me, if the subject matter had been nearer home. Who can but share this doubt, after the recent row about censorship concerning Northern Ireland?

Given the undoubted freshness and originality of *A New Green Revolution?*, the lesson, I think, for the BBC, Channel 4, WGBH, WNET and other organizations handling science on television, should be "stay loose". Planners find it convenient to have slots such as *Horizon*, *QED*, *Tomorrow's World*, *Nova* and *Nature* which take care of so many hours' broadcasting each year, but there should be no insistence on a standard product, no prejudices about how individual programmes ought to be made.

Open-mindedness about treatment helps to make sure that "soft" issues are not dealt with too softly. It is equally important in tackling the trickiest aspects of "hard" science in the most palatable fashion, as Freeth himself demonstrated in dealing with general relativity. Prime-time television has to be, first and last, a form of entertainment, competing with sport and drama. Only through the skill of programme makers who endlessly refresh the formats can serious science expect to pass that test. Along with all the other peasants, scientists and programme controllers have no choice but to trust the producer. □

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Thought on crystal shapes and sizes

David Goodman

The Scientific Reinterpretation of Form.

By Norma E. Emerton. *Cornell University Press*: 1985. Pp.318. \$29.95 (North America), \$32.95 (elsewhere).

BIOGRAPHIES and histories of ideas have been the most commonly treated subjects in the history of science. Each has its pitfalls. A biography threatens to distort the judgement of the author, who is liable to attribute unwarranted significance to the dates of birth and death of his subject, and to see a period of several decades solely from the viewpoint of the individual he is studying. In the history of an idea, fragments of a natural philosopher's writing may be taken out of context because they happen to touch on the idea under study; superficial similarities may be discerned in the thought of men living centuries apart; and scientists of very different periods may be presented as consciously contributing to the progressive development and eventual culmination of a particular theory.

Most of these distortions are avoided by Dr Emerton in her study of the development of the concept of form—the idea, so prominent in the history of science, which sought to relate the perceptible properties of things to some internal nature. Her analysis is careful and accurate, and the theories of individual natural philosophers are kept in context, though she succumbs to anachronism in her comment that the geometrical treatment of form by the fourteenth-century philosopher Nicole Oresme "looks towards" seventeenth-century corpuscularianism "for its fulfilment" (p.97). Although concentrated attention is given to tracing a single idea over the centuries, this idea is important enough for this to be done without risk of exaggeration.

There is, however, a serious flaw in Dr Emerton's book. For reasons of length, and because "it involves a great many biological complexities that distract the mind from the concept of form itself", the whole subject of organic form has been omitted in order to deal exclusively with inorganic crystalline minerals. And so the title of the book promises more than is delivered. The true historical scope of the subject is therefore reduced by focusing on the single strand of inorganic form and the book ends in Abbé Haüy's theory of crystal form, seen as a culmination of Aristotle's search for forms. But this rests on the assumption that from Aristotle up to the eighteenth century there existed a clear division in natural philosophy between things organic and inorganic. Not only is this untrue but crystalline materials were themselves the subject of debate on

this very point. Dr Emerton underestimates the support in the seventeenth and eighteenth centuries for the supposed kinship of crystals and plants. Homberg may have dismissed the chemical "tree of Diana" (a crystalline silver salt of branching form) as an inorganic deposit; but in 1706 Nicole Lemery thought that he could detect hollow tubes, like those in plants, in a tree-like crystalline formation of an iron salt. The botanist Tournefort believed that the crystalline tree of Diana multiplied by a germ similar to the seed of moss or fern. And readers of the article "Crystallization" in the second edition of the *Encyclopaedia Britannica* (1778–1783) were given a cross-reference to the article on "Vegetation" where the growth of plants was discussed. This was no slight analogy; the author indicated that crystals, like plants, required an aqueous medium for their generation, and perhaps air as well. He was certain that the tree of Diana was so much like a plant that "a common mode of formation could hardly be denied".

Moreover, at about the same time, de la Méthérie, editor of the *Journal de Physique*, was convinced that all things were products of crystallization: for example that the fetus crystallized from the semen of male and female, and that if animals and plants were rounded instead of polyhedral it was merely due to the impurity of the crystallizing liquids. Even in the early twentieth century the eccentric Haeckel argued that crystals were alive. None of this is discussed by Dr Emerton and her book is poorer for it. If Aristotle's search for forms continued to inspire natural philosophers, so indeed did his conclusion that it was impossible to discover a sharp division between things lifeless and living.

The discussion in the opening chapter of views on the figuration of minerals from antiquity to the seventeenth century is followed by one which gives the philosophical "background" of the forms of Aristotle and his mediaeval commentators. Similarly, chapters on the corpuscular interpretation of form are followed by a "background" chapter on Plato and his followers. This recurring introduction of background information prevents a continuously flowing narrative. The book could have been better written; it reads more like a series of papers than a continuous monograph.

On the other hand, the reappearance of the idea of form in various guises over the centuries is well described and the discussion of what chemists meant by "spirits" and "seeds" is particularly rewarding. With the reservations outlined above, this book will be useful for historians of ideas to consult when they are considering the subject of form. □

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