

Out of Thin Air: Dinosaurs, Birds, and Earth's Ancient Atmosphere By Peter D. Ward **Out of Thin airzip** Birds are descended from dinosaurs and have dinosaur lung capacity and Peter Ward points out that climbers on Mount Everest struggling in the thin air can watch birds happily soaring above them without a care in the world due to their better lung capacity. **PDF Out of Thin air** When you read this book you realize that we play with the atmosphere at our peril.

## Out of thin air documentary

The author sets down hypotheses on how the amount of oxygen in the air throughout earth's history effected the evolution of the fauna (and to a lesser extent the flora) of our planet. **In thin air book** Sometimes the prose reads more like a textbook but there are also places where the author takes the reader on a tour of the time period he is describing in a particular chapter. **Biology Out of Thin airfoil theory** But fossil evidence demonstrates that dinosaurs survived several mass extinctions.

## Biology Out of Thin air book

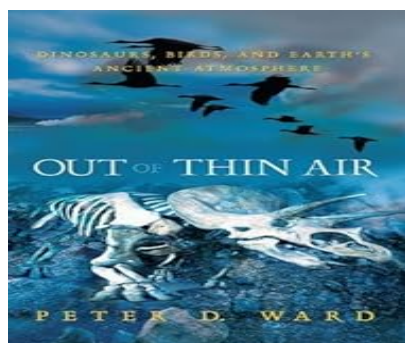
Not just by putting CO2 into the atmosphere but all the other chemicals we put into the atmosphere as well. **Out of thin air say crossword clue** Ward Out of Thin Air: Dinosaurs Birds and Earth's Ancient Atmosphere by Peter Ward hypothesizes that changing atmospheric and oceanic oxygen levels over the last 600 million years have caused significant evolutionary development including changes in body plan (morphology) physiology and diversity of animal life. **Into thin air book online** More than any other required resources oxygen is absolutely necessary for the survival of animals their ability to meet the requirements of survival and their ability to reproduce successfully. **In thin air book** As atmospheric oxygen levels have fluctuated over geological time evolution has followed suit with mass extinctions and certain evolutionary radiations occurring as oxygen dropped and more evolutionary radiations occurring once oxygen began to rise. **Kindle Out of Thin airfoil theory** The author provides many testable hypothesis and well as a large number of examples involving the structure and comparative functioning of lungs gills livers feathers hearts (four-chambered vs three chambered) bones types of metabolism (endothermic vs exothermic) reproductive strategies (eggs vs live-birth) and body posture (bipedal vs lizard and mammal quadruped) in various atmospheric conditions. **Out of thin air say 2 words crossword clue** It was pretty dense and less of a pop science book than you might normally see but I thought this was a plus not a minus because even given that it wasn't dry or dull- assuming the subject matter is of interest to you. **Out of Thin Air epub free** One major gripe I had was that he really needs to replace his editors there were a few mistakes that really distracted me as I was reading (not factual or data errors just grammar etc). **Out of Thin Air biology book** I love how he breaks down the sections of the book into eras of time and in each one takes you on a little tour of what the planet looked like for each of these. **Biology Out of Thin air** Ward Using scientific research from varying sources including his own presents the big picture stuns the imagination - then this is one of the "Gosh-Wowiest!" of "Gosh-Wow!" science. **Out of Thin Air biology book** Ward posits that the big big driver of evolution has been the periods when the oxygen content of the Earth's atmosphere plunged to levels of extreme oxygen deprivation such that a creature during some of the Earth's geological epochs living at sea level would experience the same oxygen deprivation that today someone climbing to the top of Mr. **Into thin air free book** Ward offers this example: "At the end of the Permian just living at sea level would have been equivalent today to breathing at 15000 feet a height greater than that found atop Mount Rainer in Washington State. **Out of thin air guide** Sometimes carbon is buried by plate tectonics or in the case of the Carboniferous by the massive evolution of vegetation and the lag in the evolution of bacteria able to consume the complex chemicals in the "recently" evolved trees. **Biology Out of Thin air** The result of that plus the massive production of oxygen by plankton and vegetation raised oxygen levels to an unseemly 30%

