

Chapter 1 : The Book of Life by Stephen Jay Gould

The Book of Life uses an exemplary fusion of art and science to tell the story of life on earth. The text, under the editorship of Stephen Jay Gould, provides a thorough understanding of the latest research and is accompanied by paintings prepared especially for this book.

While others shrank from the idea of an animal ancestry for humans, Darwin had trumpeted, "There is grandeur in this view of life. Many of these essays have been collected and republished in a series of popular, influential books. In giving evolutionary biology an exciting voice, Stephen Jay Gould proved that a great audience awaits great writing about science. In I was a new editor at W. Norton and blessed by being able to spend hours in the New York Public Library. DiMaggio holds a baseball, fouled off his bat at Yankee Stadium in the forties and caught by a very young Stephen Jay Gould, who was seated down the third-base line with his father. Not until three years later, when Steve had thirty-three columns under his belt, did it occur to either of us that the Natural History pieces should be gathered between hard covers. If the barrier between good scientific writing and a lay audience no longer exists, it is because Steve Gould stepped over it and then knocked it down. The guy has eyes in the back of his head. I saw this first when we went out on a field trip to some Miocene formations in Maryland in the early spring of We had a ball, eating Southern food at an extravaganza of a church cookout and collecting some of the most gorgeous fossils on Earth. But Steve, at least in my eyes, totally stole the show: The guy had eyes. My usual rap on Steve is that I have never met a smarter person who works as hard as he does. Man, that guy could put the time in. And Steve has had plenty of insights. I said at the outset that the man has eyes in the back of his head. We left together for the airport for our flight back to La Guardia, doing a joint TV interview in the car on the way. So we get on the plane, and I do my usual and order a martini. Steve sips water or something. We talk, and I remember dominating the conversation atypically; no doubt the booze. Some point in the trip, I get up for a visit to the loo. Steve remembers that he got up first for the same reason. By the time I come back up the aisle, Steve is deeply engaged in conversation with a man and woman in the seats directly behind us. So he introduces me to Bill Clinton, the temporarily out-of-office governor of Arkansas, and Bill introduces the political consultant traveling with him. Like Reggie Jackson, he stirs the drink. Always has, always will. Hence, Gould or God? Or at the very least, Gould or Einstein? Then I sat down, [50] leaving it to Steve to answer the challenge. He stood up and looked at the words on the blackboard. He hesitated, gathered his thoughts, and then launched into a defense of God so brilliant that even William Jennings Bryan would have been proud. It was then that I realized what a great lawyer Gould would make. Walcott was best known for his studies in pre-Cambrian and Cambrian geology and paleontology and had spent years interpreting the rich fossil record of the Burgess Shale in western Canada. The commission consisted of twenty-two prominent leaders in many fields, assembled to advise us on critical directions for the institution in the years to come. Its argument applies to hitters in many worlds beyond baseball, explaining why in maturing fields it gets progressively harder to be number one, a fact of life that some scientists and scientific institutions find difficult to accept. That essay alone is sufficient reason to join with other fans in feting Steve here in his home ballpark. I first met Steve one autumn afternoon in , when he joined my wife, Bettyan, and me for coffee and chocolate cake on Brattle Street in Cambridge. I was working on a history of eugenics. The more I learned about him, the more his interests seemed boundless. I sometimes thought of him the way the great biologist J. Haldane was once characterized: We heard while home in California that he had been hit by cancer, one of the worst kinds, with a mortality rate that discouraged hope for survival. He fought against the numbers and won. In the s he helped keep creationism out of the public schools, testifying in an Arkansas courtroom that the subject had no place in science courses. Yet he sat in the drugstore in Dayton, Tennessee, where the Scopes trial began, chatting amiably with contemporary opponents of the teaching of evolution, sharing a cold drink on a hot day. Steve and I have taught the general course in evolution at Harvard for about fifteen years, a course that was not previously offered, despite the fact that we are in the Department of Organismal and Evolutionary Biology. To keep a firm hold on Latin phrases and the names of eighteenth-century naturalists deeply embedded in

