# Contributions of Edward Jenner to Modern Concepts of Heart Disease

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WHEN the name of a versatile person becomes associated with an outstanding achievement, posterity often fails to give due recognition to his other gifts and accomplishments. Edward Jenner is ranked among the immortal figures in medicine because he first successfully introduced preventive inoculation as we know it today. Because his name is associated with the discovery of vaccination against smallpox we are apt to lose sight of some of his other contributions to medicine.

Had Edward Jenner never observed the vicarious relationship of cowpox to smallpox he would still have been remembered among the great clinicians of his day—the Hunters, the Pitcairns, Parry, Heberden, Rush, and others. Not only was he a distinguished physician but he also made botanical and ornithological observations, played on the violin and flute, and wrote occasional poems.[1] John Hunter, his tutor and friend, a naturalist of no mean ability, although generally remembered for lifting surgery above the plane of the barber surgeons, attempted to induce him first to become a biologist and later a teacher of medicine. On Hunter's recommendation Jenner was appointed to prepare and examine specimens which Captain Cook brought back from the South Seas, and was subsequently offered the position of naturalist to one of these expeditions.[2]

When Jenner, while a general practitioner in Berkeley in 1771, overheard a young woman remark "I cannot have that disease, I have had cowpox," he began considering the possibility of conferring an artificial immunity against smallpox and went to John Hunter for advice. Hunter more than atoned for his previous suggestions by counselling him[2]: "Don't think, try; be patient, be accurate."[3]

## RELATION OF CORONARY ARTERY DISEASE TO ANGINA PECTORIS

In 1768 Heberden described the symptom complex which he called "angina pectoris."[4] His ideas concerning the nature or cause of this syndrome were quite hazy. In May, 1777, John Hunter in a letter to Jenner briefly mentioned symptoms of a cardiovascular disease, from which he had suffered since 1773. In August he went to Bath for treatment. Here Jenner saw him and concluded that Hunter was suffering from angina pectoris. So greatly concerned was he that he wrote to Heberden in 1778 about

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their common friend's condition. In this letter he mentioned two dissections on subjects who had died of angina pectoris in which the chief morbid findings were thickening of the coronary arteries. Heberden had failed to note this, only finding sclerotic plaques in the aorta. Jenner discussed the difficulties of dissecting these vessels due to their often being embedded in fatty tissues. He states:

> The importance of the coronary arteries and how much the heart must suffer from their not being able to perform their functions (we cannot be surprised at the painful spasms) is a subject which I need not enlarge upon, therefore shall only remark that it is possible that all of the symptoms may arise from this one circumstance. Should it be admitted that this is the cause of the disease I fear the medical world may seek in vain for a remedy.[1]

John Fothergill, in 1776,[5] had described coronary sclerosis in a patient who had died of angina pectoris in 1775. He did not definitely associate the condition of the coronary arteries which "from their origin to many of their ramifications were become as one piece of bone" with the clinical manifestations. Caleb Hillier Parry, who in 1799 wrote a very clear account of the relationship of angina pectoris to coronary disease, conceded the priority of this conception to Edward Jenner.[6] In the introduction Parry includes a letter from Jenner, illustrative of a subtle sense of humor as well as confidence in his views concerning the underlying cause of angina pectoris. It reads in part:

> The first case I ever saw of Angina Pectoris, was that in the year 1772, published by Dr. William Heberden, with Mr. Hunter's dissection. There, I can almost positively say, the coronary arteries of the heart were not examined. Another case of a Mr. Carter, at Dursley, fell under my care. In that, after having examined the most remote parts of the heart, without finding any means for which I could account for his sudden death, or the symptoms preceding it, I was making a transverse section of the heart pretty near its base when my knife struck against something hard and gritty, as to notch it. I well remember looking up at the ceiling, which was old and crumbling, conceiving that some plaster had fallen down. But on a further scrutiny the real cause appeared: The coronary arteries were become bony canals. Then I began a little to suspect. Soon afterward Mr. Paytherus met with a case. Previously to our examination of the body, I offered him a wager that we would find the coronary arteries ossified. This however proved not to be exactly true; but the coats of the arteries were hard, and a sort of cartilagenous canal was formed within the cavity of each artery, and there attached, so however to be separable as easily as the finger from a tight glove. We then concluded that malorganization was the cause of the disease. . . . The appearance in Mr. Bellamy's case gave me the idea that the disease arose from a determination of the vasa vasorum, and that the concretions were deposits from the coagulable lymph or other fluids, which had oozed on the internal surface of the artery.

