DOWNLOAD PDF BIRTH OF A SCIENTIST

Chapter 1 : NPR Choice page

Jul 02, Â· The scientists captured a photograph, which they say is the very first direct image of the birth of a planet still forming around a star. It's a major finding for those of us on Earth, a

Early life of Isaac Newton Isaac Newton was born according to the Julian calendar , in use in England at the time on Christmas Day, 25 December NS 4 January [1] "an hour or two after midnight", [6] at Woolsthorpe Manor in Woolsthorpe-by-Colsterworth , a hamlet in the county of Lincolnshire. His father, also named Isaac Newton, had died three months before. Born prematurely , Newton was a small child; his mother Hannah Ayscough reportedly said that he could have fit inside a quart mug. Newton disliked his stepfather and maintained some enmity towards his mother for marrying him, as revealed by this entry in a list of sins committed up to the age of His mother, widowed for the second time, attempted to make him a farmer, an occupation he hated. Motivated partly by a desire for revenge against a schoolyard bully, he became the top-ranked student, [12] distinguishing himself mainly by building sundials and models of windmills. He set down in his notebook a series of " Quaestiones " about mechanical philosophy as he found it. In , he discovered the generalised binomial theorem and began to develop a mathematical theory that later became calculus. Soon after Newton had obtained his BA degree in August , the university temporarily closed as a precaution against the Great Plague. In April , he returned to Cambridge and in October was elected as a fellow of Trinity. However, by the issue could not be avoided and by then his unconventional views stood in the way. His studies had impressed the Lucasian professor Isaac Barrow , who was more anxious to develop his own religious and administrative potential he became master of Trinity two years later ; in Newton succeeded him, only one year after receiving his MA. Famous Men of Science. Most modern historians believe that Newton and Leibniz developed calculus independently, although with very different notations. Occasionally it has been suggested that Newton published almost nothing about it until , and did not give a full account until , while Leibniz began publishing a full account of his methods in His work extensively uses calculus in geometric form based on limiting values of the ratios of vanishingly small quantities: Starting in , other members of the Royal Society accused Leibniz of plagiarism. During that time, any Fellow of a college at Cambridge or Oxford was required to take holy orders and become an ordained Anglican priest. However, the terms of the Lucasian professorship required that the holder not be active in the church presumably so as to have more time for science. Newton argued that this should exempt him from the ordination requirement, and Charles II , whose permission was needed, accepted this argument. From to , Newton lectured on optics. Thus, he observed that colour is the result of objects interacting with already-coloured light rather than objects generating the colour themselves. As a proof of the concept, he constructed a telescope using reflective mirrors instead of lenses as the objective to bypass that problem. In late , [44] he was able to produce this first reflecting telescope. It was about eight inches long and it gave a clearer and larger image. In , the Royal Society asked for a demonstration of his reflecting telescope. He verged on soundlike waves to explain the repeated pattern of reflection and transmission by thin films Opticks Bk. However, later physicists favoured a purely wavelike explanation of light to account for the interference patterns and the general phenomenon of diffraction. In his Hypothesis of Light of , Newton posited the existence of the ether to transmit forces between particles. The contact with the Cambridge Platonist philosopher Henry More revived his interest in alchemy. He was the last of the magicians. Had he not relied on the occult idea of action at a distance , across a vacuum, he might not have developed his theory of gravity. In , Newton published Opticks , in which he expounded his corpuscular theory of light. He considered light to be made up of extremely subtle corpuscles, that ordinary matter was made of grosser corpuscles and speculated that through a kind of alchemical transmutation "Are not gross Bodies and Light convertible into one another, In the same book he describes, via diagrams, the use of multiple-prism arrays. Also, the use of these prismatic beam expanders led to the multiple-prism dispersion theory. Science also slowly came to realise the difference between perception of colour and mathematisable optics. Newton had committed himself to the doctrine that refraction without colour was impossible. He therefore thought that the object-glasses of telescopes must for ever remain imperfect, achromatism and refraction being incompatible. This inference was proved by Dollond to be wrong. The Principia was published on 5 July with encouragement and financial help from Edmond Halley. In this work, Newton stated the three universal laws of motion. Together, these laws describe the relationship between any object, the forces acting upon it and the resulting motion, laying the foundation for classical mechanics. They contributed to many advances during the Industrial Revolution which soon followed and were not improved upon for more than years. Many of these advancements continue to be the underpinnings of non-relativistic technologies in the modern world. He used the Latin word gravitas weight for the effect that would become known as gravity , and defined the law of universal gravitation. Here Newton used what became his famous expression "hypotheses non-fingo" [60]. With the Principia, Newton became internationally recognised. Cubic plane curve Newton found 72 of the 78 "species" of cubic curves and categorized them into four types. Newton also claimed that the four types could be obtained by plane projection from one of them, and this was proved in , four years after his death. Later life of Isaac Newton In the s, Newton wrote a number of religious tracts dealing with the literal and symbolic interpretation of the Bible. A manuscript Newton sent to John Locke in which he disputed the fidelity of 1 John 5: His first biographer, Sir David Brewster , who compiled his manuscripts for over 20 years, interpreted Newton to be questioning the veracity of passages referring to this, but never denying the doctrine of the Trinity as such. John â€”were published after his death. He also devoted a great deal of time to alchemy see above. Newton was also a member of the Parliament of England for Cambridge University in â€”90 and â€”2, but according to some accounts his only comments were to complain about a cold draught in the chamber and request that the window be closed. Newton became perhaps the best-known Master of the Mint upon the death of Thomas Neale in , a position Newton held for the last 30 years of his life. As Warden, and afterwards Master, of the Royal Mint, Newton estimated that 20 percent of the coins taken in during the Great Recoinage of were counterfeit. Counterfeiting was high treason , punishable by the felon being hanged, drawn and quartered. Despite this, convicting even the most flagrant criminals could be extremely difficult. However, Newton proved equal to the task. Newton successfully prosecuted 28 coiners. It is a matter of debate as whether he intended to do this or not. The French writer and philosopher Voltaire.