dependent clauses within dependent clauses of dependent clauses taxes even the best Harvard undergraduates. Some relief from intense concentration comes in the form of such visual aids as cartoons from the New Yorker and Punch. Then there are the arguments between the lecturers. Quite aside from the nature of the performance, the content of Biology 17 bears the unmistakable imprint of the Gouldian view of evolution, which is, ironically, similar to this passage from Ecclesiastes: At the time, you were so intensely focused on hard-shelled mollusks and their evolutionary patterns that I could not have predicted the eventual expansion of your interests to embrace the entire panoply of life. Just a few years later, biologist Karlene V. Schwartz and I became fascinated with the distinguished ecologist R. We had hoped that Whittaker would write the foreword to our book, but in , just as it was nearing completion, he died. We feared there was no other biologist who had both the audacity to endorse the new views and the authority to help them gain rapid acceptance. You gallantly rescued us, characterizing the five-kingdoms system and the expansion of phyla to nearly a hundred as "new and exciting ways of thinking about organisms and their evolution. According to the Oxford English Dictionary, in fact, "skeptical" has also meant "inquiring," "reflective," and, with variations in the ancient Greek, "watchman" or "mark to aim at. Supreme Court in the Louisiana creationism trial in closed the door that had been opened to creationists in the original trial. And perhaps most significantly to this observer, anyway , his skeptical here read "reflective" critique of the warfare model of science and religion has shown how and why these non-overlapping magisteria are best left to flourish along separate phylogenies. I am continually amazed by his industriousness and high standards, which have made him one of our foremost popular essayists. He covers a virtually endless variety of topics in his beautiful, flowing prose, succinctly explaining complex scientific principles, and he influences many with his infectious enthusiasm for science. He has devoted his professional life to the search for truth in evolutionary biology and has shared his conclusions through astoundingly prolific writings. No doubt you have all read of his rapture when his father brought him, at age five, to the American Museum of Natural History and introduced him to Tyrannosaurus rex. It was love at first sight, and neither Steve nor the dinosaur would ever be the same again. This encounter started Steve on a career devoted to the history of life. As teenagers, he and his schoolmate Richard Milner now a senior editor at [53] this magazine frequently visited the Museum and came to see me. That was my first contact with Steve, and since then, from the time he was my Ph. One incident from his student days illustrates well his enthusiasm and abilities. I gave him several preserved specimens of a rare Neotrigonia bivalve from the Tasman Sea. When Steve protested that he had never dissected a bivalve mollusk before, I suggested that he visit the Fulton fish market and buy a few commercial clams. He took them home and practiced dissecting them, with a student laboratory manual to aid him in the identification of the organs. Neither Steve nor the dinosaur would ever be the same again. Steve Gould has also influenced the public through his passion for science and his rare skill at expressing himself. He is an extraordinarily talented human being. Its lawyers marshaled experts to attack the scientific validity of claims that Earth is but a few thousand years old, that all organisms, including humans, were created miraculously in the space of a week, and that God decided to destroy most of his creation with a worldwide flood. Among the expert witnesses were several biologists and paleontologists, including Stephen Jay Gould , and one philosopher me. Thanks to the success of Ever Since Darwin, a collection of his Natural History essays, Gould was already the best-known evolutionist in America. Somewhat paradoxically, his appearance seemed to gladden the hearts of the lawyers for the state. They knew Gould had a Marxist background and was critical of conventional Darwinism. Boy, did they ever get a surprise! And, he went on, those who think that a jerky fossil record throws any doubt on the truth of evolution are confusing the fact of evolution with the putative means or mechanisms. So authoritative was Gould that when the Arkansas attorney general stood up to cross-examine, he asked only a few perfunctory questions and then sat down. Someone, an angelic junior clerk, began to sing "Amazing Grace. In , when I was asked by a London newspaper to name my favorite book, I selected Wonderful Life ; this led to my receiving a letter from Stephen and to the beginning of a frequent and voluminous correspondence between us. Many subjects close to both our hearts have been discussed in letters: I loved the Burgess Shale work so much because it allowed me to integrate the two. Bach are linked by a postal code. He is an enchanting companion as well as a major intellectual force, and both aspects of him come together in his

unique essays. Just as Gould harnesses enormous knowledge and elegant prose to enhance the insights and discoveries stemming from the evolutionary perspective, Johann Sebastian Bach applied his melodic and contrapuntal gifts, together with his grasp of the capacities of voices and instruments, to elicit deep contemplativeness and emotion in his listeners. In addition to secular works, Bach composed almost cantatas and other sacred pieces. Once a month at Weimar, and perhaps once weekly at Leipzig, he had yet another piece ready to be performed at the Sunday service. But there is more to the connection between these two men than the nature of their art and the scope of their production. In one of those delicious coincidences that Gould so often notes in his essays, Gould and Bach are linked by a postal code. Postal Service assigned zip codes to every locality in the country in the early s, it bestowed on Cambridge, Massachusetts. In junior high school, our schoolmates nicknamed me "Dino" and Gould " Fossilface. At the time, both my life and my career had wandered far away from natural history, and I was working as an editor of what used to be called pulp magazines. He wrote back, "Blood may be thicker than water, but junior high school friendships are thicker than anything. But where to begin, with no credentials and no umbrella institution?

Chapter 2 : Wonderful Life (book) - Wikipedia

Edited by general editor Stephen Jay Gould, with articles by numerous contributors, and gorgeously illustrated by various artists, this book gives an overview of life on Earth from its beginnings, billions of years ago, to the present.

