Lord Kelvin And The Age Of The Earth

LORD KELVIN. In 1840, a precocious 16-year-old by the name of William Thomson spent his summer vacation studying an extraordinarily sophisticated mathematical controversy. His brilliant analysis inspired lavish praise and made the boy an instant intellectual celebrity. As a young scholar William dazzled a Victorian society enthralled with the seductive authority and powerful beauty of scientific discovery. At a time when no one really understood heat, light, electricity, or magnetism, Thomson found key connections between them, laying the groundwork for two of the cornerstones of 19th century science -- the theories of electromagnetism and thermodynamics. Charismatic, confident, and boyishly handsome, Thomson was not a scientist who labored quietly in a lab, plying his trade in monkish isolation. When scores of able tinkerers were flummoxed by their inability to adapt overland telegraphic cables to underwater, intercontinental use, Thomson took to the high seas with new equipment that was to change the face of modern communications. And as the worldâ€™s navies were transitioning from wooden to iron ships, they looked to Thomson to devise a compass that would hold true even when surrounded by steel. Gaining fame and wealth through his inventive genius, Thomson was elevated to the peerage by Queen Victoria for his many achievements. He was the first scientist ever to be so honored. Indeed, his name survives in the designation of degrees Kelvin, the temperature scale that begins with absolute zero, the point at which atomic motion ceases and there is a complete absence of heat. Sir William Thomson, Lord Kelvin, was Great Britain's unrivaled scientific hero. But as the century drew to a close and Queen Victoria's reign ended, this legendary scientific mind began to weaken. He grudgingly gave way to others with a keener, more modern vision. But the great physicist did not go quietly. With a ready pulpit at his disposal, he publicly proclaimed his doubts over the existence of atoms. He refused to believe that radioactivity involved the transmutation of elements. And believing that the origin of life was a matter beyond the expertise of science and better left to theologians, he vehemently opposed the doctrines of evolution, repeatedly railing against Charles Darwin. Sadly, this pioneer of modern science spent his waning years arguing that the Earth and the Sun could not be more than 100 million years old. And although his early mathematical prowess had transformed our understanding of the forces of nature, he would never truly accept the revolutionary changes he had helped bring about, and it was others who took his ideas to their logical conclusion. In the end Thomson came to stand for all that was old and complacent in the world of 19th century science. Once a scientific force to be reckoned with, a leader to whom others eagerly looked for answers, his peers in the end left him behind -- and then meted out the ultimate punishment for not being able to keep step with them. For while they were content to bury him in Westminster Abbey alongside Isaac Newton, they used his death as an opportunity to write him out of the scientific record, effectively denying him his place in history. Kelvinâ€™s name soon faded from the headlines, his seminal ideas forgotten, his crucial contributions overshadowed. Destined to become the definitive biography of one of the most important figures in modern science, Degrees Kelvin unravels the mystery of a life composed of equal parts triumph and tragedy, hubris and humility, yielding a surprising and compelling portrait of a complex and enigmatic man.

Lord Kelvin and the Age of the EarthUniversity of Chicago Press

G. G. Stokes and Lord Kelvin helped bring about conceptual and institutional changes that transformed the science of physics. Indeed, they and their Victorian colleagues constituted one of the most significant groups of scientists in the whole history of science. This collection of letters was first published in 1990, and provides, therefore, invaluable insight and information for a period of major historical importance. Stokes and Kelvin corresponded for over fifty years as professors in Cambridge and Glasgow, respectively, thus amassing what is easily the largest extant correspondence between two Victorian physicists. The letters range widely over the people, ideas, and institutions of the age. They illuminate the histories of Cambridge and Glasgow Universities and the Royal Society of London, for example, as well as developments in electromagnetism, hydrodynamics, elasticity, optics, and X-rays. The editor's introduction describes the context of the pair's careers, while guiding the reader into their correspondence.

