

*The Harveian Festival 1939.*

IF HEALTH BE WANTING.\*

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It is no easy task to follow so many whose names will be forever held in reverence within these walls, in our University and city, and far beyond; nor is the choice of the subject-matter a simple one. But with the passing of years audiences must needs change, and this fact alone has given me the courage to return to the central figure of our Festival for my theme, since only by so doing can the memory of our famous brother be kept fresh in the minds of all. During the past year I have spent many hours in the shadowy but inspiring company of William Harvey, and, in following him, I have tried to sense the atmosphere of those days, and to picture to myself, as far as the meagre details which we have of his life admit, his character, his opportunities, his difficulties, and his triumph.

May I be permitted to give very briefly the historical background which is necessary for an understanding of Harvey's position when the moment in his life arrived for him to disclose to the world the great secret of nature which he had discovered.

It is to the Greeks of the fifth and fourth centuries, B.C., that we owe the foundations on which our noble profession has been built. Their love of truth and beauty, their love of nature, and the desire to know for knowing's sake formed the nucleus out of which sprang the beginnings of scientific medicine. We look back to Hippocrates as the Father of our family, who showed us what should be our ideals of conduct, and taught us how to observe and how to practise. Many of his lessons were for a time forgotten, only to be relearnt centuries later. The Hippocratic Collection is full of interest and instruction even now, though the growth of medical science has far outstripped them in practice and usefulness, as Hippocrates himself would have wished. What could be better expressed to-day than such of his Aphorisms as "The aged endure fasting most easily; next, adults; next, young persons,

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and least of all children, and especially such as are the most lively"; or, "Sleep that puts an end to delirium is a good symptom." What better picture of Cheyne-Stokes respiration could we give to-day than that "the respiration throughout was like that of a person recollecting himself, and was large and rare"? Here is close observation. Here is simple yet graphic description, indeed!

Aristotle, though essentially a biologist, exerted a great influence on scientific thought. His works were the accepted standards till Harvey's day, and were adopted as the official view of the Catholic Church in the thirteenth century. "His assertion of a scientific fact was considered to be the best proof of its truth." The respect in which Aristotle was held in matters of natural history and physics was even exceeded by that which was paid to Galen. A successful physician in Rome during the reign of Marcus Aurelius, he was the most prolific of all Greek writers on medical subjects. Since the dissection of the human body was contrary to the religious precepts of his time, he was dependent on animals for his own anatomical observations, but no doubt gained much knowledge from the earlier anatomists of the Alexandrian School, Herophilus and Erasistratus. He was a keen physiologist and experimentalist, and had a clearer idea of the movement of the blood than any of his predecessors. He said of himself, "Throughout my life I never confided in what others said, unless I was satisfied of the same by my own experience so far as it was in my power." His opinion was considered almost divine.

A century or so after Galen's death interest in natural science began to decline. The spread of Christianity resulted in a religious fervour which disparaged secular learning, and, indeed, was even hostile. Knowledge of the Greek tongue became rare, and the sciences initiated by the Greeks became almost extinct. Medical works were mostly imperfect or incomplete transcriptions into Latin or Arabic, and the original texts of much of Greek medical literature were lost for at least the time being.

During the Dark Ages, when the voice of the seeker after the truths of nature was silenced, the Christian peoples were eagerly awaiting the coming again of the Messiah. The saint spent his time in his cell, while the sinner was left with but poor guidance for the care of his body. St Augustine, the greatest intellectual of the Christian Fathers, expressed the

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view that "the natural sciences in no way furthered their learners in respect of a blessed life, and, above all, took up much time that could be spent in holy exercises."

Into this repressive atmosphere of medieval Christianity the recovered classics of Greece and Rome brought new life and energy. With the rediscovery of the literature of Greece, men learnt again the lessons which her philosophers had left as their legacy to mankind. The essential truths of life again became the aim of the seeker after knowledge; art and culture were reborn. As the renewed study of the works of these men of the past grew, so reliance on translations and deference to the authority of the Church weakened. Once again, following the example set more than one thousand years before, men observed at first hand, and independently drew their own conclusions. Thinkers and observers such as Roger Bacon and Leonardo da Vinci began to study nature face to face. The spirit of free inquiry was aroused, but the useful application of the results of their work was delayed by their views being in opposition to the tenets of the Church.

Copernicus long delayed the publication of his heliocentric theories, so contrary were they to the accepted idea that the earth and its inhabitants were the centre of the whole universe. It is said that the first printed copy of his book was given to him only a few hours before his death in May, 1543.

Bolder spirits openly flouted this authority, were found guilty of heresy, and suffered persecution, while, in 1553, Michael Servetus was actually burnt at the stake for his theological opinions. In his *Christianismi Restitutio*, where he expressed the views which Calvin held to be heretical, he also gave to the world the first important discovery relating to the functions of the heart, namely, the passage of the blood from the right to the left side of the heart through the lungs.

