

ance parameters, fuel cycle costs, and the arguments relating to the supply and demand of uranium.

Cochran may be right in parts of his criticism, but recent history has shown the need for frequent revision both of the ground rules in policy analyses and of the assumptions that form the background to them. In keeping with his pessimistic view of the LMFBR he suggests the continued use of thermal reactors and the stock-piling of the depleted uranium for future use—maybe not with LMFBRs. He advocates further investigation of alternative energy sources, without offering much hope of better success in any other direction.

That part of his submission which challenges the proposal to build many fast reactors between 1986 and 2000 is perhaps less important in terms of today's decision than his critical comparison between the LMFBR and the light-water reactor. Neither in the US nor the UK do we yet know what new information and experience will be available by 1986, and the present need is to ensure a capability of energy production in the latter part of this century. To that end the UK, France, Germany, Italy, Japan and the Soviet Union are actively developing the LMFBR—a system with which Europe has considerably more experience than the United States.

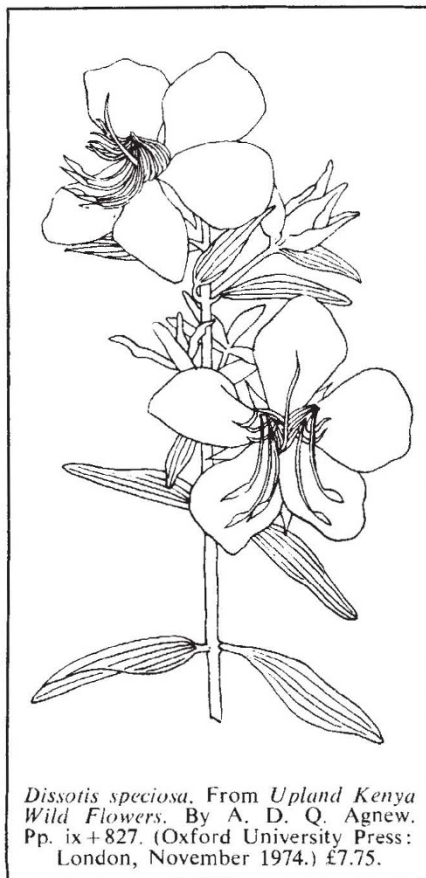
Many of the problems Cochran raises are common to any programme of nuclear power, such as the long-term storage of radioactive waste and the processing and transport of fuel. These become more acute with the rate of increase of the total power programme and are little affected by the choice of systems.

Mr Cochran has made an excellent attempt to analyse the safety of the fast reactor in simple terms. I wish to comment only on a few exceptions: for example, the difference in neutron lifetime is barely relevant to most accident conditions as the rate of change of temperature is dictated by the doppler coefficient, that is, controlled by the thermal inertia of the fuel. A prompt, critical situation cannot be controlled by mechanical systems, neither in thermal nor in fast reactors. The importance of the sodium void coefficient arises only if coolant is ejected from a substantial number of fuel channels. The way in which an accident might develop will be different in different reactor systems but the end effect of the potential thermal interaction of hot fuel and coolant can be violent in water reactors as well as in the LMFBR and the available energy is not markedly different.

There is a growing recognition that there is some uncertainty and consequent risk in many industrial activi-

ties, not only in the development of nuclear power, and it is obviously important to be aware of these risks in order to minimise them. This monograph should encourage further critical reviews of the US programme and the part to be played by fast reactors in a future energy economy.

F. R. Farmer



*Dissotis speciosa*. From *Upland Kenya Wild Flowers*. By A. D. Q. Agnew. Pp. ix+827. (Oxford University Press: London, November 1974.) £7.75.

## Happy union in the feldspar family

*Feldspar Minerals*. Vol. 1: *Crystal Structure and Physical Properties*. Pp. xx+627. Vol. 2: *Chemical and Textural Properties*. Pp. xi+690. By J. V. Smith. (Springer-Verlag: Berlin and New York, 1974.) Vol. 1: DM98.30; \$40.10. Vol. 2: DM103.50; \$42.30.

THESE splendid volumes on the most abundant, ubiquitous and internally complex minerals in the Earth's crust set a new standard for advanced mineralogical texts. They are extraordinarily comprehensive and the reader must feel a sense of wonder at the author's capacity to organise so vast a body of literature into a coherent and remarkably readable whole. The hundreds of references are very up to date (1973) and much use is made of preprints and theses. The author's aim is avowedly pedagogic, to use the feld-

spars to show how physical and chemical principles can be combined with geological observations to contribute to our understanding of mineral genesis. The books therefore contain several crisp but useful sections outlining most of the many physical and analytical techniques applicable to crystalline materials in general, with many references to basic papers which develop physicochemical principles. At the other extreme, volume 2 covers at length a multitude of petrological observations on feldspar twinning and intergrowths. In their marriage of crystallographic sophistication with grass-roots geological observation (a union sadly missing in much feldspar research) the books set an example applicable across the whole mineralogical field.

The volumes are so comprehensive that feldspar specialists are likely to find their own field dealt with at length, with a most valuable review of all the relevant literature; for more general readers certain sections stand out. In volume 1 the structural architecture of the feldspars is developed in great detail, beginning with discussion of models of bonding. The unsolved intricacies of the one or two-step ordering problem in K-feldspars are discussed and later related to the difficulties of classification of the K-feldspars. These sections as nomenclature are required reading for petrographers, who will also welcome the compilation of X ray and optical determinative techniques. Electron-optical methods will also find increasing use as a petrographer's tool and photographs of many fascinating (and sometimes enigmatic) textures are reproduced clearly.

Volume 2 begins with an outline of analytical techniques followed by a lengthy description of chemical substitution. Mechanisms of growth, development of chemical zoning, morphology and all the many feldspar twins are described, with structural explanations and a widely applicable discussion of twinning mechanisms. Similarly, intergrowths of feldspar with feldspar and with a host of other minerals are explained in terms of mechanisms of exsolution and replacement. Volume 3, dealing with phase equilibria and petrogenesis (promised for 1976) must be awaited eagerly by all mineralogists and petrologists. These lavishly produced, totally comprehensive volumes bring out, through the author's obvious enthusiasm, all the fascination there is in using modern techniques to explain mineral variation and it is to be hoped that they will be treated not just as invaluable works of reference, but also as a guide to all that is possible in modern mineralogical work.

Ian Parsons