earlier to a study of the fundamentals of structural geology.

The reader is guided step by step from the classical account of deformation and flow with which engineering students will be familiar, including finite strains and yield criteria, through a discussion of such complications as plastic flow, firmo-viscosity, brittle fracture and earthquake waves, until he can appreciate finally the more subtle refinements that the geologist must make allowance for. These include stress patterns near boreholes, tunnels and cracks, the dependence of elastic moduli on strain, strain rate and temperature (attributed largely to the presence of pores in rocks), ductility and strength, planes of weakness, liquid flow through porous media, the difference between laboratory tests on sound specimens and field tests on rock formations with breaks and other imperfections, and progressive finite deformation over geological periods of time (to be explored with veins, fossils and inhomogeneities as the only visible indicators). Wherever possible, both theoretical and observational considerations are brought together on each topic.

The argument is developed throughout with full mathematical detail, a high standard of accuracy and freedom from misprints, always in a clear, easily readable style. A glossary of the chief symbols used and separate author and subject indexes are appended. References to original papers and other works are included in the text.

This book can be recommended as giving a sound and clear account of deformation and flow in theory and in practice, admirably suitable for the geologist and the engineer and worthy of the attention of students of other disciplines seeking a balanced introduction to the general deformation of solids.

J. G. OLDROYD

SPECTRAL ANALYSIS

Rotational Structure in the Spectra of Diatomic Molecules

By István Kovács. Pp. 320. (Hilger: London, November 1969.) 104*s*.

THE name of Professor Kovács is well known to spectroscopists who analyse the rotational fine structure of the electronic spectra of diatomic molecules. In this book, all his own work on multiplet formulae, line intensities and on spectroscopic perturbations is included, together with similar equations derived by other workers in the most fundamental area of spectroscopy.

The first chapter deals with the solution of the wave equation for a diatomic molecule and includes many of the small interactions which are frequently neglected in approximate treatments. The rest of the book consists of applications of perturbation calculations to various types of interaction for all the commonly observed species of spectroscopic state and for many which are rarely seen or as yet unknown. Multiplet term formulae are derived for states with all multiplicities from singlet to septet. Each formula is tested by application to observed spectra and in most cases the agreement with theory is impressive. The intensity distribution formulae, which are presented very fully, should be the most useful part of the book. In particular, this section will be welcomed by astrophysicists, who are increasingly interested in the spectra of diatomic molecules.

A regrettable omission in a book published in 1969 is any account of nuclear hyperfine structure, which can alter the appearance of rotational structure and lead to incorrect analysis as in LaO. Again, a difficulty in this type of work is that many of the interactions are introduced as configuration interaction with other states. Such interactions are limited to one or two states, whereas, in reality, a whole spectrum of energy levels will interact. To include more than a few interacting states would make formulae which are already formidable into something quite unmanageable, but it does mean that if the formulae are ever found to fail an excuse in terms of configuration interaction can usually be made.

W. G. RICHARDS

Obituaries

Professor E. H. F. Baldwin

ERNEST BALDWIN, who died suddenly on December 7, 1969, will be remembered not only as one of the chief protagonists of comparative biochemistry but for his outstanding contributions to teaching. Educated at the Crypt Grammar School, Gloucester, he went up to St John's College, Cambridge, as an exhibitioner in 1928. He took a first in both parts of the Natural Sciences Tripos, including Part II Biochemistry. In 1936 he became a research fellow of his college and in 1943 a lecturer on the staff of the Biochemical Department under Sir Frederick Gowland Hopkins. Greatly influenced by Hopkins's wide ranging approach to biochemistry, Baldwin applied his zoological knowledge to extending the comparative aspects of the subject and in particular nitrogen metabolism. One of the earliest results of this was his little book *Comparative Biochemistry* (1937), which is still recognized as a classic introduction to the subject.

During this time Baldwin was also acquiring a wide reputation as a teacher. His sense of the modern and interesting and his quietly dramatic presentation appealed strongly to students, and the theatre was always full. During the war years much of the teaching burden in biochemistry fell on him, so that he had to cover a wide field. One product of this was *Dynamic Aspects of Biochemistry* (1947), a book that had a worldwide impact on the teaching of the subject. The presentation, based on his inspiring lectures at Cambridge, was entirely new and it was received with unusual warmth. Its sales have by now exceeded 80,000 copies in five editions and five reprints; and it has been translated into seven languages (German, Italian, Spanish, Russian, Serbo-Croat, Japanese and Malay), thus winning acclaim for British biochemical teaching. A considerable part of its success lay in its undoubted literary merit, and indeed it gained for Baldwin the European Cortina-Ulisse prize in 1952.

In 1950 Baldwin was called to the chair of biochemistry at University College, London. His appointment belied the received idea that university teachers are elevated to chairs solely on the basis of their research contributions, for there is no doubt that Baldwin's great merits as a teacher weighed heavily in his selection. University College, under F. G. Young, had taken the first steps towards the establishment of a BSc special degree in biochemistry. It needed a professor with a high reputation as a teacher to carry through the negotiations with the university to a satisfactory conclusion and to establish the new course on a sound footing.

