DOWNLOAD PDF APPENDIX B : EVOLUTION OF THE HYPOTHESES

Chapter 1 : Human Resource Management in the Project-Oriented Organization [Book]

Presents the evidence for evolution, including how evolution can be observed today. Explains the nature of science through a variety of examples. Describes how science differs from other human endeavors and why evolution is one of the best avenues for helping students understand this distinction.

Biology is such a broad field, covering the minute workings of chemical machines inside our cells, to broad scale concepts of ecosystems and global climate change. Biologists study intimate details of the human brain, the composition of our genes, and even the functioning of our reproductive system. Biologists recently all but completed the deciphering of the human genome, the sequence of deoxyribonucleic acid DNA bases that may determine much of our innate capabilities and predispositions to certain forms of behavior and illnesses. DNA sequences have played major roles in criminal cases O. Simpson, as well as the reversal of death penalties for many wrongfully convicted individuals , as well as the impeachment of President Clinton the stain at least did not lie. We are bombarded with headlines about possible health risks from favorite foods Chinese, Mexican, hamburgers, etc. Informercials tout the benefits of metabolism-adjusting drugs for weight loss. Many Americans are turning to herbal remedies to ease arthritis pain, improve memory, as well as improve our moods. Can a biology book give you the answers to these questions? No, but it will enable you learn how to sift through the biases of investigators, the press, and others in a quest to critically evaluate the question. To be honest, five years after you are through with this class it is doubtful you would remember all the details of meatbolism. However, you will know where to look and maybe a little about the process of science that will allow you to make an informed decision. Will you be a scientist? Yes, in a way. You may not be formally trained as a science major, but you can think critically, solve problems, and have some idea about what science can and cannoit do. I hope you will be able to tell the shoe from the shinola. Science and the Scientific Method Back to Top Science is an objective, logical, and repeatable attempt to understand the principles and forces operating in the natural universe. Science is from the Latin word, scientia, to know. Good science is not dogmatic, but should be viewed as an ongoing process of testing and evaluation. One of the hoped-for benefits of students taking a biology course is that they will become more familiar with the process of science. Humans seem innately interested in the world we live in. Young children drive their parents batty with constant "why" questions. Science is a means to get some of those whys answered. When we shop for groceries, we are conducting a kind of scientific experiment. If you like it you may buy it again, even when it is not on sale. If you did not like Brand Y, then no sale will get you to try it again. In order to conduct science, one must know the rules of the game imagine playing Monopoly and having to discover the rules as you play! Which is precisely what one does with some computer or videogames before buying the cheatbook. The scientific method is to be used as a guide that can be modified. In some sciences, such as taxonomy and certain types of geology, laboratory experiments are not necessarily performed. Steps in the scientific method commonly include: Controlled attempts to test one or more hypotheses. After this step the hypothesis is either modified or rejected, which causes a repeat of the steps above. After a hypothesis has been repeatedly tested, a hierarchy of scientific thought develops. Hypothesis is the most common, with the lowest level of certainty. A theory is a hypothesis that has been repeatedly tested with little modification, e. The Theory of Evolution. A Law is one of the fundamental underlying principles of how the Universe is organized, e. Science uses the word theory differently than it is used in the general population. Theory to most people, in general nonscientific use, is an untested idea. Scientists call this a hypothesis. Scientific experiments are also concerned with isolating the variables. A good science experiment does not simultaneously test several variables, but rather a single variable that can be measured against a control. Scientific controlled experiments are situations where all factors are the same between two test subjects, except for the single experimental variable. Consider a commonly conducted science fair experiment. Sandy wants to test the effect of gangsta rap music on pea plant growth. She plays loud rap music 24 hours a day to a series of pea plants grown under light, and watered every day. At the end of her experiment she concludes gangsta rap is conducive to plant growth. Her teacher grades her project very low, citing the lack of a control group for the experiment. Sandy returns to her experiment, but this time she has a separate group of plants under the same conditions as the rapping plants, but with soothing Led Zeppelin