

1: Hidden Women of Victorian and Edwardian Science | Women In Science Research Network

Victorian Science, Scientists, Inventors and Technology - Scientists, Inventors and Explorers - SchoolDirectory - Science biography by field, nationality and sector.

Gary Calton In December , the astronomer royal, Dr Nevil Maskelyne FRS, wrote effusively to year-old Caroline Herschel congratulating her on being the "first women in the history of the world" to discover not one, but two new comets. No woman since renowned Greek mathematician Hypatia of Alexandria had had such an impact on the sciences. Nevertheless, observed Dr Maskelyne with jocular good humour, he hoped Caroline did not feel too isolated among the male community of astronomers in Britain. He hoped she would not be tempted to ride off alone into outer space on "the immense fiery tail" of her new comet. Curiously, no such recognition was immediately forthcoming. All this year, and all round the globe, the Royal Society of London has been celebrating its th birthday. In a sense, it has been a celebration of science itself and the social importance of its history. The senior scientific establishment in Britain, and arguably in the world, the Royal Society dates to the time of Charles II. Although it was founded in , women were not permitted by statute to become fellows of the Royal Society until years later, in . An exception was made for Queen Victoria, who was made a royal fellow. It will be recalled that women over the age of 30 had won the vote nearly 30 years earlier, in . Very similar exclusions operated elsewhere: It is also true that by the turn of the 21st century, there had been more than 60 distinguished women fellows of the society. Many have become household names, such as the brilliant crystallographer Dorothy Hodgkin , who famously won a Nobel prize in , and whose whirling portrait by Maggi Hambling now hangs in the National Portrait Gallery. Her heroic life " she mapped the structure of penicillin and then dedicated 35 years to deciphering the structure of insulin " is told in a superb, biography by Georgina Ferry. Yet in Victorian Britain, the very idea of women doing serious science except botany and perhaps geology was widely ridiculed and even botany with its naming of sexual parts could be regarded as morally perilous. Mary Anning , the great West Country palaeontologist, struggled for years to have her discoveries " such as the plesiosaurus " recognised as her own. Certainly compared with their literary sisters, the scientific women of the 19th century still appear invisible, if not actually non-existent. Yet my re-examination of the Royal Society archives during this th birthday year has thrown new and unexpected light on the lost women of science. I have tracked down a series of letters, documents and rare publications that begin to fit together to suggest a very different network of support and understanding between the sexes. It emerges that women had a far more fruitful, if sometimes conflicted, relationship with the Royal Society than has previously been supposed. It is at once evident that they played a significant part in many team projects, working both as colleagues and as assistants though hitherto only acknowledged in their family capacities as wives, sisters or daughters. More crucially, they pioneered new methods of scientific education, not only for children, but for young adults and general readers. They also played a vital part as translators, illustrators and interpreters and, most particularly, as "scientific popularisers". Indeed, the Royal Society archives suggest something so fundamental that it may require a subtle revision of the standard history of science in Britain. This is the previously unsuspected degree to which women were a catalyst in the early discussion of the social role of science. More even than their male colleagues, they had a gift for imagining the human impact of scientific discovery, both exploring and questioning it. Precisely by being excluded from the fellowship of the society, they saw the life of science in a wider world. They raised questions about its duties and its moral responsibilities, its promise and its menace, in ways we can appreciate far more fully today. There were protests from the all-male fellows " Pepys recorded the scandal " and the dangerous experiment was not repeated for another couple of centuries. But Margaret could take advantage of her position, being the second wife of William Cavendish FRS, a member of one of the great aristocratic dynasties of British science. She knew many of the leading fellows, such as Robert Boyle and Thomas Hobbes. On this occasion, she witnessed several experiments of "colours, loadstones, microscopes" and was "full of admiration", although according to Pepys, her dress was "so antic and her deportment so unordinary" that the fellows were made strangely uneasy. But this may have been for other reasons. Engraving depicting Margaret

Cavendish. She questioned the Baconian notion of relentless mechanical progress, in favour of gentler Stoic doctrines, in her polemical *Observations on Experimental Philosophy*. She wrote a lively *Memoir*, in which she gave an interesting definition of poetry as "mental spinning", being useful to the scientific mind. She also produced arguably the first-ever science-fiction story, *The Blazing World*, which considered the alternative futures of science. All this earned her the sobriquet "Mad Madge". The idea of animals having rights within any humane society was recognised early by female scientists. Anna Barbauld, the brilliant young assistant to Joseph Priestley FRS, the great 18th-century chemist, noticed the distress of his laboratory animals as they were steadily deprived of air in glass vacuum jars, during the experiments in which he first discovered oxygen. The well-taught philosophic mind casts round the world an Equal eye, And feels for all that lives. The notion that animals and, indeed, all life-forms on Earth, had a right to "the common gifts of heaven" can be seen as the first stirrings of the whole environmental movement and the demands it now makes upon science and industry. Caroline was sister to William Herschel FRS, the great Romantic astronomer who discovered Uranus and first proposed the existence of galactic systems, such as Andromeda, beyond our own Milky Way. Her brother was immensely proud of her, built her special telescopes and helped her to obtain the first state salary for a female astronomer in Britain. Caroline also kept an observational journal for more than 30 years. This gives not only astronomical data, but emotional data too: It is one of the earliest records of how science actually gets done, its secret tribulations as well as its public triumphs. Women also saw the educational possibilities of science in a broader context than their male colleagues. Jane Marcet, encouraged by her husband, Alexander Marcet FRS, published the first truly bestselling scientific populariser for young people in Breezily entitled *Conversations in Chemistry*, in which the elements of that science are familiarly explained and illustrated by Experiments, it eventually sold as many books as the poetry of Lord Byron also an FRS. One of its 15 later editions inspired the great 19th-century physicist Michael Faraday FRS to begin his career in science. He started reading the book in , while still working as an apprentice bookbinder and later recalled: Emily is observant and rather serious, while Caroline is mischievous but inventive useful qualities for a young scientist. Caroline continually tempts Mrs B into the more imaginative aspects of science. An engraved portrait of English astronomer and musician Caroline Herschel. Caroline instantly grasps the romantic possibilities of this: By using dialogue, the "Conversations" brought science popularising a step closer to fiction. Indeed, the most universal of all science fiction novels, *Frankenstein, or the Modern Prometheus*, was largely inspired by the chemical lectures of Sir Humphry Davy FRS. Its cruder and more sensational stage adaptations, starting in the s, also popularised the idea of the "mad scientist", one of the most powerful of all stereotypes. This is a double-edged propaganda weapon, inciting hysteria as much as rational caution and discussion. Though the title, complete with exclamation mark, gives away the basic plot, the novel is far from anti-scientific. Paradoxically, it celebrates a brilliant array of futuristic inventions and technologies, such as centrally heated streets, cheap, compressed-air balloon travel, houses moved by railway and gas-illuminated safety hats for ladies. After this "wild and strange story", as she called it, Jane Loudon went on to find more conventional fame as the playful author of *The Young Naturalist*, the first of many scientific books for children. At the very time these novels were making their impact, astronomer John Herschel FRS, the son of William, and a future secretary of the Royal Society, was writing a series of historic letters on a new but crucially related field: Unusually, his correspondent was a woman, Mary Fairfax Somerville. She had first explored the theories of Babbage concerning his famous "analytical engine", by adding her own highly original but technical commentary to a review of his work which she translated from the French. Though rightly credited with a share in inventing the modern computer, Ada never risked producing a piece of popular science of the sort Mary Somerville was considering. Scottish scientific writer Mary Somerville. She described herself as "intensely ambitious to excel in something, for I felt in my own breast that women were capable of taking a higher place in creation than that assigned to them in my early days, which was very low". Her first plan was to be a painter. In , she was challenged by Lord Brougham to produce a popular summation of the new French astronomy for his philanthropic Society for the Diffusion of Useful Knowledge. Her unscientific friend, novelist Maria Edgeworth, described Mary admiringly: But now, John Herschel encouraged Mary to continue with the full text, but recommended an extended and popular introduction.

