

DATABASE 13**DARWIN'S DAWNING**

1859

Charles Darwin (1809 - 1882) was the son of medical doctor Robert Darwin, who felt it necessary to have his children brought up in orthodox Anglican fashion even though he was not a Christian. Charles Darwin's grandfather, Erasmus, who had died 7 years before Charles was born, had published a 2 volume work, '*Zoonomia*' (1794-1796), which contained a basic outline of the evolutionary theory Charles would put into a more popular form half a century later.

Charles began studying medicine in Edinburgh but not finding this to his liking left the course after a year. He then went to Cambridge University to prepare himself for a church career. Charles Darwin received a BA from Cambridge, which consisted of 3 subjects - Classics (Greek and Latin), Mathematics, and Theology. He enjoyed theology, but did poorly in classics and mathematics. His greatest interest was in the books of Creationist Theologian William Paley, whose works on evidences for Christianity were required reading for Theology. Darwin was inspired towards nature studies by Paley's publication "*Natural Theology*" (1802) which was full of examples of design seen in nature.

In 1831 Charles Darwin joined the ship 'Beagle' for a five year trip around the world during which he visited places such as the Galapagos Islands and observed the finches he would later make famous in his Theory of Evolution. The ship was controlled by evangelical Bible believing Captain Robert Fitzroy who involved Darwin in his evangelistic schemes to Christianise the natives of Tahiti. Fitzroy's influence was so significant Darwin became a supporter of one Christian Missionary Society until his death in 1882.

During the Beagle voyage, Darwin also read Charles Lyle's "*Principles of Geology*" which convinced him the world was older than 20,000 years. Lyle's work was to eventually provide him with a framework for the long time spans needed for his theory of evolution.. Darwin took copious quantities of biological notes during the Beagle's 5 year voyage, but none of them include any comments on evolution. Darwin wrote in his autobiography that it wasn't until 1838, almost 3 years after the voyage ended, that the thought of **evolution by natural selection** came to him. By then his reading had also included Creationist author Edward Blyth's work on '*The Nature of Species*' (published 1835-1837), which suggested the idea of **natural selection**. Darwin also wrote that his evolutionary theory resulted in his rejecting Christianity one year later (by 1839) when he had concluded, "*that the Old Testament was no more to be trusted than the sacred books of the Hindus*".

1839 was also the start of 20 years work on the subject of natural selection which led to Darwin's work "*The Origin of the Species*" in 1859. The now popular term, **survival of the fittest**, was originated by Herbert Spencer, a contemporary of Darwin, and did not appear in Darwin's "*Origin of the Species*" until the 5th edition. The word **evolution** did not appear until the 6th edition in 1872.

DARWIN'S EVOLUTION

The main thrust of "*The Origin of the Species*" was Darwin's suggestion of a mechanism by which a species, when isolated in a changing environment, would diverge over many generations, to become an entirely separate species. Darwin concluded all living forms were related in a great family tree which stretched from the most simple microscopic organism to the largest and most complex creature. However, in "*Origin of the Species*" he stopped short of saying ape-like

creatures evolved into man, and he made no comment on whether life had spontaneously evolved without the assistance of a Creator God.

Darwin's work was lampooned by the press and opposed by English palaeontologists such as Sir Richard Owen, but as Darwin was financially independent, this opposition had little effect.

In 1871 Darwin published "*The Descent of Man*" and "*Selection in Relation to Sex*". These two volumes contained information on sexual selection by which Darwin thought evolution could be explained. His first statement concerning human evolution appeared in these publications that "*man is descended from a hairy tailed quadruped - an inhabitant of the old world.....the progenitors of thenew world monkeys*". (Darwin 1871 - 2:389)

There can be little doubt that Darwin's Theory of Evolution caused increasing rejection of the creation view which had been derived from the book of Genesis, which taught God had both initiated the creation of life and separately created the major kinds of creatures at different times over 6 days.

