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Dinosaurs and the Expanding Earth

By

Stephen Hurrell

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WHAT REVIEWERS HAVE SAID ...

‘... something completely different ... an original work rather than a re-presentation of existing knowledge ... well presented’

Geology Today

‘(It’s) ... shown that Dinosaurs' bones could not have borne their weight ... much reduced surface gravity is essential for Dinosaurs to have existed’

Professor S. Warren Carey, University of Tasmania

‘(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

‘I thought I was the only one who questioned the riddle of Dinosaur size. (This) book is fascinating ... I'm pleased and at the same time a little envious. I could never have written a better study of this phenomenon’

Edwin Myers, Film maker

‘... the bones of the larger Dinosaurs were too weak to support their own body weight ... they could only have evolved at a time when the force of gravity at the earth's surface was much less than at present ... we can understand the huge size of the Dinosaurs’

Emeritus Professor Endersbee, Monash University

‘This book touches upon what is today considered forbidden scientific territory, ... this wonderful text is the best we have. I hope it brings forth the second generation of researchers this subject area so desperately needs’

Amazon.com

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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, for 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 the 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 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. The size of all life is controlled by gravity. A stronger gravity would tend to reduce the size of life while a weaker gravity would allow life to become larger. Dinosaurs may have become so huge because the earth's surface gravity at that time was weaker than present.

The explanation is beautifully simple in its clarification of the dinosaurs' gigantic size. Using the idea of an increasing gravity allows a fascinating new world in which the gigantic animals of the past were forced to evolve into smaller sizes as gravity increased to the present day value. There can be no doubt that this size 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.

Could it be true? Could it be so simple? This book is a first attempt to explore the possibility. The ideas presented here may well produce some more. If so, let's hear them.

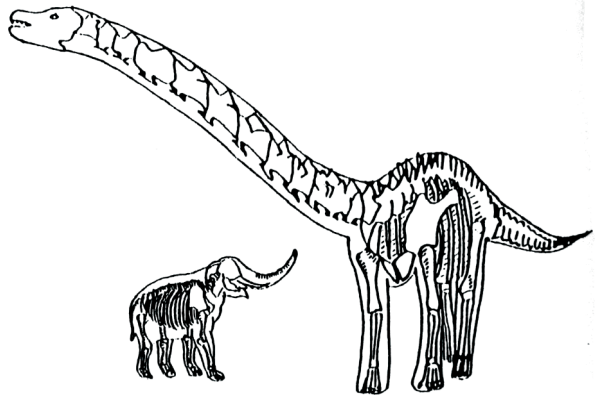
Chapter 1 - The Size Limits of Life

The mystery of the dinosaurs' large size

Intense study of prehistoric animals has demonstrated beyond doubt that the dinosaurs were the largest land creatures which ever lived. Their immense size has fired man's imagination since their first discovery — even the name dinosaur means terrible lizard. This gigantic size has often been a cause of wonder to many people, from young to old, thereby ensuring that the continuing fascination with the dinosaurs has one main question. Why were the dinosaurs so large?

The dinosaurs which have the honour of being the largest group of four-

The skeleton and outline of one of the sauropods, Diplodocus, and the Indian Elephant both drawn to the same scale shows the large scale of the dinosaurs. Diplodocus stood 3.8 metres tall at the hips. The Indian Elephant is 3.1 metres head height and the African Elephant is 3.3 metres head height.



legged land animals to have ever lived are the sauropods. They had long necks and tails with four elephant-like legs. They included among the more well-known, *Apatosaurus*, (formerly known as *Brontosaurus*), *Brachiosaurus* and *Diplodocus*. Some achieved incredible sizes. Many measured from 20 to 25 metres long and weighed over 50 tonnes. This is over seven times the weight of today's largest land animal, the African bull elephant.

In 1912 the largest known land animal to have ever existed was discovered in East Africa. Now in the museum in East Berlin it is a mounted reconstruction of *Brachiosaurus*; it was 22.5 metres long, stood 12 metres high, and it was estimated to have a mass of 77 tonnes — as much as 12 bull elephants. The shape of its deep, narrow chest and its legs suggest an animal which lived on

land. It appears to have been a gigantic giraffe-like animal, browsing the tops of trees.

The immense size of the dinosaurs has given problems from their earliest discovery. When a bipedal dinosaur, *Iguanodon*, was first described its size was so massive that it was reconstructed in London's Crystal Palace Park, in 1853, as a stout-legged, four-footed dinosaur. This was hardly surprising as *Iguanodon*'s mass was greater than today's elephant and it was over 10 metres long.