songs playing. She comes to the same conclusion as before, but now has a basis for comparison. Her teacher gives her project a better grade. The Cell Theory The Theory of Evolution by Natural Selection Gene Theory Homeostasis Robert Hooke , one of the first scientists to use a microscope to examine pond water, cork and other things, referred to the cavities he saw in cork as " cells ", Latin for chambers. Mattias Schleiden in concluded all plant tissues consisted of cells. In , Theodore Schwann came to a similar conclusion for animal tissues. Rudolf Virchow, in , combined the two ideas and added that all cells come from pre-existing cells, formulating the Cell Theory. Thus there is a chain-of-existence extending from your cells back to the earliest cells, over 3. The cell theory states that all organisms are composed of one or more cells, and that those cells have arisen from pre-existing cells. While a model may seem a small thing, their development of the DNA model fostered increased understanding of how genes work. Image from the Internet. In , American scientist James Watson and British scientist Francis Crick developed the model for deoxyribonucleic acid DNA , a chemical that had then recently been deduced to be the physical carrier of inheritance. Crick hypothesized the mechanism for DNA replication and further linked DNA to proteins , an idea since referred to as the central dogma. Information from DNA "language" is converted into RNA ribonucleic acid "language" and then to the "language" of proteins. The central dogma explains the influence of heredity DNA on the organism proteins. Homeostasis is the maintainence of a dynamic range of conditions within which the organism can function. Temperature, pH, and energy are major components of this concept. Theromodynamics is a field of study that covers the laws governing energy transfers, and thus the basis for life on earth. Two major laws are known: These will be discussed in more detail in a later chapter. The universe is composed of two things: These first three theories are very accepted by scientists and the general public. The theory of evolution is well accepted by scientists and most of the general public. However, it remains a lightening rod for school boards, politicians, and television preachers. Much of this confusion results from what the theory says and what it does not say. In this first unit we will examine these themes and the nature of science. The Ancient Greek philosopher Anaxiamander B. The classical science of their time was observational rather than experimental. Another ancient Greek philosopher, Aristotle developed his Scala Naturae, or Ladder of Life, to explain his concept of the advancement of living things from inanimate matter to plants, then animals and finally man. This concept of man as the "crown of creation" still plagues modern evolutionary biologists See Gould, , for a more detailed discussion. Post-Aristotlean "scientists" were constrained by the prevailing thought patterns of the Middle Ages -- the inerrancy of the biblical book of Genesis and the special creation of the world in a literal six days of the hour variety. The chronology he developed was taken as factual, and was even printed in the front pages of bibles. Often new ideas must "come out of left field", appearing as wild notions, but in many cases prompting investigation which may later reveal the "truth". Geologists had for some time doubted the "truth" of a 5, year old earth. Da Vinci concluded it took , years to form some nearby rock deposits. Galileo, convicted heretic for his contention that the Earth was not the center of the Universe, studied fossils evidence of past life and concluded that they were real and not inanimate artifacts. James Hutton , regarded as the Father of modern geology, developed the Theory of Uniformitarianism , the basis of modern geology and paleontology. Thus many geological structures and processes cannot be explained if the earth was only a mere years old. The Modern View of the Age of the Earth Back to Top Radiometric age assignments based on the rates of decay of radioactive isotopes , not discovered until the late 19th century, suggest the earth is over 4. The Earth is thought older than 4. Geologic time divides into eons, eroas, and smaller units. An overview of geologic time may be obtained at http: The geologic time scale, hilighting some of the firsts in the evolution of life. One way to represent geological time. Note the break during the precambrian. This image is from http: This was a major break from earlier concepts that species were created by a perfect creator and therefore could not change because they were perfect, etc. Swedish botanist Carl Linne more popularly known as Linneus , after the common practice of the day which was to latinize names of learned men , attempted to pigeon-hole all known species of his time into immutable categories. Many of these categories are still used in biology, although the underlying thought concept is now evolution and not immutability of species. Linnean hierarchical classification was based on the premise that the species was the smallest unit, and that each species or taxon belonged to a higher category.