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Chapter 2 : Scientists dedicate the birth of a new black hole to Stephen Hawking

Scientists say they've acquired imagery of a planet being born for the first time. The planet, named PDS 70 b, is estimated to be 5 or 6 million years old and far larger than Jupiter. The.

Now, since the weather was consistently too rainy to go outdoors because of the bad weather caused by that volcano, Byron suggested an indoor activity. This time, he thought of a contest. They would each make up a ghost story and read them to each other on the chilly evenings. Byron wrote a fragment of a poem. The creature in Frankenstein is probably the most famous monster in history. Victor Frankenstein was a scientist who rejected those old supernatural ideas, but by the application of electricity, in an attempt to reanimate dead tissue. She was a pretty sharp teenager and was unusually well educated in the sciences, and very possibly, she invented modern science fiction at the age of Aldiss, who, in his history of science fiction, Trillion Year Spree, cited Frankenstein as the first work of actual science fiction and Mary Shelley as the mother of the entire genre. For one thing, the novel begins with a series of letters from an adventurer named Robert Walton to his sister. Walton, who has undertaken an arctic journey in hopes of discovering the North Pole, sees himself as something of a scientist: And the next morning another sled, with only one dog remaining alive, burying the emaciated Victor Frankenstein. Title page of the first edition of Frankenstein, Volume I. The story that Victor tells to Walton makes up the more familiar part of the novel. These early chapters in which Victor describes his family history and his early life, his childhood meetings with his lifelong love Elizabeth, and his close friend Henry Clerval, and his student days, are crucial to the claim that Frankenstein might be regarded as the first work of modern science fiction. As a teenager, Victor became enamored of what was then called natural philosophy, and in particular, with the work of the 16th-century German alchemist Cornelius Agrippa. Cornelius Agrippa, my dear Victor, do not waste your time on this, it is sad trash. In this mood of mind, I betook myself to the mathematics and the branches of study appertaining to that science as being built upon secure foundations, and so worthy of my consideration. Now, we need to understand that natural philosophy was something of a catchall term referring to those branches of philosophy that considered the natural world, but not always in terms of experimental results in the manner of modern scientific methods. Instead, patterns of quasi-scientific or pseudo scientific thought that had built up over centuries became a kind of dogma. Victor abandons all this, and so does Mary Shelley. Perhaps inadvertently anticipating another horror movie trend of a century later. And rejected by his creator, the creature flees. For several chapters in the middle of the novel, the creature meets with Victor and tells him of his own experiences, learning that fire can be a source of warmth and also a source of injury, for example, and learning language by eavesdropping on a poor family, the De Laceys. By the time she returned to England a few years later, her novel was already hit stage play focusing on the horror story and almost entirely overlooking the science. And a century later, one of these stage adaptations by a now forgotten playwright named Peggy Webling gave the name Frankenstein to the creature itself. The creature was never named in the novel, leading to a misunderstanding that persists until this day. This brings us back to that point I was making earlier about how science fiction movies sometimes oversimplify and even degrade the ideas of science fiction novels. And the same is true of almost all the dozens of Frankenstein movies ever since, some estimates put them at 60, and many of these films have reintroduced those very supernatural elements that Shelley so carefully excluded from her novel. Frankenstein meets Dracula or Frankenstein meets the wolf man or demons or gargoyles or whatever. And that, in a nutshell, is the main different between science fiction and fantasy. Science fiction is about the possible given what we actually know, and fantasy is about the impossible.

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Chapter 3 : The birth of the Web | CERN

I love this story! Sam also freaks out about the most minor of cuts and scrapes. In fact there have been times I have had a very minor scrape and Sam will worry himself into a tizzy if I do not have a band aid to "make is aaaallllll better".

By Erica Tennenhouse Oct. It needs to be wide enough to allow our big-brained babies to pass through, yet narrow enough to allow women to walk efficiently. But a new study reveals birth canals come in a variety of shapes in women around the world. But recent studies have challenged it, and the new findings add to that research, he says. If the obstetric dilemma held true, one would expect birth canals around the world to be relatively standardized, Wells says. Lia Betti, a biological anthropologist at the University of Roehampton in London and evolutionary ecologist Andrea Manica of the University of Cambridge in the United Kingdom, measured the pelvises of female human skeletons from 24 different parts of the world. The birth canals were far from carbon copies of each other. Those of women from sub-Saharan Africa and some Asian populations were overall narrow from side to side and deep from front to back, whereas Native American women had wider canals. Native Americans and Europeans also had the most oval-shaped upper canals, the team reports today in the Proceedings of the Royal Society B. Betti and Manica also found that there was less variability in birth canal shape in populations farther from Africa, such as Native Americans. That pattern has been seen in other traits, and is thought to simply reflect lower variability in genes and traits among the relatively small bands of people who moved out of Africa to populate the world. Overall, the analysis suggests a population may have ended up with a particular birth canal shape simply by chance, not because of any sort of selective pressure. The birth canal on the top is wider side to side and more ovular, whereas the one on the bottom is deeper from front to back and rounder. Lia Betti Temperature could also be a factor. Colder climates favor wider bodies, which are better at holding in heat, and this could have an impact on birth canal shape. But the pelvic data only weakly followed that trend. Wells argues that other environmental factors may play a role and should still be explored. The work could improve practices surrounding childbirth, Betti says. For example, a fetus must rotate to negotiate the twisting passage of the birth canal during labor, and these movements may vary depending on the shape of the birth canal. It may simply reflect the range of birth canal shapes seen throughout the world.

