

Book Reviews

William Harvey's Biological Ideas. Selected Aspects and Historical Background, by WALTER PAGEL, Basel and New York, S. Karger, 1967, pp. 394, illus., S.Fr./DM. 96, £8 8s. 0d.

As twentieth-century thought plunges into the future enclosed in its scientific capsule it becomes ever more difficult to evaluate the efforts of those who worked centuries ago in the dawn of the modern era. Without the labours of those historians of science who immerse themselves in the work of the natural philosophers of the past we should be in grave danger of permanently losing the power of understanding these pioneers of science.

Of this danger Dr. Pagel is well aware and his remarkable capacity for self-immersion in the thought of past centuries makes him a rare and precious medical historian. Those who have studied his *Paracelsus* will already know what good reason we have to be grateful for his powers of comprehension and exposition of Renaissance medical thought. In this present work on *William Harvey's Biological Ideas*, Dr. Pagel applies similar methods to the evaluation of William Harvey's concepts of the circulation of the blood and the generation of animals. The structure of the work is built up, as its subtitle conveys, by a selection of different aspects of Harvey's biological ideas, displaying them in their historical background. 'To the same mind that observed, experimented and calculated, the results of these activities would appear as the ultimate confirmation of cosmological speculations. This, we believe, was Harvey's world.' With these words Dr. Pagel introduces us to his exposition of the complete and rounded body of Harveian thought as opposed to the mere fragment of it which can be called 'modern' or 'scientific'.

The touchstone upon which he would have his readers judge his presentation is contained in his quotation from Francis Bacon on historians which stresses that 'the material should be drawn not from the works and opinions of others, but all the main sources which are extant from a certain period should be consulted; not however merely read, but digested and understood in the peculiarity of their propositions, style, and methods, whereby the literary genius of that age as if by a magic formula should be raised from the dead.' Evidence of the faithful application of this Baconian ideal permeates this book.

It would be presumptuous to attempt to review in a few pages the whole content of a work which has ripened in the mind of its author during the last twenty years or more. And to deal with any one of its rich sections at all adequately would not only burst the bounds of reasonable space but give an unbalanced impression of the work. The following comments therefore, must be looked upon as first sparks struck off in the mind of one who has long held both the subject and the author in admiration.

In discussing the influence of European thought on Harvey, Dr. Pagel is quick to recognize Harvey's great debt to Aristotle for the whole strategy of his attack on his two major problems. This is all the more important by reason of the strange under-estimation of Aristotle's influence which has infected those who have been concerned to present Harvey as a 'modern' scientist rather than a pioneer of scientific method. And when due emphasis is laid on Harvey's own view of his methods of investigation his Aristotelian roots are even more distinctly revealed.

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Harvey himself strongly emphasized the importance of repeated ocular observation, but he did not stress the importance of 'making the experience', i.e. of experiment, this being looked upon by him as merely a form of observation. Yet it was clearly his capacity for devising, executing and interpreting experiments that separated Harvey from Aristotle's methods more sharply than any other characteristic. His *De Motu Cordis* teems with experiments so simple in design and performance that it is difficult to realize that most of them had never been previously performed. And it is when they are built up into a structure of experimental knowledge that the nature of the movement of the heart and blood breaks through with all the force of a revelation. The contrast in the scientific quality of Harvey's work on the heart and that on generation may indeed be related to the different balance in the two between plain observation and ingenious experiment. Dr. Pagel has not given much attention to Harvey as an experimenter, nor to the background of his experimental science. Like Harvey himself, he virtually ignores his experimental genius, and that of its background in Galileo, Sanctorius and Gilbert. The importance of the experimental element in Harvey's methods is obviously a matter of opinion. The greater one considers this to be, the greater must be the importance allotted to the empirical, practical sides of Harvey's methods of investigation, and conversely.

