

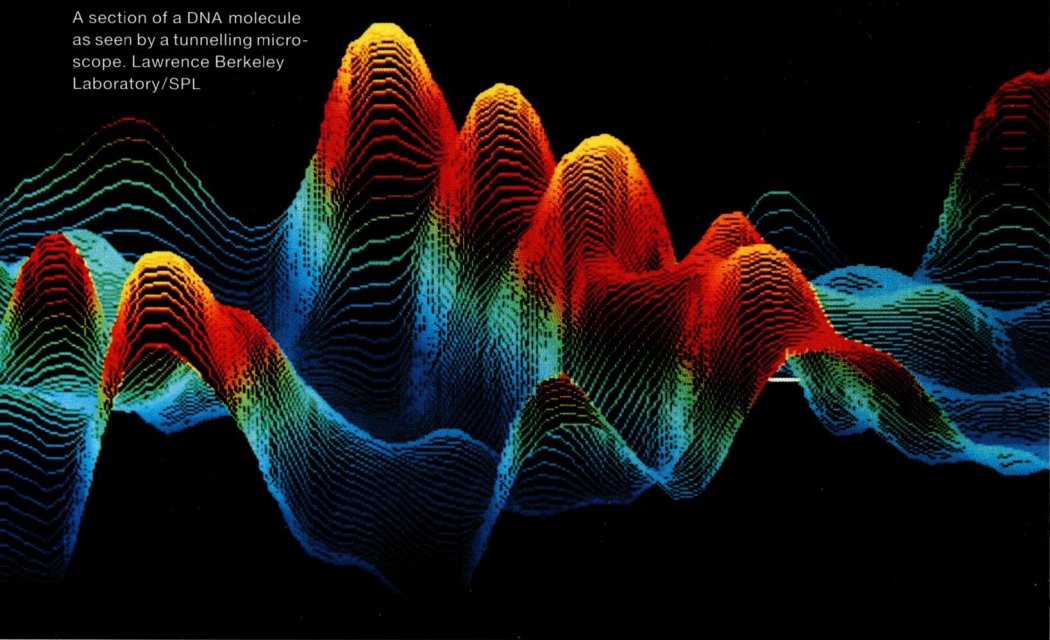
The Scientists' Tale

The eighth of 12 sets of Millennium stamps to be issued during 1999 is on the theme of scientists

Scientists' Tale stamps will go on sale at post offices and philatelic outlets on 3 August

The design of the **19p** stamp, by Mark Curtis, features DNA decoding. DNA (Deoxyribonucleic acid) is a nucleic acid containing dextyribose (sugar) consisting of complex molecules, present in chromosomes of all plant and animal cells and carrying coded instructions for passing on of hereditary characteristics. The molecular structure of DNA was first proposed by James Watson and Frances Crick in 1953; together with Maurice Wilkins they were awarded the Nobel Prize for Medicine in 1962.

A section of a DNA molecule as seen by a tunnelling microscope. Lawrence Berkeley Laboratory/SPL



Opposite: Charles Darwin by Harry Furniss. Illustrations of W G Grace by Furniss were featured on the 1973 County Cricket set. National Portrait Gallery, London

The design of the **26p** value, by Ray Harris Ching, recalls Charles Darwin's theory of evolution. Darwin began to study botany, zoology and geology at Cambridge and in 1831 signed on as a botanist aboard the survey ship *HMS Beagle* for a five-year voyage around South America and the South Pacific. By 1838 he had developed his theory of natural selection but this went unpublished for nearly 20 years. After a young naturalist, Alfred Wallace, sent him a paper on his theories, Darwin arranged a joint reading of Wallace's paper and his own notes to the Linnean Society. *On the Origin of Species* was published the following year. In essence his theories are still accepted by today's scientists.





The subject of the 19p value is DNA decoding. The 26p stamp represents Charles Darwin's theory of evolution, scientists. Michael Faraday's work on electricity is the subject of the 44p value, and the 64p reminds us of the role of British scientists in developing the telescope, from Sir Isaac Newton to the Hubble space telescope.



