

to electrostatics and magnetism during the second half of the eighteenth century, accompanied by the increasing employment of sophisticated instruments.

Even within such a dense account of early modern physics, Heilbron manages to include an extensive examination of the “boundary conditions” (my term, not his) on the scientific activity he explores: the social, financial, educational, and institutional contexts in which the work was done. Thus we have accounts of the Jesuits, many European academies and societies, of the working conditions, courses, and salaries of European university and college teachers, and of independent operators of all sorts and conditions whose main aim was the popularization of science. However, although very useful in itself, this account of the extra-scientific boundary conditions illuminates very little of what goes on in Parts II-V, since Heilbron does not tell us exactly how these boundary conditions shaped the science that developed within them.

Heilbron makes one striking claim, for which his book constitutes a sizeable body of evidence: “the single most important contributor to the support of the study of experimental physics in the seventeenth century was the Catholic Church, and, within it, the Society of Jesus” (p. 2). This is a view not often met with in the pages of *Past and Present*, and should be set as an interpretative test-piece for the supporters of the Merton-Hill-Webster thesis. More precisely, and more constructively, we should ask ourselves what it was that seventeenth-century Jesuits and Puritans had in common.

There is a full index, and a superb 69-page bibliography.

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FRED GETTINGS, *Dictionary of occult, hermetic and alchemical sigils*, London, Routledge & Kegan Paul, 1981, 4to, pp. 410, £15.95.

Alchemical, astrological, and medical-chemical (chemiatic) texts are notoriously difficult and often made completely inaccessible through interlarding with “occult” ciphers. These are “sigils” that are neither abbreviations nor hieroglyphic symbols, but belong to a category of their own. They were probably meant to exclude the profane reader or else to place on record an imagined discovery or new recipe for transmutation without giving the secret away. Some of the sigils are consistent and what they stand for has been known for a long time in a well-established tradition. However, there are innumerable variants and problems of deciphering that remain. A historical and graphical basis of the sigils can be found in various archetypal alphabets, notably those related to ancient Hebrew scripts and the extant “secret” alphabets that are derived from them. The need for a comprehensive and annotated inventory of the sigils has long been felt. Alchemy has so far been covered by the magisterial work of G. W. Gessmann (1899–1922) with its 120 excellent lithographic impressions and good indices. However, though purporting to give the “occult symbols of alchemy, medicine and astrology of the Middle Ages”, it is restricted to alchemy. Nor does it indicate the source for any let alone each individual sigil. This is perhaps the most prominent feature by which the work under notice is distinguished and in advance of anything that has gone before in this field. Moreover, its net is cast wide – not only astrology, but also occult and “hermetic” topics in all their ramifications are as comprehensively dealt with as is possible today. To give an example of the richness of entries, there are no less than eighty for capricorn as against a single one in an extant modern glossary – they include the variants and their common modifications and the rare forms each with its source, manuscript, incunabula, and papyri, among them (Thurnheisser's *Hermeneia*. 1583, (its first part, 1574, is quoted under *Onomasticum*) and the “celestial alphabeth” of Gaffarel, 1629, being strangely omitted). Interesting sidelights fall on such marginal items as John Dee's famous Hieroglyphic Monad (1564). This is entered under Monad (p. 175), Omega (p. 187), and Immortal Adam (p. 144). The problem in this composite sigil lies in its bottom-line. This consists of two curved lines like an omega, but inverted, closed above and open below. Under “monad” it is given as “alchemical fire, a sigil related to the form used for Aries” (p. 175). Under “omega” (p. 187) the reader is referred to “Immortal Adam” (p. 144) where the sigil is