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Chapter 4 : Human Birth Canal Varies More Widely than Previously Thought | The Scientist MagazineÂ®

Home; Image of the Day; Image of the Day: The Birth of a Nervous System The winner of the Nikon Small World in Motion video competition shows the development of sensory neurons in a zebrafish embryo.

As Nancy Hopkins, one of the professors who initiated the study, put it in an online forum: This is what discrimination looks like in At age five, Ada E. Yonath began conducting her own experiments. She lacked tools to measure the height of the balcony, so she gathered all of the light furniture she could find, using her tiny body to drag chairs and stools outside. She stacked them every which way, but the pile was still too short. Yonath had few options left, and she was, after all, a knowable height. She would use her own body to reach the ceiling, scaling her unstable mess of furniture in the name of scientific inquiry. Before she could reach the top, she fell off and broke her arm. She was born to Hillel and Esther Lifshitz in , Zionist Jews from Poland who could barely afford the one room they rented in a cramped Jerusalem apartment shared by two other families. Her father was constantly ill, and unable to work. They managed to place her in Beit Hakerem, a prestigious, secular grammar school. By the time Yonath turned 11, her father died. Her newly widowed mother was also ill, and struggled to take care of herself, let alone Yonath and her new baby sister. She came to rely on her eldest daughter for support, and, more importantly, a supplemental income. In addition to school, Yonath cleaned, babysat and tutored whenever she could, but it was never enough. Yonath spent her compulsory year in the Israeli army working in a top secret office of the Medical Forces, where she gained clinical experience. From there, she went straight to university, then graduate school, eventually completing her post-doc research on proteins at the Mellon Institute in Pittsburg and the Massachusetts Institute of Technology. In the s, she began working at the Weizmann Institute in Rehovot, Israel. She would spend the next two decades there, trying to determine the three-dimensional structure of ribosomes, the protein factory within cells. Her colleagues continued to doubt her, and her reputation suffered. They called her a dreamer at best, the village fool at worst. But that was the least of her concerns. In , she told the India Times that science was far easier than simply surviving. She always could do more research and conduct additional experiments, which she still enjoyed more than anything else. She found the process to be far less demanding than hunger, an inflexible state. Under 50 women have won Nobel Prizes since its inception in , as compared to men. She has inspired a pro-curly hair movement in Israel.

Chapter 5 : Stimeyland: Birth of a Scientist?

WHEN Carol Padden first visited Al-Sayyid, a small Bedouin village in the Negev desert in Israel, her expectations were not high. Padden, a linguist at the University of California, San Diego.

