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Genealogical and Genetic Structure.

C. Cannings and E.A. Thompson. New York: Cambridge University Press, 1981. xi + 156 pp. \$37.50 (\$14.95 paperback).

This book is an introduction to the mathematics of genetic relationships. The first two chapters are devoted to methods of representing the genealogy of a group of individuals and the study of identity by descent and kinship and inbreeding coefficients, respectively.

Chapters 3 and 4 discuss gene identity and the evaluation of allelic and genotypic variability in populations under regular and random mating systems. The classical approach to the study of such variability in populations is often via diffusion approximation of an underlying stochastic model of gene frequency. With a variety of examples, the authors make a convincing case that such problems are better attacked by explicit recognition of the central role of genealogy. The reader interested in some recent developments of this approach should see Kingman (1982), where the elegant structure of the genealogy of large haploid populations is uncovered.

Chapter 5 describes measures of genetic distance between individuals and populations and reviews methods for reconstructing genealogies on the basis of genetic data. Section 5.6 hints at intriguing statistical problems in the reconstruction of phylogenies on the basis of amino-acid sequence data and the estimation of divergence times. Felsenstein (1983) describes such problems in a manner accessible to statisticians.

The final chapter describes some of the algorithms necessary to compute coefficients of identity and likelihoods on pedigrees. Methods for simulating gene flow through a pedigree are also described. They pro-

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vide one useful approach to the difficult problem of assessing the statistical behavior of genetic parameters estimated from such pedigrees.

This book is well written and carefully produced. The authors should be congratulated on providing mathematicians and statisticians with an excellent introduction to the difficult and challenging problems of genealogy.

SIMON TAVARÉ
Colorado State University

REFERENCES

- FELSENSTEIN, J. (1983). "Statistical Inference of Phylogenies." *Journal of the Royal Statistical Society, Ser. A*, 146, 246-272.
KINGMAN, J.F.C. (1982). "On the Genealogy of Large Populations." *Journal of Applied Probability*, 19A, 27-43.