Chapter 2 : Appendix B | Teaching About Evolution and the Nature of Science | The National Academies P

The appendix (or vermiform appendix; also cecal [or caecal] appendix; vermix; or vermiform process) is a blind-ended tube connected to the cecum, from which it develops in the embryo. The cecum is a pouchlike structure of the colon, located at the junction of the small and the large intestines.

January 7,] volution is the cornerstone of modern biology. It unites all the fields of biology under one theoretical umbrella. It is not a difficult concept, but very few people -- the majority of biologists included -- have a satisfactory grasp of it. One common mistake is believing that species can be arranged on an evolutionary ladder from bacteria through "lower" animals, to "higher" animals and, finally, up to man. Mistakes permeate popular science expositions of evolutionary biology. Mistakes even filter into biology journals and texts. For example, Lodish, et. Misunderstandings about evolution are damaging to the study of evolution and biology as a whole. People who have a general interest in science are likely to dismiss evolution as a soft science after absorbing the pop science nonsense that abounds. The impression of it being a soft science is reinforced when biologists in unrelated fields speculate publicly about evolution. This is a brief introduction to evolutionary biology. I attempt to explain basics of the theory of evolution and correct many of the misconceptions. Evolution is a change in the gene pool of a population over time. A gene is a hereditary unit that can be passed on unaltered for many generations. The gene pool is the set of all genes in a species or population. The English moth, Biston betularia, is a frequently cited example of observed evolution. The frequency of the dark morph increased in the years following. Their frequency was less in rural areas. The moth population changed from mostly light colored moths to mostly dark colored moths. The increase in relative abundance of the dark type was due to natural selection. Soot from factories darkened the birch trees the moths landed on. Against a sooty background, birds could see the lighter colored moths better and ate more of them. As a result, more dark moths survived until reproductive age and left offspring. The greater number of offspring left by dark moths is what caused their increase in frequency. This is an example of natural selection. A single organism is never typical of an entire population unless there is no variation within that population. Individual organisms do not evolve, they retain the same genes throughout their life. When a population is evolving, the ratio of different genetic types is changing -- each individual organism within a population does not change. For example, in the previous example, the frequency of black moths increased; the moths did not turn from light to gray to dark in concert. The process of evolution can be summarized in three sentences: Evolution can be divided into microevolution and macroevolution. The kind of evolution documented above is microevolution. Larger changes, such as when a new species is formed, are called macroevolution. Some biologists feel the mechanisms of macroevolution are different from those of microevolutionary change. Others think the distinction between the two is arbitrary -- macroevolution is cumulative microevolution. The word evolution has a variety of meanings. The fact that all organisms are linked via descent to a common ancestor is often called evolution. The theory of how the first living organisms appeared is often called evolution. This should be called abiogenesis. And frequently, people use the word evolution when they really mean natural selection -- one of the many mechanisms of evolution. Common Misconceptions about Evolution Evolution can occur without morphological change; and morphological change can occur without evolution. Humans are larger now than in the recent past, a result of better diet and medicine. Phenotype is the morphological, physiological, biochemical, behavioral and other properties exhibited by a living organism. Most changes due to environment are fairly subtle, for example size differences. Large scale phenotypic changes are obviously due to genetic changes, and therefore are evolution. Evolution is not progress. Populations simply adapt to their current surroundings. They do not necessarily become better in any absolute sense over time. A trait or strategy that is successful at one time may be unsuccessful at another. Paquin and Adams demonstrated this experimentally. They founded a yeast culture and maintained it for many generations. Occasionally, a mutation would arise that allowed its bearer to reproduce better than its contemporaries. These mutant strains would crowd out the formerly dominant strains. Samples of the most successful strains from the culture were taken at a variety of times. In later competition experiments, each strain would outcompete the immediately previously dominant type in a culture. However, some earlier isolates could outcompete strains that arose late in the experiment. Competitive ability of a strain was always better than its previous type, but competitiveness in a general sense was not increasing. For most traits or behaviors there is likely no optimal design or strategy, only contingent ones. Organisms are not passive targets of their environment. Each species modifies its own environment. At the least, organisms remove nutrients from and add waste to their surroundings. Often, waste products benefit other species. Animal dung is fertilizer for plants. Conversely, the oxygen we breathe is a waste product of plants. Species do not simply change to fit their environment; they modify their environment to suit them as well. Beavers build a dam to create a pond suitable to sustain them and raise young. Alternately, when the environment changes, species can migrate to suitable climes or seek out microenvironments to which they are adapted. Genetic Variation Evolution requires genetic variation. If there were no dark moths, the population could not have evolved from mostly light to mostly dark. In order for continuing evolution there must be mechanisms to increase or create genetic variation and mechanisms to decrease it. Mutation is a change in a gene. These changes are the source of new genetic variation. Natural selection operates on this variation. Genetic variation has two components: Alleles are different versions of the same gene. For example, humans can have A, B or O alleles that determine one aspect of their blood type. Most animals, including humans, are diploid -- they contain two alleles for every gene at every locus, one inherited from their mother and one inherited from their father. Locus is the location of a gene on a chromosome. If the two alleles at a locus are the same type for instance two A alleles the individual would be called homozygous. An individual with two different alleles at a locus for example, an AB individual is called heterozygous. At any locus there can be many different alleles in a population, more alleles than any single organism can possess. For example, no single human can have an A, B and an O allele. Considerable variation is present in natural populations. At 45 percent of loci in plants there is more than one allele in the gene pool. In most populations, there are enough loci and enough different alleles that every individual, identical twins excepted, has a unique combination of alleles. Linkage disequilibrium is a measure of association between alleles of two different genes. The sign is simply a consequence of how the alleles are numbered. Linkage disequilibrium can be the result of physical proximity of the genes. Or, it can be maintained by natural selection if some combinations of alleles work better as a team. Natural selection maintains the linkage disequilibrium between color and pattern alleles in Papilio memnon. One allele at this locus leads to a moth that has a tail; the other allele codes for a untailed moth. There is another gene that determines if the wing is brightly or darkly colored. There are thus four possible types of moths: All four can be produced when moths are brought into the lab and bred. However, only two of these types of moths are found in the wild: The non-random association is maintained by natural selection. Bright, tailed moths mimic the pattern of an unpalatable species. The dark morph is cryptic. The other two combinations are neither mimetic nor cryptic and are quickly eaten by birds.

