



Kew Gardens in the 1850s, showing the newly constructed Palm House

arrogant self-righteousness of some nineteenth-century attitudes towards Britain's civilizing role among the lesser nations. We can well imagine that the destruction of indigenous weaving and metal industries in India, by imports from Britain, helped to provide a cheap labour force for plantation

industries in India (and later elsewhere in tropical Asia) when none was available in tropical America. Indeed this was advanced in the early 1830s as an argument for establishing a tea industry in India (*Tea Cultivation, India*. House of Commons Papers 63, 1839).

To most, however, this will seem an unduly eclectic view. Rubber provides a significant part of the economic basis for political independence in Malaysia and Indonesia; Indian quinine in its time saved many lives throughout the world; sisal has brought foreign exchange and some employment to Tanzania; and Kew continues to provide valued services, including third-country quarantine, for many developing countries.

Perhaps even more important are the personal and professional links, which include Kew and the Linnean Society, which hold together the large and active community of pure and applied botanists throughout the Commonwealth.

All in all, then, an unsatisfactory book; and in view of the great potential interest of its theme, a disappointing one. □

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Krylov and the genesis of statistical physics

Michael Berry

Works on the Foundations of Statistical Physics. By N.S. Krylov. Pp.283. (Princeton University Press: Princeton and Guildford, UK, 1980.) Hardback \$19.50, £10.80; paperback \$7.50, £4.15.

RECENT YEARS have seen real progress towards answering fundamental questions in statistical mechanics, thanks largely to the Russian school led by Kolmogorov and Sinai. Their work was stimulated by the thorough and imaginative studies of N.S. Krylov, who died in 1947 at the tragically early age of 29. With the publication of this book, Krylov's works are at last available to English-speaking readers.

Krylov emphasized the importance of explaining how systems relax to equilibrium, and indeed regarded this as the central problem of statistical mechanics. He shows that a sufficient condition for relaxation is that the system's dynamics possess the property of mixing, which means that an initial patch of phase space (i.e. a group of systems) eventually spreads to cover the whole energetically available region in filamentary fashion (whilst preserving its area). Most previous work had concentrated on ergodicity, namely the property that a point in phase space (i.e. a single system) eventually passes arbitrarily close to every energetically available phase point. Ergodicity is a weaker property than mixing, and does not guarantee statistical

behaviour. Krylov traced the source of mixing (at least for systems of colliding hard spheres) to instability of trajectories, i.e. the exponential divergence of neighbouring orbits. He employed this idea in an approximate calculation of relaxation times. Subsequent research has abundantly confirmed that this type of instability is indeed the source of unpredictable behaviour in causal systems.

The book is not easy to read, because

Krylov's repetitious style of writing makes it hard to hold the thread of his complex argument. Nevertheless, this is an important document, which should be studied by anybody seriously interested in statistical mechanics. A valuable feature of this book is an appendix by Sinai, outlining recent developments of Krylov's ideas. □

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Developments in plant molecular biology

Martin R. Hartley and R. John Ellis

Nucleic Acids in Plants. By T.C. Hall and J.W. Davies. Vol.I pp.261, Vol.II pp.237. (CRC: Boca Raton, Florida/Blackwell Scientific: Oxford, 1980.) Vol. I \$64.95, £48.75; Vol. II \$59.95, £44.75.

THESE two volumes represent the only comprehensive treatise so far published in the area of plant nucleic acids, and reflect the upsurge in interest and the exciting new developments that have recently taken place in plant molecular biology. The aim of the books is to provide a detailed and critical appraisal of selected topics which include many current research interests in plant nucleic acids, as well as some related aspects of protein synthesis and genetic manipulation. The title "*Nucleic Acids in Plants*" has allowed the inclusion of

contributions on viral, viroid and plasmid nucleic acids, which together with a chapter on gene manipulation by sexual and somatic cell techniques occupy Vol.II.

Volume I deals with nucleic acids found in 'healthy' plants, with articles on nuclear genome organization (Walbot and Goldberg), chloroplast DNA (Tewari), RNA polymerases (Becker), tRNAs (Weil), rRNA (Leaver) and mRNA (Hall). The styles of these chapters vary considerably, from epic literature reviews to more personal accounts. For example, Weil's 33-page article cites 432 references, while Tewari's 65-page contribution cites only 62 and relies largely on the author's own data. All of the articles are authoritative and are mostly easily readable, although by the very nature of some of the topics under discussion it has not always been possible to avoid a catalogue approach. Particularly impressive are Walbot and Goldberg's description of the intricacies of DNA reassociation kinetics in an intelligible fashion, and Becker's critical and reasoned account of plant RNA polymerases, in which he dispels many myths, including those about the action of plant growth substances at the transcriptional