

Sample of

Dinosaurs and the Expanding Earth

By

Stephen Hurrell

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THIS SAMPLE TO FRIENDS

WHO MAY BE INTERESTED

Praise for previous editions of Dinosaurs and the Expanding Earth ...

Stephen Hurrell's *Dinosaurs and the Expanding Earth* is something completely different. Hurrell's thesis - yes, this is an original work rather than a re-presentation of existing knowledge - is that large dinosaurs were forced to give way to smaller mammals because the Earth's gravity has increased, making the life of large creatures untenable.

... his thesis is well presented. ...

Geology Today Review

(This) cleared up a very contentious issue for me ... I checked my mathematical modeling today and discovered ... surface gravity during the Permian was about 50% what it is today, precisely what you are suggesting.

Dr James Maxlow, Geologist and author of Terra Non Firma Earth

Have you seen the huge dinosaur's footprint in Colorado? Or in Australia? Have you looked critically at a dinosaur skeleton in a Paleontology Museum (If you visit the Cappellini Museum in Bologna)? The size, posture and estimated weight of these giants are impressive and the problem of the mechanical deambulation of such large bodies has been posed many times. ...

The book is written in a plain straightforward style ...

Its clear and lively descriptions lead the reader straight to the core of the arguments. ...

Review in ANNALS OF GEOPHYSICS by Dr Giancarlo Scalera.

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Acknowledgements

I would like to thank everyone who has contributed to the concepts expressed in this book. I have now received hundreds of comments and suggestions about a reduced gravity on an ancient Earth which I initially presented in the first editions of this book, and these have helped make this third edition a better book. I would particularly like to thank John Davidson, James Maxlow, Ramin Amir Mardfar, Bill Erickson, Giancarlo Scalera, Neal Adams and Larry Myers for spending their valuable time providing helpful comments on this third edition. Sam Warren Carey and Lance Endersbee also commented on the first edition and although they have since passed away I am still grateful for their advice. Rod Townend and Robert Tipping both read drafts of the first edition and their efforts are still noticeable and appreciated for this third edition. Many thanks must go to Helge Hilgenberg for giving me permission to use a photograph of her father's expanding earth globe that was first published in his 1933 book. Also I am very grateful to Werner Kraus for the wonderful photographs he has provided of his life-sized reconstructions of a giant dragonfly and millipede from the Carboniferous. They very clearly show the large scale of life in those times. Any mistakes in this book remain mine as are the explanations and opinions given.

As in the first two editions of this book, I have tried to write it as clearly as possible even though it covers a very broad range of scientific concepts. It would be pointless making this book too technical since an expert in one subject is a layman in others and the book must cover a wide range of scientific disciplines. I have tried to provide a note in the text when concepts and illustrations have been inspired by previous authors so readers who wish to pursue a particular subject in greater detail can refer to the original publications mentioned. Special thanks go to my wife for her continuing role as proof reader and critic.

The Author

Stephen Hurrell lives near Liverpool in the UK. He has worked in different mechanical engineering design positions for various companies. It was his role as a mechanical design engineer at the UK's Electricity Research Centre that first offered him his insight into how scale effects were pertinent to the biomechanical problems of the dinosaurs' large size. These thoughts about dinosaurs as engineering structures, and the problems of scale effects, fostered the development of the Reduced Gravity Earth theory and its implications for the Expanding Earth. He can be contacted through his web site www.dinox.org.

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Introduction

The dinosaurs have been a source of wonder and fascination since they were first discovered. A large part of this fascination is their gigantic size, since they were the largest land animals ever to live with most average-size dinosaurs dwarfing the largest land animals of today. Although the gigantic size of dinosaurs is obvious, the reason has remained a mystery for over a century. Why were the dinosaurs so huge? What was so different about the world in those ancient times?

In October 1987, while on a lazy beach holiday in Portugal with my wife and son, I pondered on this question of the dinosaurs' gigantic size compared with present-day life. As a design engineer, I was particularly interested in calculations which showed that the bones of the larger dinosaurs were too weak to support their own body weight. Here was the essential paradox of the dinosaurs' large size. Their bones should buckle and crack. Yet the fossil bones in museums around the world showed that these giants had thrived in their own world of hundreds of millions of years ago. How can both of these statements be true? How is it possible for the dinosaurs to dwarf the life of today?