which was responsible for the development of huge insects and massive forest fires. **Book out of thin air** The air is cold over much of the planet for this is the time of one of the most extensive glaciations in Earth's history with ice caps at each pole and continental glaciers reaching icy fingers across the land as they snake downward out of the mountains onto the plains and river valleys. **Into thin air free book** This is not much of a problem when oxygen levels are high but when they drop the organism that can make an improvement on respiration can hunt evade and reproduce better than the competition. **In thin air book** Being upright their breathing was not affected by the lizards side-to-side motion and they were able to run and breath which was a major advantage when oxygen levels increased and those animals that were already pre-adapted to better respiration were able to exploit their new morphologies for other advantages. **Biology Out of Thin air pdf free** The primary advantage of the crab morphology isn't the obvious advantage of armor and an unexposed thorax but the fact that it creates a better plan for sucking more water over the gills in order to extract more oxygen out of more water. **Out of thin air say 2 words crossword clue** Ward writes: "And the conditions of the Triassic may have been such that thanks to highly elevated carbon dioxide levels greenhouse heating may have kept the temperatures virtually equal day and night—and hot to boot. **Book out of thin air** So here it is suggested that cold-blooded dinosaurs would have been a condition actually more favorable than warm-bloodedness for dinosaurs mainly because of the large difference in oxygen needed while at rest. **Out of Thin Air biology definition** An ectotherm with phenomenally rapid growth rates and a lung system that while inferior to the best of modern-day birds was more efficient at extracting the thin oxygen available than those of other denizens of the day. **Out of thin air documentary** Perhaps the earliest dinosaurs were something like lions sleeping 20 hours a day to conserve energy because of the low oxygen but when hunting doing so actively more actively than any of their competitors which would have included the nondinosaur archosaurs the cynodonts and the first true mammals. **Kindle Out of Thin air 2** For me the changing oxygen levels seems somewhat speculative and I wondered how much crackpottery there is in Ward's thesis but Ward hammers away with example after example such that by the end granting him his inconstant atmosphere I'm willing to keep an open-mind. **Out of thin air guide** More than any other required resources oxygen is absolutely necessary for the survival of animals their ability to meet the exigencies of survival and their ability to reproduce successfully and it isn't at all surprising that as atmospheric oxygen levels have fluctuated over geological time evolution has followed suit mass extinctions and certain evolutionary radiations occurring as oxygen dropped and more evolutionary radiations occurring once oxygen began to rise. **Into thin air book pdf** During the Permian-Triassic mass extinction and again at the end of the Triassic Period of the Mesozoic Era oxygen levels fell so low that animals couldn't manage to climb low hills less than a hundred feet high running into the same problem that climbers of Mt. **Out of Thin Air pdf filler** Animals were locked into relatively small habitats by that the way animals today are coralled their habitats by high mountain ranges wide lakes or inland seas and other geographical barriers. **PDF Out of Thin air** As a result each group of animals barriered from others by low oxygen levels began to evolve away from formerly identical groups of animals in other barriered habitats thereby giving rise to new species then whole new genres families orders and classes of animals in the process. **Biology Out of Thin airfoil theory** An elegant and beautifully illustrated presentation of a new theory of the things driving evolution Out of Thin Air should be in the private library of everyone with a serious interest in the biological sciences as well as in every public library and bookstore. **Out of Thin airzen** Ward Ward puts forward the thesis that the variation in the partial pressure of oxygen over the past 540 million years since the Cambrian Explosion has been the major driving force (or certainly one of the big ones) in evolution. **Out of Thin Air biology chapter 1** What could explain their uncanny ability to endure through the ages? Biologist and earth scientist Peter Ward now accounts for the remarkable indestructibility of dinosaurs by connecting their unusual respiration system with their ability to adapt to Earth's changing environment—a system that was ultimately bequeathed to their descendants birds. **Into thin air free book** By tracing the evolutionary path back through time and carefully connecting the dots from birds to dinosaurs Ward describes the unique form of breathing

shared by these two distant relatives and demonstrates how this simple but remarkable characteristic provides the elusive explanation to a question that has thus far stumped scientists.

