

hankering after a *méristème d'attente* in establishing the presence of the quiescent centre in the root. The evidence for the latter is, however, secure ; and its presence does not have such far-reaching developmental implications. The suggestions that the cells of the quiescent centre may have a functional role in maintaining the geometry of the root or as sites of hormone synthesis are interesting, for both hypotheses are open to test.

Notwithstanding Dr Clowes' concern to emphasise a dynamic approach to apical meristems, there are aspects of recent work which he conspicuously underplays. It is odd, for example, that he should give the impression that bud induction in tissue culture is not especially relevant to his theme; indeed he writes of Skoog's experiments as though they merely involve the awakening into activity of primordia that were already present, and not the initiation of buds *de novo*. Yet the demonstration by Skoog, Steward and others that an apex can be organised and a whole plant recovered from an initially homogeneous system of independent, dividing cells is surely one of the most remarkable botanical achievements of recent years. The prospects which the possession of techniques of this kind open up for the study of the origin of organisation in meristematic tissues are limitless. Then again, ultrastructural work bearing on the function of apical meristems is less fully covered than could have been desired ; there are important papers of earlier date than the latest quoted which receive no reference.

But to carp at omissions is less than fair when so much of importance is so excellently and clearly summarised. Perhaps a more justifiable cause for regret is that Dr Clowes did not find himself able to be a little less reserved in his conclusions and a little more speculative about the future of this field of investigation. It should be brilliant, with new techniques already to hand in dazzling array. But a student would not necessarily think it so from a reading of this book ; paradoxically he might have some difficulty in locating the growing points.

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HEREDITY: AN INTRODUCTION TO GENETICS. By A. M. Winchester. New York: Barnes & Noble, Inc. College Outline Series No. 58. Pp. 269. \$1.75.

An elementary introduction to genetics has a formidable list of requirements to fulfill. Its main needs are probably the following : (i) an historical foundation ; (ii) a presentation of the contrasting basic methods of investigation ; (iii) examples of classical experiments with the steps in inference to be drawn from them ; (iv) notes of the important practical applications ; (v) illustrations of the raw materials, plant and animal ; (vi) diagrams explaining the processes and hypotheses which are supposed to be of prime importance.

Most of these requirements Dr Winchester's book meets unusually well. His accounts of methods and experiments are clear and instructive. His photographs of plants and animals are admirable. So are many of his diagrams. His introduction to statistics is modest but helpful. The whole book is humanly orientated with a generally satisfactory effect. And we can blame only the censor when the author, using a Klinefelter to illustrate underdeveloped male organs is forced to obfuscate these organs with a black triangle (p. 177).

The author is weak in those points where his predecessors have also

been weak, namely in history and in theory. His history is unconvincing. From the Chinese who are said to have grown rice in 4000 B.C. to De Vries whose Mutation Theory was "essentially correct" and Bateson and Punnett who "developed the theory of *linked genes* as first discovered by Correns and Baur"—in all this, less said would have been sooner mended.

The theory that develops out of these historical beginnings sometimes also falters. When the author comes to chromosomes and meiosis, he leaves us wondering how he thinks it all happens. Still more we wonder how he thinks our present views were reached. It should be clear in these matters whether science has advanced by the testing of predictions or, as some would have it, by a majority vote at a conference. Unfortunately it is not clear. On the practical side the clay models on pp. 143, 157 and 159 are among the most distressing so far conceived for chromosomes. The author recovers control of the situation when he leaves the chromosomes and returns to describe experiments and applications and to discuss the genetic effects of radiation.

We must still wait for an elementary book on genetics which introduces the reader to the use of hypotheses. Failing to do this the present book tells us what genetics is about, without telling us what it is or how it works. Perhaps this is what is needed for a "College Outline": all university subjects must be presented at the intellectual level of the people who are expected to teach them. It is sad, if it is true, that genetics, to meet this need, has to lose its character as a part of a general education.

C. D. D.

BOOKS RECEIVED

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 EVOLUTION: ITS SCIENCE AND DOCTRINE. Symposium to Roy. Soc. Canada. Ed. by T. W. M. Cameron. 1959. Toronto Univ. Press. 1960. Pp. 242. 40s.