Four Revolutions in the Earth Sciences

Strata

Lord Kelvin: An Account of His Scientific Life and Work

From Stars to Stalagmites

When Physics Became King

A synthesis of all that has been postulated and is known about the age of the Earth

Over the course of the twentieth century, scientists came to accept four counterintuitive yet fundamental facts about the Earth: deep time, continental drift, meteorite impact, and global warming. When first suggested, each proposition violated scientific orthodoxy and was quickly denounced as scientific—and sometimes religious—heresy. Nevertheless, after decades of rejection, scientists came to accept each theory. The stories behind these four discoveries reflect more than the fascinating push and pull of scientific work. They reveal the provocative nature of science and how it raises profound and sometimes uncomfortable truths as it advances. For example, counter to common sense, the Earth and the solar system are older than all of human existence; the interactions among the moving plates and the continents they carry account for nearly all of the Earth's surface features; and nearly every important feature of our solar system results from the chance collision of objects in space. Most surprising of all, we humans have altered the climate of an entire planet and now threaten the future of civilization. This absorbing scientific history is the only book to describe the evolution of these four ideas from heresy to truth, showing how science works in practice and how it inevitably corrects the mistakes of its practitioners. Scientists can be wrong, but they do not stay wrong. In the process, astonishing ideas are born, tested, and over time take root.

As recently as two hundred years ago, physics as we know it today did not exist. Born in the early nineteenth century during the second scientific revolution, physics struggled at first to achieve legitimacy in the scientific community and culture at large. In fact, the term "physicist" did not appear in English until the 1830s. When Physics Became King traces the emergence of this revolutionary science, demonstrating how a discipline that barely existed in 1800 came to be regarded a century later as the ultimate key to unlocking nature's secrets. A cultural history designed to provide a big-picture view, the book ably ties advances in the field to the efforts of physicists who worked to win social acceptance for their research. Beginning his tale with the rise of physics from natural philosophy, Iwan Morus chronicles the emergence of mathematical physics in France and its later export to England and Germany. He then elucidates the links between physics and industrialism, the technology of statistical mechanics, and the establishment of astronomical laboratories and precision measurement tools. His tale ends on the eve of the First World War, when physics had firmly established itself in both science and society. Scholars of both history and physics will enjoy this fascinating and studied look at the emergence of a major scientific discipline.

From Darwin to Einstein - Colossal Mistakes by Great Scientists That Changed Our Understanding of Life and the Universe

A New Theory of Time

Age Of The Earth, The: A Physicist's Odyssey

Why Everything You Thought You Knew about Quantum Physics Is Different

Lord Kelvin

Fifty years ago, no one could explain mountains. Arguments about their origin were spirited, to say the least. Progressive scientists were ridiculed for their ideas. Most geologists thought the Earth was shrinking. Contracting like a hot ball of iron, shrinking and exposing ridges that became mountains. Others were quite sure the planet was expanding. Growth widened sea basins and raised mountains. There was yet another idea, the theory that the world's crust was broken into big plates that jostled around, drifting until they collided and jarred mountains into existence. That idea was invariably dismissed as pseudo-science. Or "utter damned rot" as one prominent scientist said. But the doubtful theory of plate tectonics prevailed. Mountains, earthquakes, ancient ice ages, even veins of gold and fields of oil are now seen as the offspring of moving tectonic plates. Just half a century ago, most geologists sternly rejected the idea of drifting continents. But a few intrepid champions of plate tectonics dared to differ. The Mountain Mystery tells their story.

