

could colonize only the area of land enclosed by the skin of an ox. Having split the skin into the thinnest strips possible, what is the optimal shape to enclose? The core of the book explains aspects of mathematical research into minimal surfaces and a variety of optimization problems involving processes occurring on unusual geometries and topologies. The results are illustrated by examples from biology, architecture, foams and bubbles, fluid flow and crystallography. Even professional mathematicians will find much that is new to them in these chapters — besides providing grist for popular lectures, they might provoke inclusion of options on the rigorous theory that underlies the subject in undergraduate mathematics courses.

Physicists will detect several absent topics that deserved inclusion in a book of this type. For example the discussion of geodesics in general relativity is too brief to be useful and misses the key contrast between Euclidean space and Minkowski's space-time: in Minkowski space-time there exists a longest world-line joining any two points, but no shortest one. The opposite is true in Euclidean space.

Altogether this is a most enjoyable book — a beautiful illustration of the interplay between mathematics and the natural world, interestingly and carefully written. □

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## Spirits of Victorian England

Ivor Grattan-Guinness

**The Other World: Spiritualism and Psychical Research in England, 1850-1914.** By Janet Oppenheim. Cambridge University Press: 1985. Pp.503. £25, \$44.50.

ENGLISH Victorian thought continues to fascinate historians, not only for the quantity and quality of the work achieved but also for the range and complexity of philosophical positions attendant upon it. Not for them the quick lazy positivism of our modern science: this was natural philosophy, the study of nature in all her physical manifestations, and with the ontological and religious aspects set in place. One feature of these endeavours was the prominence accorded to study of the mind

and its means of communication, both in orthodox contexts and in the realms of "spiritual" activity. "The word *spiritual* is one of the most difficult and important terms in nineteenth-century thought", wrote F.M. Turner in his *Between Science and Religion: The Reaction to Scientific Naturalism in late Victorian England* (1974), and various historians have recently developed this theme in the context of psychical research, especially B. Inglis in *Natural and Supernatural* (1977). Now we have the best study to date.

Janet Oppenheim, a young American scholar about whom the publisher tells us nothing, has ransacked the publications of the period, a wide range of manuscript collections and the relevant secondary literature to produce not only another account of the rise of psychical research in the late nineteenth century but also a detailed statement on the varieties and place of spiritualism during that period. Her book falls into three parts. "The Setting" describes in two short chapters the activi-

ties of various mediums and the wide spread of spiritualist publications and societies in England at that time. "A Surrogate Faith" explains with great lucidity the plurality of positions embraced by spiritualism — the survival of spirit after death was the common assumption, but a wide range of views was adopted by different groups — and then the complicated relations between spiritualists, the principal workers within the Society for Psychical Research (SPR), which was founded in 1882, and theosophists. After a welcome suite of portraits and illustrations, there then comes the excellent third part, unhappily entitled "A Pseudoscience", in which the places of psychical research and spiritualism are described for three areas of science: in turn, psychology and phrenology (the latter a special *Scottish* interest, as the author might have pondered); evolution and medicine; and physics.

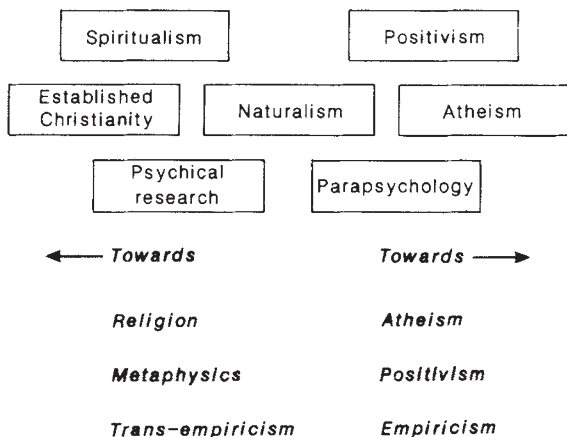
Four hundred pages of beautifully composed text are followed by 90 pages of end-notes, full of interesting information and references; however, they lack proper cross-references, so that it can be hard to find the full details of an item.

The richness and complications of Victorian thought cannot be fully conveyed in a review, although the figure (see left) and its attendant commentary include some further explanation. I focus, therefore, on the last part of the book, which is of most interest to scientists today. Sensibly, Oppenheim chooses to present the variety of positions by describing *seriatim* the views of major figures concerning spiritualism, religion, psychical research and their specialist areas of knowledge: wholehearted spiritualists such as Alfred Russel Wallace and William Crookes; men of a more cautious or vacillatory stance, such as G. J. Romanes, J. J. Thomson and Oliver Lodge; and those typified by Henry Sidgwick and his wife Eleanor, who could not subscribe to any established religious position (and in their cases also became opposed to spiritualism). The only group omitted from the survey are logicians, which is a pity, since at that time logic and psychology were closely linked. Augustus de Morgan and his wife are mentioned, but they lack the company of Mrs Boole, propounder of her late husband's algebra and also founder council member of the SPR; Lewis Carroll and John Venn; and W. E. Johnson, brother and mathematical assistant to the first research officer of the SPR, Alice Johnson.

The intertwining of the study of nature, the belief in survival and the pursuit of the paranormal that characterized a large part of Victorian thought is re-created in this book to an extent not previously achieved by an historian. Oppenheim has produced an altogether superior study. □

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REPRESENTATION of the spectrum of philosophical positions adopted by Victorians on religious and scientific questions. The boxes are placed on separate lines merely for convenience: the linear form adopted is a considerable over-simplification (so that, for



example, theosophy cannot fairly be indicated on it), but it conveys some impression of the distinctions and overlaps. "Naturalism" was a term used at the time to describe views which usually preferred Nature to God, facts to belief, reason to faith, and matter to spirit. To one side lies "psychical research", referring to views normally held by leaders of the SPR (which, however, held no *corporate* opinion); to the other is "parapsychology", used in the narrow sense to refer to the experimental, laboratory-orientated studies associated from the 1930s on with J. B. Rhine and his followers. The linear diagram, then, also has a chronological overtone, from left to right. For further details see *Research in Parapsychology 1982* pp. 283-304 (Scarecrow Press, Metuchen, NJ, 1983).