There is one simple, yet astonishing, answer. Today's life has evolved to live in our present gravity. In a reduced gravity dinosaurs would weigh less - so bones, ligaments and muscles could be weaker. Blood pressure would also be less. Effectively, the scale of life is controlled by gravity, so a weaker gravity would allow *all* life to become larger. Dinosaurs could become huge if the ancient Earth's surface gravity was weaker than the present gravity.

The explanation is beautifully simple in its clarification of the dinosaurs' gigantic size. Using the idea of an ancient Reduced Gravity Earth allows a fascinating new world in which the

animals of the past grew to gigantic proportions in a reduced gravity.

Over millions of years of geological time since the dinosaurs, the relative scale of life should reduce as gravity increased to the present-day value. There can be no doubt that this scale reduction of life has taken place. After the dinosaurs became extinct, a range of super-giant mammals reached the size of the smaller dinosaurs. Millions of years after them came giant versions of the animals of today. These died out within the last few million years to leave their smaller present-day cousins.

One possible reason for a Reduced Gravity Earth was that the ancient Earth was smaller with a reduced gravity to match. A few simple calculations on the Portugal beach in 1987 quickly revealed that the ancient Earth would need to be about half its present diameter to account for the scale of life during the dinosaurs' time. But just like most people I had taken it for granted from an early age that the dinosaurs' Earth was the same diameter as today's Earth. It seemed impossible that the ancient Earth had such a small diameter.

All these doubts were rapidly overturned when I returned home and researched the local library (there was no Internet in those days). It was soon obvious that several geologists had already proposed such a smaller diameter ancient Earth based on geological evidence that the Earth had expanded to its present size - an Expanding Earth.

Could it be true? Could it be so simple?

During the following years I contacted various geologists to help promote this concept. The British geologist Hugh G. Owen, who at that time was working at the London Natural History Museum, suggested that an easier method of promoting the significance of this concept more widely was to write a book. After his prompting the first edition of *Dinosaurs and the Expanding Earth* was finally published in 1994.¹

The book was an initial attempt to widely publicise the evidence indicating an ancient Reduced Gravity Earth. In that first edition I asked readers to contact me with any evidence that would throw light on the thesis of dinosaurs living in a reduced gravity. The invitation generated hundreds of responses from people all around the world and there have now been many interesting observations.

The Reduced Gravity Earth theory created a lot of controversy that is generally polarised into two widely different viewpoints.

¹ Hurrell, 1994.

Some people were (and still are) adamant that gravity was not less on the ancient Earth. A few were so convinced they were correct they seemed annoyed with me for even daring to suggest the possibility. But our scientific understanding of the world is still evolving, so we should be wary of insisting we are 100% right about everything we think we know. I take the more open-minded view that some of what we think we know could be wrong. This view of science is supported by history - look back 100 years and some of what was being taught as scientific fact was different to today. Look back another 100 years and the scientific truth of the day was different again. There is still room for radical new ideas.

Fortunately there were also other more open-minded people who were prepared to consider the possibility of a Reduced Gravity Earth. After reading a review of *Dinosaurs and the Expanding Earth* in the science magazine *Geology Today*, the Australian geologist John K. Davidson read my book in 1996 and was so impressed with the implications of the concept that he passed his own copy onto his former geology professor and obtained another copy of the book for himself.^{1,2}

Davidson's former professor was one of the leading advocates of the Expanding Earth theory - Sam Warren Carey, a Tasmanian Professor of Geology who championed the Expanding Earth theory for decades. He had long since retired but was still active in promoting the Expanding Earth theory to explain various geological observations that had troubled him for some time. A few years later in 2000 the second edition of Carey's last book, *Earth Universe Cosmos*, now included a new section on dinosaurs in reduced gravity and concluded:

Mesozoic dinosaurs could not have existed with present surface gravity, nor would have bat-like pterosaurs with 12 metre wing spans. Engineers (Hurrell, 1994) have shown that dinosaurs' bones could not have borne their weight ...