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Chapter 3 : Appendix (anatomy) - Wikipedia

Character optimization of cecum size and appendix presence refutes Darwin's hypothesis for evolution of the hominoid appendix (Darwin,) as an explanation for the evolution of the appendix across all mammalian clades (Fig. 2, Fig. 3, Fig. 4, Fig. 5, Fig. 6).

Evidence suggests that the latter of these two modes is the commoner in both animals and plants. The production of polyploidy via somatic multiplication requires a doubling of the chromosome number to occur in some part of the parent organism. So it requires the production of a polyploid shoot, bud, or fragment that can in some way i. This doubling must initially occur in a single cell of the organism. That cell must then initiate new growth and proliferate to become a distinct multicellular polyploid portion of the parent organism. Individual polyploid cells commonly occur in plants otherwise composed of diploid cells, but the frequency with which such cells initiate new growth and give rise to polyploidy in offspring forms is poorly known. Somatic multiplication was once thought to be the most common way of producing polyploidy in plants. More recent literature, however, suggests unreduced gametes are the most common source of plant polyploidy, as has long been assumed for animals. A wide variety of organisms produce unreduced gametes, which are usually either diploid or triploid. For example, Franke lists 31 plant families for which they have been reported. It is often suggested that the union of two unreduced gametes must be a very rare event, but this claim appears to have been made only in considering such unions as a percentage of all gametic unions. If, however, one considers the fact that gametes are produced in vast numbers and that the expected rate at which unreduced eggs will be fertilized by unreduced male gametes is equal to the fraction of all male gametes that are unreduced, then it becomes apparent such unions must be very numerous indeed. For example, suppose a very small fraction of the eggs produced by a particular population were diploid, say one egg in a million, and that a similarly low fraction of all male gametes produced by that population were diploid. If the population contained one million females each producing one million gametes, then they would produce a total of one trillion gametes, one million of which would be diploid. Among these million diploid gametes, one would be expected to be fertilized by a diploid male gamete giving rise to a tetraploid offspring. Thus, even with the assumption of this unrealistically low rate of diploid gamete production, a tetraploid would be produced by such a population in every generation. In the case of a tetraploid capable of self-fertilization or of vegetative reproduction, the production of even one individual could result in a new form getting established. However, actual rates at which diploid gametes occur are far higher than assumed in the example. In a broad survey of plants, Ramsey and Schemske found the mean frequency of diploid gametes produced by non-hybrid individuals was 0. Applying this rate in the example just given would give 0. Under the assumption that 0. This is a very large number indeed. Moreover, hybridization greatly promotes the formation of diploid gametes. Ramsey and Schemske say that in studies of hybrids the mean reported rate of diploid gamete production was fold greater In fact, unreduced gametes are often the only functional ones in hybrids produced by interbreeding between distinct chromosets. In hybrid populations the union of unreduced gametes must therefore be rampant and the production of polyploids by the union of such gametes must surely be accordingly amplified. In some hybrid zones polyploids are, no doubt, produced en masse on an ongoing basis. Indeed, in recent years it has been empirically verified that many polyploids are derived from their progenitors repeatedly via separate polyploidization events producing separate polyploid individuals. For example, in the border region between Washington and Idaho, over a year period, two types of tetraploid goatsbeard, Tragonopagon mirus and T. Many polyploids produced by the union of unreduced gametes would get established as new forms even if they were obligate outcrossers i. Consider the example of the hypothetical tetraploid just given. Such tetraploids are normally quite fertile since they have fully paired karyotypes. In that example we saw many such tetraploids were produced. These could interbreed to produce a line of descendants. Moreover, new tetraploid individuals of this sort, and their karyotypically identical tetraploid descendants, normally produce hybrids of low fertility when they backcross with either of their diploid parents. They would thus have no tendency to be swamped out of existence by interbreeding with their initially more numerous parents. Only when fertilized by others of their own kind would they produce significant numbers of fertile offspring. In this way they could maintain themselves as a new stable chromotype and, presumably, as a new somatype as well. Most shared on Macroevolution.

