

land sustained by man-made fires, but when eucalypts are planted they soon outstrip the native trees. A recent explanation, which the author does not mention, is that the roots of foreign trees can penetrate a hard layer deep in the soil, which is impervious to the roots of native trees, and obtain water from greater depths in the dry season.

The material in the book is more about the trees and forests of southern England than elsewhere. Consequently its greatest appeal is likely to be to those readers close to the writer's familiar home ground who also would like a glance at living forests of the rest of the world.

Some of the most attractive parts of the book are those in which the writer gives an account from his personal experience of a forester's daily life in England, of a Malaysian rubber plantation and of rainforests. Edlin gives a lively description of the complex, diverse and changing tropical rainforest and notes with regret that the modern rainforest "is more likely to be raped than virgin".

Being an experienced writer in his field of popular forest science, Edlin

is concerned to be correct in his factual information. The few minor inaccuracies I noticed probably resulted from the brevity needed to fit such a large number of topics into 269 pages. For example, it is not correct to say the natural range of *Eucalyptus saligna* is in a Mediterranean climate. It is in an area of predominantly summer rainfall grading into a winter rainfall, Mediterranean climate at the southern end. Also, it is not correct to suggest that sulphite pulps are the main raw material for small paper bags, although they are sometimes used.

It was a curious decision in an otherwise well-produced reference book to have no suggestions for further reading to encourage the interest aroused in students. There should have been room for a bibliography and also a glossary. Nevertheless Edlin's book is readable and informative and will be a useful general reference for newcomers to the study of trees. □

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Broad canvas for cytoplasmic genetics

R. A. E. Tilney-Bassett

Cytoplasmic Genetics and Evolution. By Paul Grun. Pp. xi+435. (Columbia University: New York, July 1976.) \$31.25.

THE publication of a book in the field of extranuclear inheritance is a rare and welcome event. Paul Grun begins by establishing the physical properties of mitochondria and plastids, and their potential for genetic variation through mutation, segregation and recombination. A few of the more important mitochondrial and plastid enzymes are each briefly described, as if the author wished to emphasise that he had not completely neglected the biosynthetic capabilities. But, in my view, this was insufficient to serve much purpose and a greater attention towards clarifying the often quite complicated genetical accounts would have been more valuable. Nevertheless, I was impressed by the way in which the reader is briefly and carefully guided through the experimental procedures, and by the way the evidence is sifted and both sides of controversial issues discussed.

A large section on symbiotes and inherited diseases extends cytoplasmic inheritance into consideration of the relationships between bacteria and their insect hosts, spirochetes in *Drosophila*, killer parametia and killer yeasts, and the problem of cancers in vertebrate animals. Non-cancerous diseases are also discussed using the example of scrapie in sheep and Leber's optic neuritis in man to illustrate the importance of understanding the interactions between nuclear genes and transmissible factors. Yet, surprisingly, Grun fails to drive home the message that probably several other diseases might be better understood if regarded in this light. Having opened the door to discuss symbiotes, I was disappointed to find no mention of those remarkable chloroplasts that can exist endosymbiotically in the cells of some molluscs and other invertebrates.

The final of the four parts catalogues many examples illustrating the importance of the plasmon as the causative factor in determining some of the stranger facts of cytoplasmic genetics. Particular attention is given to the interaction between nuclear genes and plasmon factors, as for example in cytoplasmic male sterility, and to the evidence for genetic variability and evolutionary change within the plasmon. The chapters of this part add up to an extensive and thorough review reflecting the author's close familiarity with this little understood subject—a genetic backwater that needs this kind of publicity.

To bring together into one book such a wide range of genetic phenomena is a Herculean feat—over one thousand references are quoted. But Paul Grun is not content with pure description; he has attempted a modern synthesis in which he relates cytoplasmic phenomena to varying states of an overall evolutionary process. Whether we look at a parasite starting to invade a new host, or a long established organelle like a mitochondrion, there is a continuing process of genetic and physiological adjustment by which host and invader work out a strategy to their mutual advantage. Gradually, the successful parasite may become the universal symbiont and essential organelle. Initially the host may not be able to resist invasion, yet slowly and inexorably, through mutation and selection, the host nucleus gains control. At this stage any major disturbance to the harmonious relationship between the two is strongly selected against, and so the interaction between nucleus and cytoplasm becomes a restrictive force on evolutionary divergence. So close and so delicate is the interaction, that we find many examples of geographical races or neighbouring species, in both plants and animals, that fail to form healthy fertile hybrids because the hybrid nucleus is incompatible with the maternally inherited cytoplasm. In short, the cytoplasm has become an important force in evolution.

The evolution of a mechanism to limit the transmission of cytoplasmic factors to the female line is seen as a strategy by which the host effectively stops the recombination of cytoplasmic genes and thus gains mastery over their behaviour. Once sufficient control is acquired, the host nucleus may even take over some organelle genes as seems to have happened in the splitting of the cistrons for certain plastid enzymes between nuclear and plastid DNA, and in the reduction in coding capacity of vertebrate mitochondria compared with that of yeast or higher plants.

Although some areas are covered too thinly, the author's aim to paint a broad canvas covering the more important aspects of cytoplasmic genetics is generally successful. Above all, the illustrated book is written in an easy style, and it makes such fascinating and enjoyable reading that it should have a wide appeal to degree students in the biological sciences as well as to research workers. It is to be hoped that the high cost does not prove too great a discouragement for a book that deserves to be widely read. □

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