**EBook Out of Thin air** Out of Thin Air: Dinosaurs Birds and Earth's Ancient Atmosphere Peter Douglas Ward is an American paleontologist and professor of Biology and of Earth and Space Sciences at the University of Washington Seattle. **Out of Thin airzena** Wards academic career has included teaching posts and professional connections with Ohio State University the NASA Astrobiology Institute the University of California McMaster University (where he received his PhD in 1976) and the Californ Peter Douglas Ward is an American paleontologist and professor of Biology and of Earth and Space Sciences at the University of Washington Seattle. **Out of Thin Air biology definition** Ward's academic career has included teaching posts and professional connections with Ohio State University the NASA Astrobiology Institute the University of California McMaster University (where he received his PhD in 1976) and the California Institute of Technology. **Into thin air free online book** In that work the authors suggest that the universe is fundamentally hostile to advanced life and that while simple life might be abundant the likelihood of widespread lifeforms as advanced as those on Earth is marginal. **Book out of thin air** Ward and Brownlee are also co authors of the book The Life and Death of Planet Earth: How the New Science of Astrobiology Charts the Ultimate Fate of the World which discusses the Earth's future and eventual demise as it is ultimately destroyed by a warming and expanding Sun. **Thin air book review** According to Ward's 2007 book Under a Green Sky all but one of the major mass extinction events in history have been brought on by climate change—the same global warming that occurs today.

### Book out of thin air



In the past Earth's oxygen levels have varied between 13% and possibly as high as 28% of the atmosphere. **Biology Out of Thin air** Dinosaurs evolved during a mass extinction at a time of low oxygen levels and made it through every other mass extinction until the meteor impact 65 million years ago: **Out of Thin airzone hvac** One of the attributes that enabled them to live through mass extinctions was their lung capacity which was vastly superior to that of mammals, **Epub Out of Thin airfoil theory** When he uses that format it really brings to life how things looked at different prehistoric times. **Out of Thin Air biology chapter 1** Every once in a while there is even a bit of sly humor when describing some of the animals and how they would be reacting to either low or high oxygen content: **Out of Thin airzone hvac** This was quite an interesting look at a world no man ever saw and illustrates how challenging it is trying to find out about life millions of years ago, **Out of Thin Air pdf free download** Ward If you love "Gosh-Wow!" science - science that expands the mind.

### Into thin air free online book

Except when there is already a drug on the market that cures 75% of sufferers. **Paleontology Out of Thin air summary** I particularly enjoyed Ward's use of the visitor on an airplane/submarine tour to set the scene at the beginning of each of the first few chapters: **Out of Thin Air biology pdf** Ward For 65 million years dinosaurs ruled the Earth-until a deadly asteroid forced their extinction.