The last two cases strongly suggest previous acute thrombotic coronary occlusion, in the first of which there was evidently a re-canalization of the artery.

Due to the fear of the effect it might have on his friend Hunter, Jenner did not further pursue his studies or publish these observations. They were subsequently confirmed by a postmortem examination on Hunter who died suddenly while arguing with colleagues at a hospital board meeting in 1793, some 15 years later. A necropsy was performed by Sir Everard Home, who wrote Jenner:

> I am assured that you were sincerely afflicted at the death of your old and most valuable friend; whose death, although we all looked for it was more sudden than could have been imagined. It is singular that the circumstance you mentioned to me and you were always afraid to touch upon with Mr. Hunter should have been a particular part of his complaint, as the coronary arteries of the heart were considerably ossified.[7]

Among the other findings of interest in this necropsy were two white plaques, on the under surface of the

left auricle and ventricle, entirely distinct in color from the rest of the heart. These could well have been the results of former myocardial infarctions, possibly occurring at the outset of symptoms a score of years previously. The mitral valves and the aortic valves were extremely thickened, and in places ossified—probably the result of sclerotic processes, although suggestive of an old rheumatic infection. The aorta was dilated, giving the appearance of an incipient aneurysm. The internal membrane of the aorta was studded with opaque white spots raised higher than the general surface.[8] These findings are consistent with those of syphilitic aortitis, and are consonant with the view that Hunter had syphilis, said to have been acquired during one of the operations on aneurysms, for which he was noted, or during some of the self-inoculation experiments with material from persons infected with venereal diseases. The changes in the coronary arteries were apparently of sclerotic origin, since these vessels were "hard as bony tubes." Changes in the coronary arteries due to syphilis do not usually extend more than one to two centimeters from the orifices.

Jenner's views form the basis for the present-day concept of angina pectoris. The current teaching is that this condition is due to a relative myocardial ischemia occurring as a result of acute coronary arterial insufficiency. The mechanism of these attacks is still imperfectly understood. Nervous influences play an important rôle. In at least 75 per cent of cases, significant changes are found in the coronary arteries. Coronary arteriosclerosis is by far the most common lesion, although atresia of the orifices of these vessels as a result of extension of syphilitic aortitis, rheumatic coronary arteritis, emboli from various causes, and other less frequent factors are sometimes responsible. Angina pectoris has been known to occur as a result of anemia, and cease when the anemia has been overcome. The opinion Jenner expressed concerning the progressive nature of the underlying changes was prognostically prophetic, for medical science still waits methods for preventing coronary artery disease or satisfactorily postponing its more serious consequences.

### RHEUMATIC HEART DISEASE

About 1778, Jenner was instrumental in forming a society which had for its objective improvement in medical science. It was also intended to promote conviviality and good fellowship. This small medical society usually met in the Fleece Inn at Rodborough. Jenner was a member until about 1790. It was during these meetings that he presented a paper on angina pectoris, which later formed the basis of his friend Parry's book on that subject.[1]

Edward Jenner was among the first to note the relationship between rheumatic fever and heart disease. According to the records of this society, on July 29, 1789:

"Mr. Edward Jenner favored the Society with remarks on a disease of the heart following Acute Rheumatism illustrated by Dissections." This paper, together with the one on angina pectoris and others, fell into the hands of some of its members and he could never recover them. Baron, one of his earliest biographers, states:

> I have heard him lament the loss of one of them in particular. It contained observations concerning the diseases of the heart, which frequently come on during attacks of acute rheumatism, and lead to enlargement and disorganization of the part. This formidable disorder had very much escaped the notice of medical men. Jenner's observations were original and had they been published at the time they were first communicated to the Society, his claim to priority could not have been set aside as it has been since that time by other writers.