The size of dinosaurs peaked in the Jurassic with *Diplodocus*, *Brontosaurus*, and flying reptiles like *Quetzalcoatlus*. By the mid-Cretaceous *Triceratops* and *Tyrannosaurus rex* were much smaller, although still huge. Oligocene animals were much smaller although very much larger than their modern relatives. Birds

¹ John K. Davidson personal correspondence, 1996 & 2001.

² *Geology Today*, July-August, 1996/159.

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became lighter from the heavy-boned *Archaeopteryx* and the bird-like *Iguanodon* to much lighter modern birds.¹

Carey was obviously publicly supporting the concept of a Reduced Gravity Earth and clearly stated that gravity must have been less on the ancient Earth to enable dinosaurs to reach such immense sizes.

Carey was one of the founding fathers of the Expanding Earth theory based on geological evidence and had already contemplated one key unknown about the concept - was the Earth expanding under conditions of constant or increasing mass?

The evidence for a Reduced Gravity Earth theory clearly provided additional unrelated support to the geological evidence for an Increasing Mass Expanding Earth. Both theories reinforce each other and Carey also picked up on this key point:

Reduced Earth radius with constant Earth mass implies higher surface gravity, but much reduced surface gravity is essential for dinosaurs to have existed. The mass of the Earth must have been less.¹

As well as presenting Professor Carey with a copy of my book Davidson also had an astonishing piece of fresh evidence for a Reduced Gravity Earth.² He directed me to a scientific paper, published by two American professors in the Geological Society of America magazine, *Geology*, that presented remarkable direct evidence indicating that the Earth's gravity had changed since the dinosaurs' time.³

Professors C. John Mann and Sherman P. Kanagy had examined the angle of repose in sandstone blocks, which were once ancient sand dunes, and then compared this angle of repose with the present-day value to calculate ancient gravity.

'Angle of repose' is the angle between the horizontal plane and the surface of dry sand forming a hill. As commonly seen when sand dunes form, at steep angles the sand readily slides downhill but as the angle is reduced the sand reaches a point where it eventually stops moving. The angle where the sand stops sliding down is the angle of repose.

The key point of the professors' research is that the angle of repose changed the further back in time they looked. Since the

¹ Carey, 2000 (see page 131).

² John Davidson personal correspondence, 1996.

³ Mann and Kanagy, 1990.

angle of repose is directly related to gravity, measuring this angle in ancient sand dunes indicated that:

... steeper angles may have been recorded in ancient sediment because Earth's acceleration of gravity was less than now.²

It seems that they may have found an ancient record of the changing gravity of the Earth. The whole theory is subject to record and calculation so the reduced gravity of the past can be effectively measured from the angle of repose formed by ancient sand dunes.

Professor Mann confirmed he was still investigating the evidence when I wrote to him. Even though he warned me he was not an advocate of the Expanding Earth, we agreed to keep each other apprised of our own work in this area in view of the fact that we were both continuing to pursue answers to our questions about gravity changes on Earth.¹

Although Mann and Kanagy did not support the Expanding Earth theory, Davidson had explored the concept that this variation in gravity might be caused by some form of physical change in the Earth. He used the ancient sand dune data to calculate the size of the Earth expansion required to account for the increase in gravity in a scientific paper published in the *Frontiers of Fundamental Physics*.² Once again the results supported each other. All this evidence for a Reduced Gravity Earth was becoming very interesting!

Davidson wonders in some respects if the problem has wider implications since increasing gravity and present creation of matter is at the root of all science:

Increasing gravity evidenced by either biomechanics and the maximum angle of repose of sands has to be considered by all three possible Earth radii; contracting, constant and expanding. A contracting radius requires a starting radius, some 250 million years ago, approximately 50% greater than today's if the mass is kept constant. This would result in a residual present Pacific, after absorbing the Atlantic and Indian Oceans, about five times greater than it is. Either a constant radius or expanded earth requires increasing mass and an answer to the fundamental question, where did the

¹ C. John Mann personal correspondence, 1997.

