

## Picking the winners by number

David E.H. Jones

**The Awards of Science and Other Essays.** By Eugene Garfield. *ISI Press, Philadelphia/STM Distribution, Enterprise House, Ashford Road, Ashford, Middlesex TW15 1XB, UK: 1985. Pp.572. \$30, £26.*

*CURRENT CONTENTS*, which every week reproduces the title pages of a selection of learned journals, must be the tersest and most functional magazine in existence. Almost its only concession to literature (as opposed to *the literature*) is the section "Current Comments", in which the editor, Eugene Garfield, looks up from his photocopier and discourses on whatever topic has taken his fancy that week. He has been publishing collections of his "Comments" since 1973, under the general title *Essays of an Information Scientist*; this book is the seventh in the series.

Of the 61 essays here reprinted, nine deal with recent research on biomedical topics such as cystitis and gerontology, and ten are tributes to notable information scientists or recent Nobel Prize winners. There is also a description of an artwork (with colour plate), a discussion of science books for children, and two articles by other authors which Garfield comments upon. But most of the essays deal with aspects of information science: in particular the services provided by the Institute for Scientific Information, founded by Garfield in 1960, and analyses of its compilations of scientific citations which are published as *The Science Citation Index*.

Most researchers, I imagine, use the *Index* regularly, if only to look themselves up and find out how they are doing: how often their most recent papers have been cited, and by whom. Computer technology not only enables the enormous lists of citations to be compiled and indexed, but also allows Garfield to indulge in his favourite hobby of scanning the lists for highly cited papers. Thus the book includes accounts of the hundred most cited papers ever; a hundred "citation-classics" from *The Lancet*, and another hundred from *The New England Journal of Medicine*; several compilations of the articles most cited between 1961 and 1982; and several essays on the citation-patterns of different scientific disciplines.

Each such essay contains a wealth of statistical material on papers and their citation-rates, the ranking of journals by citation-frequency in the rest of the literature, the number of citings of "classic" (highly-cited) papers as a function of time and so on. Garfield uses this material as a springboard for discussing developments in the field involved, and its current "hot

topics", usually buttressed by explanations from the principal authors concerned. Intriguing "maps" of the scientific frontiers are sometimes included, based on the flow of citations between the various authorities.

All this is splendid stuff, and gives a lot of information about the most active (or at least the most verbal) areas of science. However, Garfield's preoccupation with picking winners tends to give a one-sided impression of what science is all about. Thus the title essay "The Awards of Science" deals with just that; the scientific prizes and awards available to scientists, and how many of the recent prize-winners have been spotted among ISI's "most-cited authors". The object of the essay is to dispel the impression that the Nobel Prize is the only possible goal for a scientist — there are many other prestigious

prizes to compete for. "To set a practical limit for the essay, we have only included those awards that bestow an honorarium of at least \$15,000."

This image of science as a sort of competitive hit-parade is probably an occupational bias of the computerized citation-analyst. Fortunately Garfield's interest in science transcends this limited view. His concise accounts of research in many fields, and of the achievements of many scientists, are well worth browsing through for their erudition and informativeness — and, as one would expect, they are impeccably, not to say obsessively, documented and referenced. □

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## The moving spirit

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**Gravitational Physics of Stellar and Galactic Systems.** By William C. Saslaw. *Cambridge University Press: 1985. Pp.491. £50, \$90.*

As William C. Saslaw points out in his new book, gravitation is the spirit which underlies almost all astronomical phenomena. Rightly, then, the study of gravitational dynamics has had a major part in astronomy since the time of Newton, and today it is the foundation on which we build our understanding of the structure, formation and evolution of planetary systems, of star clusters, of galaxies, and of the large-scale distribution of galaxies. Recent research has been greatly stimulated by the advent of computers that are able to integrate the equations of motion directly for systems containing thousands of particles. As a result gravitational dynamics has become, in some part at least, an experimental science.

In view of its importance in modern astronomy, it is surprising that there is no recent all-embracing account of the subject. *Gravitational Physics of Stellar and Galactic Systems* thus addresses itself to a well-recognized gap in the literature. As the title suggests, Saslaw is here more interested in elucidating physical processes than in modelling astronomical systems. His book is written in an easy-going conversational style, and is laid out as a survey of the phenomena which govern the gravitational evolution of many-body systems.

The whole field is divided into four general areas: homogeneous systems, infinite inhomogeneous systems, finite spherical systems and finite flattened systems. The first part discusses descriptive formalisms such as the Liouville, Boltzmann, Fokker-Planck and BBGKY hierarchy

equations, together with fundamental processes such as collisional relaxation, dynamical friction, collective scattering and Landau damping. The second part concentrates on clustering in an infinite universe, with particular emphasis on thermodynamic considerations, while the third deals with the structure of spherical systems and their evolution under the influence of collisional relaxation and binary formation. The last part discusses some aspects of disk galaxy dynamics and a few other assorted topics. The sophistication of treatment and completeness of coverage decrease steadily from one part to the next, even though the relevance of the subject matter to contemporary research increases. The book restricts itself to processes involving purely Newtonian gravity.

On the dust jacket, the book is described as suitable as a text for graduate students. However the depth and completeness of coverage are too patchy and too idiosyncratic to serve students well. Thus there are long and involved calculations of collective scattering and of the growth of clustering from an initially unclustered state; these are difficult to follow and lead neither to astronomically useful results nor to a significant sharpening of physical intuition. On the other hand, the treatment of the structure and instabilities of ellipsoidal and disk-like systems is at best sketchy.

Overall, the selection of material reflects the author's own research interests, and the distribution of emphasis differs somewhat from that typical of modern research in the field. The book's length is a consequence of its enjoyable but discursive style, rather than a reflection of the completeness of its contents. Unfortunately, we shall have to go on waiting for a comprehensive discussion of modern gravitational dynamics. □

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