And why do I say so? Because it is evident, O priests, that this body which is composed of the four elements lasts one year, lasts two years, lasts three years, lasts four years, lasts five years, lasts ten years, lasts twenty years, lasts thirty years, lasts forty years, lasts fifty years, lasts a hundred years, and even more. But that, O priests, which is called mind, intellect, consciousness, keeps up an incessant round by day and by night of perishing as one thing and springing up as another. The fool hath said in his heart, There is no God. And in a day when philosophy and science were not distinguished from each other, Descartes was a famous physicist and mathematician as well as a philosopher. But Descartes was a great mathematician of enduring importance. He originated analytic geometry, where all of algebra can be given geometrical expression. Like Galileo combining physics and mathematics, this also combined two things that had previously been apart, arithmetic and geometry. The modern world would not be the same without graphs of equations. Descartes is also the person who began calling the square root of -1 i. Descartes lived in an age of great mathematicians, including Marin Mersenne , Pierre Fermat , Blaise Pascal , and Christian Huygens At a time before scientific journals, Mersenne himself mediated a correspondence between all these people as well as with Galileo, Thomas Hobbes, and many others. All prime numbers that are powers of 2 minus 1 i. Apart from being the Father of Modern Philosophy and a great mathematician, Descartes may have been the only philosopher, ever, to have begun his career as a professional solidier. This was an era when most European armies were collections of professional mercenaries, much of whose income, and even basic military supply, came from looting, often with little respect for the property, or even the lives, of civilian populations. Most of the lifetime of Descartes was taken up with the devastation and horrors of the Thirty Years War , whose end he barely outlived. By then, however, he had long retired as a soldier, and he had also settled down to live in the Netherlands, where the censorship and other dangers of the Kingdom of France could be avoided. To be sure, Descartes dedicated the Meditations on First Philosophy to the Faculty of Theology at the University of Paris, but these were people who would not have given him the time of day and can only have viewed his thought with alarm. They would have seen it as a clear and present danger to their own Aristotelian universe, which it certainly was. Similarly, it remains a noteworthy truth of the beginning of Modern Philosophy that nobody was an academic professor of philosophy until Immanuel Kant. The closest anyone in the meantime came was John Locke , who was a fellow in botany and pharmacology at Oxford, but who never obtained a degree, even in medicine, which he nevertheless practiced. It remains to the judgment of history whether contemporary academic philosophy suffers from any of the same evils as the universities in the time of Descartes -- although my judgment is that it does. Seeing Descartes as a mathematician explains why he was the kind of philosopher that he was. We might think so, and Descartes gets remembered more as a philosopher and metaphysician than as a scientist or physicist. But the paradox of modern science is its dependence on mathematics. Where does mathematics come from? What makes it true? So Descartes belongs to this puzzling, mathematical side of science, not to the side concerned with experience. One might expect the mathematician Descartes to suffer from this problem, but in fact he is sensible of the philosophical issues, the metaphysics and epistemology, that are involved in his thought, while others use mathematics as an excuse to ignore or dismiss philosophical problems. Meditations on First Philosophy is representative of his thought. The most important thing about Descartes as a philosopher is that "first philosophy" changed because of what he did. What stood first in philosophy since Aristotle was metaphysics. Thus the first question for philosophy to answer was about what is real. That decided, everything else could be done. With such an arrangement we can say that philosophy functions with Ontological Priority. In the Meditations we find that questions about knowledge come to the fore. If there are problems about what we can know, then we may not even be able to know what is real. But if questions about knowledge must be settled first, then this establishes Epistemological Priority for philosophy. Indeed, this leads to the creation of the Theory of Knowledge, Epistemology , as a separate discipline within philosophy for the first time. Modern philosophy has been driven by questions about knowledge. It begins with two principal traditions, Continental Rationalism and British Empiricism. The Rationalists, including Descartes, believed that reason was the fundamental source of knowledge. The Empiricists believed that experience was. Epistemological priority makes possible what has become a very common phenomenon in modern philosophy: That can happen when epistemology draws the limits of knowledge, or the limits of meaning, so tight that metaphysical statements or questions are no longer allowed. In the first meditation Descartes begins to consider what he can know. He applies the special method that he has conceived about which he had already written the Discourse on Method , known as "methodical doubt. Today Descartes