² Davidson, 1994.

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mass come from? (Your book seems) to make the increasing mass problem principally one for the Earth Expanders alone, but the constant radius Plate Tectonicists have a lesser, but identical problem. This is the fundamental challenge to be addressed by all of us, especially the particle physicists.¹

Another correspondent was the Australian geologist James Maxlow who wrote in 1998 that:

Your dinosaur information cleared up a very contentious issue for me regarding whether the Earth is expanding under conditions of constant mass, or increasing mass. ... I checked my mathematical modeling today and discovered that under conditions of mass increase the surface gravity ... was ... precisely what you are suggesting. Prior to this I had been erring towards a constant mass scenario because of the, what I thought was an, unacceptable increase in mass for the future.²

Maxlow later published a book in 2005 about the Expanding Earth, *Terra Non Firma Earth*, which included a short section on dinosaurs and other prehistoric life and stated in part:

It can be seen that on an Expanding Earth, surface gravity during the Precambrian Eras would be about one third of the present value and about one half of the present value during the Mesozoic Era. The Mesozoic Era of course was the Era of dinosaurs, those very large, very long bodied creatures who could very well have benefited from a much lower surface gravity.

... for an Earth undergoing expansion as a result of an increase in mass over time, the surface gravity during the Triassic Period would have been approximately 50 percent of the present value. This then increased to approximately 75 percent of the present value during the Late Cretaceous Period.

Considering the large size and length of many of the dinosaur species, this much reduced surface gravity would have benefited their existence and mobility immensely. The progressive increase in surface gravity over time may then offer an additional explanation for

¹ John Davidson personal correspondence, 2010.

² James Maxlow personal correspondence 1998.

the relatively rapid turnover of dinosaur species throughout their long history.¹

Some people wrote that they had similar ideas about dinosaurs living in reduced gravity and a few of these have published their own thoughts on the subject in various forms.

Ramin Amir Mardfar is an Iranian who is interested in the evolution of animals and the effect of the Earth's gravity on it. In the year 2000 he published his book, *The relationship between Earth gravity and Evolution*, which comprised 13 of his scientific papers previously published in *Etelaat-e-Elmi Magazine*.² This book was written in Farsi, the official language of Iran, but fortunately for those of us who don't speak this language he placed an English translation on his web site.

Mardfar also discussed scale effects relative to an animal's blood circulation system. Fish have the simplest blood circulation with two-chamber hearts. Reptiles have three-chamber hearts. Mammals and birds have four-chamber hearts. These improvements in blood circulation can all be related to the higher blood pressure required to live at a larger scale.

William Carnell Erickson has been interested in reduced gravity for many years and published an article in 2001, *On the Origin of Dinosaurs and Mammals*. Erickson argued:

... that natural selection in reduced gravity will favor bone thinning, a relative decrease in skeletal mass, and an increase in the uppermost limit to body size. These predictions are borne out in the fossil record: the Late Triassic witnessed the proliferation of gracile, long-limbed and lightly-constructed diapsid reptiles (thecodonts and dinosaurs) at the expense of the synapsid (mammal-like) reptiles, animals that were much more compact, cumbersome and massively-constructed. Giant dinosaurs, such as *Melanosaurus*, were already present in the Late Triassic, followed soon thereafter by the largest of all land-living animals, the sauropods.³

Lance Endersbee, who was Emeritus Professor of Civil Engineering at Monash University, had also followed the debate as part of his interest in geology and commented in 2000 about

¹ Maxlow, 2005.

² Mardfar, 2000.

³ Erickson, 2001.

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the Reduced Gravity Earth theory in an article in the science journal, *ATMS Focus*:

... the force of gravity may have been less in earlier times. Stephen Hurrell, a design engineer, worked out that the bones of the larger dinosaurs were too weak to support their own body weight. He concluded that they could only have evolved at a time when the force of gravity at the Earth's surface was much less than at present.¹

The Italian geoscientist Giancarlo Scalera produced a compilation of some of the main arguments for a Reduced Gravity Earth in the 2003 book *Why Expanding Earth?*, which was dedicated to Ott Christoph Hilgenberg, one early pioneer into the concept of the Expanding Earth.² Scalera's review noted:

The possibility that paleogravity could be lesser and lesser going back through geological time has been defended on different bases. The first topic says that the Dinosaur sizes and their bone architecture (especially the giant biped Dynos) are not suitable to walk and still more difficult, to run ...

