

1: A Guinea Pig's History of Biology | New Humanist

I picked up "A Guinea Pig's History of Biology" due to the recommendation author Sam Kean made in "A Violinist's Thumb". Both books handle the history of biology (with a focus on how we "discovered" DNA, genetics, and biometrics).

Through their stories he explodes the persistent myth that science is a series of eureka moments by heroic individuals, instead revealing a complex reality of social interaction and interdependence. An account that draws much of its fascination from unexpected connections. With an enviable lightness of touch, Endersby weaves his scientific threads into a much broader tapestry of cultural history. Accessible and engaging. Eye-opening and entertaining, this is cutting-edge history of science that everyone should read. Discover why Charles Darwin puzzled over passion flowers, and how the most unlikely of experimental organisms—from guinea pigs to an unprepossessing cress plant—contributed to what are now hailed as landmark discoveries, as well as leading to a lot of dead ends. It reads like a work of fiction, complete with fascinating narratives and quirky bits of detail. Clearly the author put a great deal of effort into thoroughly investigating and communicating both the scientific and human sides of this topic. Dr. Endersby does a fascinating job of connecting society and science in this historical account of scientific progress over the last years. He underlines the fact that no matter how objective scientists may try to be, they are working within social and political environments that are guiding their thought processes whether they realize it or not. Endersby has had the happy idea of tracing the successes of modern biological research through the subjects which have made it possible. In Mr. Endersby presents an admirably lucid explanation of both the scientific issues at stake and of the human and social factors that influenced the course of the research. In his narrative, the scientists, from the explosive J. Haldane to the flamboyant Barbara McClintock, come to life in all the grandeur of their genius as well as their quite considerable wackiness. At the same time, he never loses sight of the fact that these remarkable figures worked among a throng of silent and involuntary collaborators. Some of us are feeling rather Darwinned out. But Jim Endersby has come up with a fresh and rewarding approach. Science is a collaborative process and by looking at the roles played by unwilling collaborators, from guinea pigs to zebrafish, Endersby provides a new perspective on the history of genetics. He has hit upon the bright idea of telling the story of reproduction, inheritance and evolution—and how we learnt about them, by focusing on the handful of creatures that have provided most of our knowledge: Oh, and not forgetting *Homo sapiens*. It is an absorbing tale of the way our understanding of genetics has depended on a crucial set of involuntary collaborators, the unsung heroes of the laboratory. The text portrays the development not only of genetics, but also of biochemistry, developmental biology, and physiology, as well as chemistry and physics. Furthermore, in a very readable style, the author recounts many periods in history, not just providing a look at science through the years, but also exploring political, economic, and social issues and showing how intimately science and scientists connect with, and are influenced by, other social trends. This book would be of interest to anyone fascinated or intrigued by genetics or biological research, as well as any professional or lay student of history and science. More truly a history of genetics than a history of biology, the book is illuminating and entertaining throughout. As entertaining as it is enlightening. Having mastered a vast scholarly literature, he expertly sets the science in its cultural context, explains difficult scientific concepts clearly, and offers a wise and entertaining account of some of the most important lines of research in the study of heredity, variation, and evolution over two centuries. Kingsland, author of *Modelling Nature*: He brings uncommon enthusiasm and infectious passion to his accounts of gardeners and travellers, farmers and priests. He shares his joy at gazing through microscopes at zebrafish, offers indispensable information about the roots of genetic modification and vivisection and concludes with a superbly judged exploration of the significance of campaigns around biotechnology and eugenics. This book will become a vital resource for anyone who cares about where our biological knowledge came from and why it matters so much to our future.

2: JCI - A guinea pig's history of biology

A Guinea Pig's History of Biology Article (PDF Available) in The Yale journal of biology and medicine 83(2) Â· May with Reads Source: PubMed Central.