BACK TO THE FUTURE

It soon became obvious to those who took Darwin's evolutionary theory seriously, that one major implication was that God as Creator and Sustainer was not necessary to the Theory of Evolution. While many theologians and scientists who accepted Darwin tried to combine God and evolution, **most Biology textbooks written since Darwin's day have basically been without reference to God and therefore either openly stated or implied that life somehow must have evolved from molecules which possessed natural properties, which, under the right circumstances, could be 'naturally' selected to become living forms, which later evolved up the family tree to become man.** It became obvious to such people that some form of **Spontaneous Generation** had to be found for the theory to work.

FROM DAWN TO DUSK

The initial opposition to Darwin's Evolutionary Theory was from prominent scientists such as founding Director of the British Museum, palaeontologist Sir Richard Owen. Owen was the fossil expert who invented the word "Dinosaur" in 1841. He opposed Charles Darwin's evolution theory, claiming Darwin had not a single fossil to back up his ideas. Two things happened as a result. Firstly Darwin was forced to concede the fossil record didn't show evolution, because the world's greatest palaeontologist, Richard Owen, and other such as Sedgewick were claiming that rocks and fossils only proved creation. In his 1859 book "*The Origin of the Species*" Darwin said the Fossil record "*is the most obvious and serious objection which can be urged against my theory*". (Chapter 10, p234). The second result, a memorial statue showing Darwin seated on a marble throne, was not installed in the British Museum until after Owen's death in 1892. It was placed in a position of honour at the head of the main stairway in the central hall of the museum. A little less than 100 years later, Darwin was removed from this place of prominence, and placed obscurely behind the main staircase as the British Museum lost confidence in his views. By 1981 Dr Colin Patterson of the British Museum had retired Darwin's evolutionary family trees claiming: "*We have access to the tips of the tree. The tree itself is theory, and people who pretend to know about the tree and describe what went on - how the branches came off and the twigs came off - are I think telling stories*". Creationist, Sir Richard Owen's statue now stands in the main hall.

THINK IT THROUGH (13)

13-1 Much furore from Churchmen, Scientists and Educators followed the release of Darwin's book "*The Origin of the Species*". But one distinguished educator, **Matthew Arnold (1822-1888)** - graduate of Oxford, a noted poet, School Inspector, and Headmaster of the famous Rugby School - wrote in January 1871, "*I cannot understand why scientific people make such a fuss about Charles Darwin - why it's all in Lucretius*". Was he right? (Hint: see Database 3 & 4)

DATABASE 14 THE NEW SPONTANEOUS GENERATION

The influence of Pasteur's argument against Spontaneous Generation lasted until 1924 when the Russian Biochemist **A. I. Oparin** challenged the concept that those **organic compounds** which are basic to life as we know it could only be produced by living things (**biogenetically**). He **hypothesised** organic compounds existed on earth before life was present, and that these compounds joined together to become living systems. Oparin was proposing life could and did originate in the past by spontaneous generation as a result of the natural properties of molecules alone.

Oparin claimed later (1955) that even though direct observations of earth's environment showed:

1. Organic substances in living things presently originate on the earth only as a result of the **vital** (or life) activity of living organisms (plants absorb carbon from the air, and use solar energy to make the organic substances they require); and:
2. Organic carbon deposits in the earth such as peat, coal, and oil have originated from the **vital** activity of living organisms that once inhabited the earth.

Nevertheless, modern study of stars and interstellar gases has shown organic substances are being formed in conditions which absolutely preclude the possibility of any living things existing there (i.e. **abiogenetically**).

It was Oparin's thoughts which were to influence the Americans Urey and Miller, whom we read about at the start of this course.

THINK IT THROUGH (14)

14-1. Since Pasteur had so clearly proved spontaneous generation is impossible under present conditions, how did Oparin logically step around Pasteur's proof?

14-2. What does Oparin's manoeuvre show about how important it is to understand conditions under which experiments are done, before we interpret and apply any result?