Chapter 4 : Alabama Textbook Report - Appendix B: Anderson, Norris

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The appendix is connected to the mesentery in the lower region of the ileum , by a short region of the mesocolon known as the mesoappendix. Although it has been long accepted that the immune tissue surrounding the appendix and elsewhere in the gutâ€”called gut-associated lymphoid tissue â€”carries out a number of important functions, explanations were lacking for the distinctive shape of the appendix and its apparent lack of specific importance and function as judged by an absence of side effects following its removal. William Parker, Randy Bollinger, and colleagues at Duke University proposed in that the appendix serves as a haven for useful bacteria when illness flushes the bacteria from the rest of the intestines. Research performed at Winthropâ€”University Hospital showed that individuals without an appendix were four times more likely to have a recurrence of Clostridium difficile colitis. This structure helps in the proper movement and removal of waste matter in the digestive system, contains lymphatic vessels that regulate pathogens, and lastly, might even produce early defences that prevent deadly diseases. The suggestion was that it is the shrunken remnant of the cecum thought to have been present in a remote ancestor of humans. This notion is still widely held. A study, however, refutes the idea of an inverse relationship between cecum size and appendix size and presence. He suggested that the appendix was used for digesting leaves as primates. It may be a vestigial organ of ancient humans that has degraded to nearly nothing of its original purpose or evolved to take on a new purpose over the course of evolution. The very long cecum of some herbivorous animals, such as in the horse or the koala , appears to support this theory. Human ancestors may have also relied upon this system when they lived on a diet rich in foliage. As people began to eat more easily digested foods, they may have become less reliant on cellulose-rich plants for energy. As the cecum became less necessary for digestion, mutations that were previously deleterious and would have hindered evolutionary progress were no longer important, so the mutations survived. It is suggested that these alleles became more frequent and the cecum continued to shrink. After millions of years, the once-necessary cecum degraded to be the appendix of modern humans. In rare cases, adenomas are also present. Appendicitis Appendicitis is a condition characterized by inflammation of the appendix. This pain is typically a dull, poorly localized, visceral pain. This peritoneal inflammation, or peritonitis , results in rebound tenderness pain upon removal of pressure rather than application of pressure. Typically, point skin pain is not present until the parietal peritoneum is inflamed, as well. Fever and an immune system response are also characteristic of appendicitis. Untreated, the appendix may rupture, leading to peritonitis , followed by shock, and, if still untreated, death. Appendectomy The surgical removal of the appendix is called an appendectomy. This removal is normally performed as an emergency procedure when the patient is suffering from acute appendicitis. In the absence of surgical facilities, intravenous antibiotics are used to delay or avoid the onset of sepsis. In some cases, the appendicitis resolves completely; more often, an inflammatory mass forms around the appendix. This is a relative contraindication to surgery. The appendix is also used for the construction of an efferent urinary conduit, in an operation known as the Mitrofanoff procedure , [27] in people with a neurogenic bladder. The appendix is also used as a means to access the colon in children with paralysed bowels or major rectal sphincter problems. Smith of Midwestern University and colleagues explained: This function is potentially a selective force for the evolution and maintenance of the appendix. Three morphotypes of cecal-appendices can be described among mammals based primarily on the shape of the cecum: In addition, long narrow appendix-like structures are found in mammals that either lack an apparent cecum as in monotremes or lack a distinct junction between the cecum and appendix-like structure as in the koala. A cecal appendix has evolved independently at least twice, and apparently represents yet another example of convergence in morphology between Australian marsupials and placentals in the rest of the world. Although the appendix has apparently been lost by numerous species, it has also been maintained for more than 80 million years in at least one clade. This complex evolutionary history of the appendix, along with a great heterogeneity in its evolutionary rate in various taxa, suggests that it is a recurrent trait. Current epidemiological data on the cause of death in developed countries collected by the World Health Organization in show that acute diarrhea is now the fourth leading cause of disease-related death in developing countries data summarized by The Bill and Melinda Gates Foundation. Two of the other leading causes of death are expected to have exerted limited or no selection pressure.