In so doing, I follow the strategy of all my general writing. The beauty of nature lies in detail; the message, in generality. Optimal appreciation demands both, and I know no better tactic than the illustration of exciting principles by well-chosen particulars. The human story of discovery and interpretation, spanning almost eighty years, is wonderful, in the strong literal sense of that much-abused word. Charles Doolittle Walcott, premier paleontologist and most powerful administrator in American science, found this oldest fauna of exquisitely preserved soft-bodied animals in Wind back the tape of life to the early days of the Burgess Shale; let it play again from an identical starting point, and the chance becomes vanishingly small that anything like human intelligence would grace the replay. But even more wonderful than any human effort or revised interpretation are the organisms of the Burgess Shale themselves, particularly as newly and properly reconstructed in their transcendent strangeness: Opabinia and company constituted the strange and wonderful life of a remote past; they have also imposed the great theme of contingency in history upon a science uncomfortable with such concepts. Science has dealt poorly with the concept of contingency, but film and literature have always found it fascinating. The story of the reinterpretation of the Burgess fossils, and of the new ideas that emerged from this work, is complex, involving the collective efforts of a large cast. I struggled for many months over various formats for presenting this work, but finally decided that only one could provide unity and establish integrity. If the influence of history is so strong in setting the order of life today, then I must respect its power in the smaller domain of this book. The work of Whittington and colleagues also forms a history, and the primary criterion of order in the domain of contingency is, and must be, chronology. What else can I do but tell this story in proper temporal order? Like Rashomon, no two observers or participants will ever recount such a complex tale in the same manner, but we can at least establish a groundwork in chronology. Chapter I lays out, through the unconventional device of iconography, the traditional attitudes or thinly veiled cultural hopes that the Burgess Shale now challenges. Chapter II presents the requisite background material on the early history of life, the nature of the fossil record, and the particular setting of the Burgess Shale itself. Chapter III then documents, as a drama and in chronological order, this great revision in our concepts about early life. A final section tries to place this history in the general context of an evolutionary theory partly challenged and revised by the story itself. Chapter IV probes the times and psyche of Charles Doolittle Walcott, in an attempt to understand why he mistook so thoroughly the nature and meaning of his greatest discovery. It then presents a different and antithetical view of history as contingency. I am caught between the two poles of conventional composition. I am a professional paleontologist, a close colleague and personal friend of all the major actors in this drama. Still, the world of Whittington, Briggs, and Conway Morris is my world. I know its hopes and foibles, its jargon and techniques, but I also live with its illusions. My difficulty in simultaneously living in and reporting about this world emerges most frequently in a simple problem that I found insoluble. I had to adopt one other convention; in rendering the Burgess drama chronologically, I followed the dates of publication for ordering the research on various Burgess fossils. But as all professionals know, the time between manuscript and print varies capriciously and at random, and the sequence of publication may bear little relationship to the order of actual work. I therefore vetted my sequence with all the major participants, and learned, with pleasure and relief, that the chronology of publication acted as a pretty fair surrogate for order of work in this case. The word is admirable in its literal sense, but has been debased to mean simplified or adulterated for easy listening without effort in return. The concepts of science, in all their richness and ambiguity, can be presented without any compromise, without any simplification counting as distortion, in language accessible to all intelligent people. Words, of course, must be varied, if only to eliminate a jargon and phraseology that would mystify anyone outside the priesthood, but conceptual depth should not vary at all between professional publication and general exposition. Of course, these high-minded hopes and conceits from yours truly also demand some work in return. The beauty of the Burgess story lies in its details, and the

details are anatomical. I have provided insets as primers on these subjects, and I have kept the terminology to an absolute minimum fortunately, we can bypass nearly all the crushing jargon of professional lingo, and grasp the key point about arthropods by simply understanding a few facts about the order and arrangement of appendages. In addition, all descriptive statements in the text are matched by illustrations. I did briefly consider but it was only the Devil speaking the excision of all this documentation, with a bypass via some hand waving, pretty pictures, and an appeal to authority. Pleading is undignified, but allow me one line: Harry Whittington, Simon Conway Morris, and Derek Briggs endured hours of interviews, detailed questioning, and reading of manuscripts. Laszlo Meszoly prepared charts and diagrams with a skill that I have admired and depended upon for nearly two decades. Libby Glenn helped me wade through the voluminous Walcott archives in Washington. Never before have I published a work so dependent upon illustrations. But so it must be; primates are visual animals above all, and anatomical work, in particular, is as much pictorial as verbal. In this sense, I am only acting as a faithful chronicler of primary sources that will become crucial in the history of my profession. My greatest thanks for their dedication and their instruction. I could have whited out the labeling of features, often quite dense, on the drawings of specimens, for few of these labels relate to arguments made in my text and those that do are always fully explained in my captions. But I wanted readers to see these illustrations exactly as they appear in the primary sources. Some parts are usually made transparent, so that more of the full anatomy may be visualized; while other parts usually those repeated on the other side of the body are omitted for the same reason. Since the technical illustrations do not show an organism as a truly living creature, I decided that I must also commission a series of full reconstructions by a scientific artist. This collective work binds the generations. Having nearly touched Walcott himself, I ranged to the present and spoke with all active workers. His work will expand and revise several sections of my text; obsolescence is a fate devoutly to be wished, lest science stagnate and die. I have been obsessed with the Burgess Shale for more than a year, and have talked incessantly about its problems with colleagues and students far and wide. Many of their suggestions, and their doubts and cautions, have greatly improved this book. Scientific fraud and general competitive nastiness are hot topics this season. I fear that outsiders are getting a false view of this admittedly serious phenomenon. The reports are so prominent that one might almost envision an act of chicanery for each ordinary event of decency and honor. No, not at all. The tragedy is not the frequency of such acts, but the crushing asymmetry that permits any rare event of unkindness to nullify or overwhelm thousands of collegial gestures, never recorded because we take them for granted. Paleontology is a genial profession. I do not say that we all like each other; we certainly do not agree about very much. But we do tend to be helpful to each other, and to avoid pettiness. I rejoice in this sharing, in our joint love for knowledge about the history of our wonderful life.

Stephen Jay Gould () was the Alexander Agassiz Professor of Zoology and Professor of Geology at Harvard University. He published over twenty books, received the National Book and National Book Critics Circle Awards, and a MacArthur Fellowship.

