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antipathy in the Cosmos—familiar from the ancients down to the *Occult Philosophy* of Agrippa of Nettesheym and so many other Renaissance writers:

What virtue is hidden in the diamond [should be: steel. Rev.] so that it loosens iron? And, whilst your rash mood persists, tell me, O Philosophers, what magnetic power holds iron fast? How does jet attract a straw, and the stone hematite staunch the exuded blood? Why does black peony free the top of the head from the falling sickness? How does spodium strengthen the liver. . . .

Also more general topics:

What was the appearance in the beginning, when all things were confused and lay hid in a formless sphere . . . which Plato called a wood (*silva*) and this later age terms hyle—its barbarity having been refined and those who before were unlettered adopting culture? Whence come about such stable bounds in the four elements, when, with bold front, they hold together the opposing causes of things? What is the hidden nature of things?

These few glimpses must suffice into a work of rare scholarship, that opens up a multitude of new sources and elucidates as many old ones—a work that cannot be simply read, but calls for careful study by all those concerned with the continuity of ancient tradition through the Middle Ages and the Renaissance and thereby up to our own age. It is the result of a labour of love which must have taken many years, if not decades, to accomplish and cost the author gallons of 'midnight oil'. It is the work of a scholar who combines tremendous erudition and aptitude in literary criticism with an attachment to his subject which is only found in that *rarissimum*: the collector who is able to use and make available his treasures, and what is even more, finds time and energy to do so on top of the commitments of a general medical practice.

WALTER PAGEL

The Growth of Medical Thought, by LESTER S. KING, Chicago, Ill., University of Chicago Press, 1963, pp. 254, \$5, 41s.

This book provides a fine example of linear medical history. Dr. Lester King has set out to follow the evolution of the thread of medical thought from ancient to modern times, particularly with regard to concepts of pathogenesis. In tracing this thread through the fabric of medical theory he reveals a series of patterns of medical thought which for many of us lie unsuspected in the dust of past ideas. This he achieves in so smooth and easy a style as to conceal from the reader his eminently didactic purpose. For here is a series of essays in historical appreciation born of an intense interest in the intellectual processes of men of any age. Given such interest the thought lying behind the procedures of ancient Greek medicine is as fascinating as that of our own times. And this is the theme of the book.

As a touchstone throughout Dr. Lester King uses the modern concept of scientific method. He emphasizes the necessity of a structural pattern of knowledge as opposed to that of mere isolated facts in the rise from ignorance to science. The facts must be structured 'like beads on a string' as he puts it. And he shows us how often both the beads and the string have been completely renewed in the long trek from religious to scientific theory in medicine.

The first movement of this journey was made by the Hippocratic School with those limited inductions from case-histories which came to generalization in the *Prognostics* and *Aphorisms*. Like many historians before him, including Charles Singer, Dr. King grapples courageously with the interpretation of the word 'techne', emerging with the

surprising translation of it as 'science', and showing this to be quite as justifiable in the context of medical activity as the more usual translation of the word as 'art'. Moreover by a use of the term he aligns Hippocratic thought with Aristotle's appreciation of the relation between experience and inductive generalizations. One is stimulated to wonder how much Aristotle owed to Hippocrates as well as Plato.

With Galen we are taken into the realms of sophistication. Galen's careful methodology is given full recognition; his genius for experiment is amply acknowledged, and the manner of his fall into the pit of teleological excess and analogical mirage is skilfully evaluated without the scorn that has so often greeted the name of Galen in the past century. His sympathetic consideration of Galen's observational difficulties leads the author to point out that these men of the past were emphatically *not* fools, but were working in a factual fog of ignorance which would have daunted any but intellectual heroes. Their fearful isolation is difficult if not impossible for us in the twentieth century to realize.

With Paracelsus we are immersed in the foamy concepts of mediaeval alchemy, astrology and magic with a thoroughness which reflects the author's debt to Walter Pagel, that medical historian with exemplary powers of self-immersion in his subject. Paracelsus is shown in the context of the dynamic sprouting of new Renaissance ideas out of the dead carcass of mediaeval scholasticism. In his convulsive strivings we are shown his reaching out to a chemical theory of disease, as expressed in the concept of 'tartar', here brilliantly summarized. Paracelsus' concept of pulmonary disease produced by the 'chaos' or gas we breathe, pushed to the extent of deriving asthma from the 'fog' that lies between heaven and earth, provides another example of this genius's penetrating if erratic prevision.