They are the key to all life. Our understanding of the cells themselves has also been transformed by the application of chemistry and other techniques. We now know much more about how cells function. A major step was the identification of genes and discovering that their function is to code for proteins â€” real miracle workers in the cell. All this provides excellent evidence for science being a special kind of thinking, which is prepared to go against common sense. There is no common sense in the idea that small random variations underlie the evolution of all life or that we are no more than a society of cells who develop from one single cell, the fertilised egg. Many of these discoveries have important implications for human health and this has often been a motivation for the research. However, only in special cases are humans good experimental subjects, moral issues aside, since they breed very slowly and are so large. The history of these remarkable achievements has depended very heavily, then, on model organisms, and that is what this book so elegantly describes, together with the complex lives of the scientists who did the work. A special feature of the book is the importance Jim Endersby, an historian of science at Sussex University, gives to the role of research on plants. Much attention is given, for example to the passionflower. Darwin collected two unfamiliar species when he was in the Galapagos; he wished to investigate their fertilisation and was puzzled by their aversion to self-fertilisation. He also wanted to understand how natural selection had created this specialised climbing plant. His plant studies also affected his thinking about sex. How the units of heredity, genes, were finally identified is another good, though complex, story. No one predicted that they would be tiny and located on chromosomes and merely code for proteins. But as Mendel was a simple monk in Austria his discoveries were largely ignored. Endersby reports that Mendel sent a copy of his paper to Darwin, but the eminent biologist neglected to read it. Small events could have big effects in the advance of science at that time, with many a wrong turn along the way. Dutch botanist Hugo DeVries used yet another plant, the primrose, to study changes that could provide the mechanism for evolution. Did evolution go slowly with small variations, or by leaps? DeVries thought he found the answer in the emergence in his plants of new species of primrose. Also this was the first organism subject to radiation to bring about changes. But there was something odd about the behaviour of the primrose and its popularity fell into decline Then attention became focused for many on the fruit-fly, *Drosophila*, which had many advantages as a research object including size and a rapid breeding cycle. The American Thomas Hunt Morgan was a key figure and identified the linkage of mutations with chromosomes. Morgan won the Nobel prize for Physiology in for his work on mutation in the fruit-fly. Endersby emphasises that in addition to being a researcher Morgan was also a lecturer, first at Columbia and then as the Biology Chair at Caltech. He was able to attract and retain talented students to aid his research, a valuable lesson for those who would wish to separate teaching from research in our universities. In addition to plants small mammals have proved important model organisms, most often used on studies that relate to human health. Both the guinea pig and the mouse are heroes of scientific discovery, though their use has, of course, raised ethical issues about animal experimentation. The discovery of Vitamin C came from guinea pig studies. It was he who promoted the improvement of the human race by artificial selection which led, alas, to eugenics. Though this is a fascinating and beautifully written book, as a developmental biologist I do regret that there is nothing on how the fruit-fly and amphibia have contributed to our understanding of how embryos develop. But this is a minor quibble, intended merely to suggest that Endersby has started, though not completed, the work of honouring these apparently humble organisms that continue to teach us the facts of life. To support our journalism, please subscribe. A simple way to support New Humanist, share this article with friends.

3: A Guinea Pig's History Of Biology on OnBuy

A Guinea Pig's History of Biology is a fascinatingly different take on the history of evolution, showing how science developed as a complex and fruitful interaction between individuals and the scientific world.

Historians have broadened their perspectives to tell more about the personal and social aspects of scientific activity and in so doing expose the sometimes transient nature of scientific theories. His book is organized not by date or scientist but by the organisms that enabled scientists to make progress. Each subsequent chapter introduces another animal or plant that has been a focus of research -- meaning breeding experiments. We learn about the findings that came from experiments with corn, mice, drosophila fruit flies, bacteriophage, guinea pigs, the evening primrose, and humans the last by observation and measurement -- not breeding experiments, thankfully. Haldane, Watson and Crick, Barbara McClintock, and many others -- and the book is most engrossing when Endersby delves into their relationships and the scientific communities that have formed up around them. Some scientists have spent much of their careers engaged in the massive husbandry and gardening efforts required to support these communities. The energy that has gone into supporting the fruit fly science industry, for instance, is impressive and not well known. This is a welcome feature in a science history and makes the book even more engaging and accessible. Overall this is a highly successful and modern history of biology. If you are not into that sort of stuff, however, you might not like this book. There were a few things that bothered me though. For one, the chapters jump around a lot. Each chapter is titled after an organism that contributed to biology like, guinea pigs and fruit flies, but the individual chapters jump around a lot. Overall I really enjoyed this book. The last chapter, which is titled: Another thing that bothered me was the number of typos. On the contrary, I liked it very much. I loved that it really is what it says it is: I liked this because I feel that while people are usually given thanks for their contributions, the plants and animals seldom are. Another thing I liked was the stories. And it also gave a history of the plant or animal itself. For example, the chapter on guinea pigs talks about where the animal came from and how it ended up as a household pet and lab animal. Overall I think this book is fantastic, and an absolute must read for anyone at all interested in the subject! I tried, and tried, but I could not complete reading this book. I returned it to the library. I reissued it several months later and repeated my efforts. This went on for 3 years before I gave up finally sometime in September I think last year. The book is too monotonous and suffers from the disease that ails most popular science books - too much detail, too much text, simply too much.. You ca I must be honest. You cannot get away with numbers or equations or flow diagrams here. In the light of these grave difficulties, I think the author has done a commendable job and I do hope to do him better justice by completing the book and modifying this review sometime in the not too distant future.