He was educated at Antioch College in Ohio and then trained as a paleontologist, doing his doctoral work at Columbia University in New York. His first academic position was at Harvard University in Cambridge, Massachusetts, where he remained for the rest of his life, later adding to his responsibilities a curatorship in paleontology at the American Museum of Natural History in New York. Gould received many honors, including numerous honorary doctoral degrees, and was a member of the National Academy of Sciences. But soon, he and paleontologist Niles Eldredge began trying to break the paradigm of conventional Darwinism, which sees the fossil record as essentially flowing from one form to another, with all gaps due to inadequacies in the record. Gould and Eldredge forwarded a theory of punctuated equilibrium, arguing that the fossil record shows stasis no appreciable change, for periods of time, in some particular line of organisms, followed by very rapid change. The gaps in the record therefore reflect real gaps in the fossilization process. Gould held to the theory of punctuated equilibrium throughout his life, although the causal mechanism for the process was often in flux and not entirely clear. For a while, Gould floated the idea of saltations real macromutations that jump from one species to another, but this theory was criticized by population geneticists, causing Gould to look for other non-Darwinian, nonselective mechanisms. Together with molecular evolutionist Richard Lewontin, Gould argued that many aspects of organic nature are nonadaptive and could not have been produced by selection. Lewontin and Gould argued that many features of plants and animals are like spandrels the tops of columns in medieval churches; they are simply byproducts of the building process and thus without any great biological significance. He was a master at writing for a general audience, especially in essay form. For thirty years he wrote a monthly column called "This View of Life" in the magazine *Natural History*. In this column, Gould explored hundreds of different topics, not all of them related to biology. The essays were collected in several very successful volumes, beginning with *Ever Since Darwin*. Gould also wrote books on general topics, including the history of brain science in *The Mismeasure of Man* and the fossils of the Burgess Shale in Canada in *Wonderful Life*. At the scholarly level, Gould published numerous articles on the nature of the fossil record, usually in the journal *Paleobiology*, and the book *Ontogeny and Phylogeny* on the importance of development. Just before he died, Gould completed *The Structure of Evolutionary Theory*, a comprehensive book covering all of his thoughts about evolution. In this last book, Gould turned to the history of science, as he had often done earlier, not merely to develop his ideas but to demonstrate that he was part of a respectable tradition, while his opponents were not. Detailed examination did not always bear them out. The lack of a convincing causal hypothesis for punctuated equilibrium certainly counts against it. Gould admitted that he always wrote with a concern for the morality beneath the surface of his science. A nonpracticing Jew with a Marxist background the lasting influence of which was a matter of debate, he felt strongly about all matters of prejudice. Gould argued that sociobiology was not real science, but simply conservative ideology in fancy dress. For him, culture is essentially a spandrel, with no real biological importance. Undoubtedly the Lewontin-Gould attack on adaptation was motivated in part by this continued critique. Sociobiologists argued strongly that human nature is directly adaptive, such that men and women, for example, are psychologically as well as physically different because of their biology. Gould was determined to counter such views. Gould also saw claims about biological progress as being part and parcel of the offensive ideology against which he fought, which set humans at the top of the animal hierarchy, with white gentiles at the top of the human chain. Gould saw Darwinism, with its emphasis on the success of the fittest, as badly bound up with claims about progress, and this was another reason to attack adaptationism. Whether or not Gould was correct, such views brought him into conflict with many of his fellow evolutionists. In one of his essays, Gould accused the Jesuit paleontologist Pierre Teilhard de Chardin of being responsible for the Piltdown hoax. Although a nonbeliever, Gould had a passion for singing oratorio, which was equaled

by his passion for baseball. He was, in a sense, a deeply religious man, despite the absence of any formal theology. He knew the Bible , both the Old and New Testaments, very well, and he frequently used biblical stories or allusions to illustrate points in his science writing. As an ardent evolutionist, Gould stood firmly against biblical literalists and creationists, and in he served as an expert witness for the American Civil Liberties Union in its successful litigation against a creationist law that had been passed in Arkansas. One of his last books, *Rocks of Ages* , deals explicitly with issues of science and religion. Gould takes the position of the neo-orthodox like Langdon Gilkey , arguing that science and religion are different dimensions for understanding and feeling—he calls them magisteria —and hence can not come into conflict if properly understood.

Chapter 4 : The Book of Life by Stephen Jay Gould (, Hardcover) | eBay

Wonderful Life was the best book written by the late Stephen Jay Gould, paleontologist and popular science writer. It is a work with several layers of meaning. It is a work with several layers of meaning.