Dr. Pagel's modest estimate of the importance of Harvey's experimental methods is reflected in the brief analysis of the structure and contents of *De Motu Cordis*. He sees the first eight chapters of this work as a 'substructure' leading to the more important second part of the work which describes the circulation of the blood, and takes the view that the concepts of circular symbolism combined with the meditation on the venous valves of which he told Boyle, provide dominant influences throughout Harvey's investigations. This view is stimulatingly presented but it must remain debatable. For example, one may ask, 'Why then did Harvey not mention the circulation in the title of the book in which he described it?' And what of Harvey's other explanation of the way in which the hypothesis occurred to him? Harvey wrote that it depended on 'considerations of the quantity of the blood which was transmitted, in how short a time its passage might be effected. And not finding it possible that this could be supplied by the juices of the ingested aliment . . . I began privately to consider if it had a movement, as it were, in a circle.' To debate the relative importance of the deductive or inductive paths by which Harvey reached his concept of the circulation, though enjoyable, would smack of medieval scholasticism and be inevitably inconclusive. Dr. Pagel legitimately and ably emphasizes the importance of Harvey's 'hunch' since this reflects the influence of the circular symbolism so strong throughout the history of prescientific thought from Plato onwards.

The next section of the book, on Circular Symbolism, follows the anticipations of a circular movement of the heart and blood which found their way into western thought from Plato and Hippocrates, through Aquinas to Cardan and Castro. This leads to a 'digression' on the views expressed by Castro in his book *De Meteoris Microcosmi*, which is cited by Harvey in a letter to Beverwijk. In this letter Harvey reveals his knowledge of the Paracelsian views of the formation of renal calculi. This determined pursuit of a clue to its significant depth provides a good example of the way this book pays the reader rich historical dividends. For by establishing Harvey's knowledge of

the work and summarizing its general content Dr. Pagel reveals the source of a hidden stream in which Harvey's mind was bathed. No truer example of the 'background' of a man's ideas could be found. A similar fascinatingly detailed presentation is made of Giordano Bruno's view that the blood in animals moves in a circle. Here, no direct link with Harvey has been found, and such correspondence in circular symbolism as exists between them can be attributed to their common ancestor, Aristotle.

Robert Fludd's well-known friendship with Harvey is delightfully traced. However, they seem to have had but little mutual influence in the realm of ideas. Fludd's early support of his friend's discovery seem to have lain purely in its confirmation of his views on circular symbolism and the influence of the macrocosm on the microcosm—'As the moon follows its unchanging path . . . she incites the spirit of the blood . . . to follow in a circular movement.'—such is Fludd's comment on Harvey's circulation.

Dr. Pagel next turns to a consideration of the predecessors of Harvey. The contributions of Galen, Vesalius, Servetus, Columbus, and Cesalpinus are displayed through the medium of meticulous excerpts and evaluations in such a way that many fresh lights are thrown on those well-known sources. That Leonardo da Vinci is omitted will be regretted by those who see his experimental work on the heart as the truest of all the anticipations of Harvey's experimental success. Dr. Pagel does him less than justice by merely mentioning that his advanced views did not concern the pulmonary transit. By reason of the lack of Leonardo's sufficiently early publication, and therefore of influence, this gap in cardiovascular history is accepted by the majority of historians of medicine. However, it would have been of great interest to some to see this thinker's circular symbolism and experimental genius placed in their context by Dr. Pagel.

Harvey's work on generation, so rich in his philosophical thought, is treated as an entity briefly since the unity of the circular symbolism of generation with that of the blood has led to consideration of many of its concepts in different parts of the book. Harvey's ideas on fertilization are partly dealt with under the heading, 'Harvey's vitalistic criticism of ancient materialism'. Here and elsewhere the difficult concept of 'Contagion from a distance' is discussed at length. Surely Harvey himself eventually evaded the difficulty when he asserted that 'the male has touched but no longer touches', or that 'the egg is rendered prolific not because it now touches but because it formerly did so'; both of which statements are consistent with Aristotle's and Harvey's anxiety to explain their conviction that the male element does not contribute any material to the egg.

As an appendix to the book we find a brilliantly informative chapter on Marcus Marci and his works, particularly those on generation. In this we are told interesting details of the meeting of Harvey with Marci in Prague in 1636, of Marci's basic views on astronomy and embryology, and of their close similarity to those of Harvey; and of Harvey's strange silence on all these points.

'Some books are to be tasted, others to be swallowed, and some few to be chewed and digested'. In Bacon's classification of books there can be no doubt into which this one falls. But it will require strong jaws and digestive powers on the part of its readers to derive full benefit from a quality in this book that Bacon does not describe, its highly intellectual nutritious content. To this is joined a deep sincerity and devoted scholarship which pervade the whole work, and give it an almost spiritual beauty.

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