When we turn to that great and necessary deviation in medical science involving the foundations of modern anatomy and physiology the author's touch is less sure. In some way there seems to be too little emphasis on the importance of this stage in medical thought. It was after all, on the basis of anatomy and physiology that macroscopic morbid anatomy took its stand. This stage of the process has been condensed to a degree that leaves an uncomfortable feeling of emptiness after reading the chapter on Vesalius, Harvey and Hoffmann. To omit in this regard all mention of Leonardo da Vinci is to ignore a paradigm of Renaissance thought which, in rejecting alchemy and astrology, provides a balanced complement to Paracelsus' approach; one partially brought to public fruition by Vesalius. To describe, 'most of Harvey's facts' as 'not new' is to ignore the importance of his experimental method whereby from old observations he refined new 'facts' upon which he was able to erect his inductive edifice of the circulation. Not only this, he demonstrated the fertility of experimentally derived facts in scientific methodology, a demonstration which was to be taken over into pathology and medical theory only after a long time lag.

With his chapter on Cell Theory Dr. King enters into his finest flow of sequences in the growth of medical thought. From Boerhaave to Virchow he makes the tale appear exciting yet inevitable. The intuitions of Rokitansky, with their emphasis on the 'blastemas', and his anticipations of a chemistry of pathology, received such a buffeting at Virchow's hands that the nineteenth century left them dead and buried under the triumphant Cell Theory. Now, as Dr. King points out, 'Rokitansky's insights have received surprising support'.

Such anticipations of chemical pathology have, of course, an even more ancient lineage; they go back to Galen theorizing about the humours. And this view was expressed again by Harvey in his early quest for morbid anatomical discovery when he

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described the changes wrought by disease in organs as 'the fruit of diseases' rather than their cause. This fruit he saw as 'the effect of a first cacochymia' . . . a depraved state of the humours, or altered chemistry.

Thus the author brings us to a final glimpse of modern molecular medicine in the genetics underlying the production of abnormal haemoglobins. And lest we should, for one rash moment, feel complacent about twentieth-century achievements in medicine he leaves us with the warning; 'All theories have a life-history. They start tentatively, grow piecemeal, and slowly became mature. Then they successfully handle new facts and also have considerable predictive value. But sooner or later a discrepancy appears between facts and theory. Then the theory will become modified, perhaps will entirely disintegrate, to be succeeded by something new.' *Sic transit gloria mundi!*

KENNETH D. KEELE

Science and the Renaissance: An Introduction to the Study of the Emergence of the Sciences in the Sixteenth Century, by W. P. D. WIGHTMAN (Aberdeen University Studies No. 143-4), Edinburgh and London, Oliver & Boyd, 1962, 2 vols., pp. xvi, 327; xix, 293, illus., 42s. each volume.

This is a work which will please everybody who has any concern for the history of science and medicine. The author, who is responsible for teaching the history and philosophy of science in the university of Aberdeen, has obviously rejoiced in the wealth of early scientific literature preserved in the libraries of the university. He has read in it both widely and deeply and has presented us with the results of his researches in a manner which shows that he has brought to his reading a learning and judgement, a nice discrimination and imaginative insight which is by no means common in works of this kind. The first volume contains the discussion of the subject; the second is a *catalogue raisonné* of the early printed books in the Aberdeen library, with informative and penetrating annotations on the individual works. Each volume may be read (and purchased) independently of the other, but the reader who denied himself either volume would be missing a great deal.

At least one-half of the first volume is occupied with the medical and biological sciences, the cultural and general scientific background having already been laid in the earlier chapters. The presentation, which has nothing didactic about it, owes little to other modern histories but is closely linked to the original documents (the printed books) in which the emergence of these sciences is traced. The contributions of Vesalius and Paracelsus are discussed most judiciously, but the many lesser figures who worked at similar problems before them are not ignored and the significance of their work is brought out in a way which provides a refreshing example of how the history of medicine and science should be written, not as mere chronology, with a mass of names and dates, but as a thoughtful appraisal of the ideas and influences which contribute to the mainstream of advance.

This book is in every way a worthy tribute to the memory of the scholar-physician, Dr. Duncan Liddel, whose own magnificent library of sixteenth-century medical and scientific books was bequeathed to the university when he died in 1613. It is the nucleus of the collections described in the second volume and is especially rich in the books of Paracelsus. To it have been added other special collections, notably those of John Gregory, Alexander Read, Sir John Forbes, and others, including a special donation from the Luton Hoo Library of the Earl of Bute. The result is a library of which any