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Chapter 2 - The Giants of the Past

The reconstruction of fossils

We have now considered the relationship between the earth's gravity and the relative size of life. The main point which emerged is that a lower gravitational field will allow all life to become larger, and this illustrates how the large size of life at the time of the dinosaurs was due to a lower gravity in the distant past. The argument can be extended further because any change in the relative size of prehistoric life over time quantifies how the earth's gravity has also changed.

In order to compare the relative size of life in the past with present day life it is vital to ensure that both the age of the fossil is correct and that like-to-like comparison is made to minimise any error — even a variation in an animal's activity level can change its optimum size. This type of problem in determining the optimum size means that any value of gravity can only give an impression of how life's sizes, and hence gravity, have changed with time.

Fortunately, our world has supported a vast range of land-based life for hundreds of millions of years. At certain times, as animals and plants died they were buried, covered with mud and sand, and their soft parts decayed as their hard parts were slowly replaced by rock. A fossil had formed. This process preserved some of them for hundreds of millions of years. As life ebbed and flowed, as mountains rose and were worn away, and as seas came and went, these isolated islands of fossils remained intact.

The fossil record is very imperfect. Usually there might be detailed fossils of several animals or plants from one brief time in the distant past. Then for millions of years the fossil record is completely blank and nobody can say if these animals became extinct or continued to exist. This is shown by the discovery of animals alive today which have been presumed to have been extinct for millions of years. One such living fossil is the coelacanth. The first live example of this fish was discovered off the coast of Africa in 1938. Before this discovery, this fish was only known from Cretaceous fossils of a hundred million years ago.

Despite these imperfections in the fossil record, palaeontologists have been able to reconstruct the now extinct range of life in remarkable detail. Although the flesh and muscles of the animals are very rarely fossilised, by studying the shape of the bones the size of the muscles and ligaments can be estimated. Their fossilised footprints are examined and compared with today's animals to estimate their speeds. Their teeth show whether they ate meat or plants, and the

fossilised remains of their stomachs tend to confirm this evidence. A piece of fossilised skin can be extended to cover the whole body until the palaeontologist can present us with a very good impression of animals and plants which have been extinct for hundreds of millions of years.

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Chapter 3 - Drifting Continents

Possible causes of a gravitational increase

The last two chapters have explained why I believe the earth's gravity has been slowly increasing. Why would the force of gravity have changed? Has gravity increased throughout all space or is the increase restricted to the earth's surface? Has the increase stopped or is it still happening now? These questions can only be answered by establishing the cause of the increasing force of gravity at the earth's surface.

There are several possible causes of a gravitational increase. At first sight, an easy solution would be if the force known as the universal constant of gravity was changing with time. The universal constant of gravity is present throughout all space and time and is assumed never to vary. It is that fundamental force which tends to make two masses attract each other. The magnitude of gravitational attraction between two bodies is directly proportional to the universal constant of gravity and the mass of the two bodies, and inversely proportional to the square of the distance between them.

This universal constant of gravity has always been assumed to be the same throughout all space and time, and indeed the evidence strongly supports this view. If the universal constant of gravity was changing on the earth then the same effect would be occurring throughout all space and time and this does not agree with the telltale light from the distant stars that astronomers observe in the universe.

The study of the stars has shown that the physical processes occurring in the sun and stars depend on the force of gravity within the central stellar mass. Changing the universal constant of gravity would change the heat output to a marked degree. Since we can effectively look back in time by observing distant stars, any change in the stars that are distant in time and space would already have been noted. These ancient stars follow the same sequence of events that younger stars do. Hence the universal constant of gravity must be the same in both time and space.

If the universal constant of gravity has remained the same then the increase in gravity at the earth's surface must have been caused by some physical difference of the earth. What could be so different about the earth to cause such a marked change in its surface gravity? One possible solution is that the earth was much larger than its present size but was much less dense. As it compacted and became more dense the gravitational field at the surface would increase.

However, this theory of a contracting earth is unsuitable since it does not fit the known geological facts of the earth. Indeed, all the available evidence shows that the earth has been expanding.