4: A Guinea Pig's History of Biology - Jim Endersby - Google Books

" A Guinea Pig's History of Biology is a fascinatingly different take on the history of evolution, showing how science developed as a complex and fruitful interaction between individuals and the scientific world. As entertaining as it is enlightening.

Natural habitat A tri-colored guinea pig in his natural habitat C. Some species of cavy identified in the 20th century, such as C. They are social, living in the wild in small groups that consist of several females sows , a male boar , and the young which, in a break with the preceding porcine nomenclature, are called "pups" not "piglets". They move together in groups herds eating grass or other vegetation, and do not store food. Guinea pigs learn to recognize and bond with other individual pigs, and testing of boars shows their neuroendocrine stress response is significantly lowered in the presence of a bonded female when compared to the presence of unfamiliar females. However, the success of interspecies interaction depends on the individual animals. Domestic guinea pigs generally live in cages, although some owners of large numbers of guinea pigs dedicate entire rooms to their pets. Cages with solid or wire mesh floors are used, although wire mesh floors can cause injury and may be associated with an infection commonly known as bumblefoot ulcerative pododermatitis. Bedding made from red cedar Eastern or Western and pine , both softwoods , were commonly used in the past, but these materials are now believed to contain harmful phenols aromatic hydrocarbons and oils. Guinea pigs do not generally thrive when housed with other species. Housing guinea pigs with other rodents such as gerbils and hamsters may increase instances of respiratory and other infections, [64] and such rodents may act aggressively toward the guinea pig. Some published sources say that guinea pigs and rabbits complement each other well when sharing a cage. In geriatric boars or sows rarely in young ones , the muscles which allow the softer pellets to be expelled from the anus can become weak. This creates a condition known as "anal impaction", which prevents the animal from redigesting cecotropes even though harder pellets may pass through the impacted mass. Guinea pigs benefit from a diet of fresh grass hay , such as timothy hay , in addition to food pellets which are often based on timothy hay. Alfalfa hay is also a popular food choice and most guinea pigs will eat large amounts of alfalfa when offered it, [21] [75] though some controversy exists over offering alfalfa to adult guinea pigs. Some pet owners and veterinary organizations have advised that, as a legume rather than a grass hay, alfalfa consumed in large amounts may lead to obesity , as well as bladder stones from the excess calcium in all animals except for pregnant and very young guinea pigs. If guinea pigs do not ingest enough vitamin C, they can suffer from potentially fatal scurvy. A number of plants are poisonous to guinea pigs, including bracken , bryony , buttercup , charlock , deadly nightshade , foxglove , hellebore , hemlock , lily of the valley , mayweed , monkshood , privet , ragwort , rhubarb , speedwell , toadflax both *Linaria vulgaris* and *Linaria dalmatica* , and wild celery. A guinea pig may or may not eat poisonous material. Reproduction Pregnant sow one week before delivering three pups Males reach sexual maturity in 3-5 weeks, while females can be fertile as early as 4 weeks old, and can carry litters before they are adults. A sow can have as many as five litters in a year, but six is theoretically possible. Females can once again become pregnant 48 hours after giving birth, but it is not healthy for a female to be constantly pregnant. Litter size ranges from one to six, with three being the average; [90] the largest recorded litter size is This might take place if the original parents die or are for some reason separated from them. This behavior is common and is seen in many other animal species such as the elephant. Signs of toxemia include: The reason for potential calcification is a metabolic disease, like ochronosis. Female genitals are distinguished by a Y-shaped configuration formed from a vulvar flap. While male genitals may look similar, with the penis and anus forming a similar shape, the penis will protrude if pressure is applied to the surrounding hair. Health problems Common ailments in domestic guinea pigs include respiratory tract infections , diarrhea , scurvy vitamin C deficiency, typically characterized by sluggishness , abscesses due to infection often in the neck, due to hay embedded in the throat, or from external scratches , and infections by lice , mites , or fungus. Other causes of hair loss can be due to hormonal upsets caused by underlying medical conditions such as ovarian cysts. While it is normal for guinea pigs to sneeze periodically, frequent sneezing may be a symptom of