William Thompson (1824-1907), later Lord Kelvin, was the foremost scientific figure of an age that saw the quest of classical physics concluded and marked the beginning of the modern era of atomic physics and relativity. Kelvin's role in the 19th-century scientific revolution can be compared with Newton's position in the 17th century and Einstein's in the 20th. Kelvin meets no simple definition of scientist-engineer. The reader of his biography will be introduced to an extraordinary figure of a past era who in no way fits the image of the modern specialist. It is just this characteristic of Kelvin's life that will take readers, scientists and nonscientists, into the wider universe of technological innovation derived from scientific theory. Kelvin's ideas are expressed in words, not in the language of mathematics. Kelvin directly influenced James Clerk Maxwell, whose work culminated in the electromagnetic theory of light, the theory that ushered in the modern period of electrical science and technology. Kelvin's work on the Atlantic cable shortened the space between Europe and America from weeks to seconds. His controversy with the Darwinians resulted in one of the few scientific debates that the Victorian public followed. Kelvin was the nonpareil scientist of the 19th century, and his biography encompasses the dynamic scientific changes of the Victorian age.

The quest to pinpoint the age of the Earth is nearly as old as humanity itself. For most of history, people trusted mythology or religion to provide the answer, even though nature abounds with clues to the past of the Earth and the stars. In A Natural History of Time, geophysicist Pascal Richet tells the fascinating story of how scientists and philosophers examined those clues and from them built a chronological scale that has made it possible to reconstruct the history of nature itself. Richet begins his story with mythological traditions, which were heavily influenced by the seasons and almost uniformly viewed time cyclically. The linear history promulgated by Judaism, with its story of creation, was an exception, and it was that tradition that drove early Christian attempts to date the Earth. For instance, in 169 CE, the bishop of Antioch, for instance declared that the world had been in existence for "5,698 years and the odd months and days." Until the mid-eighteenth century, such natural timescales derived from biblical chronologies prevailed, but, Richet demonstrates, with the Scientific Revolution geological and astronomical evidence for much longer timescales began to accumulate. Fossils and the developing science of geology provided compelling evidence for periods of millions and millions of years—a scale that even scientists had difficulty grasping. By the end of the twentieth century, new tools such as radiometric dating had demonstrated that the solar system is four and a half billion years old, and the universe itself about twice that, though controversial questions remain. The quest for time is a story of ingenuity and determination, and like a geologist, Pascal Richet carefully peels back the strata of that history, giving us a chance to marvel at each layer and truly appreciate how far our knowledge—and our planet—have come.

Beyond Weird

The Correspondence Between Sir George Gabriel Stokes and Sir William Thomson, Baron Kelvin of Largs

The Theories and Influence of Lord Kelvin

History of Heat Transfer

Brilliant Blunders

We all make mistakes. Nobody is perfect. And that includes five of the greatest scientists in history -- Charles Darwin, William Thomson (Lord Kelvin), Linus Pauling, Fred Hoyle, Albert Einstein. But the mistakes that these great scientists made helped science to advance. Indeed, as Mario Livio explains in this fascinating book, science thrives on error; it advances when erroneous ideas are disproven. All five scientists were great geniuses and fascinating human beings. Their blunders were part of their genius and part of the scientific process. Livio brilliantly analyses their errors to show where they were wrong and right, but what makes his book so enjoyable to read is Livio's analysis of the psychology of these towering figures. Along the way the reader learns an enormous amount about the evolution of life on earth and in the universe, but from an unusual vantage point -- the mistakes of great scientists rather than the achievements that made them famous.

Burchfield charts the enormous impact made by Lord Kelvin's application of thermodynamic laws to the question of the earth's age and the heated debate his ideas sparked among British Victorian physicists, astronomers, geologists, and biologists. "Anyone interested in geologic time, and that should include all geologists and a fair smattering of biologists, physicists and chemists, should make Burchfield's commendable and time-tested volume part of their personal library"—Brent Darymple, Quartely Review of Biology

