

## Edward Jenner's Activity in Science

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Dr Edward Jenner (1749-1823) rightly celebrated as the Father of Immunology, because of his pioneering studies into the prevention of smallpox using vaccination with a cowpox vaccine. However, this monumental success has overshadowed many other achievements, not only in medicine but also in botany, biology and physics which could in themselves have made him famous.

As an expert surgeon, physician and anatomist who had studied under the great John Hunter, Jenner was always keen to understand the anatomical basis for symptoms. To this end he dissected the corpses of patients who had died from diseases which puzzled him.

Such conditions included chest pain. This led to him providing some of the first descriptions of the association between Angina Pectoris and coronary artery occlusion. As a classic example, in 1772 he described a dissection of the coronary arteries in which his scalpel struck hard, gritty material. After first blaming this on plaster which might have fallen from the ceiling, he then correctly associated it with pathological changes which he proposed as the cause of the patient's angina.

Jenner related his findings to colleagues who met with him regularly to discuss medical matters.

However, they were not widely known until reported by Caleb Hillier Parry in a book on angina published in 1799. Jenner probably did not publish his theory himself because he had realised that his friend John Hunter was displaying the early symptoms of the disease and would not have wished to cause Hunter distress. His diagnosis was to be confirmed after Hunter's death in 1793.

By similar investigation Jenner linked rheumatic heart disease with mitral stenosis observed at post mortem in 1789.

Much of Edward Jenner's success as a medical researcher stemmed from his childhood passion for observing and trying to understand his environment. He collected fossils and studied the wildlife around him. He was to uncover the first British example of a plesiosaurus fossil, near his home.

In 1783 he was inspired by the Montgolfier brothers who had flown a hot-air balloon in France the preceding year. He fabricated and launched from Berkeley Castle a hydrogen-filled balloon which travelled a distance of ten miles. Jenner was probably the first person in Britain to launch a balloon. The hydrogen with which his balloon was filled would have been generated chemically, revealing Jenner's interest in that subject. He used this knowledge to recrystallize and purify tartar emetic, thereby reducing its side effects and improving its efficacy.

Jenner's knowledge of anatomy, including that of plants, greatly impressed John Hunter. When Captain Cook and the botanist Joseph Banks returned to England after their first voyage of discovery around the Pacific Ocean in 1771 they brought with them many species of plants hitherto unknown to science. At Hunter's suggestion Edward Jenner was asked to help with the description and classification

of the specimens.

Edward Jenner's association with Banks continued for many years. In 1787 he reported to Banks the results of experiments on the nutritional value of blood as a plant fertiliser. Astutely, he noted differences between the effects of whole blood and serum. Years later (1809) Jenner was to argue with Sir Humphry Davy that earthworms were beneficial to Man. He had observed that they aided the decomposition of organic debris and improved soil condition.

He showed great interest in body temperature and its relation to hibernation in animals such as hedgehogs. This in time led to an interest in the effects of hypothermia and frostbite in Man, and a rationalization of their treatment.

In Jenner's day it was commonly believed that bird which appeared in Britain only in the summer months spent the winter in hibernation. Jenner dissected birds to compare the contents of their stomachs and the state of their reproductive organs at different times of the year. In 1787 his observations led him to propose the concept of migration, although his ideas remained unpublished until 1824, the year after his death.

Edward Jenner had, as a boy, become aware of the unusual nesting habits of the cuckoo, the only British bird which parasitises the nests of other birds rather than building a nest of its own. Through observation and experiment he contested the universally held view that the mother cuckoo ejected any eggs and fledglings already present in the nest at the time it laid its own eggs. His paper to The Royal Society was read in March 1788. In it he presented convincing evidence that it was, in fact, the fledgling

cuckoo which expelled the other contents of the nest, rather than the parent cuckoo. As a result of this paper Edward Jenner was made a Fellow of the Royal Society in 1789. However, it was not until 1921 that cine photography was used to confirm his observations indisputably.

(The Jenner Museum, Berkeley, U. K.)