From the vegetal realm it is possible to note a progressive decrease of the dimensions of the trees, whose maximum height depends on the possibility to transfer water and sap to higher leaves, and then directly from gravity. ...plants, from angiosperm to gymnosperm and so on have decreased in size on the average through Mesozoic and Cenozoic, and this can be undoubtedly interpreted as evidence of lesser Mesozoic gravity.³

A more comprehensive scientific examination of the implications behind any possible gravity variation is contained in Scalera's paper *Gravity and Expanding Earth*.⁴ He has also reviewed the first two editions of *Dinosaurs and the Expanding Earth* and concluded in part:

Have you seen the huge dinosaur's footprint in Colorado? Or in Australia? Have you looked critically at a dinosaur skeleton in a Paleontology Museum ... ?

¹ Endersbee, 2000

² Scalera and Jacob, 2003

³ Scalera, 2003.

⁴ Scalera, 2002 & 2004.

Stephen Hurrell's book ... offers a discussion of this problem, proposing an increasing gravity throughout geologic time. ...¹

The Internet has spawned numerous web sites which promote the Reduced Gravity Earth theory and various people are also arguing the case for a Reduced Gravity Earth in Internet discussion groups like *Unexplained-Mysteries.com* and *The Paleogravity Chat Room*.

One of the most noticeable people using the Internet to argue the case for a Reduced Gravity Earth due to an Increasing Mass Expanding Earth is Neal Adams who has also been interviewed on American Radio explaining why he believes dinosaurs lived in a reduced gravity. As he explained to Art Bell on the American Coast to Coast radio program in 2005, and a number of other radio shows:

There is a debate on the Discovery Channel between two very prominent paleontologists who talk about a *Tyrannosaurus rex* and they say it was the size of, or larger than, an elephant. One of them says it was a scavenger because it could not run faster than 10 miles per hour. The other scientist - a very profound scientist - says no, that's not true. It was a predator: it chased down and killed its prey. The other scientist says it could not chase down and kill its prey because if it took a right turn going 50 miles per hour its head would snap off. Well, you know, it's true. Its head would be the weight of a motor cycle and bone really can't carry that kind of weight. ...

This debate can easily be settled by assuming that gravity (was less than today).²

The book sales of *Dinosaurs and the Expanding Earth* have not followed the typical pattern of most books where sales generally decrease after the initial surge of interest. Sales of the book have gradually increased over the years as the Reduced Gravity Earth theory began to be more widely known and debated. The first hard back edition sold in small but steady numbers so it needed to be reprinted in 1996 and 2001. An ebook edition was also released in 2003. But as the theory and its implications became more widely known, sales gradually increased year on year and

¹ Scalera, 2006.

² Neal Adams's interview on American Coast to Coast Radio Program, 2005.

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various people began asking me for another paper copy of the book to be reprinted.

Rather than just allowing the book to be reprinted, I have taken the opportunity to make some minor edits and explain various points in greater detail, as suggested by many readers. I hope this has made this third edition an even better and more interesting book and must pass on my sincere thanks to everyone who has suggested improvements.

Acceptance of the possibility of a Reduced Gravity Earth has gained ground slowly but steadily over the years since the first edition of *Dinosaurs and the Expanding Earth* introduced the theory. Some disregard the new concept without much thought but others think deeply about it and see the merits of the idea. These individuals tend to pass the information onto others so it gradually becomes more widely known and debated. Today there are some notable supporters of the Reduced Gravity Earth theory.

This book can only be a brief introduction to the concept. The Reduced Gravity Earth theory, and its implications for the Expanding Earth, will require years of further open-minded research and support to develop and refine the concepts. It needs your support.