Cylinders and colours

19p Q1 (bright magenta) ● Q1 (greenish yellow) ● Q1 (new blue) ● Q1 (black – twice) ● Q1 (silver)

26p Q1 (greenish yellow) ● Q1 (bright magenta) ● Q1 (new blue) ● Q1 (black) ● Q1 (bronze) ● Q1 (reddish violet)

44p Q1 (greenish yellow) ● Q1 (bright magenta) ● Q1 (new blue) ● Q1 (black) ● Q1 (gold)

64p Q1 (bright magenta) ● Q1 (greenish yellow) ● Q1 (new blue) ● Q1 (black) ● Q1 (silver)

Note that the 19p and 64p were printed in litho (plates), the 26p and 44p in gravure (cylinders). A phosphor number Q1 follows the last colour number on all values. The 19p required a special printing of black, hence the two plate numbers.

Michael Faraday's work on electricity is the subject of the design, by Colin Gray, for the **44p** value. Faraday began his scientific career as Sir Humphry Davy's laboratory assistant at the Royal Institution, where he made many discoveries including benzene and the pain-killing effect of inhaling ether. Above all he was fascinated by the properties of electricity, discovering and formulating the theory of electro-magnetic induction, and producing the laws of electrolysis. He invented the first electric generator to produce continuous electrical current.

The **64p** stamp reminds us of the important work of British scientists in the development of the telescope; Sir Isaac Newton invented the reflecting telescope in 1668. The stamp shows Saturn as photographed by the Hubble space telescope – an international project involving British technology, launched in 1990. It has photographed over 10,000 images although only a small percentage have been made public. The telescope is named after the American astronomer Edwin Powell Hubble who in the 1920s discovered that there were other galaxies apart from our own and that the universe is expanding. The image on the stamp was supplied by the Space Telescope Science Institute. This 64p stamp will also be issued in miniature sheet format – see page 344.

"Science is divided into two categories, physics and stamp-collecting."
ROBERT RUTHERFORD: THE SOCIAL FUNCTION OF SCIENCE

December, 1872

A lbert Einstein thought Newton the greatest scientist who had ever lived. Sir Isaac Newton (1643-1727) was responsible for major advances in fields as diverse as mathematics, physics and optics. He formulated the laws of gravity to explain the positions of heavenly bodies, and he perfected the reflecting telescope to observe those more clearly. Newton proved that comets were part of nature, not portents of divine disapproval.

B The impact of Newton's discoveries extended beyond the scientific world. The poet Keats lauded him for exploring a sublime and lessening its mystery. Yet a thriving market developed for scientific explanation, and for popular books which non-scientists could understand. Museums of natural history, public scientific lectures and collections of enthusiastic amateurs were inaugurated.

C In 1799 the Royal Institution was founded in London to publicize how science could improve life for everybody. It presided over a golden age. Humphry Davy was a brilliant chemist and lecturer there, and in his audience one day in 1812 was a bookbinder's apprentice called Michael Faraday.

D He became Davy's assistant and was later to succeed him to the Chair of Chemistry at the Royal Institution. Faraday, one of the first of the modern scientists, discovered the principles of the electric motor and generator. Importantly, he also hit upon the notion of a 'field of force' to account for the principles, a concept that is used today to explain what holds everything together – from the particles inside an atom to the entire universe.

E Faraday inaugurated the Royal Institution Christmas lectures for young people, which are still popular today. Awareness of science is also high when the subject is controversial, as when Charles Darwin published *The Origin of Species* (1859), claimed to be second only to the Bible in terms of its impact. Darwin (1809-82) explained how evolution worked and built on observations he made as a naturalist on the survey ship *HMS Beagle* in the 1830s. The *Beagle*'s five-year journey around the Pacific aroused stormy controversy at the time.

F Insights he needed to construct a tree of life showing how complex creatures arose from simpler ones. Radically, Darwin included humans in his theory. The book embroiled Darwin in controversy, particularly with the religious establishment, but by the 1870s his views were increasingly accepted.

G The breakthrough discovery of the structure of deoxyribonucleic acid (DNA), the molecule that carries information from one cell to another, is frequently cited as the discovery of our century. At the Cavendish laboratory in Cambridge in 1952, Francis Crick and James Watson turned biology upside down with their discovery of the twin-helical structure. Their insights, combined with the work of Maurice Wilkins and Rosalind Franklin, have propelled us in less than half a century to the world of Dolly the cloned sheep and the Human Genome Project which seeks to map the millions of elements of the human gene.

H Darwin's theory and the discovery of the building blocks of life underpin modern biology. In account of the physical world of time and space has been provided by theoretical physicists including Stephen Hawking, who holds the same Chair in Mathematics at Cambridge as Newton did (and whose *A Brief History of Time* is one of the most successful books ever). Hawking's groundbreaking work is largely responsible for the theories surrounding the existence of black holes, and may one day allow us to understand the very beginnings of the universe and time itself. Work progresses on formulating a single theory to unify all the forces of nature.