14-3. If at least one condition in an experiment is not known for sure, how certain can you be about what the results mean?

14-4. In 1924, what new tools were available for Oparin to view organic chemicals in space, which were not available to Pasteur in 1860?

14-5. How would Oparin's view of Spontaneous Generation have differed from Needham's? (HINT: See Biographies 4 & 10)

14-6. Would Oparin, an atheistic communist, have been open to research evidence for life having been created by God? Explain your answer.

CHALLENGE QUESTION: OPTIONAL

14-7. Research the topic to see whether we can observe chemicals forming in space, or do we only observe chemicals which are in space? What difference might this make in evaluating Oparin's claims?

ADDITIONAL BIOGRAPHIES (14)

Alexander Ivanovich OPARIN 1894 - 1980 graduated from the University of Moscow in 1917, the year of the Russian Communist Revolution. He later became a Professor of Plant Biochemistry and helped organise the Soviet Institute of Biochemistry. He also held many important posts in the Russian scientific bureaucracy. His main contribution to science was in plant biochemistry related to food processing. Oparin was appointed a member of the Soviet Committee in Defence of Peace and to the International Council for Peace. He was twice Vice-President of the International Federation of Scientists.

He is best remembered for his speculations about the origin of life, although he did no actual experiments. His interest in astronomy and geology as well as biology, together with an aggressive atheistic communistic philosophy by which he lived and worked, led him to propose his ideas about life arising spontaneously from simple chemicals.

Harold UREY 1893 - 1981 was the son of a schoolteacher and lay preacher. He studied zoology and chemistry at university but became more interested in chemistry during the First World War when he was involved with high explosives. In the early 1930s, he studied heavy water and won a Nobel prize for devising a method of finding and separating isotopes such as heavy hydrogen.

After the Second World War, he turned his attention to geophysics and theories of planetary formation because he was concerned about the danger of nuclear war and considered this an area of science unlikely to be used for destructive purposes. He also believed life was the inevitable result of the natural processes of planet formation, and that therefore life was a common natural occurrence throughout the universe.

Stanley Lloyd MILLER 1930 - was born in Oakland, California. He studied at the University of Chicago and obtained a PhD in 1954. As a graduate student, he worked with Harold Urey and followed up Urey's speculations about reducing atmospheres and organic molecules with his famous amino acid experiment. He was appointed Professor of Biochemistry at the University of California and continues (1995) to experiment and speculate in this area of study.

THE SEARCH FOR THE ORIGIN OF LIFE - FINAL ASSIGNMENT

Name of Student _____ (PRINT)

Last Name

First Name

Date Submitted _____

Name of Teacher _____

Class _____

Rating _____

Teacher's Signature _____

SUPPLY WRITTEN ANSWERS TO THE FOLLOWING QUESTIONS, ATTACH YOUR ANSWERS TO THIS SHEET, AND HAND TO YOUR INSTRUCTOR FOR ASSESSMENT.

1. What evidence and beliefs prior to the 1700's had led people to conclude life could be spontaneously generated?
2. What did Pasteur prove about Spontaneous Generation?
3. Explain how Pasteur's experiments of 1861 helped or hindered Charles Darwin's Theory of Evolution published in 1859.
4. Prior to Pasteur's experiment in 1861, would the argument for and against Spontaneous Generation have been Creationist vs Evolutionist? Compare and contrast this with the situation after Oparin (1924) & Miller (1953).
5. Examine the biographies of researchers mentioned in "*The Search for the Origin of Life*". Are there any common factors to those who accepted life could originate by purely natural means? Explain your answer.
6. Using any resources at your disposal, write a 500 word essay on **one** of the following topics:
 - (A) The possibility of finding intelligent life in outer space when it's hard enough to find it down here is

OR

 - (B) When we create life in a test tube we will have proved ?

OR

 - (C) The evidence life has evolved spontaneously is !