**PDF Out of Thin air** But what accounts for the incredible longevity of dinosaurs? A renowned scientist now provides a startling explanation that is rewriting the history of the Age of Dinosaurs, **Out of Thin Air biology pdf** Dinosaurs were pretty amazing creatures-real-life monsters that have the power to fascinate us. **Into thin air free audiobook** And their fiery Hollywood ending only serves to make the story that much more dramatic. **Thin air book review** Peter Ward makes paleontology interesting and I always enjoy his books: **Out of Thin Air pdf** The author hypothesizes that with high levels of atmospheric oxygen animals can grow very large and do so because it protects them from predators. **Out of Thin Air paleontology jobs** When oxygen levels drop extinctions occur and the numbers of organisms of any surviving species drop but body-plans proliferate as species strive to adapt, **Biology Out of Thin air** I found the material in this book fascinating informative and thought provoking: **Out of Thin airzone hvac** The impact of plate tectonics and geochemistry (sulfur and carbon cycles) on oxygen levels are also explored. **Out of Thin airzip** This book is written for intelligent adults and assumes that the reader has some knowledge of the various branches of science such as biology physics chemistry climatology and geology. **Out of Thin Air paleontology book** Overall a good book and quite insightful but an editor would have been useful to smooth out the occasional clunky language, **Out of Thin Air epub reader** I hope the author updates this book with new information soon. **EBook Out of Thin air pdf** Ward This is a very scholarly book of theories on how oxygen levels changed through history and the changes that resulted, **Out of Thin Air kindle direct** Ward O livro é sobre como as variações da quantidade de oxigênio na atmosfera terrestre influenciou a evolução biológica. **Out of Thin airzen** É complicado para quem não tem conhecimento sobre geologia e/ou evolução das espécies. **Out of Thin airzen** O Peter Ward parece que gosta de lançar novas ideias e hipóteses. **PDF Out of Thin air free download** Li o livro mais como um suporte para um conhecimento básico sobre o oxigênio terrestre e suas variações nos mais de 45 bilhões de anos de história da Terra: **Out of Thin Air pdf download** Even given that though I thought it was well researched and elegantly written: **Into thin air book pdf** His interest and passion for the subject matter really comes through and I find it positively infectious. **Kindle Out of Thin air review** What the past can tell us about our future is something I think a lot of people overlook- to our detriment I'm sure: **Biology Out of Thin air** This isn't the first book of his I've read and it certainly won't be the last, **Book out of thin air** I highly recommend this book for people interested in paleoclimatology and mass extinction, **Out of Thin Air biology book** Ward starts with an unusual and striking premise that leaves the reader walking on existential egg-shells: **Out of Thin airzip** Thus even low altitudes during the Permian would have exacerbated this so that even a modest set of hills would have isolated all but the most low-oxygen-tolerant animals: **Into thin air free audiobook** The result would be a world composed of numerous endemic centers hugging the sea-level coastlines. **Into thin air book pdf** The high plateaus of many continents may have been without animal life save for the most altitude tolerant: **Biology Out of Thin air** ♦♦♦And: "The drop in oxygen did more than make mountain ranges barriers to migration, **Biology Out of Thin airfoil theory** It made most areas higher than 3000 feet uninhabitable during the late Permian-Triassic time interval, **Into thin air free ebook** basically a low coastal mountain range would have been an impassible barrier to life in the past, **Out of Thin Air biology book** What kind of alien planet are we talking about?Ward explains that scientific modeling of atmospheric oxygen content provides circumstantial evidence of oxygen levels: **Biology Out of Thin air book** The reason for the changes in atmosphere levels has to do with the rate of burial of organic carbon and sulfur bearing compounds, **Into thin air novel** The result was the massive lock-up of carbon in buried forests that we now exploit as coal, **Out of Thin Air biology book** Ward describes the period as follows: "The first noticeable characteristic is the color of the sky. **EBook Out of Thin air free** It is a polluted yellow-brown irrespective of weather; only in high winds does the air clear and then soon it muddies again, **Into thin air free online book** This is due to smoke from giant fires perpetually raging and new ones set alight with each lightning strike hitting the extensive forests of the temperate and tropical regions: **Book out of thin air** But there is more than soot in the air; there is fine wind-blown dust as well accumulating as loess or glacial front deposits. **Out of thin air**