Mammoths and dinosaurs, tropical forests in northern Europe and North America, worldwide ice ages, continents colliding and splitting apart, comets and asteroids crashing catastrophically onto the Earth these are just some of the surprising features of the eventful history of our planet, stretched out over several billion years. But how was it all discovered, how was the evidence for the Earth s long history collected and interpreted, and what sorts of people put together this reconstruction of a deep past that no human beings could ever have witnessed? In "Earth s Deep History," Martin J. S. Rudwick tells the gripping story of the gradual realization that the Earth s history has not only been unimaginably long but also astonishingly eventful in utterly unexpected ways. Rudwick, the world s premier historian of the Earth sciences, is the first to make the story of the discovery of the Earth s deep history attractively accessible to readers without prior knowledge of either the history or the science, and in so doing he reveals why it matters to us today. "

A Tale of Genius, Invention, and Tragedy

A Criticism of the Astronomical Theory of the Ice Age, and of Lord Kelvin's Suggestions in Connection with a Genial Age at the Pole

Lord Kelvin's Machine

On Lord Kelvin's Address on the Age of the Earth as an Abode Fitted for Life

A Biographical Study of Lord Kelvin

This book spells out in detail how the age of the Earth has been determined over the centuries. First — the 'biblical' age: how was the date of Creation 4004 BC figured out? A date which is so important even today ... it is the basis of claims made by millions that the Earth is only about 6000 years old. Next — the response of geologists (and Darwin) for a very old Earth. Then, Kelvin's calculation of how long it would take for a hot Earth to cool down to its present state. And finally, today's answer ('billions'), based on the properties of radioactive materials. So, how old is Planet Earth?

This work has been selected by scholars as being culturally important and is part of the knowledge base of civilization as we know it. This work is in the public domain in the United States of America, and possibly other nations. Within the United States, you may freely copy and distribute this work, as no entity (individual or corporate) has a copyright on the body of the work. Scholars believe, and we concur, that this work is important enough to be preserved, reproduced, and made generally available to the public. To ensure a quality reading experience, this work has been proofread and republished using a format that seamlessly blends the original graphical elements with text in an easy-to-read typeface. We appreciate your support of the preservation process, and thank you for being an important part of keeping this knowledge alive and relevant.

"The story starts with William Smith's early years, from apprentice to surveyor for hire, and from publication of his groundbreaking 1815 geological strata map to imprisonment for debt. Smith's 1799 geological map of Bath and table of strata, his first strata map of England and Wales, published in 1801, and photographs of some of Smith's collection of 2,000 fossils illustrate the tale. The remainder of the book is organized into four parts, each beginning with four sheets from Smith's hand-colored, 1815 strata map, accompanied by related geological cross sections and county maps (1819-24), and followed by sections of Sowerby's fossil illustrations (1816-19), organized by strata. Interleaved between the sections are essays by scholars that focus on the people and industries that benefited from the knowledge imparted by Smith's work. Concluding the volume are reflections on Smith's later years as an itinerant geologist and surveyor, plagiarism by a rival, receipt of the first Wollaston Medal in recognition of his achievements, and the influence of his geological mapping and biostratigraphical theories on the sciences, which culminated in the establishment of the modern geological timescale"--

Kelvin: Life, Labours and Legacy

The Life of Lord Kelvin

The Mountain Mystery

Lord Kelvin and the Age of the Earth

From Heresy to Truth

Within the magical gears of Lord Kelvin's incredible machine lies the secret of time. The deadly Dr. Ignacio Narbondo would murder to possess it and scientist and explorer Professor Langdon St. Ives would do anything to use it. For the doctor it means mastery of the world and for the professor it means saving his beloved wife from death. A daring race against time begins...

In a universe filled by chaos and disorder, one physicist makes the radical argument that the growth of order drives the passage of time -- and shapes the destiny of the universe. Time is among the universe's greatest mysteries. Why, when most laws of physics allow for it to flow forward and backward, does it only go forward? Physicists have long appealed to the second law of thermodynamics, held to predict the increase of disorder in the universe, to explain this. In The Janus Point, physicist Julian Barbour argues that the second law has been misapplied and that the growth of order determines how we experience time. In his view, the big bang becomes the "Janus point," a moment of minimal order from which time could flow, and order increase, in two directions. The Janus Point has remarkable implications: while most physicists predict that the universe will become mired in disorder, Barbour sees the possibility that order -- the stuff of life -- can grow without bound. A major new work of physics, The Janus Point will transform our understanding of the nature of existence.

