

psychotherapy were in fact first raised by H. J. Eysenck in 1952, yet that name appears here only as quoting a US author. This seems to indicate something else that is seriously wrong with US psychology. □

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Codebreaking

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Gehennical Fire: The Lives of George Starkey, an American Alchemist in the Scientific Revolution. By William R. Newman. Harvard University Press: 1994. Pp. 348. \$49.95, £39.95.

LIKE Chaucer and Ben Jonson, we associate alchemy with rogues and confidence men; or perhaps with "the lunatic, the lover, and the poet. . . of imagination all compact". We tend to believe that charlatans, the self-deceived or those in search of tropes and images involving sexual union and perfection were the kinds who took up with alchemy, but that to the serious science of chemistry it was but a step-mother, perhaps delaying the 'Chemical Revolution' so that Antoine Lavoisier's *Elements of Chemistry* came a whole century after Isaac Newton's *Principia*. And serious alchemy in America, among sober Puritans with their work ethic, would seem quite incongruous.

William Newman shows how mistaken such preconceptions are. To recover the worldview of alchemists is no easy matter and demands the disciplined use of the historical imagination: his style, confident, spirited and ironic, and his evident knowledge and enthusiasm carry us back into another world. It is not entirely a brave new world, for students of Newton have for many years been foraging among his copious alchemical manuscripts, trying to establish which are original writings and which are copies; and Robert Boyle's interest in alchemy is also being explored. The texts, operating on different levels, need interpretation; written both to impart and to withhold information, they have always needed decoding. To this hermeneutics, Newman is an excellent guide.

His hero, if that is the word, is George Stirk or Starkey. Born in Bermuda of Scottish parents in 1628, he matriculated at Harvard in 1643 and graduated as a bachelor of arts in 1646. He was one of a class of only four, and at Harvard would have encountered what might seem to us a curious hybrid: a belief that matter was made up of corpuscles, within an Aristotelian framework. It is part of Newman's

thesis that early modern atomism is not a feature only of the 'mechanical worldview' in the tradition of Galileo and René Descartes. Starkey also developed his interest in the generation of insects; that is, of nature's growth towards perfection. Alchemy, fusing chemical, prophetic and millenarian traditions, was centre-stage at this time.

Moving to London, Starkey entered Samuel Hartlib's circle associated with hopes for practical science, and in 1651 he



"Alchemists at Work" from Philip Ulstadt's *De Secretis Naturae* (1544).

made contact with Boyle. Practising medicine but pursuing alchemy as the way to truth, and boozing, he found himself constantly short of money and was imprisoned for debt; alchemists were also under suspicion of coining. He invented an *alter ego*, Eirenaeus Philalethes, a cosmopolitan sage with whom he claimed to be in privileged contact and whose writings he published. His alchemy derived from a mediaeval corpuscular tradition associated with writings attributed to "Geber" and drawing on "Ramon Lull", Bernard of Trier, Paracelsus and especially J. B. Van Helmont.

Newman penetrates the deliberate obscurity and obfuscation of alchemical texts, seeing them as undoubtedly chemical and decoding the recipes within. Using contemporary authors as guides, he shows the similarities between Starkey's alchemy and his medical chemistry. (Starkey was a great supporter of chemical remedies against the orthodox Galenists.) He illuminates Starkey's search for the alchemist, philosophical mercury or universal solvent; and describes his fascination with antimony and its crystalline star, and his

belief in shells of corpuscles that made up the various metals. Newman shows how this 'paradigm' differs from that of Starkey's contemporary Thomas Vaughan, who confusingly wrote as Eugenius Philalethes and in whose system, building on that of Cornelius Agrippa, the element Earth is primary.

Starkey's life reached its climax in the plague of 1665, when the physician was unable to save himself and died in the course of his duties. He seems to have fallen between two stools: he was neither a respected physician nor a quack committed to selling his remedies through extensive advertising. Moving on the fringe of the respectable world associated with the Royal Society, he never became a pillar of society. Curiously, he was then seen as a bad disciple of his fictive Philalethes, whose reputation long outlasted Starkey's and whose works were avidly studied by Newton — Newton's theory of matter does seem to show connections with Starkey's.

Newman shows how studying an obscure and ambiguous figure can bring the science of a period to life. And he shows that alchemy can be studied like more mainstream science, given the effort required to penetrate its language, verbal and visual. Because his remedies were used by Boyle and his writings studied by Boyle, G. W. Leibniz and Georg Stahl as well as by Newton, Starkey was clearly not an insignificant figure. He makes us think again about the 'Scientific Revolution'. □

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Integrative animal behaviour

Gene Robinson

Behavioral Mechanisms in Evolutionary Ecology. Edited by Leslie A. Real. University of Chicago Press: 1994. Pp. 469. \$80, £63.95 (hbk); \$29.95, £23.95 (pbk).

In 1975, E. O. Wilson predicted in his masterly *Sociobiology* that animal behaviour would split into two separate disciplines by the year 2000, one devoted to mechanisms and the other to the evolution of behaviour. Trends since then support this prediction. But as we approach the millennium there are signs of a new *rapprochement* in animal behaviour. Some who ask 'how?' are increasingly also asking 'why?', and vice versa. Even federal granting agencies are getting into the act — several institutes at the National Institutes of Health have developed a pro-