On January 10, 1805, evidently wishing to establish claim to the originality of this observation, he wrote to Dr. Caleb Hillier Parry:

> A neighbor of mine died yesterday, from a disease of the heart which followed two or three attacks of acute rheumatism. You may probably remember a paper of mine that was given at the Fleece Medical Society on this subject. This and my other papers are in your possession. If you could be good enough to convey them to me I should be extremely happy in regaining them particularly that I now allude to, as I am confident that many a life is lost by not shielding the heart at the going off of acute rheumatism. . . .

As there is no record of the return of this manuscript it seems evident that it was lost.

The claim for Jenner's priority in noting the relationship between rheumatic fever and heart disease is not as clear as that of the coronary basis of angina pectoris. According to Hope,[10] David Pitcairn in 1788 taught that persons subject to rheumatism were attacked more frequently than others with an organic disease of the heart which he called rheumatism of the heart. Mathew Baillie [11] in a footnote in his second edition of *Morbid Anatomy of Some of the Most Important Parts of the Human Body,* published in 1797, gives Pitcairn credit for discovering the relationship between acute rheumatism and heart disease. In a later edition he states [12]:

> Dr. Pitcairn observed this in several cases and should be considered as the first person who made this important observation. Its accuracy has since been confirmed by different individuals of high professional character, so that it may now be regarded as an established pathological fact.

These editions were dedicated to Pitcairn. In the first edition, published in 1793 and dedicated to Sir George Baker, no mention is made of this relationship.

Pitcairn, who incidentally was the son of Major John Pitcairn, who was killed leading the British forces at the Battle of Bunker Hill, never published these observations. In at least one obituary notice he was given credit for being the first to associate acute rheumatism with heart disease. One states that he was the first to note the connection between rheumatism of the external parts and certain affections of the heart which he communicated to Dr. Baillie who wrote concerning it.[13] Pitcairn was by nature a very shy person and once stated that the reason he never wrote was because he did not wish " to contradict seven years hence " his present opinion. One obituary writer commented concerning him " Such rigid abstinence from anything like authorship is not to be defended, particularly among the higher orders of physicians, because it may be extended to the rejection of every project for the improvement of their art." [14]

Although Baillie mentions acute rheumatism as a cause of morbid changes in the heart, it remained for Dundas, in about 1806, first to describe clinical cases of acute rheumatism with cardiac manifestations, proved later by postmortem examinations. These observations were published in 1812.[15] He stated that as early as 1770 he had noted this relationship. Of the 9 cases he reported, 7 were dead and the 2 surviving cases offered poor prognoses. All of his patients were young individuals, only 2 over 22 years. In all the cases he had seen the disease followed one or more attacks of rheumatic fever. In 1 case the affection of the heart had appeared at the commencement of the acute rheumatism. Usually it attended a migrating polyarthritis and ran a course of a few months, ending in dropsy. In his description of the morbid anatomy, pericarditis and cardiac enlargement seemed to be the most prominent features, although in 1 case involvement of the mitral valve was inferred.

Irrespective of whether Edward Jenner was the first to note the relationship between acute rheumatism and heart disease, there is little doubt that he was among the first to conceive it. Jenner's and Pitcairn's observations were made independently. Jenner was at that time residing in Berkeley.[16] Pitcairn lived in London. There is no evidence that they were then acquainted. Pitcairn was John Hunter's physician, and later they belonged to the same medical society in London. Although the manuscript was lost, there seems little question that Jenner was the first to write upon this subject. Since he supported his observations with necropsy specimens, which probably took some time to collect, it is not unreasonable to believe that he was the first to offer objective proof of the nature of rheumatic heart disease.

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# Survey of Belgian Health Services

IN coöperation with the Belgian Ministry of Health, the Health Committee of the League of Nations will make a survey of health conditions of the population and of the equipment, organization, methods and efficiency of the health services in Belgium.

Professor Parisot, of Paris, is chairman of the committee appointed to make the study early this summer.