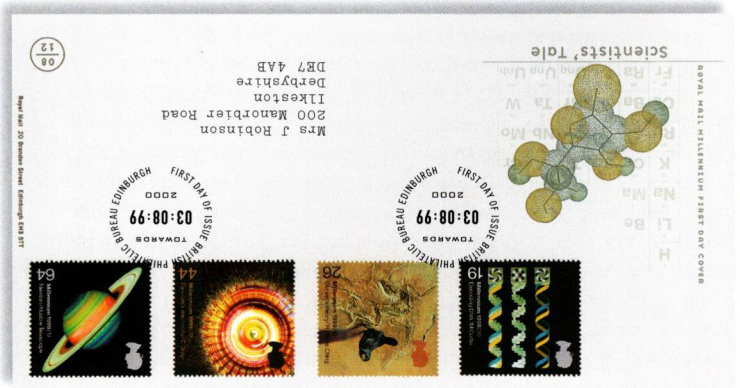
I British scientists are playing key roles in international projects such as the Hubble Space Telescope which looks deeper into space (and further back in time) with greater clarity than ever before. British expertise, particularly well-developed in instrument-building and applied science, also contributes to the International Space Station taking shape in orbit above our heads, and to the proposed robot mission to search for evidence of past life on Mars. The nose of the Mars probe, *Mars 2*.

J Understanding the great capabilities of nature has intrigued scientists for centuries. Newton showed the power of mathematics and genius in explaining the world. He realised all that was known about the orbits of the planets to a large tree of science which could predict the motions of the stars.

K In the next ten generations since Newton's time the scientific program has gained momentum and success in explaining the workings of life and the universe, from human evolution to the shape of our galaxy.

L From how plants form to the complexity of a creature's anatomy.

Presentation pack This well-illustrated pack (price £1.90) will be available from philatelic outlets and main post offices.



FIRST DAY FACILITIES Unstamped Royal Mail FDC envelopes will be available from main post offices and philatelic outlets about a week before 3 August, price 25p. Orders for FDCs with the stamps cancelled by a pictorial first day postmark of the Bureau or Cambridge (location of DNA research) must reach the Bureau by 3 August. Price £2.22 UK (including VAT) or £1.89 overseas (no VAT).

Collectors may send stamped covers on the day of issue to: British Philatelic Bureau, 20 Brandon Street, Edinburgh EH3 5JT, or Special Handstamp Centre, Royal Mail, Wexham Road, Slough SL1 1AA (Cambridge postmark), marking the outer envelope 'FD9917' (Bureau), or 'FD9918' (Cambridge). Covers can be posted or handed in at main post offices for the Cambridge postmark. A non-pictorial Cambridge postmark is also available from the Slough Handstamp Centre; request 'FD9918 NP'.

Bilingual Welsh/English versions of the Cambridge pictorial and non-pictorial handstamps can be obtained by sending covers to the Cardiff Handstamp Centre quoting reference FD9918 Bil (pictorial) and FD9918 NP Bil (non-pictorial).

Sponsored handstamps will be announced in the *British Postmark Bulletin* – available on subscription from the Bureau (£10 UK/Europe; £21.75 elsewhere). Covers may bear just the 19p Scientists' Tale stamp for any philatelic postmark in use on 3 August.

MILLENNIUM PHILATELIC PRODUCTS A pack (£1.90) and stamp cards (25p each) will be available from main post offices and philatelic outlets. A Millennium Stamps Album, with pages for the 1999 issues, also three FDC and three presentation pack pages, is available from the British Philatelic Bureau. Price: album and shipcase £19.99; sets of pages only £9.99. A presentation case has been produced to display the Millennium packs and covers.

FUTURE 1999 MILLENNIUM ISSUES: 7 September Farmers' Tale; 5 October Soldiers' Tale; 2 November Christians' Tale; and 7 December Artists' Tale. The 2000 series will begin on 18 January; details to be announced.



Enquiries British Philatelic Bureau, 20 Brandon Street, Edinburgh EH3 5JT

Technical details

Printer House of Questa

Process 19p & 64p gravure, 26p & 44p litho

Size 37 × 35mm

Sheets 100

Perforation 13.5 × 14 19p & 64p • 14 × 15.26p & 44p

Phosphor One band 19p • two bands others

Gum PVA

Central gutter Vertical 19p & 64p • Horizontal 26p & 44p