Explains the essence of chemistry to the layman while exploring such topics as the noble gases, wave-particle duality, and bonds.

Story-Lives of Great Musicians

His Influence on Electrical Measurements and Units

How Everything Connects

The Age of the Earth as an Abode Fitted for Life. By the Right Hon. Lord Kelvin,...

William Smith's Geological Maps

This is a life of Lord Kelvin, who began life as William Thomson, matriculated at Glasgow University at the age of 10 and entered Cambridge University at 17. By the time he was 22, he was back again at Glasgow, but this time as Professor of Natural Philosophy. He had now published the first 20 of a total output of 66 scientific papers and many textbooks. Later, he became the originator of more than 70 patents which were, contrary to the normal fate of many patents, all profitable. Knighted in 1866 for his work on the Atlantic cable project, he was raised to the peerage in 1892, in which year he became President of the Royal Society - the highest scientific honour England could bestow upon him. He was three times President of the Institution of Electrical Engineers. A gigantic task faced physicists at the middle of the 19th century. As Kelvin put it, during a lecture on electrical measurement, "...Poisson and Green, and Gauss, and Weber, and Ohm, and Lentz, and Faraday, and Joule, this century, had given us the mathematical and experimental foundation, for a complete system of numerical reckoning...and as early as 1858 a practical beginning of definite electric measurement had been made. ..but fifteen years passed after this beginning before anything that could be called electric measurement, had come to be regularly practised in most of the scientific laboratories of the world". Kelvin was the first to recognize the necessity for a solid scientific foundation for electrical units and standards, and he, more then any other, paved the way for their establishment and eventual international adoption. His insistence on the metric system, and his monumental work in the British Association for the advancement of Science and later at the International Electrical Congresses, beginning with Paris in 1881, continued unceasingly until his death in 1907. Kelvin's great accomplishment was to bring together all the experimental scientists of his time into one co-operative association for investigators whose individual efforts were aided by their combined results, expressed in a notation and described in language understood by everyone.

“ Anyone who is not shocked by quantum theory has not understood it. ” Since Niels Bohr said this many years ago, quantum mechanics has only been getting more shocking. We now realize that it ’ s not really telling us that “ weird ” things happen out of sight, on the tiniest level, in the atomic world: rather, everything is quantum. But if quantum mechanics is correct, what seems obvious and right in our everyday world is built on foundations that don ’ t seem obvious or right at all—or even possible. An exhilarating tour of the contemporary quantum landscape, Beyond Weird is a book about what quantum physics really means—and what it doesn ’ t. Science writer Philip Ball offers an up-to-date, accessible account of the quest to come to grips with the most fundamental theory of physical reality, and to explain how its counterintuitive principles underpin the world we experience. Over the past decade it has become clear that quantum physics is less a theory about particles and waves, uncertainty and fuzziness, than a theory about information and knowledge—about what can be known, and how we can know it. Discoveries and experiments over the past few decades have called into question the meanings and limits of space and time, cause and effect, and, ultimately, of knowledge itself. The quantum world Ball shows us isn ’ t a different world. It is our world, and if anything deserves to be called “ weird, ” it ’ s us.

Portrait of Lord Kelvin

The Life of William Thomson, Baron Kelvin of Largs

A Natural History of Time

Treatise on Natural Philosophy

On Lord Kelvin's Address on the Age of the Earth as an Abode Fitted for Life, by Prof. T. C. Chamberlain...