Biography[edit] Gould said he was inspired to become a paleontologist by T. Raised in a secular Jewish home, Gould did not formally practice religion and preferred to be called an agnostic. But, basically, Huxley was right when he said that agnosticism is the only honorable position because we really cannot know. Gould continued these demonstrations until the policy was revoked. As a boy he collected baseball cards and remained an avid New York Yankees fan throughout his life. He sometimes alluded ruefully to his tendency to put on weight. However the other half may live significantly longer depending on the nature of the distribution. Gould needed to determine where his individual characteristics placed him within this range. Given that his cancer was detected early, he was young, optimistic, and had the best treatments available, he reasoned that he likely fell within the favorable tail of a right skewed distribution. After an experimental treatment of radiation , chemotherapy , and surgery, Gould made a full recovery, and his column became a source of comfort for many cancer patients. Gould was also an advocate of medical cannabis. When undergoing his cancer treatments he smoked marijuana to help alleviate the long periods of intense and uncontrollable nausea. According to Gould, the drug had a "most important effect" on his eventual recovery. He later complained that he could not understand how "any humane person would withhold such a beneficial substance from people in such great need simply because others use it for different purposes. Gould died 10 weeks later on May 20, from a metastatic adenocarcinoma of the lung , an aggressive form of cancer which had already spread to his brain, liver, and spleen. The following year, , he was awarded a fellowship at the American Association for the Advancement of Science , where he later served as president " The AAAS news release cited his "numerous contributions to both scientific progress and the public understanding of science. In Gould was elected into the body of the National Academy of Sciences. In , the American Humanist Association named him the Humanist of the Year for his lifetime of work. In , he was posthumously awarded the Darwin-Wallace Medal , along with 12 other recipients. Until , this medal had been awarded every 50 years by the Linnean Society of London. It is contrasted below to phyletic gradualism , a more gradual, continuous model of evolution. Punctuated equilibrium Early in his career, Gould and his colleague Niles Eldredge developed the theory of punctuated equilibrium , which describes the rate of speciation in the fossil record as occurring relatively rapidly, which then alternates to a longer period of evolutionary stability. However Simpson describes the paleontological record as being characterized by predominantly gradual change which he termed horotely , though he also documented examples of slow bradytely , and rapid tachytely rates of evolution. Punctuated equilibrium and phyletic gradualism are not mutually exclusive, and examples of each have been documented in different lineages. The debate between these two models is often misunderstood by non-scientists, and according to Richard Dawkins has been oversold by the media. Neoteny is the process where ontogeny is slowed down and the organism does not reach the end of its development. Terminal addition is the process by which an organism adds to its development by speeding and shortening earlier stages in the developmental process. Rather than direct adaptations , he considered many higher functions of the human brain to be the unintended side consequence of natural selection. To describe such co-opted features, he coined the term exaptation with paleontologist Elisabeth Vrba. Wilson introduced his analysis of animal behavior including human behavior based on a sociobiological framework that suggested that many social behaviors have a strong evolutionary basis. Here sociobiology has had and will continue to have success. And here I wish it well. For it represents an extension of basic Darwinism to a realm where it should apply. With Richard Lewontin, Gould wrote an influential paper entitled, "The Spandrels of San Marco and the Panglossian Paradigm", [50] which introduced the architectural term " spandrel " into evolutionary biology. In architecture, a spandrel is a triangular space which exists over the haunches of an arch. When visiting Venice in , Gould noted that the spandrels of the San Marco cathedral, while quite beautiful, were not spaces planned by the architect. Rather the spaces arise as "necessary architectural byproducts of mounting a

dome on rounded arches. Proposed examples include the "masculinized genitalia in female hyenas , exaptive use of an umbilicus as a brooding chamber by snails, the shoulder hump of the giant Irish deer , and several key features of human mentality. Pangloss is portrayed as a clueless scholar who, despite the evidence, insists that "all is for the best in this best of all possible worlds". Gould and Lewontin asserted that it is Panglossian for evolutionary biologists to view all traits as atomized things that had been naturally selected for, and criticised biologists for not granting theoretical space to other causes, such as phyletic and developmental constraints. The relative frequency of spandrels, so defined, versus adaptive features in nature, remains a controversial topic in evolutionary biology. Gould was criticized by philosopher Dan Dennett for using the term spandrel instead of pendentive, [57] a spandrel that curves across a right angle to support a dome. Robert Mark, a professor of civil engineering at Princeton, offered his expertise in the pages of *American Scientist* , noting that these definitions are often misunderstood in architectural theory. Uncritical commentaries often portray evolution as a ladder of progress , leading towards bigger, faster, and smarter organisms, the assumption being that evolution is somehow driving organisms to get more complex and ultimately more like humankind. Because life is constrained to begin with a simple starting point like bacteria , any diversity resulting from this start, by random walk, will have a skewed distribution and therefore be perceived to move in the direction of higher complexity. But life, Gould argued, can also easily adapt towards simplification, as is often the case with parasites. By this definition, adaptive evolution is not just incidentally progressive, it is deeply, dyed-in-the-wool, indispensably progressive. In the early s this led him into a debate with Derek Briggs , who had begun to apply quantitative cladistic techniques to the Burgess Shale fossils, about the methods to be used in interpreting these fossils. Inexpensive but increasingly powerful personal computers made it possible to process large quantities of data about organisms and their characteristics. Around the same time the development of effective polymerase chain reaction techniques made it possible to apply cladistic methods of analysis to biochemical and genetic features as well. He focused his early work on the Bermudian genus *Poecilozonites* , while his later work concentrated on the West Indian genus *Cerion*. According to Gould "Cerion is the land snail of maximal diversity in form throughout the entire world. There are described species of this single genus. Some are shaped like golf balls, some are shaped like pencils. Now my main subject is the evolution of form, and the problem of how it is that you can get this diversity amid so little genetic difference, so far as we can tell, is a very interesting one. His "spandrels" paper has been cited more than 5, times. Historian Ronald Numbers has been quoted as saying: In an interview for the Dutch TV series *Of Beauty and Consolation* Gould remarked, "In a couple of years I will be able to gather in one volume my view of how evolution works. It is to me a great consolation because it represents the putting together of a lifetime of thinking into one source. That book will never be particularly widely read. A passionate advocate of evolutionary theory, Gould wrote prolifically on the subject, trying to communicate his understanding of contemporary evolutionary biology to a wide audience. A recurring theme in his writings is the history and development of pre-evolutionary and evolutionary thought. He was also an enthusiastic baseball fan and sabermetrician analyst of baseball statistics , and made frequent reference to the sport in his essays. Many of his baseball essays were anthologized in his posthumously published book *Triumph and Tragedy in Mudville*. He fiercely opposed many aspects of sociobiology and its intellectual descendant evolutionary psychology. He devoted considerable time to fighting against creationism , creation science , and intelligent design. Most notably, Gould provided expert testimony against the equal-time creationism law in *McLean v. In a essay for Natural History* Gould wrote: Our failure to discern a universal good does not record any lack of insight or ingenuity, but merely demonstrates that nature contains no moral messages framed in human terms. Morality is a subject for philosophers, theologians, students of the humanities, indeed for all thinking people. The answers will not be read passively from nature; they do not, and cannot, arise from the data of science. The factual state of the world does not teach us how we, with our powers for good and evil, should alter or preserve it in the most ethical manner. Gould was also a guest in all seven episodes of the Dutch talk series *A Glorious Accident* , in which he appeared with his close friend Oliver Sacks. In the episode " Lisa the Skeptic ", Lisa finds a skeleton that many people believe is an apocalyptic angel. The fossil is discovered to be a marketing gimmick for a new mall. Gould had died two days before the episode aired. The "Darwin Wars"["