Shrewdly, Herschel urged her to continue to think like a painter, to sketch in firm "outlines", to "illustrate" vividly, to consider the overall composition: While the main translation became the standard textbook for science postgraduates at Cambridge unheard-of for a woman author, the "Preliminary Dissertation made her famous with a general reading public. Again encouraged by Herschel, she republished it separately in and it continued to be widely read for the next 50 years. Maria Edgeworth singled out its exemplary quality as popular science. Mary Somerville then set out to write a completely original book, *On the Connexion of the Physical Sciences* in 1831. In it, she surveyed the whole field of contemporary sciences – chemistry, astronomy, physics – and drew attention to the unity of their underlying principles and methodology. Nothing like this had previously been attempted. Amazingly, the word had not existed before. This book ran to 10 editions and shaped the progressive idea of science for more than half a century. *Physical Geography* in 1835 and *Molecular and Microscopic Science* in 1848 were written in her late 30s. Her autobiography, *Personal Recollections*, was published posthumously in 1841. She is now largely remembered because she had an Oxford college named after her in 1879. But in her time she was the greatest of all 19th-century women science writers, known as "the Queen of science" and elected honorary fellow of the Royal Astronomical Society along with Caroline Herschel. If she never entered into the Royal Society in person, her fine marble bust by Chantrey did so. It was first installed in the Great Hall and now resides in the research library of the Royal Society, flanked by Faraday and Darwin. Most important, Mary Somerville became an outstanding model for a later generation of younger women in science. This was notably true of the first great American woman astronomer, Maria Mitchell. Born in 1792 on the remote whaling-station of Nantucket, Maria had a Quaker upbringing, where her scientific interests were encouraged by her schoolmaster father. Three years after her discovery of a new comet in 1847, she was elected first woman member of the American Association for the Advancement of Science, aged only 55. Modestly revelling in her newfound celebrity, Maria then toured all the great observatories of Europe, subjecting their various astronomers to her candid, Nantucket eye and salty humour. She visited Greenwich Observatory and the Royal Society, bringing with her as a calling card the first known photograph of a star. She was disconcerted to find the Vatican observatory closed to women after dark, a distinct setback for a professional astronomer. Like her heroine, Maria identified with the anti-slavery cause and the female suffragist movements. But being a generation younger, Maria Mitchell was far more assertive than Mary Somerville about the vital importance of women actually doing science. Too often, and for too long, those "words" had been male.

2: Victorian era - Wikipedia

For the first time, science was seen as a profession in its own right; the very term "scientist" was a Victorian invention, originally proposed by William Whewell in Major discoveries were made during Victorian times in all branches of science, including physics, astronomy, natural history and medicine.

Her reign lasted for 63 years and seven months, a longer period than any of her predecessors. Definitions that purport a distinct sensibility or politics to the era have also created scepticism about the worth of the label "Victorian", though there have also been defences of it. He saw the latter period as characterised by a distinctive mixture of prosperity, domestic prudery, and complacency [11] — what G. Trevelyan similarly called the "mid-Victorian decades of quiet politics and roaring prosperity". The Act abolished many borough seats and created others in their place, as well as expanding the franchise in England and Wales a Scottish Reform Act and Irish Reform Act were passed separately. Minor reforms followed in and Her government was led by the Whig prime minister Lord Melbourne, but within two years he had resigned, and the Tory politician Sir Robert Peel attempted to form a new ministry. It proved a very happy marriage, whose children were much sought after by royal families across Europe. However, a disastrous retreat from Kabul in the same year led to the annihilation of a British army column in Afghanistan. In 1847, the Great Famine began to cause mass starvation, disease and death in Ireland, sparking large-scale emigration; [14] To allow more cheap food into Ireland, the Peel government repealed the Corn Laws. Peel was replaced by the Whig ministry of Lord John Russell. The goal was to ensure that Russia could not benefit from the declining status of the Ottoman Empire, [16] a strategic consideration known as the Eastern Question. On its conclusion in with the Treaty of Paris, Russia was prohibited from hosting a military presence in the Crimea. During 1857–58, an uprising by sepoys against the East India Company was suppressed, an event that led to the end of Company rule in India and the transferral of administration to direct rule by the British government. The princely states were not affected and remained under British guidance. Society and culture Evangelicals, Utilitarians and reform The central feature of Victorian era politics is the search for reform and improvement, including both the individual personality and the society. First was the rapid rise of the middle class, in large part displacing the complete control long exercised by the aristocracy. Respectability was their code — a businessman had to be trusted, and must avoid reckless gambling and heavy drinking. Second the spiritual reform closely linked to evangelical Christianity, including both the Nonconformist sects, such as the Methodists, and especially the evangelical or Low Church element in the established Church of England, typified by Lord Shaftesbury — Starting with the anti-slavery movement of the 1830s, the evangelical moralizers developed highly effective techniques of enhancing the moral sensibilities of all family members, and reaching the public at large through intense, very well organized agitation and propaganda. They focused on exciting a personal revulsion against social evils and personal misbehavior. They were not moralistic but scientific. Their movement, often called "Philosophic Radicalism," fashioned a formula for promoting the goal of "progress" using scientific rationality, and businesslike efficiency, to identify, measure, and discover solutions to social problems. The formula was inquiry, legislation, execution, inspection, and report. Evangelicals and utilitarians shared a basic middle-class ethic of responsibility, and formed a political alliance. The result was an irresistible force for reform. Even more important were political reforms, especially the lifting of disabilities on nonconformists and Roman Catholics, and above all, the reform of Parliament and elections to introduce democracy and replace the old system whereby senior aristocrats controlled dozens of seats in parliament. This sketch is from an issue of Punch, printed in November that year. Religion was a battleground during this era, with the Nonconformists fighting bitterly against the established status of the Church of England, especially regarding education and access to universities and public office. Penalties on Roman Catholics were mostly removed. The Vatican restored the English Catholic bishoprics in 1850 and numbers grew through conversions and immigration from Ireland. Houghton argues, "Perhaps the most important development in 19th-century intellectual history was the extension of scientific assumptions and methods from the physical world to the whole life of man. The "Nonconformist conscience" of the Old group emphasised religious freedom and

equality, the pursuit of justice, and opposition to discrimination, compulsion, and coercion. The New Dissenters and also the Anglican evangelicals stressed personal morality issues, including sexuality, temperance, family values, and Sabbath -keeping. Both factions were politically active, but until the mid-19th century, the Old group supported mostly Whigs and Liberals in politics, while the New "like most Anglicans" generally supported Conservatives. In the late 19th century, the New Dissenters mostly switched to the Liberal Party. The result was a merging of the two groups, strengthening their great weight as a political pressure group. They joined together on new issues especially regarding schools and temperance, with the latter of special interest to Methodists. They could not hold most public offices, they had to pay local taxes to the Anglican church, be married by Anglican ministers, and be denied attendance at Oxford or degrees at Cambridge. Dissenters demanded the removal of political and civil disabilities that applied to them especially those in the Test and Corporation Acts. The Anglican establishment strongly resisted until It was a major achievement for an outside group, but the Dissenters were not finished and the early Victorian period saw them even more active and successful in eliminating their grievances. Only buildings of the established church received the tax money. Civil disobedience was attempted but was met with the seizure of personal property and even imprisonment. The compulsory factor was finally abolished in by William Ewart Gladstone , and payment was made voluntary. Nonconformist ministers in their own chapels were allowed to marry couples if a registrar was present. Also in , civil registration of births, deaths, and marriages was taken from the hands of local parish officials and given to local government registrars. Burial of the dead was a more troubling problem, for urban chapels had no graveyards, and Nonconformists sought to use the traditional graveyards controlled by the established church. The Burial Laws Amendment Act finally allowed that. Cambridge required that for a diploma. The two ancient universities opposed giving a charter to the new University of London in the s because it had no such restriction. The university, nevertheless, was established in , and by the s Oxford dropped its restrictions. In Gladstone sponsored the Universities Tests Act that provided full access to degrees and fellowships. Nonconformists especially Unitarians and Presbyterians played major roles in founding new universities in the late 19th century at Manchester , as well as Birmingham , Liverpool and Leeds. Huxley coined the term. It was much discussed for several decades, and had its own journal edited by William Stewart Ross "the Agnostic Journal and Eclectic Review. Interest petered out by the s, and when Ross died the Journal soon closed. Ross championed agnosticism in opposition not so much to Christianity, but to atheism, as expounded by Charles Bradlaugh [42] The term "atheism" never became popular. Blasphemy laws meant that promoting atheism could be a crime and was vigorously prosecuted. The literary figures were caught in something of a trap "their business was writing and their theology said there was nothing for certain to write. They instead concentrated on the argument that it was not necessary to believe in God in order to behave in moral fashion. Separate spheres and Women in the Victorian era The centrality of the family was a dominant feature for all classes. Worriers repeatedly detected threats that had to be dealt with: The licentiousness so characteristic of the upper class of the late 18th and early 19th century dissipated. The home became a refuge from the harsh world; middle-class wives sheltered their husbands from the tedium of domestic affairs. The number of children shrank, allowing much more attention to be paid to each child. Extended families were less common, as the nuclear family became both the ideal and the reality. Instead they should dominate in the realm of domestic life, focused on care of the family, the husband, the children, the household, religion, and moral behaviour. They taught in Sunday schools, visited the poor and sick, distributed tracts, engaged in fundraising, supported missionaries, led Methodist class meetings, prayed with other women, and a few were allowed to preach to mixed audiences. The poem was not pure invention, but reflected the emerging legal economic social, cultural, religious and moral values of the Victorian middle-class. Legally women had limited rights to their own bodies, the family property, or their children. The recognized identities were those of daughter, wife, mother, and widow. Meanwhile, the home sphere grew dramatically in size; women spent the money and decided on the furniture, clothing, food, schooling, and outward appearance the family would make. This made their work highly attractive to the middle-class women who bought the novels and the serialized versions that appeared in many magazines. However, a few early feminists called for aspirations beyond the home. By the end of the century, the "New Woman" was riding a

bicycle, wearing bloomers, signing petitions, supporting worldwide mission activities, and talking about the vote. The public school became a model for gentlemen and for public service. Victorian literature In prose , the novel rose from a position of relative neglect during the s to become the leading literary genre by the end of the era. With the arrival of the railway network, seaside towns became popular destinations for Victorian holiday makers Popular forms of entertainment varied by social class. Michael Balfe was the most popular British grand opera composer of the period, while the most popular musical theatre was a series of fourteen comic operas by Gilbert and Sullivan , although there was also musical burlesque and the beginning of Edwardian musical comedy in the s. Drama ranged from low comedy to Shakespeare see Henry Irving. There were, however, other forms of entertainment. Gentlemen went to dining clubs, like the Beefsteak club or the Savage club. Gambling at cards in establishments popularly called casinos was wildly popular during the period: The band stand was a simple construction that not only created an ornamental focal point, but also served acoustic requirements whilst providing shelter from the changeable British weather. It was common to hear the sound of a brass band whilst strolling through parklands. At this time musical recording was still very much a novelty. The permanent structure sustained three fires but as an institution lasted a full century, with Andrew Ducrow and William Batty managing the theatre in the middle part of the century. Fanque also stands out as a black man who achieved great success and enjoyed great admiration among the British public only a few decades after Britain had abolished slavery. Such activities were more popular at this time than in other periods of recent Western history. Amateur collectors and natural history entrepreneurs played an important role in building the large natural history collections of the nineteenth and early twentieth centuries. Large numbers travelling to quiet fishing villages such as Worthing , Morecambe and Scarborough began turning them into major tourist centres, and people like Thomas Cook saw tourism and even overseas travel as viable businesses. Britain was an active competitor in all the Olympic Games starting in Economy, industry and trade Further information: Much of the prosperity was due to the increasing industrialisation, especially in textiles and machinery, as well as to the worldwide network of trade and engineering that produced profits for British merchants, and exports from[clarification needed] across the globe. There was peace abroad apart from the short Crimean war, 1853–56 , and social peace at home. Opposition to the new order melted away, says Porter. The Chartist movement peaked as a democratic movement among the working class in 1848; its leaders moved to other pursuits, such as trade unions and cooperative societies. The working class ignored foreign agitators like Karl Marx in their midst, and joined in celebrating the new prosperity.

3: The Royal Society's lost women scientists | Science | The Guardian

In an age when science and engineering exploded due to the Industrial Revolution, men and women's roles continued to be sharply defined. Women were often left at home to oversee the domestic.

Under the impact of the excesses of the French Revolution, the Reign of Terror and the wars of Napoleon, the skepticism and rationalism of the Enlightenment had given way to a renewal of Christian faith. Many Victorians believed that the Bible was the best, indeed in many cases the only guide to a moral life. They saw the hand of God in every event, indeed Disraeli once complained after being worsted by Gladstone in a debate that the really irritating thing about his great rival was not that he always had the trump card hidden in his sleeve, but that he evidently believed that God had put it there. Attitudes to death, as I argued in a previous lecture, were fundamentally Christian in the High Victorian period. The dead did not cease to exist; they were merely going to a better place, or so it was hoped. Churches were crowded with parishioners [and although some complained that industrialization and urbanization were alienating the masses from religion, there was scant evidence for that in church attendance figures. When the first national census revealed in that no fewer than 5 million people had not attended church the previous Sunday there was much shaking of heads among the pious; but of course this did not mean they failed to attend every Sunday, nor that they had ceased to believe in God. Church and chapel attendance did not fall between and , and in absolute terms actually grew up to around , though it fell relative to the population. Nevertheless, religion was to be found everywhere. Chained bibles were to be found on railway stations; sermons were regularly printed and sometimes became best-sellers; huge and highly popular efforts were made to bring Christianity to the heathen, especially if they lived in the British Empire, and missionaries like David Livingstone became household names. Using modern methods of textual criticism, Strauss dismissed the miraculous elements in the Gospels as mythical along with the allegedly Divine nature of its subject, and demonstrated how little hard evidence there actually was for the historical Jesus. As a result, Victorians tended to take refuge in the idea that religion was the only way to explain the world of nature, expressing a belief that nowadays would be called intelligent design. Evangelical religion inspired men and women to seek to prove themselves by good works, by helping the poor, reforming the world, and spreading the Gospel to the heathen. Challenges came from a variety of sources, of which the atheism of the eighteenth-century Enlightenment was perhaps the least influential. The most public and hotly disputed challenge to the established religion of the Church of England came from rival versions of the Christian faith, and this meant in the first place Roman Catholicism. Ever since the sixteenth-century Reformation, the English and following them the Scots and Welsh had regarded Catholicism as a form of national treachery, and only gradually had opinion softened as the threat of invasion by Catholic powers like France and Spain receded. Catholics like Protestant dissenters had long been barred from public office, which was reserved for fully paid up members of the Church of England, but in and these restrictions were removed by Act of Parliament, not least in the Catholic case to defuse mounting tension in Ireland. So inflamed were parliamentary passions that the Duke of Wellington, the Prime Minister who had introduced the legislation, fought a duel against the Earl of Winchelsea, who had accused him of plotting to destroy the Protestant Constitution of the United Kingdom both men deliberately missed and honour was satisfied – the incident was a gift to the cartoonists. While the campaign for reform was strongly supported by Nonconformists and Dissenters, who were strong in the new industrial areas of the midlands and the north, it was vehemently opposed by the Church of England bishops who had seats in the House of Lords. A growing number of Anglican clerics saw these developments as threatening, especially when the government reduced the number of Irish bishops and proposed to secularise some of their revenues, following this with the commutation of church tithes, the legalization of civil marriage and marriages carried out in Dissenting chapels, and the establishment of a permanent Ecclesiastical Commission to reform diocesan administration, all in As one of them, William Palmer, complained, looking back on these events half a century later: We knew not to what quarter to look for support. A Prelacy threatened, and apparently intimidated; a Government making its powers subservient to agitators who avowedly sought the destruction of the Church. The state so long the

guardian of that Church now becoming its enemy and its tyrant. Enemies within the Church seeking the subversion of its essential characteristics and what was worst of all – no principle in the public mind to which we could appeal. The Tractarians, as they were known, regarded the Church of England as a branch of the universal Church led by the Pope. They campaigned for the greater use of ritual, vestments and Catholic observances in the church, and aroused increasingly vehement opposition: Pusey for instance was banned from preaching for two years. Eventually, and following his own logic, Newman joined the Roman Catholic Church in 1845, later becoming a Cardinal. Though neither Keble nor Pusey followed him into the Catholic Church, the movement was not to be stopped, and in 1847, following an order by the Privy Council to reinstate an evangelical Anglican vicar who had denied the real effect of the sacraments in this case, regeneration through baptism, another prominent Anglican, Henry Edward Manning, also converted, later becoming Cardinal-Archbishop of Westminster and heading the newly established Catholic hierarchy in England. They occasioned a vast outpouring of tracts, pamphlets, speeches and commentaries. They went hand in hand with wider cultural aspects of a return to Gothic medievalism, exhibited above all in the deliberate neo-medievalism of the architect Augustus Pugin, and celebrated in the secular world with the overtly Gothic style of the Palace of Westminster, 12 reconstructed after the old one burnt down in 1834. The turn to the Gothic and the Catholic was among other things an attempt to rekindle spirituality in an age widely seen as secular and lacking in faith; a reaction to a perceived crisis of the Christian religion. Yet much of what the Tractarians objected to was fervently religious too, even though the form it took was not acceptable to Anglo-Catholics. Dissenting religion had roots in the seventeenth century, but really achieved widespread popularity with the industrial revolution. The Methodist movement, for instance, founded by John Wesley in 1729, numbered 57,000 members on his death in 1791, and reached 1,000,000 by 1850. There were evangelical revivals in Wales and Scotland, and sects such as the Baptists and Unitarians won mass adherence in mining and industrial districts across Britain. Among agricultural labourers too, the turn to Nonconformity was unmistakable, as the proliferation of primitive Methodist chapels across Norfolk testified. However much they differed in points of doctrine, all these sects emphasized a simple form of religion, dependent on the Bible, shorn of ritual, and dependent above all on open-air sermons to attract support. Heaven and hell were always close to the Evangelical mind, God was always present in everyday life, and the rationalism of eighteenth-century religion was replaced by an emotionalism similar in degree though diametrically opposed in doctrine to that of the Anglo-Catholic movement. Nonconformity emphasized above all the need for a sober and orderly lifestyle; Evangelical preachers denounced drunkenness and advocated total abstinence, along with the abandonment of cruel and violent sports, gambling, riotous behaviour, and sexual indulgence. The demon drink was the instrument of the devil, driving men insane and pulling them down to the torments of Hell. A sober-living God-fearing Methodist worker could feel morally superior both to the spendthrift aristocrat and the self-indulgent bourgeois. As the Baptist leader Robert Hall 15 said: We see whole kingdoms – start from their slumber, the dignity of man rising up from depression, and tyrants trembling on their throne – Man seems to be becoming more erect and independent. He leans more on himself, less on his fellow creatures. He begins to feel a consciousness in a higher degree of personal dignity and is less enamoured of artificial distinction. Nonconformity thus had a powerful political potential that eventually found its way into the trade unions and the labour movement. As Keir Hardie, founder of the Labour Party, declared: Apocalyptic visions were present in the popular, much-reproduced paintings of John Martin, 16 and found their ultimate expression in the movement founded by the prophetess Joanna Southcott, who wrote sixty-five books of Prophecies between 1820 and 1840, sealing each for a prescribed number of years: Southcott left behind her a black box of prophecies, to be opened only in time of national crisis in the presence of 24 bishops. After failing to persuade the bishops to open it in the Crimean War and the First World War, the Southcottians eventually got a bishop to unlock it in 1917, when it was found to contain a lottery ticket, a pistol, and assorted other items but no prophecies. However, the Southcottian Panacea Society claims it was the wrong box, and still possesses another one that has yet to be opened. Yet in the longer run, the greatest threat to faith was to be posed by science. God of course had created everything at one go, in an appropriately perfect and immutable form. As Adam Sedgwick said in 1830: If the book be true, the labours of sober induction are in vain; religion is a lie; human law is a mass of folly, and

a base injustice; morality is moonshine; our labours for the black people of Africa were works of madmen; and man and woman are only better beasts! Following on the defeat of Chartism, the dangers of revolution finally seemed to be receding, and with them the need for religion as a guarantor of order. The contemplation of the works of the creation [he wrote in] necessarily leads the mind to that of the Creator himselfâ€¦[The naturalist] traces, from the bulk and strength of the massive elephant to the almost invisible structure of the minutest insect, a mutual dependency, that convinces him nothing is made in vain. He feels too, that at the head of all this system of order and beauty, pre-eminent in the dominion of his reason, stands Man. He sees himself the favoured creature of the Creatorâ€¦ Darwin in other words came to feel that his work would strengthen natural theology rather than challenge it. Prompted by the threat of being scooped by another naturalist, Alfred Russel Wallace, who had independently come to similar conclusions, Darwin finally published *The Origin of Species* in 1859. Sometimes, as with dogs or racehorses or racing pigeons, this could be done by deliberate breeding, but overwhelmingly it happened naturally. Moreover, this was a scientific work, not a popular tract, so its immediate impact was correspondingly limited. And in the biologist Thomas Huxley he inspired an enthusiasm for propagating his ideas that quickly brought them widespread publicity. The Bishop rose, and in a light scoffing tone, florid and he assured us there was nothing in the idea of evolution; rock-pigeons were what rock-pigeons had always been. Then, turning to his antagonist with a smiling insolence, he begged to know, was it through his grandfather or his grandmother that he claimed his descent from a monkey? On this Mr Huxley slowly and deliberately arose. A slight tall figure stern and pale, very quiet and very grave, he stood before us, and spoke those tremendous words - words which no one seems sure of now, nor I think, could remember just after they were spoken, for their meaning took away our breath, though it left us in no doubt as to what it was. He was not ashamed to have a monkey for his ancestor; but he would be ashamed to be connected with a man who used great gifts to obscure the truth. No one doubted his meaning and the effect was tremendous. One lady fainted and had to be carried out: I, for one, jumped out of my seat. As all this suggests, the debate made Darwin and his theories famous. Soon caricaturists were depicting him as an ape, 22 underlining the threat that his theories seemed to pose to religion, for if evolution by natural selection were true, then at what point in evolution had humans acquired a soul? Now, I am on the side of the angels. Thus whether Darwin liked it or not, the popular debate on his theory of evolution pitted evolutionism against creationism, facts against faith. And facts, and the positivist belief in the supremacy of facts, were central to the Victorian belief system. Teach these boys and girls nothing but Facts. Facts alone are wanted in life. Plant nothing else, and root out everything else. You can only form the minds of reasoning animals upon Facts: This is the principle on which I bring up my own children, and this is the principle on which I bring up these children. Stick to Facts, sir! Positivism, the doctrine developed by the French thinker Auguste Comte in the 1830s, and made available in English in his major work *A General View of Positivism*, in 1853, held that scientific observation was the only legitimate basis for action. A priori beliefs had to be jettisoned; only what could be seen, what could be verified, was true. The champions of Christian faith would have none of this. As one of them wrote mockingly: There was an ape in days that were earlier; Centuries passed and his hair became curlier; Centuries more and his thumb gave a twist, And he was man and a Positivist. Facts, the Positivists believed, were out there waiting to be discovered. The enticing prospect opened up of a time in the future when every fact would be known. And if the scientific method was applied to every discipline, then all the facts would be known about everything. When the young German scientist Max Planck asked his supervisor for advice on whether he should embark on doctoral research, for instance, he was told firmly that it was a bad idea, since everything that there was to be known in Physics had already been discovered. Such optimism reflected the fact that in the Victorian era, science was becoming professionalized. Once the domain of gentlemen of independent means, of intellectual clergymen and gifted amateurs, science moved into the universities, previously devoted mainly to preparing young men for service in medicine, the law, or the church; but progress was slow. Laboratories earlier in the century existed not in the universities but in establishments like the Royal Institution as in this illustration showing Michael Faraday at his bench. Only in 1881 did Cambridge establish a purpose-built physics laboratory, named after the Chancellor of the university, William Cavendish, Duke of Devonshire. By this time standard procedures were being developed in teaching

and research – dissection in biology, for example, standard experiments in physics and chemistry following textbooks replaced the old system whereby students had set up whatever experiments they fancied, often with disastrous results. Soon technical assistants were being appointed and standardized equipment manufactured, taking advantage of the opportunities offered by the new world of industrial production.

4: Victorian Science & Religion

scientist in the Victorian era, he explains, "would be a man who devoted much of his time to science and scientific research" (). Some scientists, including Charles Darwin and.

From alchemists to mad scientists: We are pleased to present the second of a three-part essay review of a truly classic text in the history of science in fiction – "From Faust to Strangelove by Roslynn B. Haynes" by our regular contributor Kirk Smith. Use the navigation buttons on the top right to catch up. The novelists of the early years of the Victorian Era generally treated scientists and their motives more favorably than earlier writers. Haynes attributes the improving image of scientists in part to the impressive gains in medical science during that time and the successful application of scientific knowledge to improving the quality of life at least for some people. Haynes also makes the point that the Victorian era saw the appearance of the full-time professional scientist. Of the three characters that are scientists, two are amateurs, while Roger Hamley, who was modeled on Charles Darwin, is the first instance of a professional scientist in literature. She reserves some of her more extensive analyses for the less well-known novels of famous authors. Professor Lidenbrock comes across as an intrepid and courageous adventurer, the equal of the celebrated explorers of the eighteenth and nineteenth century. In Chapter 10 Haynes devotes several pages to the eponymous scientist of H. Moreau is the essence of the evil and irresponsible scientist. In a sense, this novel perpetuated the Frankenstein prototype of the evil scientist. Some of his experiments even involve powerless humans. Wells weighs in with *The World Set Free*, in which a physicist named Holsten works out the details of nuclear fission but tries to keep it secret. Its use in the ensuing war destroys most of the civilized world, but Holsten becomes a political leader who guides the survivors into a utopian world governed by the principles of science and freedom. *The World Set Free* is set in the 1930s, and not only anticipates much of what happened in real life but also anticipates the emotional responses of the physicists who created the first real bomb and saw it used as a weapon. Wells, however, proved to be too optimistic about the political influence of physicists in the years that followed. In his views on the moral values underlying science, he poses a moving target. His earliest scientists, with the exception of Doctor Moreau, were morally complex. They combined the virtue of commitment to rational thought and the scientific method with the faults of insensitivity to the impact of their work on the people around him and a lack of attention to consequences and applications of their results. However, in his later utopian novels, Wells endowed his scientist protagonists with an almost saintly combination of brilliant intellect and moral superiority. Not only were they clever and knowledgeable scientists and sometimes talented engineers to boot; they turn out to be wise and benevolent as political leaders. During the early decades of the twentieth century, new discoveries and the new technologies resulting from them increased at an exponential pace, but the winds of public opinion about these developments constantly changed direction. The two opposite views flowed through literature side-by-side. While Haynes sheds light on this ambivalence, she sometimes fails to clarify how these two attitudes coexisted. The organization of her book suggests a more monolithic cultural perception that swung back and forth like a pendulum. Significantly, scientists were important characters in these influential novels. Over time, readers tended to split into science-fiction genre devotees and mainstream fiction readers. At the same time, scientists began to fade from the cast of characters, replaced by adventurers and space soldiers. Rarely did a sci-fi novel make its way onto the literary best-seller lists, even when it tackled significant and current social, political, and environmental issues. Doyle is of course best known for his Sherlock Holmes character; however, beginning with *The Lost World*, many of his readers followed the exploits of an arrogant biology professor named George Edward Challenger. Challenger courageously pursued scientific questions as tenaciously as Holmes stalked criminals. Thus, Doyle presents readers with a mixed message about science and scientists: Following the publication of H. Their roles invariably called for them to apply their knowledge to the development of either innovative methods of travel or new weaponry with which to combat the alien villains. Though treated as heroes, scientists figure as inventors in the weapons industry, a role that became a reality at the end of the War. The scientist as world savior was a somewhat different theme in the first part of the twentieth century. Hendron turns out to be an

expert, not only in physics but also in invention, security necessary when the rest of the world wants to get on the ships , and later political leadership when the two ships arrive on the new home planet in the sequel, *After Worlds Collide Strangelove*, had many less well-known predecessors. In her treatment of the literature of the Victorian era and beyond, Haynes makes it clear that not all scientists in fiction were evil, crazy or morally irresponsible. Some novels actually erred in the opposite direction, presenting readers with unrealistically virtuous and admirable versions.

5: Victorian Era Technology and Scientific Discoveries – SchoolWorkHelper

Chemistry is a branch of science that deals with the properties, composition, structure, and change of matter. Victorian era () marks a period of immense development in the various fields of science and technology.

Charles Babbage – , English mathematician and computer pioneer: Alexander Bain - , Scottish philosopher and educationalist: William Buckland - , English geologist: Nicholas Callan - , Irish priest and scientist: George Combe - , Scottish lawyer and writer on phrenology and education: Robert Chambers , Scottish geologist and thinker: Erasmus Darwin , English physician, philosopher, botanist, naturalist and grandfather of Charles Darwin: Charles Darwin – , English naturalist: Michael Faraday - , English chemist and physicist: George FitzGerald - , Irish physicist: Francis Galton - , English anthropologist, eugenicist and statistician and cousin of Charles Darwin: William Rowan Hamilton - , Irish physicist, astronomer, and mathematician: Thomas Henry Huxley - , English biologist: Charles Lyell - , British lawyer and geologist: James Clerk Maxwell - , Scottish physicist and mathematician: Richard Owen - , English biologist and paleontologist: William Paley , British Christian apologist and philosopher: William Ramsay - , Scottish chemist: Herbert Spencer - , English philosopher, biologist and sociologist: William Thomson, Lord Kelvin - , British physicist and engineer: John Tyndall - , British physicist: Alfred Russel Wallace - , British naturalist, anthropologist and biologist: Charles Wheatstone - , English scientist and inventor: William Whewell - , English scientist, Anglican priest and historian of science: Victorian Scientists and Inventors.

6: Breaking The Mold: Great Female Scientists Of The Victorian Era | IFLScience

*A Victorian Scientist and Engineer: Fleeming Jenkin and the Birth of Electrical Engineering [Dr Colin Hempstead, Gillian Cookson] on www.enganchecubano.com *FREE* shipping on qualifying offers.*

In lieu of an abstract, here is a brief excerpt of the content: Porter bio The Victorian Scientist: The Growth of a Profession, by Jack Meadows; pp. Here are two books about scientific careers in Victorian Britain, one focusing on a single individual, the other offering a collective portrait. The subtitles indicate a focus on professional aspects of science—in particular, career-making, which is, for Jack Morrell, "the business of Victorian science. As Meadows points out, the word "scientist" was coined only in the s, and it was not commonly used in Britain as the name of an occupational category before the s. The end of the century is also when the career in science was assuming its contemporary form, with university degrees as the gateway to a profession, and a university post as the exemplary and often preferred location for scientists. During the Victorian period, universities were not so privileged. Although Phillips spent the last decades of his life, from to , at Oxford, he earlier turned down a professorship at University College, London, where, since there was no real salary, he would have had to survive on student fees. Even at Cambridge, where George Airy become professor of astronomy, the University offered little in the way of material support, beyond the observatory. Meadows passes on the local joke that this professorship gave "to Airy nothing, a local habitation, and a name" For Phillips, the Geological Survey provided a better financial situation and more opportunity to pursue his scientific work. A series of public lectures might pay better than university teaching, and many Victorian "men of science" earned their keep wholly or partly in this way. The Royal Institution—where Humphry Davy, Michael Faraday, John Tyndall, and many others lectured to mostly fashionable audiences, sometimes including Prince Albert—was the preeminent site of the public scientific lecture, but successful lectures were also sponsored by mechanics institutes, provincial literary and philosophical societies, Sunday lecture groups, and university extension programs. Public outreach and career-making in Victorian science were allied endeavors. The Victorian Scientist is not so much an academic study as a guidebook and photo album, a collection of engaging anecdotes joined into chapters. His endnotes point intermittently to modern scholarship, but chiefly to the classic Victorian biographical form, the "Life and Letters," which, in a way, is also the genre of his book. Yet the movement of historical time is defined not mainly by a cycle of life, but by the working out of the forces of professionalization. These he defines rather loosely: Some scientists, including Charles Darwin and Francis Galton, lived from inherited money, and gentlemanly status gave a decided advantage to aspiring men of science until at least mid-century. Others, including Faraday, William Whewell, and T. Huxley, worked their way up from humble backgrounds. The occupational category "scientist" is not really consistent with this heterogeneity. Although Whewell introduced the term in part so that scientific women, or at least Mary You are not currently authenticated. View freely available titles:

7: The Victorians: Religion and Science

Poetry has been a long-standing tradition in the natural sciences, and Victorian scientists, in particular, had a wide-ranging education that fostered a powerful affinity with the Muse.

Charles Wheatstone Great Victorians This list is just my choice of prominent Victorians from all the many possibilities. The Victorian age was such a time of innovation and change, and spanning 64 years, provided a great number of people to select from. I have included those born before the Victorian era, and those who died afterwards: The list is far from complete and will be added to as time goes on, but if you have any burning nominations, then drop an email. She was educated at home and private school and formed the intention of becoming a doctor, something that was unheard of for a woman at the time. She tried unsuccessfully to obtain admission to various medical schools, but eventually resorted to private tuition. She tried to gain a qualifying diploma allowing her to practise medicine, but was refused by several examining bodies, but eventually the Society of Apothecaries allowed her to sit for her qualification, which she obtained in 1851, only the second woman in Britain qualified to practise as a doctor. She obtained further medical qualifications including becoming a member of the British Medical Association, who subsequently banned the admission of further female applicants for a number of years. She founded the London School of Medicine for Women in 1849. In 1869 she was elected mayor of Aldeburgh, the first female mayor in England. Joseph William Bazalgette Sir Joseph William Bazalgette is most renowned for his work on improving the sanitation systems of London. This was accomplished by the creation of a sewer network for London which helped to stem the spread cholera, and by the cleansing of the river Thames, which had been little more than an open sewer. Sewage had been flowing openly through the streets of the Capital, and Bazalgette designed a system involved thousands of miles of sewers which were dumped untreated into the Thames, downstream of London. Sewage treatment centres were not built until much later, but several new pumping stations were established. His system is still in use today. He was knighted in 1865. Alexander Graham Bell March 3, 1847 – August 2, 1922 Bell was a Scottish inventor, scientist and engineer who is best known for his invention of the telephone. He is also credited with inventing the metal detector as well as having other successes in the field of aeronautics and hydrofoils. He was born in Portsmouth to a French Civil Engineer and his wife. In the family moved to London and for a while Brunel was taught by his father. At the age of eight he was sent to boarding school in Hove. Unfortunately when Brunel was 15 his father was sent to debtors prison because of debts he had accumulated, however, recognising that they could lose a good engineer the government made an offer to clear his debts if he remained in Britain. Brunel completed his studies and became apprenticed to Abraham-Louis Breguet, a famous clockmaker. In 1840 Brunel returned to England to work alongside his father who was the chief engineer on a tunnel under the Thames being built at Rotherhithe. He was badly injured in an accident when the tunnel caved in killing several workers. He spent 6 months recuperating. Brunel took part in designing a bridge across the River Avon. He submitted four designs to a committee headed by Thomas Telford, but Telford rejected all the designs in favour of one of his own. This prompted public opposition, and a new competition was held, which Brunel won. Work began on the Clifton Suspension Bridge in 1831, but was suspended almost immediately because of local political unrest and riots. Brunel did not see the completion of the bridge which, at the time, was the longest in the world. Brunel also designed many bridges for the Great Western Railway, many of which are still in use. In 1825 Brunel was appointed chief engineer of the Great Western Railway. He hoped that eventually the railway would link up with his ship, the Great Western, at a port in Wales, so that passengers could be conveyed to America. He made the controversial decision to use a broad gauge for the track, even though it was different to the standard introduced by Stephenson. He showed that the broad gauge allowed for higher speeds, was more comfortable to passengers, and could carry a greater capacity of freight. The railway contained some impressive engineering, including viaducts, stations, signal boxes, and the longest tunnel in the world at that time, the Box Tunnel, nearly 2 miles long. Sometime later the railway was converted to standard gauge to maintain consistency. Brunel designed something called an Atmospheric Railway, which ran from Exeter towards Plymouth. Instead of using locomotives, trains were moved by a

patented system of vacuum traction designed by Clegg and Samuda. Trains ran at almost 70mph. The idea was abandoned fairly quickly when it became apparent that the maintenance costs were very high compared to steam locomotives. In Brunel offered his services free of charge to the newly formed Great Western Steamship Company with the proposition of building a steamship to go to New York. Many people thought it could not be done. The Great Western, when completed, was the longest ship in the world. The ship was built mainly from wood and in a race against another ship the Great Western arrived only a day after the other ship even though it had started four days late because of an accidental fire a few days before launch. His second ship, the Great Britain, was made of metal, and was propeller driven with an engine, similar to modern ships. She was launched in and made several crossings to New York before running aground off Ireland. She was salvaged and then used to take passengers to Australia. She is now open to the public in Bristol. She was the largest ship ever built until the start of the twentieth century. Perhaps the project was ahead of its years, being too large for the travelling numbers of the time. She was instead used for the laying of the transatlantic telegraph cable. In 1854, during the Crimean War, Florence Nightingale sent a request for temporary hospital, and Brunel designed a prefabricated structure that would house patients. The design took Brunel only six days, and incorporated sanitation and drainage requirements. Brunel had married Mary Horsley in 1833 and they made their home in London. He had been elected a Fellow of the Royal Society in 1831. Brunel and his wife had three children, one of whom also became a successful civil engineer. He later bought an estate near Torquay and built Brunel Manor which was to become his retirement home. Sadly he never got to see it completed, because in 1859 he had a stroke and died. His early death at the age of 53 was probably exacerbated by his heavy smoking habit.

Richard Burton Captain Sir Richard Francis Burton - was best known as an explorer, but he had many other accomplishments. After University, where he showed a proficiency in languages, he joined the army of the East India Company where, because of his grasp of languages, he was selected for undercover work, and adopted a disguise so that he could work as a spy on the Indians. He also participated in an undercover investigation of a brothel that was offering young boys to visiting soldiers. Sent home on sick leave in 1843 he wrote a travel book of the Goa region. In 1844 he obtained leave and got approval from the Royal Geographical Society for an expedition to Mecca and a Hajj pilgrimage. He went in disguise posing as a Moslem, and although almost discovered, returned safely. In 1845 he went on exploring expeditions meeting John Hanning Speke who was to accompany him on his most famous trip. This began in 1848 in Zanzibar and was intended to explore the tribes of the areas with the hope of future trade. They made it to Lake Tanganyika, which took them several months, and by which time both men were ill. They then went on to Lake Victoria which they were thought might be the source of the Nile, but having lost their surveying equipment and being in very poor health they were unable to confirm this. The two men returned to London separately, leaving behind a number of debts, and having fallen out with each other. Speke arrived first and immediately staked a claim as the discoverer of the true source of Nile. Burton, Livingstone and others were not convinced that Lake Victoria was the true source. To help settle the matter, a debate was scheduled between Burton and Speke, but on the day before Speke was found laying dead from a gunshot wound. It was speculated that it might be suicide, but the coroner ruled that it was accidental. In the latter part of his life Burton served in the Diplomatic Service, although he still found some time for exploring. He also co-founded the Anthropological Society of London as well as translating erotic books including the Kama Sutra. He wrote and translated a number of other books.

Charles Darwin 12 February 1791 – 19 April 1882 Darwin was an English naturalist most famed for his theory of natural selection, which led to the theory of Evolution. Darwin thought that eventually various missing links would be found. He spent 5 years travelling on scientific exploration and in 1859 published *On The Origin of the Species*.

John Boyd Dunlop 5 February 1800 – 23 October 1885 Another Scottish inventor, who initially pursued a career as a veterinary surgeon. The invention came at the time of the development of the motor car, but because of a problem with the patent Dunlop never became rich from the invention, and continued to earn his living as a vet.

Thomas Edison Thomas Alva Edison, 11 February 1847 – 18 October 1931, was an American inventor, scientist, and businessman who invented many things including the phonograph, the motion picture camera and with Swan, the electric light bulb. He also had many inventions in the field of telecommunications. He also originated the concept of electrical power distribution and established a power station on Manhattan

Island. He founded 14 companies including General Electric, one of the largest public traded companies in the world. His family were poor and could not afford to educate him, so he did his best to educate himself. He became apprenticed for 7 years to a bookseller and was able to read many books to further his learning. He became interested in science and electricity. At the end of his apprenticeship he attended a series of lectures given by Humphry Davy. At the end of the lectures he sent Davy pages of notes he had taken at the lectures. This so impressed Davy that, following a laboratory accident which damaged his eyesight, he took on the young man as his secretary. Subsequently, when one of the Royal Institution assistants lost his position Faraday was appointed as Chemical Assistant. Because of his social class, Faraday was not treated as an equal, and he thought about giving up chemistry, but fortunately decided to persist.

8: Year 6 : Famous Victorian Scientists PowerPoint Presentations

Victoria's Lead Scientist. Victoria's Lead Scientist works across the Victorian Government to foster linkages and identify opportunities for economic outcomes by engaging with business, the research sector, government and the broader Victorian community.

9: Scientific Discoveries in Victorian Times | Synonym

During the nineteenth century, the entities we refer to as 'science' and 'religion' both underwent dramatic changes. It would consequently be naïve to expect to be able to find one simple and unchanging relationship between the two.

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