

history and methodology of the subject and reviews the studies relating to the main concepts such as the assembly of communities, number of species, niches, guilds, distributions, density compensation, resources and convergence.

Interspecific competition is usually thought to be the prime factor in determining the main patterns of bird communities. In his second volume, Weins reviews the relevant literature and shows that there are significant problems in most studies and few convincing examples. The best evidence, is for insectivorous birds, and Weins devotes a whole chapter to them. These birds, however, tend to defend interspecific territories, and thus competition between them may be atypical.

It is likely that competition has been overemphasized and that predation, parasitism and disturbance all contribute to the observed patterns. Of these, the role of parasites seems the least understood, but as an example of their possible importance, it seems that the distribution of bird species in Hawaii is related more to the susceptibility of each species to introduced malaria than to competition. How many community ecologists would consider examining the responses of their study species to parasites?

It has often been assumed that communities are in equilibrium, but in reality they are probably fairly dynamic. In many studies, specialists suggest that atypical rain, temperature, wind or some atypical biotic event affected the expected patterns. As Weins points out, such 'atypical' events may occur sufficiently regularly to account for typical patterns of community structure.

Weins points out that the study of bird communities may be harder than Lack or MacArthur imagined. It does seem that the more abstract the measure, the less convincing the results. Thus studies of niches, assemblages and diversity all seem rather unconvincing, whereas those based firmly in population biology seem more successful. The studies that are really illuminating are those, such as Galapagos ground finches and *Parus* in Scandinavia, where the natural history is well known and provides a solid base for detailed studies of ecology and genetics. It seems clear from these volumes that ecologists need to know their species and need to study individuals and populations rather than generalized processes affecting communities. □

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Case study

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DNA Technology and Forensic Science. Edited by Jack Ballantyne, George Sensabaugh and Jan Witkowski. *Cold Spring Harbor Laboratory Press: 1989. Pp.368. \$95.*

A FEW years ago, a Cold Spring Harbor Laboratory Banbury symposium devoted to forensic science would have been unthinkable. The reason for the recent surge of scientific, legal and media interest in this field lies in the power of DNA analysis. Previously, forensic scientists were used to quoting figures of chance association of the order of one in hundreds using conventional grouping methods, but now estimates of one in thousands or millions are common for undegraded samples.

Forensic biology has understandably attracted attention from those in various disciplines — sociologists, statisticians, and population and molecular geneticists, not to mention the legal profession. The organizers of the Banbury conference attempted to bring these different factions together, perhaps to find common ground, but certainly succeeding in showing the controversies surrounding this new science.

Approximately one-third of *DNA Technology and Forensic Science* is devoted to the socio-legal implications of

DNA analysis. There are lobbies both in the United States and the United Kingdom who wish to profile the DNA of all individuals (males?) at birth. At present, this extreme appears unrealistic, but in the short term DNA databases, in which details of individuals are stored, may be feasible. The implications of such databases are explored here by several authors; for example, they could be used to search for associations of hypervariable loci with other characteristics, such as genetic diseases. And because present-day technologies will be out of date in 5–10 years' time, there is a need to store DNA from convicted people in order to compile new databases in the future. Although most authors recognize the social need for a DNA index, safeguards are needed to ensure that any such database or DNA samples are used only for the purpose originally intended.

Paradoxically, the section "Establishment, maintenance and regulation of databases" contains only one paper describing the practical problems of organizing databases between several laboratories. The conclusion here is that complete standardization of systems is needed. The remaining papers in this section include descriptions of national databases already in use by the National Crime Information Center of the United States (vehicles, guns, wanted people and so on) and details of the human gene mapping library. The emphasis placed on sociological implications of DNA database identification is not balanced by a scientific evaluation of

the problems of implementation.

Eric Lander discusses some of the assumptions of population genetics, such as the problems of correctly identifying a population, of sampling error, or obtaining a truly random sample and of the assumption of Hardy-Weinberg equilibrium. The questions of independence and matching criteria are at present crucial issues in the interpretation of DNA profiles. Any cutoff point (such as ± 3 standard deviations) which the specialist uses to decide whether two bands on a gel match is an arbitrary decision that can be circumvented by the application of bayesian statistics. The absence of papers discussing this technique is a significant gap, as the reader is left with the impression that there is no objective solution on the horizon to the problem of band-match criteria.

Quality control and quality assurance are covered by M. Baird. The lively discussion provoked by an autoradiograph showing a band-shift in a semen stain compared with a suspect's control sample highlights the need for well-defined (and measurable) objective criteria for matching DNA profiles.

Alec Jeffreys provides an excellent review of the development of DNA profiling, from multilocus probes to the use of the polymerase chain reaction (PCR) in coamplifying six loci. Problems associated with the use of PCR in forensic science are discussed by R. Higuchi. It is generally agreed here that it is too early to introduce this technology into casework because of potential problems associated with nanolitre contamination, particularly from PCR products; this would be sufficient to give a false result. One option would be to include identifier plasmid primers in each reaction that could subsequently be detected and shown to be correct. Two papers on automated sequencing are included, but again this technology is too preliminary for practical applications.

The question of the introduction of DNA into forensic casework provoked some revealing discussions, often longer than the papers themselves and so providing a flavour of the differences in opinion associated with DNA profiling. The contributions are mainly North American (only two from the United Kingdom), and so the discussions relate predominantly to the requirements of the North American legal system, such as the Frye test.

This volume is wide ranging, and in this respect unique. The field is now moving so quickly that the controversies on independence and band-match criteria highlighted here will quickly become out of date, although socio-legal debates will continue in the same vein. □

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