is often faulted for requiring certainty of knowledge. But that was no innovation with him: Anything without certainty would just be opinion, not knowledge. The disenchantment with certainty today has occurred just because it turned out to be so difficult to justify certainty to the rigor that Descartes required. Logically the two parts of methodical doubt are very similar, but in the Meditations they are procedurally different. Doubt does its job in the first meditation. Descartes wonders what he can really know about a piece of matter like a lump of wax. He wonders if he might actually be dreaming instead of sitting by the fireplace. Ultimately he wonders if the God he has always believed in might actually be a malevolent Demon capable of using his omnipotence to deceive us even about our own thoughts or our own existence. Thus, there is nothing in all his experience and knowledge that Descartes cannot call into doubt. The junk of history, all the things he ever thought he had known, gets swept away. With Descartes, this uneasiness about causality becomes a terror in relation to knowledge: Thus what we possess, our perceptions, are the effects of external causes; and in thinking that we know external objects, we are reasoning backwards from effect to cause. Indeed, in ordinary life we know that they can be. Hallucinations can be caused by a lot of things: That raw nerve is now known as the Problem of Knowledge: How can we have knowledge through perception of external objects? There is no consensus on how to solve this even today. Philosophical explanations are usually anything but obvious; but no sensible person, not even Descartes, really doubts that external objects are there. This is why modern philosophy became so centered on questions about knowledge: In his own discussion, Descartes does not identify his problem as resulting from the asymmetry of cause and effect as applied to knowledge. However, this is what underlies his difficulty, and an explicit statement of the matter does not have long to wait. In , Bishop Pierre-Daniel Huet, a member of the French Academy, wrote that any event can have an infinite number of possible causes. Since the relation between cause and effect is not as such a cognitive relation, C. Lewis realized that Determinism, in which the only relations between objects are causal ones, eliminates the ability of Determininists to account for the truth of their own theory. This is a sound insight; and although it was famously disputed by Elizabeth Anscombe , it is really no more than a corollary of the Problem of Knowledge. Determinism can account for knowledge, even of its own theory, no more than can Descartes when faced with the nature of perception. In the second meditation, Descartes wants to begin building up knowledge from the wreckage of the first meditation. This means starting from nothing. Such an idea of building up knowledge from nothing is called Foundationalism and is one of the mistakes that Descartes makes. Descartes does not and cannot simply start from nothing -- just as Newton admitted that he stood "on the shoulders of giants" to make the progress that he did. Nevertheless, Descartes gets off to a pretty good start: This is usually stated in Latin: Cogito ergo sum, "I think therefore I am. Thinking comes first, and for Descartes that is a real priority. The title of the second meditation actually says, "the mind is better known than the body," and the cogito ergo sum makes Descartes believe, not just that he has proven his existence, but that he has proven his existence as a thinking substance, a mind, leaving the body as some foreign thing to worry about later. In the end Descartes will believe that there are two fundamental substances in the world, souls and matter. The essence of soul for him, the attribute that makes a soul what is it, is thinking. The essence of matter for him given to us in the fifth meditation , the attribute that makes matter what is it, is extension, i. This is known as Cartesian Dualism, that there are two kinds of things. It is something else that people have thought funny or absurd since Descartes. The great difficulty with it was always how souls and their bodies, made of matter, interact or communicate with one another. The body cannot even hold the soul within it, since the soul has nothing to press upon to carry it along with the body a problem that was pointed out to me by a student during my lecture. Problems like this occur whenever the body and soul are regarded as fundamentally different kinds of realities. But, usually, a theory of the soul wants it to be some kind of thing that cannot be detected in a laboratory -- in great measure because souls have not been detected in a laboratory. The Cartesian soul is essentially a "thinking substance," which means that it cannot stop thinking, any more than matter can stop being extended. Thought is not going to happen in the unconsciousness of deep sleep, a condition already recognized in the Upanishads. The unconsciousness of sleep tears a large hole in the confidence of Descartes that "the mind is better known than the body," but there are other things he also overlooks. None of our memories are immediately present to us in consciousness. The memory of Descartes himself contained the large vocabulary of the French and Latin languages alone, thousands of items. Yet we can quickly access our memories and bring them to consciousness. Or sometimes we can only do this with difficulty, and sometimes we forget things altogether.