pneumonia , especially in response to atmospheric changes. Pneumonia may also be accompanied by torticollis and can be fatal. Treatment of disease is made more difficult by the extreme sensitivity guinea pigs have to most antibiotics , including penicillin , which kill off the intestinal flora and quickly bring on episodes of diarrhea and in some cases, death. Most commonly, the roan coloration of Abyssinian guinea pigs is associated with congenital eye disorders and problems with the digestive system. List of guinea pig breeds Handling, temperament and socialization If handled correctly early in life, guinea pigs become amenable to being picked up and carried, and seldom bite or scratch. In Switzerland, owning a single guinea pig is considered harmful to its well-being and forbidden by law. These varieties vary in hair and color composition. The most common varieties found in pet stores are the English shorthair also known as the American , which have a short, smooth coat, and the Abyssinian , whose coat is ruffled with cowlicks , or rosettes. Also popular among breeders are the Peruvian and the Sheltie or Silkie , both straight longhair breeds, and the Texel , a curly longhair. Grooming of guinea pigs is primarily accomplished using combs or brushes. Shorthair breeds are typically brushed weekly, while longhair breeds may require daily grooming. Allergies to guinea pigs Allergic symptoms, including rhinitis , conjunctivitis , and asthma , have been documented in laboratory animal workers who come into contact with guinea pigs. In popular culture and media As a result of their widespread popularity, especially in households with children, guinea pigs have shown a presence in culture and media. Some noted appearances of the animal in literature include the short story " Pigs Is Pigs " by Ellis Parker Butler , which is a tale of bureaucratic incompetence. Two guinea pigs held at a railway station breed unchecked while humans argue as to whether they are "pigs" or "pets" for the purpose of determining freight charges. A guinea pig named Rodney, voiced by Chris Rock , was a prominent character in the film Dr. Dolittle , and Linny the Guinea pig is a co-star on Nick Jr. Guinea pigs were used in some major advertising campaigns in the s and s, notably for Egg Banking plc , [] Snapple , and Blockbuster Video.

5: Review: A Guinea Pig's History of Biology by Jim Endersby | Books | The Guardian

A history of biology using the major 'guinea pigs' of biological research. The author is an historian, not a scientist, but he comes across as an informed outsider. The examples provide a good linked.

April 28, Miroslav Hlavko , Shutterstock Guinea pigs, also called cavies, are a domesticated species of rodent *Cavia porcellus*. They were originally native to South America. However, they have been popular for thousands of years as pets and as food, and this species no longer exists in the wild. The Incas domesticated Guinea pigs more than 3, years ago. Selective breeding resulted in variations in coat color, patterns and texture, as well as flavor subtleties, Vanderlip wrote. According to Vanderlip, some historians speculate that the roasted meat reminded Europeans of suckling pigs. Some think Guinea pigs got their name from the squealing sounds they make. The name may come from the price of a Guinea pig in 16th-century England: Some researchers say ships leaving the port of Guiana in South America or Guinea in West Africa may have carried the animals to the European market. The little furry animals also have identity crises in other languages, Vanderlip wrote. Their compact, cylindrical bodies range from 8 to 10 inches Their ears are small and petal-shaped and their eyes are set on the sides of their heads. They have small, triangular mouths, which contain 20 teeth. Like other rodents, their teeth grow continuously, and Guinea pigs must chew or gnaw constantly to keep them from growing too long. According to ADW, there are 13 commonly recognized types or breeds of guinea pig: American, American satin, Abyssinian, Abyssinian satin, Peruvian, Peruvian satin, silkie, silkie satin, teddy, teddy satin, texel, coronet and the white crested. These breeds are characterized by differences in hair color, hair texture, the sheen of the pelage and the color patterns of the pelage. Habitat While domesticated Guinea pigs are no longer found in the wild, they do have some cousins, also called Guinea pigs, in South America that live in forests, savannas, mountainous grasslands and bushy areas. Habits Guinea pigs are very social and are herd animals. They like to be with others of their own kind, but also thrive from human affection. They are crepuscular, which means they are most active during dusk and dawn. Diet Guinea pigs are herbivores, meaning they do not eat meat. Typically, domesticated Guinea pigs eat processed pellets made from alfalfa hay or timothy hay and vitamins and minerals that Guinea pigs need to be healthy. They also love vegetables and fruits such as kale, mustard greens, bell peppers, carrots, bananas, apples and blueberries. Special water bottles that hang from the cage bars are often a good way to supplement water needs for pet Guinea pigs. Offspring Male cavies are called boars and females are called sows again with the pig nomenclature. Baby Guinea pigs are called pups. Sows have a gestation period of 59 to 72 days and give birth to litters of three or four babies on average, although they can have as many as 13 babies at one time. Though pups nurse for nutrition, they can also eat solid food as soon as they are born. At three weeks, the babies are weaned, and they are fully mature in two to three months. They typically live five to seven years.