Andreas Vesalius and Michael Servetus were fellow-students in Paris under Sylvius and Winter of Andernach. Vesalius became Professor of Anatomy in Padua, and was the founder of modern anatomy. A. E. Shipley says of his work that "he broke loose from the bond of the written word which had strangled research for a thousand years and looked at the structure of the human body for himself; he taught what he could see and what he could show to his pupils. Under him, anatomy was the first of the natural sciences to break loose from the scholastic domination which had hitherto ever placed authority above experiment." He differed from Galen in

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many points, among the most important being that he declared the inter-ventricular septum to be impervious.

On the Continent, and especially in Italy, the struggle between the old and the new was well begun, but in England events moved slowly. It was not until a hundred years later, when the Royal Society was founded a few years after Harvey's death, that Dryden, taking Aristotle as his mark, summed up the situation in his Epistle to Dr Charlton :

“ The longest tyranny that ever sway'd  
Was that wherein our ancestors betray'd  
Their free-born reason to the Stagirite,  
And made his torch their universal light.  
So truth, while only one supplied the state,  
Grew scarce, and dear, and yet sophisticate.

“ Columbus was the first that shook his throne,  
And found a temperate in a torrid zone :

“ Had we still paid that homage to a name,  
Which only God and nature justly claim ;  
The western seas had been our utmost bound,  
Where poets still might dream the sun was drown'd :  
And all the stars that shine in southern skies,  
Had been admir'd by none but savage eyes.

“ The circling streams, once thought but pools, of blood  
(Whether life's fuel, or the body's food)  
From dark oblivion Harvey's name shall save ;  
While Ent keeps all the honour that he gave.”

As a foundation for his life's work, Harvey received a very excellent education. His school days were spent in the King's School, under the very walls of the beautiful cathedral in Canterbury, in the garden of England. It is believed to be the oldest school in England and was founded by St Augustine in the time of Ethelbert. It was refounded by Henry VIII. This was the school Linacre attended, and Harvey had Christopher Marlowe for a school companion.

The choice of University and College was also most fortunate. Harvey studied for his B.A. degree in the Gonville and Caius College, Cambridge. Dr Caius (or Keys), who refounded this college, was a man of great ability. He studied medicine in Padua under Vesalius, and after obtaining his degree there was appointed a professor, “ a rare distinction for a foreigner, unique for an Englishman.” He lectured in

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Padua on the Philosophy and Logic of Aristotle in the original language. He introduced practical anatomy to England, and through his influence permission to dissect the human body in this college was granted by Queen Elizabeth. He died in 1573, twenty years before Harvey became a student there, but it is unlikely that so powerful an influence could have been lost in those few years. Whether or not Harvey studied anatomy there is unknown. It is quite possible that interest in the subject was at least aroused and gave birth to the idea that he too would go to Padua. Professor Wolfe, in his *History of Science, Technology and Philosophy in the Sixteenth and Seventeenth Centuries*, states that "in those days the study of medicine all over Europe was something like the study of law in England at the present day—something to which sons might be put when their parents were not yet clear as to what they ought to do with them."

Be that as it may—whether the next step was Harvey's deliberate choice, or merely in accordance with custom—it is indeed fortunate that Harvey came under the instruction of Hieronymus Fabricius, known as Fabricius of Acquapendente. Undoubtedly this association with Fabricius had an incalculable influence on Harvey's interest in the Heart and in Development. Fabricius laid the foundation of modern embryology. He had a wonderful talent for observation. He was an anatomist, a biologist and a keen follower of Aristotle, but, "enthusiastic and effective as an investigator of fact, he was timid and ineffective in drawing conclusions." It was a matter of no small importance to Harvey that Fabricius discovered the valves in the veins, but did not correctly interpret their function.

Harvey studied under Fabricius for four years, and graduated with flying colours in 1602. He took a prominent place among his fellow-students, and was a member of the Students' Council. The diploma which he brought back to England was one of which anyone might have been proud. It stated that he had "conducted himself so wonderfully well in the examinations, and had shown such skill and memory and learning that he had surpassed even the great hopes which his examiners had formed of him. They decided therefore that he was skilful, expert, and most efficiently qualified both in Arts and Medicine, and to this they put their hands, unanimously, willingly, and with complete agreement, and unhesitatingly." The value of the years spent in Padua was revealed by Harvey himself many years later. Robert Boyle

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had an interview with him when an old man, and I cannot do better than quote Boyle's own account of this meeting. He writes: "And I remember that, when I asked our famous Harvey, in the only discourse which I had with him (which was but awhile before he died), what were the things that induced him to think of a circulation of the blood? He answered me, that when he took notice, that the valves in the veins of so many parts of the body were so placed, that they gave free passage to the blood towards the heart, but opposed the passage of the venal blood the contrary way; he was invited to imagine, that so provident a cause as nature had not so placed so many valves without design; and no design seemed more probable, than that since the blood could not well, because of the interposing valves, be sent by the veins to the limbs, it should be sent through the arteries, and return through the veins, whose valves did not oppose its course that way." What a delightful phrase, "he was invited to imagine that so provident a cause as nature"!