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Chapter 5 : Appendix B â€“ Biological Natural History: Creation vs. Evolution - Bible Framework Ministries

Credit Hours: M. A. Ph.D.(from M.A. Ph. D.(from B.A.) ANTH Old World Prehistory ANTH Archaeology of the Far East ANTH Human Origins ANTH Human Osteology ANTH Evolutionary Perspectives.

Earliest known drawing of the appendix, by Leonardo da Vinci. Throughout medical history many possible functions for the appendix have been offered, examined, and refuted, including exocrine, endocrine, and neuromuscular functions Williams and Myers , pp. Today, a growing consensus of medical specialists holds that the most likely candidate for the function of the human appendix is as a part of the gastrointestinal immune system. Several reasonable arguments exist for suspecting that the appendix may have a function in immunity. Like the rest of the caecum in humans and other primates, the appendix is highly vascular, is lymphoid-rich, and produces immune system cells normally involved with the gut-associated lymphoid tissue GALT Fisher ; Nagler-Anderson ; Neiburger et al. Animal models, such as the rabbit and mouse, indicate that the appendix is involved in mammalian mucosal immune function, particularly the B and T lymphocyte immune response Craig and Cebra Animal studies provide limited evidence that the appendix may function in proper development of the immune system in young juveniles Dasso and Howell ; Dasso et al. However, contrary to what one is apt to read in anti-evolutionary literature, there is currently no evidence demonstrating that the appendix, as a separate organ, has a specific immune function in humans Judge and Lichtenstein ; Dasso et al. To date, all experimental studies of the function of an appendix other than routine human appendectomies have been exclusively in rabbits and, to a lesser extent, rodents. Currently it is unclear whether the lymphoid tissue in the human appendix performs any specialized function apart from the much larger amount of lymphatic tissue already distributed throughout the gut. Most importantly with regard to vestigiality, there is no evidence from any mammal suggesting that the hominoid vermiform appendix performs functions above and beyond those of the lymphoid-rich caeca of other primates and mammals that lack distinct appendixes. As mentioned above, important differences exist in nearly all respects between the human and rabbit appendixes Dasso et al. The rabbit appendix, for instance, is very difficult to identify as separate from the rest of its voluminous caecum see Figure 2. Additionally, there are important differences in lymphoid follicular structure, in T-cell distribution, and in immunoglobulin density Dasso et al. Furthermore, from systematic analysis we know that the rabbit, rodent, and human appendixes are convergent as outgrowths and constrictions of the caecum Shoshani and McKenna It is thus very questionable to conclude from these animal studies that the human appendix has the same function as the other non-primate appendixes. Of course, over a century of medical evidence has firmly shown that the removal of the human appendix after infancy has no obvious ill effects apart from surgical complications, Williams and Myers Earlier reports of an association between appendectomy and certain types of cancer were artifactual Andersen and Isager ; Gledovic and Radovanovic ; Mellemkjaer et al. In fact, congenital absence of the appendix also appears to have no discernable effect. From investigative laparoscopies for suspected appendicitis, many people have been found who completely lack an appendix from birth, apparently without any physiological detriment Anyanwu ; Chevre et al. In sum, an enormous amount of medical research has centered on the human appendix, but to date the specific function of the appendix, if any, is still unclear and controversial in human physiology Williams and Myers , pp. The appendix is suboptimally designed The human appendix is notorious for the life-threatening complications it can cause. The most common age for acute appendicitis is in prepubescent children, between 8 and 13 years of age. Before modern 20th-century surgical techniques were available, a case of acute appendicitis was usually fatal. Even today, appendicitis fatalities are significant Blomqvist et al. The small entrance to this dead-end pocket makes the appendix difficult to clean out and prone to physical blockage, which ultimately is the cause of appendicitis Liu and McFadden This peculiar structural layout is quite beneficial for a larger cellulose-fermenting caecum, but it is unclear why gut lymphoid tissue would need to be housed in a remote, dead-end tube with negligible surface area. Such an occurrence would be much less problematic if the interior of the appendix were not so small, confined, and inaccessible from the rest of the gut. In many other primates and mammals, the GALT lymphoid tissue appears to function without difficulty in a much more open, bulbous caecum with ample surface area. Furthermore, there is mounting evidence that removing the appendix helps prevent ulcerative colitis, a nasty inflammatory disease of the colon Andersson et al. This evidence suggests that the appendix is actually maladaptive, and that the lymphoid tissue contained in the appendix is prone to chronic pathological inflammatory states. If the appendix does have an important function that we have yet to find, it is a leading