6: A Guinea Pig's History of Biology by Jim Endersby

The guinea pig, with its pleasant disposition and prolific nature, captured the loyalty and mathematical mind of American geneticist Sewall Wright. When Wright joined the group of fellow American geneticist William Castle as a graduate student, Castle assigned him the guinea pig as his model to study genetics.

On the one hand it is the much-loved family pet, which owes its docility and portly form to millennia of breeding for the table in its Andean homeland. On the other, its small size and relatively rapid breeding cycle made it an attractive subject for laboratory research from the 18th century onwards - so much so that guinea pigs have helped to win 23 Nobel prizes, though they never got the credit. But though the guinea pig has come to symbolise the living experimental subject, other species have proved to be smaller, easier to keep, faster to breed and less troubling to the conscience some of them are not even animals. By telling the laboratory life-stories of *Passiflora*, *Oenothera*, *Drosophila*, *Arabidopsis* and *Danio*, as well as the trusty *Cavia porcellus* and one or two others, the historian Jim Endersby reveals how humans have unravelled the mysteries of evolution, genetics and development to such an extent that we can now, up to a point, engineer life itself. Though less cuddly than the guinea pig, these weeds, flies, fish and microbes prove heroes of their own absorbing narratives. Science is never so simple. Endersby introduces us to many more names, less famous but each a crucial contributor to modern biology. Through their stories he explodes the persistent myth that science is a series of eureka moments by heroic individuals, instead revealing a complex reality of social interaction and interdependence. And most science is drudgery. The "fly boys" at Columbia University lived surrounded by buzzing insects for months, picking out individuals with unusual characteristics, arranging marriages between them and counting the offspring. The zebra fish, whose transparent eggs and larvae allow you to watch as its network of blood vessels blooms under a microscope, eventually revealed several of the genes essential to normal development. But George Streisinger, generally regarded as the godfather of zebra fish research, published nothing for a decade while he struggled to develop the techniques that would make such advances possible. Time after time Endersby relates how founding groups and individuals such as Streisinger eagerly shared their methods, results and even their organisms with others, so that international communities developed around flies and worms, bacteriophage and fish, with an ethic of openness and informality. The author does not quite spell out that this ethic of collective endeavour led directly to the Human Genome Project and the free publication of the complete human DNA sequence, in the face of considerable opposition from commercial interests. But this is a rare omission in an account that draws much of its fascination from unexpected connections. With an enviable lightness of touch, Endersby weaves his scientific threads into a much broader tapestry of cultural history. The abolition of a tax on glass in led to an explosion in the building of greenhouses and a fashion for growing exotic plants: Darwin found much to feed his evolutionary thinking in the pollination of orchids and the pertinacity of the passionflower. The fruit fly found its way to labs in the US only because it hitched a ride to the Caribbean from the Far East in the 16th century along with its favourite food, the banana - imported as cheap food for slaves. Now science is poised to use the knowledge derived from our fellow creatures to answer new questions about our own nature and nurture, health and disease. Human guinea pigs lining up to participate in the UK Biobank project, which has just started collecting genetic and lifestyle information from half a million middle-aged adults, should read this accessible and engaging account to find out how we got here. Science, Politics, Ethics and the Human Genome.

7: Guinea Pig Facts

A guinea pig's history of biology. [Jim Endersby] -- "Biology today promises everything from better foods or cures for common diseases to the alarming prospect of redesigning life itself Looking at the organisms that have made all this possible gives.