connected with “Christian esoteric tradition of symbolism relating to the significance of alpha and omega”. Both of these meanings – Aries as well as omega – have their historical basis in Dee’s text “Arietis nota mystica ex duobus semicirculis in communi puncto connexis constituta” are Dee’s words to describe the sigil (fol.13v, in C. H. Josten’s edition and translation, *Ambix*, 1964, 12: 103, 161). Elsewhere (ed. Josten, p. 192) it is called the figure “mystically” inverted – Aries standing on its head. Aries – the ram – has its “hermetic” significance, for it is traditionally and constantly depicted as the the companion of Hermes. There is also a connexion with fire – together with Leo and Sagittarius, Aries forms a “fiery triplicity” (Josten, p. 103) and fire is the basic driving-force in alchemistic and hence Dee’s own practice. Equally, the omega fits as “small vessel full of mysteries” into Dee’s scheme (Josten, pp. 103, 197). Finally, there is the connexion of omega with immortal Adam (p. 198) and the symbol as a whole with the number eight (octonary, ogdoas, p. 156) – it recalls the Eightness of Adam, the Gnostic tradition which made Adam to consist of eight parts (W. Pagel and M. Winder, ‘The higher elements and prime matter in Renaissance naturalism and in Paracelsus’, *Ambix*, 1974, 21: 120; and ‘Eightness of Adam’, *ibid.*, 1969, 14: 119–139). Our detailed story may serve as witness of the thoroughness and skill of the author in covering all its points in the narrow compass of dictionary entries.

Obviously, then, we are dealing with a major work of reference indispensable for scholars in many fields, notably including the student of early chemiatic-medical texts. It falls into two main parts, first the Lexicon proper with its 1500 subject-entries and pictographs in alphabetical order, and second an index of sigils for their identification by counting strokes (1–5) and recognizing curvings and additional circles. This task of identification is at least time-consuming, in view of overwhelming numbers of sigils here listed – the answer can in many cases be elicited with much greater ease by consulting shorter lists such as those of Gessmann, W. Schneider (1962), and Luedy (1928), or even the tables appended to Blancard’s *Lexicon medicum*, or the second volume of Partington’s *History of chemistry*, or G. Testi, *Dizionario di alchimie e di chimica antiquaria* (Rome, 1950; see also D. Cavanna and S. Rocchietta, ‘The language of chemical symbols’, *Panminerva medica*, 1961, 3: 28–32). Moreover, the counting of strokes and circles is not always unequivocal. Part 1 and 2 are separated by the bibliography; there are several appendices. The book is a bulky quarto with the text reproduced in small typescript – obviously to keep it in manageable proportions and available at a price reasonable in view of its magnitude, significance, and exhaustiveness. It remains to say a word of admiration for the devotion and singleness of purpose with which the author, a historian of esoteric art and graphics, has so successfully achieved the codification and historical presentation of nine thousand graphic symbols of the hermetic, astrological, alchemical, and chemiatic tradition from the ancient Chinese, Greek, and Arabic lore up to quite modern times.

Walter Pagel

STEPHEN SKINNER, *Terrestrial astrology: divination by geomancy*. London, Routledge & Kegan Paul, 1980, 8vo, pp. xiii, 293, illus., £15.00.

This book is concerned with divinatory geomancy, a technique using sixteen figures composed of dots to foretell the future. This was originally done by marking the earth (*geo-*), usually sand, at random with a stick, or throwing pebbles, nuts, or seeds haphazardly, and later by writing lines of dots on to paper. The greater part of the book deals with the history of this art, and there are notes and a bibliography. About seventy pages explain the practice which is based on principles similar to those of the Chinese I Ching. The Greek sources mean by “geomancy” observing cracks in the earth rather than creating chance patterns oneself. Dismissing Persia, India, and Palestine with good reasons as the country of origin, the author concludes that the Arabs were the first to practise the art. From Arabia it spread through North Africa to the Sahara; second, via the Red Sea and the Indian Ocean to Madagascar; third, via Muslim Spain to the rest of Europe. As each of the sixteen figures, apart from a life circumstance like loss, good fortune, or prison, refers also to a part of the body, geomantic talismans against diseases