candidate for the worst designed organ in the human body. How nice if the appendix would just degenerate away after it is no longer needed, so it could never get infected and kill us needlessly. Any biological structure that supposedly ensures our livelihood by its functions, yet paradoxically and unnecessarily kills a large fraction of its bearers prematurely, is poorly designed indeed. Why do some medical sources question the vestigiality of the appendix? The reasons for this are multiple, but they largely stem from the simple fact that most physicians are not trained in evolutionary biology. The erroneous "completely nonfunctional" definition of a vestige is primarily found in medical papers, textbooks, and dictionaries e. Williams and Myers , p. Using this incorrect and nonevolutionary definition, it is logical to conclude that a structure is not vestigial if its function is discovered. For instance, based upon this incorrect definition, Williams and Myers incorrectly argue that an evolutionary vestige cannot be both a complex and a "regressive" structure p. However, vestiges are very often complex or specialized structures, in fact overly complex for their functions, and prime examples are the wing of the ostrich and the eyes of blind cavefish. A vestige can be a complex structure, in an absolute sense, while simultaneously being rudimentary or degenerate relative to the same homologous structure in other organisms. Perhaps most important is the fact that a vestige can be identified only via comparative analysis. Physicians are experts on human anatomy and physiology, but rarely do discussions in medical publications consider phylogenetic and comparative issues. Medical articles that attempt to consider phylogenetics often provide a gross misconception of evolutionary fundamentals. For instance, the most thorough and in depth source on the physiology of the human appendix, Williams and Myers , refers to how the appendix changes as "the primate scale is ascended" and to the "evolutionary scale" with humans at its end pp. These are long-refuted orthogenetic concepts which have been contradicted by basic evolutionary theory since Darwin. Scott similarly argues against vestigiality based upon orthogenetic concepts and a belief in evolutionary "progress. How would we know if the appendix were not vestigial? Whether the appendix has a function of some sort or not has no direct bearing on whether it is a bona fide vestige. However, at least three possible observations would help negate the conclusion that the human appendix is vestigial, using either the evolutionary or the typological definitions of vestigiality: An additional possible observation would contradict the conclusion of vestigiality by the evolutionary definition: All four of these potential observations are demonstrably false. Additionally, each is based upon positive scientific evidence: Therefore, the conclusion of vestigiality is susceptible and open to scientific testing against empirical observation. As such the concept of vestigiality is not an "argument from ignorance. The vermiform appendix is vestigial Currently, arguments against the vestigiality of the human vermiform appendix have been based upon misunderstandings of what constitutes a vestige and of how vestiges are identified. From an evolutionary perspective, the human appendix is a derivative of the end of the phylogenetically primitive herbivorous caecum found in our primate ancestors Goodman et al. The human appendix has lost a major and previously essential function, namely cellulose digestion. Though during primate evolution it has decreased in size to a mere rudiment, the appendix retains a structure that was originally specifically adapted for housing bacteria and extending the time course of digestion. For these reasons the human vermiform appendix is vestigial, regardless of whether or not the human appendix functions in the development of the immune system. From a nonevolutionary, typological perspective, the human appendix is homologous to the end of the physiologically important, large, cellulose-fermenting caeca of other mammals. Even though humans eat cellulose, the contribution to cellulose digestion by both the human caecum and its associated appendix is negligible. Regardless of whether one accepts evolutionary theory or not, the human appendix is a rudiment of the caecum that is useless as a normal mammalian, cellulose-digesting caecum. Thus, by all accounts the vermiform appendix remains a valid and classic example of a human vestige. Acknowledgements Thanks to Colin Groves for helpful discussion on the comparative anatomy and homology of the primate appendix and caecal apex, and to John Harshman for

insightful comments and clarification of levels of homology. References General Condon, R. Sabiston Textbook of Surgery: A textbook of histology Chapman and Hall: Scientific Principles and Practice. Small Maynard and co.: Chapman and Hall Medical: A population-based study of the effects of age. An epidemiological study of cases. Strategic defences in the intestinal mucosa. Geest und Portig K. Its minute and comparative anatomy. Osman Primates, comparative anatomy and taxonomy. University of Chicago Press: Comparative anatomy, function, evolution. Holt, Rinehart and Winston: Prevention of Ulcerative Colitis Andersson, R. Its role in ulcerative colitis. BCG-vaccination status, tuberculosis, infectious diseases, tonsillectomy, and appendectomy. Apropos of a case.