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Chapter 4 - The Expanding Earth

The difficulty in accepting a radical new theory

The idea of an earth which is constant and unchanging has been restated so often throughout history that it has now become established as a firm fact. It needs no proof — which is lucky since there is none. There have been many instances where other beliefs have come to be treated as firm facts over generations. These beliefs have become so firmly rooted in the minds of mankind that it is sometimes dangerous to propose an alternative. A classic example of this was when Copernicus first discovered that the earth orbits the sun.

Between the years 1510 to 1514 Copernicus circulated within a small group a manuscript summarising his theory of how the earth revolved around the sun. This was a completely different view from that held by most people who believed that the earth was the centre of the universe and that the planets, sun and stars revolved around it. The idea that the earth was the centre of everything was taken to be a firmly established fact since the sun was observed to rise in the morning and move across the sky before it set at night. In the same way as the sun, the moon and stars could also be seen to revolve around the earth. For many, it needed no further proof.

Copernicus was wise enough to realise the anger that would develop when he published his theory. He postponed publishing his work "On the Revolutions of the Celestial Spheres" until 1540 when he was near his death. A finished copy is believed to have been brought to him on the last day of his life.

One man who was later to support this theory was not even born at the time of the publication. This was Galileo, the famous Italian mathematician, astronomer and physicist. Many years after Copernicus's death he began to study the stars and planets through the newly discovered telescope. He saw Jupiter's moons and Saturn's rings, and these observations convinced him that the earth and planets must orbit the sun.

By the year 1613 Galileo's reputation was so well established that he published three letters in which he maintained that the Copernicus theory was correct. Although he was confident of his position and rank, he had misjudged the depth of belief in the earth as the centre of the universe. The Aristotelian professors united against him and he was finally secretly denounced to the Inquisition for blasphemous utterances. Much alarmed by these events, he wrote letters to the Grand Duke reminding the Church of its standing practice

of interpreting Scripture as conveying a deeper meaning than that on the surface whenever it clashed with scientific truth. This was not successful and resulted in the Copernican system being declared false in 1616.

While Galileo was arguing his beliefs with the Church, others were having more success. In 1609, Kepler had demonstrated that Mars revolves in an elliptical orbit around the sun. Kepler was the first to extend Copernicus's reasoning to the other planets to show that all the planets were bodies like the earth rotating around the sun. By 1619 Kepler had published all three of his principles of planetary motion.

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Chapter 5 - Meteoroids and the ice ages

Introduction

In the last few chapters I have explained why I believe the earth has doubled in diameter, and increased in mass by about eight times, during the last few hundred million years. In this chapter I shall examine three possible causes for the expansion of the earth with extra matter:

- (a) That the interior core of the earth is creating new matter
- (b) That cosmic particles are becoming embedded in the core of the earth
- (c) That the earth has been repeatedly bombarded by meteorites and cosmic dust to increase the size of the earth

The evidence appears to strongly favour one of these possibilities over the others. We can of course rule out previous suggestions that various atoms within the interior of the earth are disintegrating with time, since this does not create new matter. Due to the size reduction of life on our own planet we know that the mass of our planet must have been growing to increase the volume of the earth.

New matter

The first idea, that new matter is being created inside the core of the earth, is outside any known physical laws acting in our universe. It should therefore be treated with suspicion, since matter has not been observed to come into existence. Of course, the fact that this has not been observed to occur on the surface of the earth does not mean that it is not occurring deep within the core of the earth. The earth's core is subject to great pressures and densities, so these unusual conditions may produce unique physical reactions deep within the heart of the earth. It must remain pure speculation since there is no direct evidence for or against this idea. But having stated this I tend to ask myself where matter began. Did it really come into existence at the beginning of time and space, or is it being created now?

Cosmic particles

The second idea, that cosmic particles are becoming embedded deep within the core of the earth, is based on the observation of the cosmic particles that bombard the earth. The idea of matter being able to enter the earth from space is similar in concept to that proposed by Hilgenberg in 1933. In his book 'Vom

Wachsenden Erdball' he suggested that an ether-like material from space enters the interior of the earth to increase both the mass and volume of the earth. Unfortunately I have been unable to obtain a copy of his book, so I cannot say if he also considered the effect this new mass would have on the surface gravity of the earth. In any event, the physics of the day stated that this hypothesis was physically impossible and the idea was dismissed.

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Chapter 6 - The solar system

Introduction

The concept of an earth which has been expanding while life has evolved on it has significant effects on how we must view the whole universe. If the earth has formed by expanding in size then it is likely that all planets have also formed in the same manner. Not only the planets in our own solar system, all the planets in the universe should be forming in exactly the same manner.

