This alone can provide an answer to the central question—how are individual cells in the embryonic epiblast programmed for neuroendocrine function and how, and at what stage, are the further series of instructions added which determine the ultimate endocrine function of each of the original cells? Already (Le Douarin, *Med. Biol.*, **52**, 281; 1974) we have learnt something of the timing and nature of the later stages of instruction but it is the problem of elucidating the earliest stages which provides the real challenge to experimental ingenuity. □

Cathodoluminescence of dislocations

from John Walker

DISLOCATIONS—misplaced planes of atoms which disturb the regular periodicity of otherwise perfect crystals—are important both theoretically and technically. They reduce a material's mechanical strength and affect its electrical properties; the quality and yield of electronic devices are inversely correlated with dislocation density. Hence dislocations have been extensively studied, and various techniques are used to observe them, including X-ray topography, electron microscopy and etch pit formation. A recent paper by Kiflawi and Lang (*Phil. Mag.*, **33**, 697–701; 1976) has demonstrated that a new weapon—cathodoluminescence—can be added to the technological armoury.

Cathodoluminescence is the release of light induced by electron bombardment, just as occurs in a television (cathode ray) tube. In earlier papers Lang and his colleagues showed that the growth history of a diamond crystal could be studied using cathodoluminescence, and reported the existence of defects, suspected of being dislocations, which emitted a linearly-polarised blue luminescence. The most recent report demonstrates in a diamond a one to one correspondence between dislocations (as revealed by X-ray topography) and the blue-emitting lines (see Fig. 1); this proves beyond doubt that they are dislocations.

Features that appear in Fig. 1*b* but not Fig. 1*a* are dislocations which are too deep in the crystal to be observed in cathodoluminescence. Features in Fig. 1*a* that do not appear in Fig. 1*b*, although linear, are not dislocations. Their emission is not polarised and does not saturate in intensity with increased electron beam current, unlike the dislocation lines.

One problem with cathodoluminescence in the topographical examination of crystals is that it is limited to a layer within 100 μm of the surface by the penetration depth of the electrons. Consequently crystals need to be cut according to the surface to be studied. Furthermore, the crystal must be transparent to the emitted radiation. Diamond is ideal in this respect, because it transmits well into the ultraviolet, and can therefore be examined visually.

A great advantage of cathodoluminescence is its power of discrimination. Different types of feature can be distinguished easily. The possible variables are colour (blues, greens, yellows and pinks have been observed so far), polarisation of the light, and variation of luminescent intensity with electron beam current (some features saturate, others do not). No doubt cathodoluminescence will be used a great deal in the future for the study of dislocations and growth features in crystals. □

How closely did the continents fit together?

from A. Hallam

A FUNDAMENTAL tenet of plate tectonics, that amount of crust created at oceanic ridges must equal the amount subducted elsewhere, has recently been challenged in a stimulating paper by Owen (*Phil. Trans. R. Soc.*, **A281**, 223; 1976). He has argued that the components of Wegener's supercontinent Pangaea moved apart as a consequence of 20% expansion of the Earth's diameter since the early Jurassic, less than 200 million years ago. This iconoclastic view is very radical in terms of physical theory and is no more likely to be widely accepted than the similar view put forward some years ago by the Australian geologist Warren Carey. Bearing in mind the unfavourable reaction to Wegener's continental drift hypothesis earlier this century, and its subsequent history, it behoves earth scientists to preserve an open mind on such matters, but they have the right to demand compelling evidence in favour of earth expansion and a clear demonstration of the inadequacy of current global tectonic theory.

It can hardly be said that Owen is especially convincing on either count, which is not to say that he makes no telling points. The gist of his argument is geometric, that the celebrated Bullard fit of the Atlantic continents, and its successors such as the Smith and Hallam fit of the Gondwana continents, pose awkward problems of continental overlap and misfit which

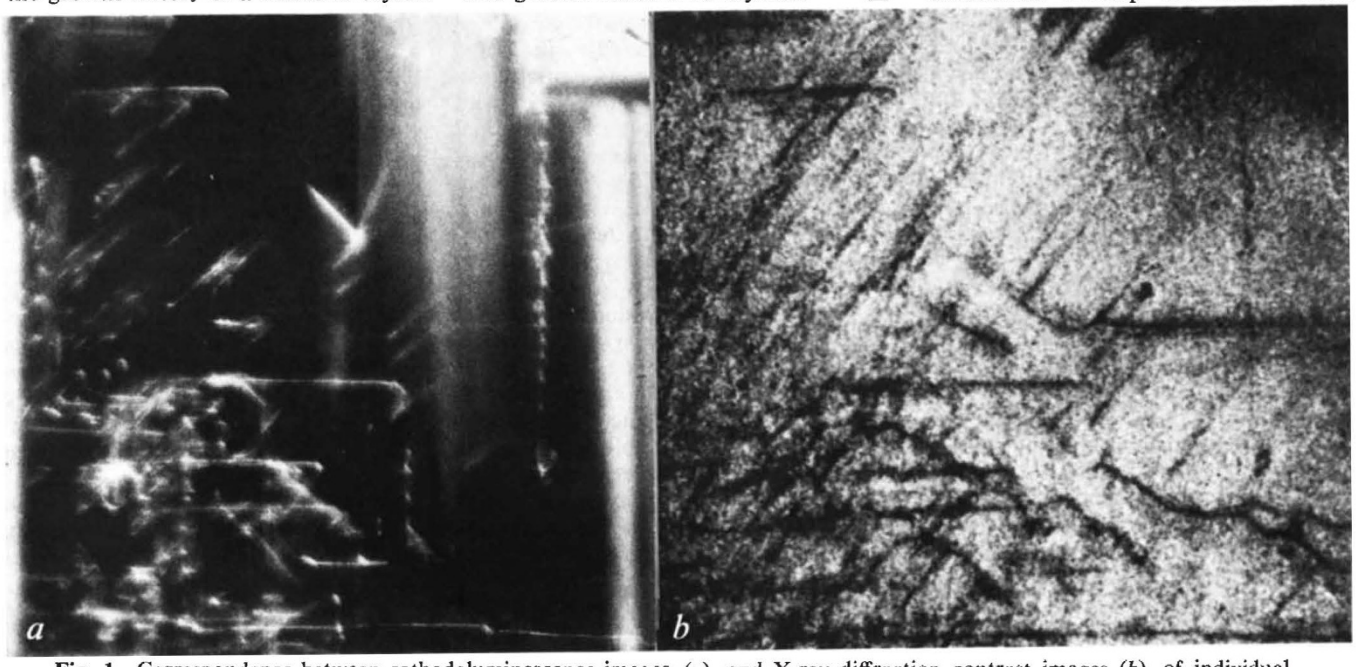

Fig. 1 Correspondence between cathodoluminescence images (*a*), and X-ray diffraction contrast images (*b*), of individual dislocations in a natural diamond.