edit] Gould received many accolades for his scholarly work and popular expositions of natural history, [77] but a number of biologists felt his public presentations were out of step with mainstream evolutionary thinking. Often he infuriates me, but I hope he will go right on writing essays like these. As a result, many non-specialists sometimes inferred from his early writings that Darwinian explanations had been proven to be unscientific which Gould never tried to imply. Sterelny documents their disagreements over theoretical issues, including the prominence of gene selection in evolution. Dawkins argues that natural selection is best understood as competition among genes or replicators, while Gould advocated multi-level selection, which includes selection amongst genes, nucleic acid sequences, cell lineages, organisms, demes, species, and clades. Cambrian fauna[edit] In his book *Wonderful Life* Gould famously described the Cambrian fauna of the Burgess Shale, emphasizing their bizarre anatomical designs, their sudden appearance, and the role chance played in determining which members survived. He used the Cambrian fauna as an example of the role contingency has in shaping the broader pattern of evolution. He also argued that convergent evolution has a tendency to produce "similarities of organization" and that the forms of life are restricted and channelled. Richard Dawkins disagrees with the view that new phyla suddenly appeared in the Cambrian, arguing that for a new phylum "to spring into existence, what actually has to happen on the ground is that a child is born which suddenly, out of the blue, is as different from its parents as a snail is from an earthworm. No zoologist who thinks through the implications, not even the most ardent saltationist, has ever supported any such notion. Gould argues that no paleontologist regards the Cambrian explosion "as a genealogical event" that is as the actual time of initial splitting", but rather it "marks an anatomical transition in the overt phenotypes of bilaterian organisms. Wilson and other evolutionary biologists concerning the disciplines of human sociobiology and evolutionary psychology, both of which Gould and Lewontin opposed, but which Richard Dawkins, Daniel Dennett, and Steven Pinker advocated. I grew up in a family with a tradition of participation in campaigns for social justice, and I was active, as a student, in the civil rights movement at a time of great excitement and success in the early s. Scholars are often wary of citing such commitments. Objectivity must be operationally defined as fair treatment of data, not absence of preference. Gould emphasized that adaptive behaviors can be passed on through culture as well, and either hypothesis is equally plausible. Its flexibility "permits us to be aggressive or peaceful, dominant or submissive, spiteful or generous" Violence, sexism, and general nastiness are biological since they represent one subset of a possible range of behaviors. But peacefulness, equality, and kindness are just as biological"and we may see their influence increase if we can create social structures that permit them to flourish. *The Mismeasure of Man* Gould was the author of *The Mismeasure of Man*, a history and inquiry of psychometrics and intelligence testing, generating perhaps the greatest controversy of all his books and receiving both widespread praise [98] and extensive criticism, [99] including claims of misrepresentation. Gould claimed that both theories developed from an unfounded belief in biological determinism, the view that "social and economic differences between human groups" primarily races, classes, and sexes"arise from inherited, inborn distinctions and that society, in this sense, is an accurate reflection of biology. *Non-overlapping magisteria* In his book *Rocks of Ages*, Gould put forward what he described as "a blessedly simple and entirely conventional resolution to The magisterium of religion extends over questions of ultimate meaning and moral value.

Chapter 5 : Natural History "This View of Stephen Jay Gould"

With one of the largest book inventories in the world, find the book you are looking for. To help, we provided some of our favorites. With an active marketplace of over million items, use the Alibris Advanced Search Page to find any item you are looking for. Through the Advanced Search Page, you.