The Earth on Show

Lord Kelvin was one of the greatest physicists of the Victorian era. Widely known for the development of the Kelvin scale of temperature measurement, Kelvin's interests ranged across thermodynamics, the age of the Earth, the laying of the first transatlantic telegraph cable, not to mention inventions such as an improved maritime compass and a sounding device which allowed depths to be taken both quickly and while the ship was moving. He was an academic engaged in fundamental research, while also working with industry and technological advances. He corresponded and collaborated with other eminent men of science such as Stokes, Joule, Maxwell and Helmholtz, was raised to the peerage as a result of his contributions to science, and finally buried in Westminster Abbey next to Newton. This book contains a collection of chapters, authored by leading experts, covering the life and wide-ranging scientific contributions made by William Thomson, Lord Kelvin (1824–1907).

At the turn of the nineteenth century, geology—and its claims that the earth had a long and colorful prehuman history—was widely dismissedasdangerous nonsense. But just fifty years later, it was the most celebrated of Victorian sciences. Ralph O’Connor tracks the astonishing growth of geology’s prestige in Britain, exploring how a new geohistory far more alluring than the standard six days of Creation was assembled and sold to the wider Bible-reading public. Shrewd science-writers, O’Connor shows, marketed spectacular visions of past worlds, piquing the public imagination with glimpses of man-eating mammoths, talking dinosaurs, and sea-dragons spawned by Satan himself. These authors—including men of science, women, clergymen, biblical literalists, hack writers, blackmailers, and prophets—borrowed freely from the Bible, modern poetry, and the urban entertainment industry, creating new forms of literature in order to transport their readers into a vanished and alien past. In exploring the use of poetry and spectacle in the promotion of popular science, O’Connor proves that geology’s success owed much to the literary techniques of its authors. An innovative blend of the history of science, literary criticism, book history, and visual culture, The Earth on Show rethinks the relationship between science and literature in the nineteenth century.

An important component of a biography of any great scientist is that the biographer also have deep scientific knowledge. This holds true for Silvanus P. Thompson, a scientist of distinction who authored this biography of Lord Kelvin. Thompson was a Fellow of the Royal Society, President of the Physical Society, President of the Institution of Electrical Engineers, and President of the Illuminating Engineering Society--all within a six year span. He also held the office of president for other scientific organizations. This biography was begun in 1906 and published in 1910. It was re-issued in 1976 by Chelsea Publishing. The work is considered the definitive biography of Lord Kelvin. It includes Kelvin's personal recollections and data. His death in 1907 affected the project by extending the scope of the original work. He left letters, diaries, and other documents that supplemented the existing information. These documents would allow Thompson to create a much more comprehensive account of Kelvin's career than was previously possible.From the Preface by Thompson: ""It has been the author's desire to let documents and letters speak as far as possible for themselves; and if he has not always been able to avoid letting his own views tinge these pages, he has at least endeavoured to avoid attributing to others that which is only his own. Doubtless there are many of Lord Kelvin's former pupils who will find gaps in the presentation of his life and character, as must needs be when the author can himself claim no nearer association than that of disciple. But the disciple of one who was himself conspicuously faithful in little things, must at least try to be faithful. The peculiar and affectionate admiration, amounting in some almost to worship, which characterizes those who had the high privilege of that more intimate association, spreads far beyond their circle to the disciple. Let it be hoped that the affectionate admiration which he too shares may not have warped his judgment.

Lord Kelvin, the Dynamic Victorian

Lord Kelvin's Address on the Age of the Earth as an Abode Fitted for Life

Degrees Kelvin

The Age of the Earth

Essays in Honor of the 50th Anniversary of the ASME Heat Transfer Division

This study of Lord Kelvin, the most famous mathematical physicist of 19th-century Britain, delivers on a speculation long entertained by historians of science that Victorian physics expressed in its very content the industrial society that produced it.

Earth's Deep History

The Victoria Institute. The Annual Address... [the Age of the Earth as an Abode Fitted for Life] by the Right Hon. Lord Kelvin,... Also the Report for the Year. [Signé : G. G. Strokes.].

Energy and Empire

Fossils and the Poetics of Popular Science, 1802-1856