Find articles by Kwitek, A. First published May 1, - Version history Jim Endersby. Scientific discovery typically does not happen overnight, or in a vacuum. The current understanding of the mystery of life is based upon historical discoveries, built upon in increments. Major roles in this story were played by a diverse set of organisms: He and other naturalists, such as Jean-Baptiste Lamarck and Hugo de Vries, studied visible traits in plants such as the passionflower *Passiflora*, evening primrose *Oenothera*, and hawkweed *Hieracium*. Conflicting theories on speciation resulted in part from the unknown biological differences between their plants of study. For example, the polyploidy that is commonplace in *Oenothera* and *Hieracium* led great minds such as de Vries down a perplexing pathway. Eventually, the school of experimentalists began to emerge. Scientists such as de Vries and Gregor Mendel found that meticulously designed and executed breeding experiments provided results not possible by the naturalist approach of simply observing population variation. For instance, although Mendel described the familiar 3:1 ratio, because chromosomes and genes had not yet been discovered, his interpretation described simple factors that parents passed to offspring. It was not until the discovery of chromosomes and genes that the concept of diploidy was realized. The guinea pig, with its pleasant disposition and prolific nature, captured the loyalty and mathematical mind of American geneticist Sewall Wright. When Wright joined the group of fellow American geneticist William Castle as a graduate student, Castle assigned him the guinea pig as his model to study genetics. It was the basis of their pivotal work on genetic linkage mapping in mammals in the early 1930s and remained his model of choice throughout his career. This trend continued for most successful model organism communities, such as the *Arabidopsis* community, spearheaded by Chris and Shauna Somerville, and the zebrafish *Danio rerio* community, which stills pays special tribute to the late George Streisinger, considered by many to be the founding father of zebrafish research. Their goal is to share data openly, to establish common resources, and to enable integration of multiple studies. A result is a close-knit community of scientists focused on a single organism, rather than a function or disease. Endersby brings to life the scientists of the times – their passions, conflicts, successes, and quirks. I found the book highly entertaining and enlightening for the geneticist, but it is also written in a fashion appropriate for the well-read lay audience having an interest in science. However, the focus of this chapter is not on the mouse, as would have been expected and rightly so. Rather, the genetically modified mouse serves as a segue into the use of genetic modification in our food supplies and the associated political issues and controversies. Perhaps the guinea pig held a grudge. Version 1 May 1, No description Article tools.

8: A Guinea Pig's History of Biology by Jim Endersby - book review

A Guinea Pigs' History of Biology is published by William Heinemann This article was brought to you by New Humanist, a quarterly journal of ideas, science and culture. To support our journalism, please subscribe.

9: A Guinea Pig's History of Biology – Jim Endersby | Harvard University Press

The result is a quirky, enlightening, and thoroughly engaging perspective on the history of heredity and genetics, tracing the slow, uncertain path – complete with entertaining diversions and dead ends – that led us from the ancient world's understanding of inheritance to modern genetics.

In the Privy Council on appeal from Prince Edward Island Flexible denture base materials Shifts that build dynamic and lasting relationships The Engineer battalion in the civil war, by Gilbert Thompson. Unmaking of Canada Ghost Rider and the Midnight Sons, Mhr4 Upload files Wheelchair sports classification system Tino Turtle Travels to Mexico City, Mexico Poems to print for blackout poetry Puppy in the pocket Mandelas ethical legacy. The Creation of the European Community Modern Political Thinkers and Ideas Keynote 1: How can academic institutions help support an endangered language? : the case of North Frisian StressAlyzer CD-ROM (Stand-Alone Version) Nutrition and you myplate edition 2nd edition Memorandum 3: the Cheshire-cat factor Reading the bible in the land of the bible Electrical/electronics technology National Ski Patrol System recognition act of 1979, S. 43 Apa referencing sixth edition Great scientific experiments I just called to say i love you piano The cross as a tale of terror : Romes perspective Instructional Media Production Management The ultrasound beam Drift migrancy and architecture Rad self defense manual Minor Rites In Masonry Genetically modified food list Contemporary Challenges for Vocational Education The presidential campaign of 1860 The Browning connection Contemporary political theory by jc johari Large synchronous machines Love one another : how Christian community transforms us Hydrology and the management of watersheds 4th edition Supervisory Management and Its Link to the Human Resources Function (Mellen Studies in Business, V. 6) V. 2. Perennials and annuals.