Plant organisation in an evolutionary background. In his new book* Professor Wardlaw sets out his objective clearly both in the Preface and the first chapter—it is no less than the title implies—but this book is still a difficult one to place. At the end I think it is best assessed as a personal statement: a morphogeneticist sets the aims and achievements of his own work in the background that he believes will show its significance in present-day botany. That is a courageous endeavour: but the result is inevitably an uneven book. If it is nearly a text on organisation, it most emphatically is not one on evolution.

The author is professedly less than satisfied with current selectionist explanations of adaptive characters and the existence of seemingly non-adaptive ones. In all the evolutionary matter, however, one senses a lack of personal engagement. If the doubts expressed are to be sustained they demand a much more thorough-going inquiry into the way selection acts than is attempted here.

The important part of the book is undoubtedly that which concentrates on organisation (roughly chapters 7–14). Here there is much interesting information and some first-rate photographic illustrations. It is useful to consider the apical meristem as a reaction system where there is interplay between genic and cytoplasmic factors, the physico-chemical forces within the system and the external environment. I doubt, however, if the concept engenders sufficient depth of thought to lead to any distinctive 'reaction system theory' to which the author frequently refers; nor can I find that it really illuminates the evolutionary problems. Organisation and evolution fail to marry, not through any fault of the author but through our lack of knowledge. There is still a great gulf between what is known of the chemical action of a gene and the assumption of form. Professor Wardlaw recognises this quite clearly. But in the absence of effective speculation, or any more substantial data, pointing towards a solution, the word 'and' in the title remains a mere conjunction. Nevertheless the attempt to bridge the gap is not wholly fruitless and this preliminary reconnaissance will bear careful study. It not only brings out some of the more promising approaches, it shows up very clearly some of the ground that is wholly uncharted.

Where knowledge is scanty Professor Wardlaw is inclined to offer us words instead and it is not difficult to find a number of what I call spell-words and phrases —like abracadabra, organismal, dynamic equilibrium, and, I fear, reaction system itself. There is, in my view, another weakness in contemporary biological writing which Professor Wardlaw does not wholly avoid. Ideas cannot be cogently and concisely expressed by stringing together quotations from those who have contributed to their development. I would not have an author deny credit to his predecessors, but in publishing one makes a gift of one's thought to the community and the true tribute to such a gift is for later authors to contemplate, expand, integrate it with other ideas and to re-state it in an improved form appropriate to its new context. Only thus can a clear, memorable (I am tempted to add 'and readable') exposition be given.

One point that caught my attention was the relatively scant importance attached to Steward's carrot plants raised from a culture of free cells. The work is quoted (p. 198): some of Steward's illustrations are reproduced: the effect of isolating the cells from an environmental tissue is noted. Three or four lines in all. The embryo-like behaviour is mentioned only in the caption to the figure. When the zygote itself is considered (p. 332), it is the environmental influence of the enveloping tissues that is emphasised. Yet surely Steward's work suggests the partial isolation

* Organisation and evolution in plants. C. W. Wardlaw. xiii, 499 pp.; text-figs. and 24 plates. Longmans, London, 1965. Price £3.

of the zygote as the important factor in the distinctive development of a single cell into an embryo. Similarly Reinert's work (quoted elsewhere* by Wardlaw, though not in detail here) showed that embryo-like development from cultured tissue started in a particularly thick-walled cell. Furthermore, changes in cell-wall structure are amongst the early observable indications of differentiation as it proceeds in normal tissues. Simple addition of these points suggests that the initiation of a degree of isolation, resulting from changes in the cell-wall, may be a phase of importance in cell-differentiation. It is disappointing, therefore, to find that the whole subject of the cell wall is virtually ignored.

Typography, illustration and production are very good and author and publisher are to be congratulated in co-operating to produce such a pleasing volume at a fair price.

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* In W. Ruhland, Encyclopedia of Plant Physiology, xv(i), 947 (1965).