Every planet will go through the same process. A few specks of dust will begin to clump together to form a meteorite. Other objects crash into it, constantly distorting its shape while pock-marking it with the characteristic meteorite craters seen on the moon. From a small irregular shaped meteorite it will become large enough for its gravity to form it into a spherical shape. At first it will be too small to hold any gases at its surface, but after eons of time it will become large enough to hold an atmosphere.

A planet's atmosphere forms in a roundabout route. As a planet increases in size internal activity begins to produce volcanoes on the surface. As well as magma, these volcanoes emit large amounts of gas and water vapour. It is this gas which develops into the atmosphere. As the atmosphere increases in density it will begin the process of weathering with wind storms which will begin to change the whole surface of the planet by eroding meteor craters away.

Of the inner planets and moons in our own solar system, earth is the largest. It should be possible to plot the results of this slow expansion with examples of different stages from the moons and inner planets, starting with the smallest moon, through to the largest of the inner planets — earth.

The size of the moon or planet should show its age. The smallest moons will be the youngest while the largest planets will have needed the most time to form.

The Moon

On a clear night it is easy to see darker and lighter patches on the moon. The moon is composed of light-coloured highland areas and dark-coloured low-lying areas. From earth the low-lying areas appear to be some form of liquid that has flowed into the craters and low-lying areas of the moon — hence they are called the Latin for sea - Maria. It is also possible to see numerous craters of all sizes.

It is now generally agreed that most of the craters have been formed by impacting bodies. The body is likely to be traveling up to 20 km per second as it strikes the moon's surface and begins to compress it downwards. Huge shock waves develop, and the surface is squeezed out sideways from between the impacting bodies and the surface at high velocities. This material has such a high velocity that it escapes the gravity field of the moon and enters space. Meanwhile, the impacting body continues downwards, to form the bowl shape of a new crater. Much of the energy of impact has now been dissipated as heat and the material which is still being ejected begins to fall back to the surface of the moon. The total time for the average crater to reach this stage would be less than one minute. In the last moments of the formation of the crater, there will be quantities of broken rock and dust which gets trapped inside the crater. In larger craters more than 15 km across a central hill sometimes forms.

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Chapter 7 - The ancient earth

Introduction

What was the ancient earth like? Was it boiling hot? Perhaps it was freezing cold? Why could not the higher forms of life exist? Was there any atmosphere, and if there was, was it a lethal mixture of gases like Ammonia or Hydrogen Sulphide? All these questions are among the most difficult to answer. In practice the record of the ancient earth is so fragmentary that the conditions present during the first 90% of the earth's lifetime is almost completely unknown.

There are a few known facts. From the nature of the oldest earth rocks comes the fact that these rocks formed on an earth without oxygen. As progressively younger rocks are examined, the oxygen level slowly increases up to its present day level. The oldest rocks are also less dense than the rocks which tend to form today. They are similar in density to the rocks which are found on the moon. The development of life can also be traced in these rocks. For about 3000 million years life slowly evolved, and then suddenly in geological time scales about 600 million years ago it exploded into the sea in forms that could swim, see and react.

The evidence available does fit the concept of an expanding earth remarkably well. Using the evidence that the earth has expanded since the time of the dinosaurs it is possible to extrapolate this expansion backwards in time to see how the earth should have been expanding since its ancient formation. An expanding earth limits any flights of imagination to within tight boundaries of the possible and impossible, for we can observe the conditions present on worlds smaller than ours. Considering the restraint that is imposed by an expanding earth, it seems convincing that the known facts about the ancient earth is explained so well by it.

The ancient earth — atmosphere

This idea of a small ancient earth helps to understand the conditions which were present on it, for this ancient earth was smaller than our present day moon, with similar conditions. It was little more than a collection of rock and dust, and because of its low gravitational field it could hold no atmosphere.

This effect is presently occurring on the smallest planets and moons that can be seen to have little or no atmosphere — as planets increase in order of size they develop atmospheres. So as the ancient earth grew in size it began to retain

a larger and denser atmosphere. This density has gradually increased until it has reached its present level.

Various evidence shows that the earth's atmosphere has only recently formed during the latest stage of our planet's development. The time taken for this development is almost unimaginable, for the oldest known earth rocks have been dated at over 3800 million years. Looking back to the very limit of our knowledge of the early earth, the very ancient earth had virtually no atmosphere.

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