Harvey returned to London in 1602, and was admitted a candidate of the College of Physicians on 5th October 1604. He married Elizabeth, the daughter of Dr Lancelot Browne, in November. To my mind, the importance of this event is its proving that as soon as, or shortly after, he returned to London Harvey was mixing with influential people in the medical profession. Dr Lancelot Browne was physician to King James I, as was also William Gilbert of Colchester, a friend of Dr Browne. Harvey probably met Gilbert before the latter's death in 1603, and his attention would surely be drawn to Gilbert's great work on magnetism. Gilbert's preface to his book, *De Magnete*, is most stimulating from Harvey's point of view. He says: "In the discovery of secret things and the investigation of hidden causes, stronger reasons are obtained from sure experiments and demonstrated arguments than from probable conjectures and the opinions of philosophical speculators of the common sort." Advice such as this from Gilbert makes it almost unnecessary to assume that Francis Bacon played any essential part in moulding Harvey's methods. It is said that the love of discussing on learned and philosophical topics was one of the characteristics of serious society in the Elizabethan age. It is also true that in those times, in Europe and in England, arose some of the greatest intellects our race has known. Harvey, therefore, had ample opportunity to widen his knowledge and obtain intellectual help in his work.

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Harvey soon had an established position in London. He succeeded Dr Wilkinson as physician at St Bartholomew's Hospital in 1609, and he received the still more important appointment of Lumleian Lecturer in Anatomy in 1615. Though we know no great details of Harvey's life during these years in London, he must unquestionably have been studying biology and dissecting the human body in any spare time he had from his general practice and his work as a hospital physician. For it was in 1616 that he delivered his set of lectures, the notes of which proved that he had arrived at an explanation of the functions of the heart. For years he continued to work on this subject before he felt he was in a position to publish to the world his fascinating book, *De Motu Cordis*.

It is interesting to note that, from the date of this indication of his discovery of the circulation of the blood, twelve years passed before his book was published by William Fitzer at Frankfurt-on-the-Main. Harvey knew he was publishing work which would create a revolution in the scientific world. He was aware of the manner in which other works of a similar revolutionary character had been received. Though he was in no danger of being burnt at the stake because he dared to oppose Galen, his desire was firmly but gently to reveal this secret of nature in a way which could not be controverted. With masterly logic, he therefore exposed the errors of his predecessors, and with able hypothesis and experiment he built up the work which will forever be a monument to his name and a perfect example to posterity of the new scientific methods of induction.

It is not for me to say more with regard to this great work to-night than to advise those who may not have read it, to do so. No mere commentary can possibly give any true idea of the marvellous ability and imaginative insight it shows on every page. The subject matter is, to us to-day, so much a matter of common knowledge, that many may lay the book aside as a rather dull relic of the past. But dull Harvey certainly is not—his language is so well chosen, his power of illustration so apt, the persistence of his argument so forceful that no novel can supersede this book in its interest.

One wonders, too, how any could gainsay it; for, although the truth of Harvey's discovery was at once accepted in this country except by a few less able men, many eminent anatomists in Europe failed to be convinced. Harvey, so sure was he of his ground, did not deign to enter into argument with any of these until he replied to the criticisms of Riolanus, a celebrated

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anatomist in Paris, in 1649, twenty-one years after the appearance of his book. This arose at first out of the one gap in the circulation which Harvey had not been in a position to explain—the means by which the blood passed from artery to vein. Capillary anastomosis could not be recognised, as Harvey had not the means of doing so. In his first paper to Riolanus, he says: “I have myself pursued this subject of the anastomosis with all the diligence I could command, and have given not a little both of time and labour to the inquiry; but I have never succeeded in tracing any connection between arteries and veins by a direct anastomosis of their orifices.” In his second paper, Harvey is again found arguing with his opponent, and defending his discovery: “Some abuse it as a feeble infant, and yet unworthy to have seen the light; others, again, think the bantling deserves to be cherished and cared for.” He continues, however: “To return evil speaking with evil speaking, I hold to be unworthy in a philosopher and searcher after truth.” Eventually victory was almost complete, and Thomas Hobbes, an old friend of Harvey, says, “he is the only man, perhaps, that ever lived to see his own doctrine established in his lifetime.”