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Chapter 6 : Appendix B: Appendices: Rapport and Report at Bedside

This is a brief introduction to evolutionary biology. I attempt to explain basics of the theory of evolution and correct many of the misconceptions. the appendix.

Samaniego and Yun Sam Chong, University Of California, Davis It is common to plan a life test based on the assumption of exponentiality of observed lifetimes or lives between failures. Analysts are then able to calculate specifically how many items should be placed on test or the number of observed failures it takes to terminate the test and the maximum total time on test required to resolve the hypothesis test of interest. Once the test data are in hand, one has the opportunity to confirm the exponentiality assumption or to decide that an alternative modeling assumption is preferable. This paper pursues the question: We give indications of the potential savings in the number of systems and the time on test that would accrue from having modeled the experiment correctly in the first place. Various approaches to testing hypotheses concerning Weibull means are discussed. The first two sections of the paper are expository and review the main issues in exponential life testing and some properties and procedures associated with the Weibull distribution. In Sections three and four we develop the mechanics of Weibull life testing, and carefully examine the performance of Weibull life tests based on exponential life test plans. Poore, University of Tennessee, and Carmen J. Trammel, Software Engineering Technology, Inc. Defense systems are becoming increasingly software intensive. While software enhances the effectiveness and flexibility of these systems, it also introduces vulnerabilities related to inadequacies in software design, maintenance, and configuration control. Effective testing of these systems must take into account the special vulnerabilities introduced by software. The software testing problem is complex because of the astronomical number of scenarios and states of use. The domain of testing is large and complex beyond human intuition. Because the software testing problem is so complex, statistical principles must be used to guide testing strategy in order to get the best information for the resources invested in testing. Page Share Cite Suggested Citation: Statistics, Testing, and Defense Acquisition: New Approaches and Methodological Improvements. The National Academies Press. The problem of doing just enough testing to remove uncertainty regarding critical performance issues, and to support the decisions that must be made in the software life cycle is a problem amenable to solution by statistical science. The question is not whether to test, but when to test, what to test, and how much to test. Statistical testing enables efficient collection of empirical data that will remove uncertainty about the behavior of the software-intensive system and support economic decisions regarding further testing, deployment, maintenance, and evolution. A statistical principle of fundamental importance is that a population to be studied must first be characterized, and that characterization must include the infrequent and exceptional as well as the common and typical. It must be possible to represent all questions of interest and all decisions to be made in terms of this characterization. When applied to software testing, the population is the set of all possible scenarios of use with each accurately represented as to frequency of occurrence. The operational usage model is a formalism presented in this paper that enables the application of many statistical principles to software testing and forms the basis for efficient testing in support of decision making. Most usage modeling and related statistical testing experience to date is with embedded real-time systems, application program interfaces, and graphical user interfaces. One very advanced industrial user of this technology is the mass storage devices business. Use of this technology has led to extensive test automation, significant reduction in the time these software-intensive products are in testing, improved feedback to the developers regarding product deficiencies or quality, improved advice to management regarding suitability for deployment, and greatly improved field reliability of products shipped. From a statistical point of view, all the topics in this paper follow sound problem-solving principles and are direct applications of well-established theory and methodology. From a software testing point of view, the application of statistical science is relatively new and rapidly evolving, as an increasing range of statistical principles is applied to a growing variety of systems. Statistical testing is used in pockets of industry and agencies of government, including DoD, on both experimental and routine bases. This paper is a composite of what is in hand and within reasonable reach in the application of statistical science to software testing.

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Chapter 7 : Introduction to the Scientific Method

The Evolution of Nurse-to-Nurse Bedside Report on a Medical-Surgical Cardiology Unit. MEDSURG Nursing. To read about the positive change in bedside report in nursing.

Chapter 8 : Vestigiality of the human appendix

All four hypotheses assume that transmission to mosquitoes, b, is an increasing function of G, as without a benefit to increasing gametocyte production it would make no sense to ask why there are so few. This assumption is therefore implicit in all analyses below.

Chapter 9 : Appendix B: Modes of Polyploid Production

The differences between evolution as "fact" and evolution as theory. Continuity of being versus common design. Problems with mutation and other aspects of evolutionary theory.