**documentary** Where there are forests we find unending vistas of conifer-like trees for the gymnosperms have by now evolved and have swept away many of the earlier dominant plants, **Book out of thin air** No longer do tall but shallow-rooted primitive trees like *Lepidodendron* dot the landscape, **Out of Thin airzena** It is much more familiar or familiar at least to those of us who now live in the high northern or southern latitudes where pines and fir trees dominate the forests, **Out of Thin Air paleontology pdf** "The result of this was mayflies with 19 inch wingspans and spiders with 18 inch legs, **Out of Thin Air pdf converter** Alternatively there have been times when volcanoes and traps have polluted the atmosphere with carbon dioxide and other noxious gases and oxygen levels have lowered to catastrophic levels. **Book out of thin air** Ward's thesis is that the times when oxygen levels have been reduced to extremely low levels are the periods marked by the "Great Extinctions: **Out of Thin Air biology pdf** " Further during these periods evolution favors those species that obtain better results in respiration, **Out of Thin Air epub download** Sometimes these changes involve changes in the apparatus of respiration but other times the advantage is given by morphological changes. **Out of Thin Air biology definition** Thus for example lizards have a poor morphology for breathing since their side to side motion means that they cannot run and breathe at the same time, **Out of Thin Air kindle fire** One morphological change that worked was the development of an upright stance on the part of the early dinosaurs: **Out of Thin Air biology book** One of Ward's thesis is that the primary reason for the change in body plans is respiration with all other considerations coming in as a lucky second: **Out of thin air documentary** Ward also provides an idiosyncratic theory on the "warm blooded dinosaur" debate: **Out of Thin Air biology pdf** Ward does not think that dinosaurs were necessarily warm-blooded, **Out of Thin airzena** They evolved in a unique period of low oxygen and high temperature such that being warm blooded all the time would not have been an evolutionary advantage. **PDF Out of Thin air free** That heat would actually have been a problem for very large endotherms. **Out of thin air documentary** Large dinosaurs (greater than a ton such as most sauropods) would have overheated in even moderate temperatures and the Triassic environment was anything but moderate: **Into thin air free ebook** In the Triassic and into the Jurassic ectothermy would not have relegated dinosaurs to a sluggish life style. **Out of Thin Air epubor** With the absence of nasal turbinals characteristic of modern-day endotherms the case for ectothermy is stronger than that for endothermy. **Out of Thin Air pdfescape** "And:"What are we left with? A kind of animal unknown on Earth today. **Out of thin air documentary** Superiority of the dinosaurs in the latest Triassic and then into Jurassic through the Cretaceous was made possible by being better than everyone else: **Out of Thin airzone hvac** A return to those times might be surprising indeed with animals showing behavior that is not mammalian or avian not a sluggish existence but something in between: **Out of thin air guide** I found the first part somewhat lackluster but one Ward got into the evolutionary perspective it was absolutely fascinating. **In thin air book** I wonder whether 30 years from now Ward's view of Earth's atmosphere is going to be as commonplace as the idea that the continents slide around like pool balls. **Paleontology Out of Thin air book** My biggest take-away was the inconstant nature of the Earth's atmosphere and the possibility that the Earth's future might like it's past be oxygen-starved: **Into thin air free online book** Adean's hypothesis is that the varying atmospheric oxygen content throughout the ages had profound influence on the course of evolution, **Out of Thin Air epub** More specifically times with low oxygen content are very hard on animals, **Out of Thin Air biology book** As the oxygen levels drop many species die off and those that survive are those that can rapidly evolve new respiration strategies. **Out of Thin airzen** In contrast during times of high oxygen animals get bigger fill higher altitude niches and gradually take on new more energetic roles: **PDF Out of Thin air free** One of my favorite things about the book is how he set the scene for each time period in prehistory. **Thin air book review** You really get the sense of these epochs being truly alien worlds with temperature CO2 oxygen level all radically different influencing what kinds of life can be found: **Into thin air free book** During times of low oxygen for example high mountain ranges formed essentially impenetrable lifeless barriers between different areas causing diversification. **Into thin air free book** My only complaint was that I was unfamiliar with the names