Chapter 6 : Ada Yonath: The Birth of a Scientist - The Toast

Psychology just wouldn't be the same without William James, known as the father of modern American psychology. He initially earned a degree at Harvard Medical School, but rather than practice medicine, James wandered into the fields of philosophy and psychology. He acknowledged that he was a.

The ancient people who are considered the first scientists may have thought of themselves as natural philosophers, as practitioners of a skilled profession for example, physicians , or as followers of a religious tradition for example, temple healers. The earliest Greek philosophers, known as the pre-Socratics , [29] provided competing answers to the question found in the myths of their neighbors: For example, that land floats on water and that earthquakes are caused by the agitation of the water upon which the land floats, rather than the god Poseidon. This was greatly expanded on by his pupil Democritus and later Epicurus. Subsequently, Plato and Aristotle produced the first systematic discussions of natural philosophy, which did much to shape later investigations of nature. Their development of deductive reasoning was of particular importance and usefulness to later scientific inquiry. Plato founded the Platonic Academy in BC, whose motto was "Let none unversed in geometry enter here", and turned out many notable philosophers. He made countless observations of nature, especially the habits and attributes of plants and animals on Lesbos , classified more than animal species, and dissected at least The important legacy of this period included substantial advances in factual knowledge, especially in anatomy , zoology , botany , mineralogy , geography , mathematics and astronomy ; an awareness of the importance of certain scientific problems, especially those related to the problem of change and its causes; and a recognition of the methodological importance of applying mathematics to natural phenomena and of undertaking empirical research. Neither reason nor inquiry began with the Ancient Greeks, but the Socratic method did, along with the idea of Forms , great advances in geometry , logic , and the natural sciences. What Archimedes did was to sort out the theoretical implications of this practical knowledge and present the resulting body of knowledge as a logically coherent system. Nor should it be supposed that by some trick of translation the extracts have been given an air of modernity. The vocabulary of these writings and their style are the source from which our own vocabulary and style have been derived. The astronomer Aristarchus of Samos was the first known person to propose a heliocentric model of the solar system, while the geographer Eratosthenes accurately calculated the circumference of the Earth. The level of achievement in Hellenistic astronomy and engineering is impressively shown by the Antikythera mechanism â€” BC , an analog computer for calculating the position of planets. Technological artifacts of similar complexity did not reappear until the 14th century, when mechanical astronomical clocks appeared in Europe. Herophilos â€” BC was the first to base his conclusions on dissection of the human body and to describe the nervous system. Theophrastus wrote some of the earliest descriptions of plants and animals, establishing the first taxonomy and looking at minerals in terms of their properties such as hardness. Pliny the Elder produced what is one of the largest encyclopedias of the natural world in 77 AD, and must be regarded as the rightful successor to Theophrastus. For example, he accurately describes the octahedral shape of the diamond , and proceeds to mention that diamond dust is used by engravers to cut and polish other gems owing to its great hardness. His recognition of the importance of crystal shape is a precursor to modern crystallography , while mention of numerous other minerals presages mineralogy. He also recognises that other minerals have characteristic crystal shapes, but in one example, confuses the crystal habit with the work of lapidaries. He was also the first to recognise that amber was a fossilized resin from pine trees because he had seen samples with trapped insects within them. History of science and technology in the Indian subcontinent Ancient India was an early leader in metallurgy , as evidenced by the wrought-iron Pillar of Delhi. The earliest traces of mathematical knowledge in the Indian subcontinent appear with the Indus Valley Civilization c. The people of this civilization made bricks whose dimensions were in the proportion 4: They designed a rulerâ€”the Mohenjo-daro rulerâ€”whose unit of length approximately 1. Bricks manufactured in ancient Mohenjo-daro often had dimensions that were integral multiples of this unit of length. In AD, Brahmagupta suggested that gravity was a force of attraction. In particular, Madhava of Sangamagrama is considered the "founder of mathematical analysis ". The first textual mention of astronomical concepts comes from the Vedas , religious literature of India. The 13 chapters of the second part cover the nature of the sphere, as well as significant astronomical and trigonometric calculations based on it. Some of the earliest linguistic activities can be found in Iron Age India 1st millennium BC with the analysis of Sanskrit for the purpose of the correct recitation and interpretation of Vedic texts. Inherent in his analytic approach are the concepts of the phoneme , the morpheme and the root. Findings from Neolithic graveyards in what is now Pakistan show evidence of proto-dentistry among an early farming culture. The wootz , crucible and stainless steels were invented in India, and were widely exported in Classic Mediterranean world. It was known from Pliny the Elder as ferrum indicum. Indian Wootz steel was held in high regard in Roman Empire, was often considered to be the best. After in Middle Age it was imported in Syria to produce with special techniques the " Damascus steel " by the year They also have workshops wherein are forged the most famous sabres in the world.