Stephen Jay Gould, a Professor of Geology at Harvard University, a Curator of invertebrate paleontology in the Museum of Comparative Zoology, a public figure and spokesperson, and an author of many popular science books, has in a *Wonderful Life* created a window through which the reader views one of the most important events in natural history: What could be more thrilling than to witness one of the great steps in the long history story of life that has begun with a microbe and ended with the *Homo sapiens*? A favorite theme of Dr. Gould is to overturn commonly accepted notions that have arisen through human prejudices often due to self-centered preconceptions. It is almost as though Gould regards humans as apes with merely enlarged brains and big egos 1 who would still believe to this very day that the Earth was the center of the universe had not humanity been enlightened by Galileo, Newton and Copernicus. Charles Doolittle Walcott, who discovered the remains of tens of thousands of mostly soft-bodied invertebrates in the Burgess Shale in , managed to misinterpret what one day would become one of the greatest discoveries in paleontology. Walcott incorrectly classified these marine animals as ancient versions of modern fauna despite the extraordinary character of some of them such as *Opabinia*, which had five eyes, and *Hallucigenia*, whose name describes its bizarre and dream-like appearance it had seven pairs of toothpick-like spines, a tubular tail, a bulb-like head, seven tentacles along its back and six pods at the base of its tail! Walcott considered this creature to be a worm. How could the director of the Smithsonian Institution make such an incredible mistake? According to Gould, Walcott was trying to force the Burgess Shale fauna into the classification scheme prevailing at the time. Here was one of the great field paleontologists trying, like an infant child, to squeeze round pegs into square holes. However, in , Harry Whittington published a monograph on *Marrella* in which he expressed doubts that *Marrella* was a trilobite² as previously thought. *Marrella* looked roughly like a fly with wings replaced by a shield consisting of four, pointed prongs sweeping over its back. Eventually, *Marrella* would be classified as an arthropod unique to the Cambrian Period. Through thorough examination of the specimens, the three would in due time arrive at the conclusion that many Burgess Shale specimens were unique arthropods or belonged to new phyla, implying that the Cambrian Period was one of the richest for animal diversity. Thus, this period in geological history marked the appearance of new "wonderful life. In fact, we are very "lucky" to be here on Earth. The Cambrian Period began million years ago. It marked the beginning of the Paleozoic Era from which henceforth hardened body parts such as exoskeletons, shells and bones would leave a trail of fossil evidence that paleontologists would ponder over to construct the "tree of life" , and it marked the advent of virtually all the major groups of modern animals. The Cambrian was a period during which Nature seemed to be experimenting in an enormous variety of body structures. Many of these "experiments" failed in the sense that they did not survive, but interestingly Gould suggests that somewhat random factors rather than survival-of-the-fittest properties were the reason for the subsequent decimation. This coincides with a new viewpoint of evolution that Stephen Gould and Niles Eldredge have advocated in which contingency plays a significant role. This is the so-called punctuated equilibrium. Only the smallest creatures survived. Another example of contingency, Gould argues, is the Cambrian fauna. It is impossible for scientists in examining the remarkable Burgess Shale fauna to predict which ones would survive and be "successful. These ideas have led to a new view of the tree of life with a richer branching structure. Compared to the old tree, the new tree during brief periods such as at the beginning of the Cambrian suddenly broadens in diversification only to suffer a decimation at a later time with many "leaves" terminating in evolutionary dead ends. Only a few lineages survive. Not all scientists believe in the theory of punctuated equilibrium of Gould and Eldredge, but most give the two credit for pointing out that species quite often appear and disappear on what seems to be short geologic time scales. Although this might be an artifact due to the scanty fossil record, it is more likely that evolutionary processes occur much faster than have previously been assumed. Gould, by his own

admission, is unable to provide a convincing explanation of why the explosion in animal diversity occurred during the Cambrian Period. This is often regarded as an unsolved problem in natural history. According to Gould, several evolutionary forces could have contributed. One argument is that life was filling a new, previously uninhabited, ecological niche, thereby providing an "open field of unparalleled opportunity" into which organisms expanded at rapid rates. A second, rather weak, idea argues that genetic systems age and just happened to "mature" at around the time of the Cambrian Period. Some religiously inclined individuals claim that the lack of a good explanation for the Cambrian biological explosion implies divine intervention. The Cambrian explosion can be "explained" by several important developments in evolution that had occurred in the Precambrian. Indeed, this was "fortunate" for O₂ was poisonous for early life. The oxygen in the atmosphere has been largely biologically generated as a waste product of photosynthetic life, and, as a result, oxygen in air has been increasing during the last 3 billion years. Approximately 2 billion years ago, certain organisms uncovered how to use O₂ as a more efficient means to generate energy in metabolic processes. This allowed life forms to increase in size. Eukaryotes, which are organisms with cells containing organelles specializing in various biological processes and containing, in particular, a nucleus housing genetic codes, first appeared around 1. About a billion years ago, sexual reproduction arose as a more efficient means of biological replication. The potentially rapid increase in evolutionary progress expected from sexual reproduction, however, was retarded by the longest ice age in geologic history. Had Earth been warmer, the Cambrian explosion might have happened several hundred million years earlier. With the eukaryotic cell, respiratory metabolism and sexual reproduction, life forms were able to increase their size: The first multicellular organisms -- microscopic metazoa -- emerged about million years ago. Then, million years later, the two supercontinents of Earth broke up providing more shallow water habitats for life, and, at around the same time, one of the coldest ice ages, the Varanger, ended. The confluence of all these developments and events provided the "fuel" for the Cambrian explosion. Now evolution was proceeding at a rapid pace. The fire on the fuse was burning. The fuse itself was almost gone. And everything was perfect for a biological explosion, an evolutionary radiation:

Chapter 6 : Stephen Jay Gould | American Museum of Natural History

Wonderful Life: The Burgess Shale and the Nature of History by Stephen Jay Gould focuses mainly on the Burgess Shale in British Columbia high up in the Canadian calenderdelascience.com book's title has a meaning to it, not only about life in the Burgess Shale, but also one of Gould's favorite movies.