Baldwin remained at UCL for the next twenty years. During that time, in spite of frequent ill-health, he added much to our knowledge of the comparative biochemistry of nitrogen metabolism and the relation between ureotelic metabolism and water shortage, building up an internationally known school of research workers in such subjects. Curiously, this endeavour was always valued more highly in the United States and on the Continent than in Britain. In it Baldwin was ahead of his more conservative contemporaries, and it is only of very recent years that the movement to cross boundaries has made much progress here. Baldwin's influence at UCL was particularly important, for he saw biochemistry as a "biological" subject and his views were thus a valuable counter to the prevailing London conception of biochemistry as a branch of chemistry.

Bearded and amiable, quizzical and fastidious, the figure

of Ernest Baldwin will be sadly missed, not only in the neighbourhood of Gower Street but also in his old haunts at Cambridge. It was from St John's that he went forth for his early work with friends at the French marine biological stations such as Roscoff and Tamaris; and the Biochemical Institute in Tennis Court Road saw some of his most notable achievements. There he was a particularly active organizer of the International Congress of Biochemistry in 1949, editing for it in collaboration the memorial volume *Hopkins and Biochemistry*. Baldwin was indeed a most worthy disciple of Frederick Gowland Hopkins. A good friend, a kindly director, a fine scientist and a gifted writer has been lost at too early an age to all of us.

Correspondence

Goldfinger no Longer

SIR,—You say that "it is arguable that a research council should divest itself of supporting the routine data collection that comprises much of the work of the institutions. This is not research and only occasionally aids research" (*Nature*, **225**, 2; 1970). I doubt whether these propositions are arguable in respect of any major field of science but they are quite untenable in regard to environmental research.

Penetrating research on the natural environment is impossible without programmes of field data collection. In answer to your suggestion that work of this kind should not be done in research institutions, I say that it would be disastrous if it were to be done anywhere else.

If your propositions were to be accepted, it would mean that the NERC would be able to support research on the input components of the natural system (in terms of physiology and biochemistry, for example) but would find it difficult to support analyses of the outputs in terms of field observations; or, at least, you would not support those field studies which deal with extensive time-series or large areas. The point which you have missed is that some kinds of research depend on the availability of collections of observations in the field, often on a scale which can be achieved only by establishing a systematic programme of sampling. The resolution, accuracy and scale of such observations must be determined by the objectives of the research programme. Thus they are as integral to research as a physiologist's laboratory equipment and measurements, for example.

Environmental research cannot exist without the description, analysis and interpretation of events and processes in nature. This is becoming even more essential with the increasing threat of pollution. The detection and measurement of the effects of pollution in the field will always be difficult, and often impossible, without a thorough understanding of the base-lines of natural variation. It would be extremely dangerous to predict the consequences of pollution, or to devise precautions against it, without a sound knowledge of natural ecosystems. Any attempt to monitor pollutants will be pointless unless we also monitor the communities and ecosystems. Essential laboratory studies of topics such as toxicity will be wasted unless they can be related to ecological field studies. Thus fundamental research on natural variations lies at the core of the investigation of pollution as it does of almost every branch of environmental science. The scale of natural variation is such that it demands the analysis of field observations taken frequently over a very long period of years and, often, from a very wide area.

In the past, much so-called ecology has dealt with single species, limited regions or restricted periods, rather than with communities and ecosystems. Of the many reasons for this, the most important are the severe practical as well as intellectual difficulties in analysing nature; especially, perhaps, in studies of the oceans. However, the revolution in electronics is now beginning to remove these impediments by providing the sensors with which to make the observations, the data loggers on which to record them and the computers with which to analyse them.

My excuse for making so many self-evident points is that your propositions, if unchallenged, would deny environmental science the principal opportunity for advance in this last third of the twentieth century. This is the establishment of research programmes based on the systematic collection and analysis of field data—linked, of course, to the essential experimental and theoretical studies.

In the environmental sciences, at least, applied science is no more than fundamental research on those things which matter to society. Any attempt to define the limits or to isolate either kind of research is bad for science and wasteful for society. I believe that your propositions are both.

Yours faithfully,

R. S. GLOVER

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University News

Dr Francis J. Smith has been appointed director of the Computer Laboratory at the **Queen's University of Belfast.**

Dr J. N. Hawthorne, University of Birmingham, has been appointed professor of biochemistry in the **University of Calgary.**

Air Marshal Sir Kenneth Porter, Royal Air Force Maintenance Command, has been appointed director of technical education projects at **University College, Cardiff.**

Professor Maurice D. Kilbridge has been appointed dean of the **Harvard Graduate School of Design.**

Dr James F. Tait, Worcester Foundation for Experimental Biology, has been appointed to the Joel Chair of Physics as Applied to Medicine tenable at the **Middlesex Hospital Medical School.** The title of Professor of Urology has been conferred on **Mr J. P. Blandy** in respect of his post at the **London Hospital Medical College.**

Professor N. Millott, Bedford College, has been appointed director of the newly instituted University Marine Biological Station, Millport, and professor of zoology in the **University of London.**

The **University of Nottingham** has appointed three special professors in the Department of Physiology and Environmental Studies, School of Agriculture: **Dr L. E. Mount,** ARC, