Discovery and Invention

Sub-chapter	Section	Subject Matter	People
Part 1: The Historic Passage of Human Innovation		Intellectual innovation & the beginnings of human consciousness ● From stone axes to urban settlements ● Ancient civilisation (from the wheel to algebra) ● The preservation of knowledge by the Arab empire ● European dominance: from the Renaissance to the Industrial Revolution	
Part 2: An International Perspective		Setting the stage for industrial revolution ● The spread of industry throughout Europe & its colonies ● The effects of industrialisation on human life (textiles: from the ***'Flying Shuttle'*** to the ***'Cotton Gin'***) ● Steam-powered engines: icons of the age (from water pumps to printing machines)	**John Kay | James Hargreaves | Richard Arkwright | Samuel Compton | Edmund Cartwright | Eli Whitney | Joseph-Marie Jacquard | Thomas Savery | Thomas Newcomen | James Watt | Henry Maudsley | Friedrich Koenig**
Part 3: Transport and Navigation	*i. The birth of automotive technology*	The first horseless carriages ● Steam locomotion: from '***The Puffing Devil'*** to ***'Stephenson's Rocket'*** ● Alternatives to steam: development of the internal combustion engine ● From petrol-driven motorcycles to Diesel engines	**Samuel Morland | Christiaan Huygens | Denis Papin | Nicolas Cugnot | Richard Trevithick | George Stephenson | Robert Stephenson | George Cayley | Robert Sterling | John Ericsson | Etienne Lenoir | Nikolaus August Otto | Eugen Langen | Alphonse Beau de Roches | Gottlieb Daimler | Wilhelm Maybach | Edward Butler | Karl Benz | Rudolf Diesel | Stuart Herbert Akroyd**

Part 3: Transport and Navigation (...continued)	*ii. Maritime advances*	Appearance of the steamboat (from '***Pyroscaphe***' to the ***'Great Western'***) ● The Blue Riband & introduction of the screw propeller ● The age of iron-hulled steamers ● Development of the high-speed turbine ❁ Early amphibious vehicles & submersibles ● Experimental submarines & military connections ● The end of man-power (from '***Le Plongeur'*** to the ***'USS Holland'***)	**Denis Papin | Jonathan Hull | J.C. Périer | Claude de Jouffrey d'Abbans | James Rumsey | John Fitche | Samuel Morey | William Symington | Robert Fulton | John Stevens | Isambard Kingdom Brunel | Joseph Ressel | Francis Pettit Smith | John Erocssom | Charles Parsons | Carl Gustav de Laval** ❁ **Oliver Evans | Cornelius Drebbel | Edmond Halley | John Lethbridge | Nathanial Symons | Philip de Son | Denis Papin | David Bushnell | Robert Fulton | Wilhelm Bauer | Brutus de Villiers | Horace Hunley | Charles Burn | Simon Bourgeois | Thjorsten Nordenfeldt | Gustav Zede | Simon Lake | John P. Holland**
	iii. Efficient engines and dynamic designs	The expansion of Diesel engines (from '***Petit Pierre***' to the ***'Mercedes-Benz 260D'***) ● Motoring innovations (from the disk brake to the petrol-driven rotary engine) ● Low-flight transport (hydrofoil, hovercraft & magnetic levitation)	**Frederic Dykhoff | Robert Bosch | Frederick W. Lanchester | Henry Ford | Charles Kettering | Felix Wankel | Thoma Moy | Emmanuel Denis Farcot | Enrico Forlanini | Alexander Graham Bell | Frederick Baldwin | Hanns von Schertel | Rostislav Alekseev | Emmanuel Swedenborg | John Thornycroft | Christopher Cockerell | John Bardeen | Leon Cooper | J. Robert Schrieffer | James R. Powell | Gordon T. Danby**

Part 3: Transport and Navigation (...continued)	*iv. Conquering the skies*	Early balloon flight (from curiosity to airship) ● The development of gliders & aerofoil designs ● The emergence of aeroplanes (from '***Flyer***' to ***'Spirit of St. Louis***') ❁ Novel fixed-wing designs & the desire for rotary-winged flight ●Evolution of the modern helicopter (from '***Gyroplane 1***' to the ***'Sikorsky R-4***') ● V/STOL (from the ***'Harrier Jump-Jet'*** to '***Osprey***') ❁ The rapid expansion of manned flight ● Development of the jet engine ● The advent of rockets ● The age of jet airliners (from the ***'De Havilland Comet'*** to ***'Concorde***')	**Bartolomeu de Gusmão | Joseph Montgolfier | Jacques-Etienne Montgolfier | Jacques Charles | Henri Giffard | Charles Renard | Alberto Santo-Dumont | Ferdinand von Zeppelin | George Cayley | Otto Lilienthal | Orville Wright | Wilbur Wright | Louis Blériot | Charles Lindbergh** ❁ **Glenn Hammond Curtis | Igor Sikirsky | Hugo Junkers | Mikhail Lomonsov | Jean-Pierre Paucton | George Cayley | Enrico Forlanini | Gustav Ponton d'Amecourt | W.H. Phillips | Louis Bréguet | Jacques Bréguet | Charles Richet | Paul Cornu | Jacob Christian Ellwhammer | Boris Yuriev | Henry Villard | Louis Brennan |Emile Berliner | Etiénne Oehmichen | Leonardo da Vinci | Paul Pateras Perchara | Juan de le Cierva | Réne Dorland | Heinrich Focke | Gert Achgelis |Sidnet Camm | Ralph Hooper | Stanley Hooker** ❁ **Laurent Seguin | Frank Whittle | Pabst von Ohain | Ernst Heinkel | Konstantin Tsiolkovskii | Robert Hutchings Goddard | Wernher von Braun**
	v. Navigation	Ancient & medieval navigation ● Industrial innovations: from reflecting quadrant to gyrocompass ● The development of acoustic & radio navigation (sonar & radar) ● Satellite navigation: from '*TRANSIT*' to '*GPS*'	**John Hadley | Thomas Godfrey | John Harrison | James Cook | Nathaniel Bowditch | Thomas Sumner | Matthew Fontaine Maurey | Frederick von Bohnen-Berger | Jean Bernard Foucault | Hermann Anschutz-Kampfe | Elmer A. Sperry | Heinrich Hertz | Nikola Tesla | Lewis Nixon | Reginald A. Fessenden | Paul Langévin | Constantine Chilowsky | Albert H. Taylor | Leo C. Young | Rudolph Kühnold | Robert Watson-Watt | Richard Kirschner**

Part 4: Weapons of War	*i. The evolution of firearms*	Consequences of military technology & weapons of war ● Medieval firearms & their increasing sophistication ● From flintlock to cap lock & the development of breach-loading weapons ● Early rifles (from the *'needle-fire rifle'* to the *'Krag-Jorgensen'*) ● 19th century advances: from heavy guns to revolvers ● Continuous fire (from '*Gatling gun*' to '*Bren gun*') ● Semi-automatic pistols (from '*C93*'to '*Colt.45*') ● Sub-machine guns & semi-automatic rifles ● Post-war developments (from the '*Vulcan*' to the '*Belgian FN*') ● Metal Storm	**Roger Bacon | Berthold Schwartz | James Puckle | Alexander Forsyth | Joshua Shaw | Samuel Colt | Johann Niklaus Dreyse | Eliphalet Remington | Benjamin Tyler Henry | Oliver Winchester | Claude Étienne Minié | Henri-Gustave Delvigne | William Greener | James H. Burton | Robert Adams | William Tranter | Frederick Beaumont | Charles Lancaster | Joseph Whitworth | William Armstrong | Horace Smith | Daniel Wesson | John Moses Browning | Charles E. Barnes | William Palmer | Wilson Agar | Richard Gatling | Benjamin Hotchkiss | Thjorsten Nordenfeldt | Samuel Gardiner | Hiram Maxim | Jens Torring Schouboe | Isaac Newton Lewis | Samuel McLean | Hugo Borchardt | John Thompson | John Garand | Melvin M. Johnson | Mikhail Kalashnikov**
	ii. Lethal ingenuity	Torpedoes & tanks ● Grenades & mortars ● Flamethrowers & doodlebugs ● The development of man-portable missile systems (*'Redeye'* & *'Stinger'*)	**Robert Whitehead | Ernest Swinton | William Mills | Frederick Wilfred Stokes | Richard Fielder | Wernher von Braun**
	iii. Explosives	Gunpowder ● The search for explosive alternatives (guncotton, nitroglycerine & acetylene) ● TNT & dynamite ● The development of other 19th century explosives (from nitroguanidine to cordite) ● 20th century improvements: from '*Amatol*' to' *PYX*' ● The development of WMDs	**Henry Shrapnel | William Bickford | Henri Braconnot | Théophile Jules Pelouse | Jean-Baptist-André Dumas | Friedrich Schönbien | Rudolf Christian Böttger | Frederic Abel | Ascanio Sobrero | Friedrich Wöhler | Edmund Davy | Joseph Wilbrand | Alfred Nobel | Peter Woulfe | Hermann Spengel | Eugène Turpin | James Dewer | Robert Robertson**

Part 5: The Physical Sciences (of elements & atoms)	*i. Elementary Breakthroughs*	Science & civilisation ● The enduring credence of alchemy ● The first natural philosophers ● *'The Sceptical Chemyst'*: a rational analysis of nature ● Great scientists of the Enlightenment ● Discoveries of the industrial age: gasses & metals (from carbon dioxide to strontium) ● A compulsion to assign order to nature: from '*A New System of Chemical Philosophy'* to '*The Periodic Table of Elements'* ● Spectral analysis & discovery of the noble gasses ● Radioactive isotopes: from inadvertent discoveries to the race to synthesise new 'transuranic' elements	**Empedocles	Democritus	Plato	Aristotle	Francis Bacon	Galileo Galilei	Johannes Kepler	René Descartes	Robert Boyle	Robert Hooke	Isaac Newton	Gottfried Leibniz	John Locke	Voltaire	David Hume	Denis Diderot	Jospeh Black	Henry Cavendish	Daniel Rutherford	Karl Scheele	Joseph Priestly	Antoine Lavoisier	Martin Klaproth	William Wollaston	Per Cleve	Carl von Welsbach	Humphry Davy	John Dalton	Amedeo Avogadro	Jöns Jakob Berzelius	Johann Döbereiner	Stanislao Cannizzaro	Béguyer de Chancourtois	John Newlands	Dmitri Mendeleev	Joseph Lockyer	Pierre Janssen	William Ramsay	John Rayleigh	Morris Travers	Marie Curie	Pierre Curie	Wilhelm von Röntgen	Henri Becquerel	André Debileren	Friedrich Dorn	Kashmir Fajans	Emilio Segrè	Marguérite Perey	Charles Coryell	Edwin McMillan	Glen Seaborg	Albert Ghiorso	Georgii Flerov	Peter Armbruster	Gottfried Münzenberg	Sigurd Hofmann**
	ii. Exposing the forces of nature	Ancient perceptions & the emergence of science ● Mercurial measurements & understanding the concept of heat energy ● Investigating gasses & developing the modern atomic theory ● Thermodynamics: from Brownian motion to an absolute scale of temperature ● Undermining established beliefs	**Pythagoras	Archimedes	Erastothenes	Galileo Galilei	Robert Boyle	Isaac Newton	Evangelista Torricelli	Daniel Fahrenheit	Anders Celcius	Joseph Black	Jacques Charles	Benjamin Thompson	William Henry	John Dalton	Joseph Gay-Lussac	Amedeo Avogardo	Sai Carnot	Robert Brown	Thomas Graham	Julius von Mayer	John Waterson	Hermann von Helmholtz	James Joule	William Thomsom	William Rankine	Rudolf Clausius	James Clerk Maxwell	Ludwig Boltzmann	Albert Michelson	Edward Morley**

Part 5: The Physical Sciences (of elements & atoms) (...continued)	*iii. From matter to energy*	Investigating electromagnetic radiation ● X-rays & the discovery of radioactivity ● Discovering elementary particles & the birth of quantum theory ● Special relativity & superconductivity ● Understanding the atom ● From 'general relativity' to the 'uncertainty principle' ● Splitting the atom at a time of ideological conflict ● From the '*Manhattan Project*' to a thermonuclear arms race ● From submarines to power stations	**James Clerk Maxwell | Heinrich Hertz | Willhelm von Röntgen | Henri Becquerel | Marie Curie | Pierre Curie | Joseph J. Thompson | Ernest Rutherford | Paul-Ulrich Villard | Max Planck | Frederick Soddy | Albert Einstein | Hans Geiger | Jean Baptiste Perrin | Heike Onnes | Niels Bohr | James Chadwick | Louis Victor de Broglie | Wolfgang Pauli | Werner Heisenberg | Erwin Schrödinger | Paul Dirac | Carl David Anderson | Frederick Reines | Clyde Conan | Charles T. Wilson | John Douglas Cockcroft | Ernest Walton | Marcus L. Oliphant | Paul Hartek | Otto Hahn | Fritz Straussmann | Lise Meitner | Otto Frisch | Rudolf Peierls | Enrico Fermi | Isidor Rabi | Richard Feynman | Julius Robert Oppenheimer | Harold Urey | Hans Bethe | Leo Szilard | Edward Teller**
Part 6: The Physical Sciences (of electricity & light)	*i. Primal energy*	Our complete reliance on electricity ● Early studies of electrical energy & putting it to practical use (from lightning conductors to batteries) ● Electromagnetism (motors, dynamos & more) ● Electrochemical advances (fuel cells, galvanometers & more) ● AC/DC (transformers, generators & more) ● Measuring & boosting electrical signals	**William Gilbert | Otto von Guericke | Charles du Fay | Peter van Musschenbroek | Benjamin Franklin | Joseph Priestley | Charles Coulomb | Luigi Galvani | Alessandro Volta | William Cruikshank | Hans Christian Ørsted | André Ampère | William Sturgeon | Joseph Henry | Georg Ohm | Michael Faraday | Humphry Davy | Antoine-Hippolyte Pixie | Joseph Saxton | Moritz Hermann Jacobi | Thomas Davenport | Robert Davidson | John Frederic Daniell | William Robert Grove | Robert Bunsen | Julius von Mayer | Herman von Helmholtz | James Joule | Antoine Becquerel | Leopoldi Nobili | Wilhelm Weber | Antoine Masson | Gustav Kirchhoff | William Thomson | Jacques d'Arsonval | Marcel Deprez | Gsaton Planté | George Leclanché | Ernst Werner von Siemens | Daniel Davis | Paul-Gustan Froment | Antonio Pacinotti | Zénobe Gramme | Joseph Swan | Thomas Edison | Lucien Gaulard | John Dixon Gibbs | Galileo Ferraris | William Stanley | Charles Steinmetz | George Westinghouse | Heinrich Hertz | James Clerk Maxwell | Karl Ferdinand Braun**

Part 6: The Physical Sciences (of electricity & light) (...continued)	*ii. Electrical communications*	1830's: from the *'Five -needle Telegraph'* to '*Morse Code'* ● 1840s -70s: from chemical telegraphs to radio telegraphy ● The origins of multiplex systems & the '*Telex*' network ● The first practical telephone systems ● Improvements in telephony & the beginnings of radio communication ● 20th century breakthroughs: from the '*Fleming Valve*' to FM radio ● Transistors: The antecedent of modern computing	**Samuel Thomas Sömmerring | Francis Ronalds | Harrison Gray Dyer | Joseph Henry | Karl Gauss | Wilhelm Weber | Charles Wheatstone | William Cooke | Pavel Schilling | Samuel Morse | Alfred Vail | Alexander Bain | Frederick C. Bakewell | Antonio Meucci | Charles Bourseul | Johan Phillipp Reis | Elisha Gray | David Hughes | Giovani Caselli | Mahlon Loomis | James Clerk Maxwell | Moses G. Farmer | William Gintl | Carl Frischen | Joseph B. Stearns | Thomas Edison | Emile Baudot | Charles Krumm | Frederick Creed | Nikolai Trusevich | Alexander Graham Bell | Emile Berliner | Ernest A. Hummel | Arthur Korn | Edouard Belin | Heinrich Hertz | Edouard Branly | Nikola Tesla | Oliver Lodge | Alexander Popov | Guglielmo Marconi | Reginald Fessenden | Adolphus Slaby | Karl Ferdinand Braun | John Ambrose Fleming | Lee de Forest | Irving Langmuir | Gustav Ferrie | Edwin Armstrong | Charles Harold | David Sarnoff | Harry P. Davis | Frank Conrad | Karl Jansky | Michael Pupin | John Bardeen | Walter Brittain | William Shockley**
	Footnote	Invention of the modern microphone	**Thomas Edison | Emile Berliner | David Hughes**

Part 6: The Physical Sciences (of electricity & light) (...continued)	*iii. Optical studies and the manipulation of light*	Early optical studies & invention of the compound microscope ● Telescopic improvements in the 17th century ● 19th century advances: from spectroscopy to the *'electron theory of matter'* ● New theories of the 20th century: from '*special relativity'* to the '*Big Bang'* ● Development of the electron microscope ● Masers, lasers & fibre optics	**Alhazen | Roger Bacon | Zacharias Janssen | Marcello Malpighi | Antoni van Leeuwenhoek | Robert Hooke | Hans Lippershey | Galileo Galilei | Johannes Kepler | Christoph Scheiner | Niccolo Zucht | Willebrord Snell | Francesco Grimaldi | Isaac Newton | Giovanni Cassegrain | Olaus Römer | Christiaan Huygens | Thomas Young | James Bradley | John Dolland | William Herschell | Etienne Malus | Augustin Fresnel | William Wollaston | Joseph von Fraunhofer | Christian Doppler | Armand Fizeau | Jean Foucalt | Albert Michelson | Hermann von Helmholtz | Robert Bunsen | Gustav Kirchoff | Anders Ångström | Joseph norman Lockyer | James Clerk Maxwell | Heinrich Hertz | Edward Morley | Wilhelm Wien | Ludwig Boltzmann | Max Planck | Hendrik Lorentz | George Fitzgerald | Albert Einstein | Edwin Hubble | George Lemaître | Max Knoll | Ernst Ruska | James Hillier | Albert Prebus | Vladamir Zworykin | Manfred vonArdenne | Charles Oatley | Charles Townes | Gordon Gould | Leonard Schawlow | Theodore H. Maiman | John Logie Baird | Clarence W. Hansell | Heinrich Lamm | Narinder Kapany | Harold H. Hopkins | Abraham van Heel**

Part 6: The Physical Sciences (of electricity & light) (...continued)	*iv. The capture of light*	The camera obscura & light-sensative pictograms ● The '*Daguerrotype*' & '*Calotype*' processes ● The development of photo-art ● 19th century innovations: from flash photography to the photoelectric cell ● 20th century innovations: from 35mm cameras to holographic images ❁ The magic lantern & photographic projection ● The origins of cinematography (from '*Phenakistoscope*' to '*Zoopraxiscope*') ● Shortening exposures & turning to celluloid ● The '*Cinématographe*' - combining camera & projector ● The first movie makers ● Adding colour - from '*Kinemacolor*' to *'Glorious Technicolor'* ● Synchronising sound: from '*Kinetophone'* to *'Movietone'*	**Alhazen | Roger Bacon | Leonardo da Vinci | Giovanni Battista de la Porta | Jan Vermeer | Canaletto | Joshua Reynolds | Angelo Sala | Robert Boyle | Johann Heinrich Schulze | Humphry Davy | Thomas Wedgwood | Joseph Nicéphore Nice | Louis Daguerre | William Henry Fox Talbot | John Herschel | Hyppolite Bayard | Antoine Claudet | John Dancer | David Octavius Hill | Robert Adamson | Gustav le Gray | Nadar | Roger Fenton | John Mayall | Matthew B. Brady | Alexander Gardner | Frederick Scott Archer | James Clerk Maxwell | Thomas Sutton | Richard Leach Maddox | Joseph Swan | Harles Bennet | Frederick Eugene Ives | Ernst Mach | Harold E. Edgerton | George eastman | Leo Bakeland | Julius Elster | Hans Friedrich Geitel | Oskar Barnack | Chester Carlson | Edwin land | Dennis Gabor** ❁ **Athansius Kircher | Christiaan Huygens | John Reeves | Robert Hooke | Joseph Plateau | William George Horner | Simon Stampfer | John Hyatt | Isaiah Hyatt | Coleman Sellers | Charles Emile Reynard | Eadweard Muybridge | Ettienne-Jules Marey | Louis Augustin le Prince | William Friese-Greene | George Eastman | Hannibal Goodwin | Thomas Edison | William K.L. Dickson | Herman Casper | Charles Francis Jenkins | Thomas Armat | Woodville Latham | Auguste Luière | Louis Lumière | Bird Acres | Robert W. Paul | George Méliès | Abel Gance | James Williamson | Cecil Hepworth | Edwin Porter | David Wark Griffith | Émile Cohl | James Stuart Blackton | Winsor McCay | Edward R. Turner | Charles Urban | George Albert Smith | Herman Kalmus | Charles Pathé | August Baron | Leo Gaumont | Eugene Laust | Joseph T. Tykociner | Oscar Messter | E.E. Norton | Orlando Vellum | Lee De Forest | Edward C. Went | Stanley Watkins | George Groves | Jack T. Warner | Josef engel | Hans Vogt | Theodore W. Case | Earl I. Sponable | William Fox**

Part 6: The Physical Sciences (of electricity & light) (...continued)	*iv. The capture of light* (...continued)	The birth of television: from the '*Crookes tube*' & '*Nipkow disc*' to oscilloscopes & triodes ● Early TV pioneers & the development of all-electric systems (from '*Phonovision* to '*Kinescope*') ● The commercial explosion of television in the 1940s & 50s ● UHF television & 'quadruplex' technology ● From satellite & VCRs to videodiscs & DVDs	**Joseph May | Willoughby Smith | William Crookes | Julius Plüker | Herman Sprengel | Johan Hittorf | Eugene Goldstein | Willhelm Hallwachs | Phillip Lenard | Karl Ferdinand Braun | Paul Gottlieb Nipkow | Lee de Forest | Boris Rosing | Alan A. Campbell Swinton | Philo Taylor Farnsworth | Charles Francis Jenkins | Ernst Alexanderson | Herbert Ives | David Sarnoff | Edouard Belin | Dénis von Mihaly | Kenjiro Takayanagi |John Logie Baird | Vladimir Zworykin | Allen B. DuMont | Peter Carl Goldmark | John Walson | Milton Schopp | Ed Parsons | Lewis W. Parker | Russell Varian | Sigurd Varian | Robert Adler | Charles P. Ginsburg | Joop Sinjo | Toshi Tada Doi**
Part 7: Other Practical Inventions	*i. Industrial synthesis*	Rubber: from waterproofs to pneumatic tyres ● Construction materials: from hydraulic cement to reinforced concrete ● The development of plastics in the 19th century: from '*melamine*' to '*isoprene*' ● Industrial synthetics of the 20th century: from '*cellophane*' to '*polyester*'	**Charles Macintosh | Charles Goodyear | Robert William Thomson | Thomas Hancock | John Boyd Dunlop | André Michelin | Edouard Michelin | Benjamin F. Goodrich | John Smeaton | Joseph Aspdin | Jean-Louis Lambot | William B. Wilkinson | F. Joseph Monier | Edmond Coignet | François Liennebique | Auguste Perret | William Kelly | Henry Bessemer | Harry Brearley | Georges Audemars | Alexander Parles | Daniel Spill | John Hyatt | Isiah Hyatt | Joseph Swan | Charles Frederick Cross | Hilaire Bernigaud Chardonnet | Louis Henn Desperssis | William Augustus Tilden | Jacques Edwin Brandenberger | Leo Hendrick Baekeland | Wallace Hume Carothers | John Rex Whinfield | James Tennant Dickson**

Part 7: Other Practical Inventions (...continued)	*ii. Civil adaptations*	Innovative ideas: the sewing machine & typewriter ● Street lighting & safety matches ● Evolution of the bicycle ❁ Domestic innovation: from washing machine to microwave oven ● Evolution of the refrigerator ● Security: locks & alarms ● The development of musical discs & loudspeakers	**Thomas Saint | Barthélemy Thimonnier | Walter Hunt | Elias Howe | Isaac Singer | Henry Mill | Pellegrine Tardi | William Burt | Xavier Proni | Charles Grove Thurbur | christopher Sholes | Carlos Glidden |Samuel Soulé | William Murdock | Humphry Davy | Joseph Swan | Thomas Edison | Françoise Derosne | John wlaker | Johan Edvard Lundström | Mede de Sivar | Karl von Drakes de Sauerbrom | Nicéphore Nice | William Clarkson | Lewis Gompertz | Kirkpatrick MacMillan | Pierre Lallement | Ernest Michaux | James Starley | Henry J. Lawson | John Kemp Starley | William Sutton** ❁ **Alva Fisher | William Hoover | Percy L. Spencer | William Cullen | Oliver evans | Jacob Perkins | John Gorrie | James Harrison | Alexander Catlin Twining | Gustavus F. Swift | Thomas Elkins | Edmond Carré | Carl von Linden | Linus Yale | Augustus Pope | Edwin Holmes | John Rayleigh | Thomas Edison | Alexander Graham Bell | Emile Berliner | Vauldemar Poulsen | Horace Short | Charles A. Parsons | Chester W. Rice | Edward W. Kellog**
Part 8: Of Life Itself		Early studies of life: from ancient Greece to medieval anatomists ● Organic classification & the conflict with traditional beliefs ● 18th century life sciences: from botany to immunology ● 19th century studies: from organic chemistry to zoology	**Hippocrates | Herophilus | Dioscorides | Galew | Aristotle | Theophrastus | Diocles | Phillippus Paracelsus | AndreasmVersalius | Konrad Gesner | Gabriel Fallopius | Hieronymus Fabricius | William Harvey | Marcello Malpighi | Robert Hooke | Antoni van Leeuwenhoek | Carolus Linnaeus | Nicolaus Steno | Geoffroy Saint-Hilaire | Georges Buffon | Georges Cuvier | Jan Ingenhousz | Luigi Galvani | edward Jenner | Louis-Nicolas Vauquelin | Humphry Davy | Pierre-Joseph Pelletier | Friedrich Wöhler | Jean-Baptiste Lanarck | François Appert | René Laënec | Robert Brown | Johannes Purkinje | Matthius Schleiden | Theodore Schwann**

Part 8: Of Life Itself

(...continued)

From ether & chloroform to pasteurisation & antiseptic surgery ● The rise of bacteriology & organic chemistry ● '*On the Origin of Species*': evolution & inheritance - the birth of genetic science ● experimental medicine & understanding the human body ● Microbiology & the discovery of viruses

Medical advances in the early 20th century: from blood transfusions to antibiotics ● Epidemiology & immunology ● Synthetic organics & the creation of artificial substitutes (from insulin to vitamin B12) ● From the contraceptive pill to organ transplants ● Radiology & nuclear medicine: the introduction of CAT, MRI & PET scanners ● From pacemakers to artificial hearts

Crawford W. Long | William Morton | James Simpson | Hermann Helmholtz | Alexander Wood | Louis Pasteur | Francesco Redi |Lazzard Spallanzani | Joseph Lister | Charles Chamberland | Pierre Roux | Friedrich Kekulé | Archibold Scott Couper | Jacobus van't Hoff | Charles Darwin | Francis Galton | Thomas Huxley | Ernst Häeckel | Gregor Johann Mendel | Hugo de Vries | Carl Franz Correns | Erich Tschermak von Seysenegg | Claud Bernard | Paul Langerhans | Edward Sharpey-Schafer | Paul Pierre Broca | Carl Wernicke | Camillo Golgi | Santiago Ramón y Cajal | Walter Bradford Cannon | Rudolf Virchow | Ferdinand Cohn | Robert Koch | Ilya Mechnikov | Emil von Behring | Paul Ehrlich | Dmitry Ivanovsky | Martinus Beljermick | Frank MacFarlane Burnett | Jean MacNamara | Peter Medawar

Jean-Baptiste Denis | Karl Landsteiner | Charles Sherrington | otto Loewi | Henry Dale | Bernard Katz | Julius Axelrod | Christiaan Eijkman | Frederick G. Hopkins | Casimir Funk | Archibold Hill | Alan Hodgkin | Andrew Huxley | Paul Karrer | Carl Cori | Gerty Radnitz | Alexander Fleming | Howard Florey | René Dubos | Selman Waksman | James Sumner | John Northrop | Wendell Stanley | Jonas Salk | César Milstein | George Köhler | Frederick Sanger | Frederick G. Banting | Charles Best | Sales-Guyon de Montlivault | Hermann E. Richter | William Thomson | Svante Arrhenius | Alexandr Oparin | Harold Urey | Rudolf Shoenheimer | Stanley Miller | Melvin Calvin | Carl Sagan | Allan J. Bard | Ilya Prigogine | Robert Burns Woodward | Gregory Pincus | John Rock |

Part 8: Of Life Itself (...continued)			**Min-Chuch Chang | Joseph Murray | John Hartwell Harrison | James Hardy | Thomas Starzl | Christiaan Barnard | Wilhelm von Röntgen | Geoffrey Hounsfield | Allan Cormack | Felix Bloch | Paul C. Lanterbur | Raymond Damadian | Peter Mansfield | Martin Reivich | David Kuhl | Louis Sokoloff | Albert S. Hyman | John Hopps | Wilson Greatbatch | Willhelm Kolff | Michael Ellis DeBakey | Paul Winchell | O.H. Frazier | William DeVries | Robert Jarvik**