was a semi-popular account of the paper in his Note 16?* And there was no need to repeat what other creationists have already pointed out about this new theory (and the grudging concession to creationists that the scales-to-feathers idea doesn’t work).²

Secondly, I will chose to believe that by making this argument, Mr Clark is playing the devil’s advocate here and does not actually believe in the evolution of feathers which he says ‘is easily explained’. Yet there is still a problem with this ‘easy explanation’ Clark invokes: in order for the skin, rather than scales to evolve into feathers, one has to postulate that somehow some dinosaurs first lost their scales, existing for a time without them and subsequently evolved feathers. Now why would dinosaurs lose scales first? Not for better protection purposes for sure! From a strict evolutionary point of view, a scaleless dinosaur (theropod) would be less adapted and more vulnerable.

There is one last thing that I would like to mention and that is inspired by Mr Clark’s critique: I am convinced that whatever feathered vertebrates were found and will be found in the fossil record, they represent birds and no other category, regardless the continuing contortion of cladistics in order to accommodate them as precursors to birds.

All the same, some of my colleagues agree with Mr Clark that a feathered dinosaur is not ruled out by the creation model, but are yet to be convinced that any have been found.³ A number of prominent evolutionary paleo-ornithologists are likewise sceptical of feathered dinosaurs, e.g. Dr Alan Feduccia,⁴ but Mr Clark has ignored both sets of dino-bird sceptics and seems far too willing to accept the pronouncements of the evolutionary consensus.

The case of *Archaeopteryx* is symptomatic for this—this had fully-formed flight feathers, an avian braincase and through-flow lungs. Dinosaurs will

always remain dinosaurs, just as God has created them. And I believe God created them without feathers. Although I am perfectly aware that this is not a scientific argument, I believe that a featherless *Deinonychus* as reconstructed by paleontologists before the discoveries in Liaoning, is more logical a creature than the heavily feathered one they believe in now. Mr Clark uses the expression 'feathered theropods' which still means 'feathered dinosaurs' and he states their existence is a proven fact. This is where we are definitely at variance.

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References

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2. Matthews, M., *Scientific American* admits creationists hit a sore spot: Need for a 'new paradigm' in bird evolution, <www.creationontheweb.com/content/view/2775>, 13 March 2003.
3. E.g. Jonathan Sarfati argues, 'We have often pointed out that there is nothing in the creationist model that states that dinosaurs could not have feathers (or fur, for that matter). However, nothing so far has been remotely convincing.' New four-winged feathered dinosaur?, <www.creationontheweb.com/4wings>, 28 January 2003.
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Flood transported quartzites

I am referring to the paper 'Flood transported quartzites: Part 2', in *Journal of Creation* 20(2), 2006.

I also read the article 'Noah's long-distance travellers', in *Creation* magazine 28(3), 2006.

I am really interested in an explanation of how the metamorphism happened.

The quartzites are described as being formed by metamorphism of

sedimentary rock. Heat and/or pressure are required for the metamorphism. If we assume that the sedimentary rocks were laid down during the Genesis Flood, and it is believed that the quartzite boulders were scattered by the receding waters of the Flood, then we are talking of:

- sedimentary layers being laid down at the beginning of the Flood,
- hardening to such an extent that sequential differential uplifting of the land produced enough heat to cause metamorphism of the sediments, producing the quartzites at the top of the layers,
- further uplifting of the continents to start the recession of the waters to scatter the boulders, and
- all of this in more or less one year *while being under water*.

Is all of this feasible or is there another possible source of heat and pressure for the required metamorphism?

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Michael J. Oard replies:

I hadn't thought about the metamorphism, since it was really not germane to the quartzite project, which demonstrates late Flood transport long distance by fast currents. Regional metamorphism is still a subject for creation research. Even contact metamorphism is not so simple, since I have seen and run across other references where the country rock is not metamorphosed or is merely weakly metamorphosed compared to the assumed temperature of an intrusion that formed a dike or other igneous body.

The quartzites for our study came from the Belt Supergroup, Precambrian and 'dated' about 1.2 Ga. This supergroup is deposited in an elliptically shaped area with a long axis about 700 km. Based on eroded folds, the formation is greater than 20 km thick, and the bottom does not show up



Photo by Michael J. Oard

and the top has been eroded. About 10% of the Belt is quartzite, the other 90% being mostly argillite, a lightly metamorphosed shale. So, the depth of deposition is good enough for the metamorphism, but there could have been other heat and chemical sources during the Flood that would have helped. It is still debated by creationists whether the Belt is a Flood rock or a third day of Creation rock. I favour the former.

So, it looks like some mechanism caused huge rifts in the continental crust and filled them up very early in the Flood. The layers lithified rapidly and then were metamorphosed, which need not have anything to do with uplift. Some creationists believe it could be a hot chemical reaction. Then uplift started in the last half of the Flood and the Flood eroded the material, including the quartzite, spreading the quartzites over 950 km, more likely up to 1200 km away.

Yes, all this is feasible underwater for a one year Flood. Many catastrophic events occurred during the Flood.

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