Science defines the natural world while religion defines our moral world. As Gould puts it: However, I seriously doubt that most believers on either side will change their minds. I have long observed that beliefs prove more powerful than reason and NOMA represents a reasonable proposition. Gratefully, Gould clarifies an omission from his last book about the value of ethics from us nonbelievers: I take issue that religion defines our moral world. Most religionists whom I have known and I once owned religious beliefs act out of duty towards their belief in their God, whether it comes from fear, greed of heaven, hope, or born from youth, long before they understood morality, and not because of its moral nature. Religion, by definition, submits to the expressions of human belief in a superhuman power, not for a defining act of morality. The idea that religion defines morality comes as a relatively modern invention used today as a rhetorical defence of religion. Yes, I know that Gould aims for a resolution between science and religion, and I fully understand his use, but I would prefer the more general idea of a magisteria of ethics, rather than religion. Does not the liberal religionist view that includes morality, fall under the generality of ethics? As another minor criticism, Gould, throughout his legacy of essay writings, always seems to insert a religious expression, almost as if he pretends to believe. I can understand this from a person of religion, a priest, or even a scientist who also believes such as the physicist and bishop, Polkinghorne. But Stephen Gould has clearly professed his unbelief and admits to agnosticism, yet he uses expressions such as "Lord only knows As a nonbeliever myself, I simply cannot in full conscious entertain the idea of using "Lord" or amen, even as "just" an expression although sometimes I unconsciously spurt out a "God damn," no doubt given to me through an early memetic event. There stands no excuse for word play or unconscious appeals here; Gould has the vocabulary and talent to find better and more useful expressions. I simply cannot fathom his reasoning and it seems disingenuous. I can only guess that perhaps he appeals for a conscience to his religious friends and colleagues. If this serves the case, then the snail man deserves another title-- chicken. But I applaud this book as a noble attempt from a true irenic and I highly recommend it to those interested in science and religion, and especially those who think science should define morality or religion should determine science. A few quotes from the book: NOMA cuts both ways an imposes restriction and responsibility on both magisteria. The political campaigns of American creationists do represent The enemy is not religion but dogmatism and intolerance. Huxley and Darwin did indeed lose any vestige of a lingering personal belief in an intrinsically just world, governed by a loving anthropomorphic deity. He [Darwin] lost personal comfort and belief in the conventional practice of religion, but he developed no desire to urge a view upon others-- for he understood the difference between factual questions with universal answers under the magisterium of science, and moral issues that each person must resolve for himself. Huxley must have relished the prospect that a freethinker who had so discombobulated the most hallowed traditions of Western thought could now lie with kings and conquerors in the most sacred British spot of both political and ecclesiastical authority. I most emphatically do not argue that ethical people must validate their standards by overt appeals to religion-- for we give several names to the moral discourse of this necessary magisterium, and we all know that atheists can live in the most firmly principled manner, while hypocrites can wrap themselves in any flag, including most prominently the banners of God and country. While every person must formulate a moral theory under the magisterium of ethics and meaning, and while religion anchors this magisterium in most cultural traditions, the chosen pathway need not invoke religion at all, but may ground moral discourse in other disciplines, philosophy for example. The half-century between Pius [XII] surveying the ruins of World War II and his own pontificate heralding the dawn of a new millennium has witnessed such a growth of data, and such a refinement of theory, that evolution can no longer be doubted by people of goodwill and keen intellect. But when we do for we must, nature can finally emerge in her true form: Only then can we unite the patches built by our separate magisteria into a beautiful and

coherent quilt called wisdom. When we reject the siren song of false sources, we become free to seek solutions to questions of morals and meanings in the proper place-- within ourselves. The Big Bang does not set the ultimate beginnings of all material things-- a subject outside the magisterium of science. The Big Bang is a proposition about the origin of our known universe.

Chapter 7 : Stephen Jay Gould, Ph.D. - Academy of Achievement

Wonderful Life: The Burgess Shale and the Nature of History is a book on the evolution of Cambrian fauna by Harvard paleontologist Stephen Jay Gould. The book was a volume made *The New York Times Best Seller list*, was the winner of the Royal Society's Rhone-Poulenc Prize, the American Historical Association's Forkosch Award, and was a finalist for the Pulitzer Prize.

Chapter 8 : Review of Wonderful Life, by Stephen Jay Gould "Fairfax Master Naturalists"

It's true, of course, but in Wonderful Life (, pp) Stephen Jay Gould guides us through the murkier parts of the algorithm: sometimes it's not entirely up to us, even in an Anthropocene era. Sometimes, natural contingencies determine what survives and what doesn't.

Chapter 9 : Wonderful Life ()

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