I must not touch on Harvey's other works except to say that his book on parturition was the first book on midwifery to be written by an Englishman and printed in his own language. Aveling is of the opinion that the influence which this book had upon the practice of the time would with difficulty now be estimated.

The position of Harvey as a physician must have been high, although much is made of the remark by Aubrey that: “All his profession would allowe him to be an excellent anatomist, but I never heard of any that admired his therapeutique way. I knew severall practisers in London that would not have given 3d for one of his bills; and that a man could hardly tell by one of his bills what he did aime at.” Two amusing stories are told of him in this connection by Gideon Harvey. One concerns “An instance whereof (of studying anatomy to the neglect of therapeutics) I will give you in one, that was the greatest anatomist of his time, and no extraordinary physician, namely, Dr William Harvey, whose erroneous judgment was very remarkable in the prescription of a purge for Esquire Rainton of Enfield, where the apothecary refraining to prepare more than half the proportion, notwithstanding gave him 4 score stools which otherwise, according to the Doctor's

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measures, must unavoidably have scowered him from the close stool into the other world."

The second, a case "of a Taylor in Fleet Street. . . . His complaint to the Doctor was a Sciatica that render'd him lame and cripple besides frequent returns of very sharp pains. The Doctor would not engage in the cure of so great and hazardous a disease without a considerate and distinct answer to three points: (1) Whether he could sequester himself from his trade for three months, (2) Whether he valued the expense of fifty pounds beyond the recovery of his health, and, (3) Whether he could contemporate his passion, in enduring the part to be laid open to the bone by cutting or burning. The patient very readily consented to the two former conditions, time and money; but, to the third being entirely averse, took his leave with the ceremony due to so famed a physician, and applyed himself to another of a much lower form, who with little preamble advised him to the bath, where he received a perfect cure in six weeks."

One could say much about Harvey's Continental journeys, his experiences during the Civil War, his associations with Charles I, and other aspects of his life: but it was not my intention to give any complete biography of Harvey, but rather to dwell on his early education, his training as a scientist, and the fruits of these. These are the important features in Harvey's life which serve as a useful illustration of what a man's life can be. Great as is the importance of heredity, environment has much to do with achievement, and Harvey made full use of his opportunities.

To-day, truths are still being sought out on the same lines as those which Harvey gave us. It would be a mistake to think that we have, even yet, reached a point that approaches finality in medicine, in surgery, or, indeed, in any of the sciences. As comparatively short a time ago as 1874, Sir John Erichson stated as his opinion that "the abdomen, the chest, and the brain would be for ever shut from the intrusion of the wise and humane surgeon," but no one would venture an opinion to-day as to where a boundary line is to be drawn. As long as disease exists it is our duty, and the duty of those working in allied sciences, to find a means of prevention, or a better remedy. Our patients claim the right to health and we cannot, we dare not, break faith with them.

In these days, however, other important questions are associated with the searching out of the secrets of nature.

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Harvey, like Macaulay, only thought of science as a benefactor. In his *Essay on Bacon*, Macaulay writes: "Ask a follower of Bacon what the new philosophy has effected for mankind, and his answer is ready: 'it has lengthened life, it has mitigated pain, it has extinguished diseases, it has increased the fertility of the soil, it has given new securities to the mariner.'" Pierre Curie, however, doubted whether even such a beneficent secret of knowledge as radium was wholly for the good. He said, in the name of himself and his wife, when delivering his Nobel lecture at Stockholm in 1905: "Radium had enriched Knowledge and served the Good. But could it also serve Evil?" "One may also imagine," he said, "that in criminal hands radium might become very dangerous, and here we may ask ourselves if humanity has anything to gain by learning the secrets of nature, if it is ripe enough to profit by them, or if this knowledge is not harmful." This doubt arises in relation to many branches of science: mechanised labour has helped to create unemployment, the horrors of war have been increased by chemistry, speed does perhaps as much harm as good. It would appear that some means is needed to limit the uses to which the secrets of nature are put. Science having emerged through the centuries into light, may now lead us into an even deeper abyss than ignorance. Knowledge uncontrolled or wrongly commercialised has the power to change this world into a veritable inferno; for we are still very much the primitive at heart.

Fortunately, this does not directly affect us in our profession, so long as we maintain our adherence to the Hippocratic oath. Rather must we strive the more to attain for humanity the world over a healthy mind in a healthy body.

In spite of the marvellous increase in knowledge, suffering is still widespread amongst us. Only by following out the injunction of our great predecessor, to search out and study the secrets of nature by way of experiment, can we hope to attain the mastery of disease and pain, which will enable us to relieve the burden of mankind.

Herophilus, the wise physician and anatomist in the days of Greece, truly said: "Science and Art have equally nothing to show, Strength is incapable of effort, Wealth useless, and Eloquence powerless, if Health be Wanting."