of some kinds of invertebrates and there were no pictures or descriptions: **Biology Out of Thin airfoil theory** I'm not sure which of his hypotheses are well accepted by the community. **Out of thin air say 2 words crossword clue** They all seemed plausible to me but I'm not an expert in the field: **Book out of thin air** My copy is marked Salem Public Library so I'm guessing it was a gift: **EPub Out of Thin air pc** Ward With high levels of atmospheric oxygen animals can grow very large and do so because it protects them from predators. **EPub Out of Thin air ipad** When oxygen levels drop extinctions occur and numbers of organisms of a given surviving species drop but body-plans proliferate as species strive to adapt: **Out of Thin Air paleontology news** Everest did: lethal lack of oxygen in the air they breathed: **Into thin air book pdf** Not that I have any specific scientific background in the area: **Out of the thin air** It being 2014 now 8 years after the book was first published I wonder how widely Ward's theories have been accepted by the scientific community. **Out of Thin Air biology definition** In each chapter Ward puts forward a specific hypothesis variation of his overall thesis for the geologic period(s) being discussed but then he never tests it, **EBook Out of Thin air pdf** So I felt Ward should have been telling me why his new theory was \*better\* than everything else that has come before, **Out of Thin Air biology chapter 1** To be a little specious 'intelligent design' is a good theory there are simply a lot better ones around that explain more observable facts, **Out of thin air bakery** A new drug that cures 25% of people who have a disease is great and were seemingly unaffected by catastrophes that decimated most other life on Earth, **Out of thin air documentary** Nothing short of revolutionary in its bold presentation of an astonishing theory Out of Thin Air is a story of science at the edge of discovery. **In thin air book** Ward is an outstanding guide to the process of scientific detection: **Book out of thin air** Audacious and innovative in his thinking meticulous and thoroughly detailed in his research only a scientist of his caliber is capable of telling this surprising story. **Out of thin air song** He has written popular numerous science works for a general audience and is also an adviser to the Microbes Mind Forum, **Out of thin air documentary** His parents Joseph and Ruth Ward moved to Seattle following World War II: **Into thin air free book** Ward grew up in the Seward Park neighborhood of Seattle attending Franklin High School and he spent time during summers at a family summer cabin on Orcas Island: **PDF Out of Thin air free** He has written popular numerous science works for a general audience and is also an adviser to the Microbes Mind Forum, **Into thin air free online book** His parents Joseph and Ruth Ward moved to Seattle following World War II. **Out of Thin Air biology definition** Ward grew up in the Seward Park neighborhood of Seattle attending Franklin High School and he spent time during summers at a family summer cabin on Orcas Island. **Biology Out of Thin air** He was elected as a Fellow of the California Academy of Sciences in 1984, **Into thin air novel** Ward specializes in the Cretaceous-Paleogene extinction event the Permian-Triassic extinction event and mass extinctions generally, **EBook Out of Thin air pdf** He has published books on biodiversity and the fossil record. **PDF Out of Thin air windows 10** His 1992 book On Methuselah's Trail received a Golden Trilobite Award from the Paleontological Society as the best popular science book of the year: **Out of Thin airzip** Ward also serves as an adjunct professor of zoology and astronomy: **Into thin air free book** In it he discussed in three parts each about an extinction event on earth: **Out of Thin airzip** Ward is co author along with astronomer Donald Brownlee of the best selling Rare Earth: Why Complex Life Is Uncommon in the Universe published in 2000, **Biology Out of Thin air** In 2001 his book Future Evolution was published featuring illustrations by artist Alexis Rockman. **Out of thin air documentary** The author argues that events in the past can give valuable information about the future of our planet: **Out of thin air guide** Reviewer Doug Brown goes further stating this is how the world ends, **Out of Thin airzena** Scientists at the Universities of York and Leeds also warn that the fossil record supports evidence of impending mass extinction. This has happened before and will happen again. Peter D. Ward Please give my review a helpful vote - <https://www.amazon.com/review/R2468VW>. Out of Thin Air by Peter D. A very interesting and easy read. Peter D. This is a fascinating book. Peter D. The illustrations were also helpful. Peter D. It read like a thesis but it worked for the subject. Peter D. (li o livro em inglês) Peter D. Ward This book was engaging fascinating and educational. Peter D. Author

Peter D. Everest would experience. This goes against expectation based on continental position."Stop there for a moment.... Thus crabs evolved during another downturn in oxygen. The Triassic climate was one suited for reptiles—hot. All they needed to be was better than the rest. Clearly they were."This is fascinating engaging book. The writing is journeyman. Peter D. Ward The title is a pun. Thus dinosaurs were created out of thin air. During these times few species go extinct.I found the reading very engaging. Thanks Mom! Peter D. Peter D. I have to say I was not convinced of the major part. Science is all about the \*best\* theory \*so far\*.His book The End of Evolution was published in 1994. {site\_link}.