Chapter 7 : The Birth of Modern Science - Understanding the Origins of Modern Science

Marketing for Scientists is a blog, a Facebook group, a series of professional development workshops, and a book published by Island Press, meant to help scientists, engineers, and doctors build the careers they want and shape the public debate. Because sometimes, unlocking the mysteries of the universe just isn't enough.

One enduring mystery of modern science is why it developed where and when it did. It was not necessary that the scientific revolution emerge in the 17th century as far as anyone can tell. It was not inevitable and had not been predicted. It was not predictable that it would happen just then or in Western Europe, but nevertheless, modern science clearly did not just drop down out of the sky like some deus ex machina in a Greek play. Modern science did not just suddenly appear out of nowhere. Realms of Physics Modern science clearly did not just drop down out of the sky like some deus ex machina in a Greek play. Once it appeared, we can see that it represents the integration, the synthesis, of a lot of pieces that had been around from the time of ancient Greece and Rome, through the medieval period and especially the university context, and all of the dynamism of the Renaissance. The pieces were all there. What happened in the 17th century is that a glue was added to hold all of those pieces together, and that glue seems to be the idea of method. Inventing the Scientific Method There is, in fact, this typical characterization of the rise of modern science that it is the result of the discovery or invention of the scientific method. And once people grasped the scientific method, then all of a sudden all of the available tools came together in a way that generated the theories characteristic of the rise of modern science, especially the work of people like Descartes and Galileo and Christiaan Huygens in Holland, and Isaac Newton and Gottfried Leibniz. And then we march into the 18th century, the 19th, 20th, and here we are, the heirs of the riches generated by the scientific method. You could be getting much more from this article by watching its accompanying video lecture on The Great Courses Plus! Method was a critical factor in pulling together all the pre-existing pieces that contribute to modern science: By inheriting Greek mathematics and Islamic algebraic mathematics that 16th-century European mathematicians were able to start from an already pretty high level. The Renaissanceâ€"with its recovery of ancient learning, especially the great mathematical texts of classical antiquityâ€"allowed European mathematics to not have to reinvent the number, as it were, but by inheriting Greek mathematics and Islamic algebraic mathematics that 16th-century European mathematicians were able to start from an already pretty high level. What emerged in the 17th century was an enormous flourishing of mathematics providing tools for people to apply mathematics to natural phenomena. Method was central to the 17th-century natural philosophyâ€"the intellectual activity that morphed into what we recognize as modern scienceâ€"but there was no one method that all of the founders of modern science used. What is interesting and important is that a sensitivity to methodological issues was the common denominator of the founders of modern science. That is very consistent with the idea of knowledge as being central to the idea of science and now to the idea of modern science. What the founders of modern science, the people that all historians point to as the founding figures in modern science, what all of them were concerned about was this idea of knowledge of nature and the problem that Aristotle recognized, that the medieval university recognized in the problem of universals: How can we have universal, necessary, and certain knowledge of nature if our only access to nature is experience, and experience is particular, concrete, and continually changing? That becomes an explicit and self-conscious issue that the founders of modern science wrestled with even as they insisted that, as a matter of fact, it was possible to have knowledge of nature, understanding now that it was what was behind experience. And this could not have emerged without the recognition that they were building on what their predecessors had done. So the founders of modern science were inheriting a great deal. They were building on a great deal. To call it a revolution is fundamentally misleading because it makes light of the evolution in which a sensitivity to method and the idea of knowledge played a key role in allowing people to integrate all of these pieces. They were lying around, so to speak, and could be pulled together and were pulled together by the people who founded modern science.

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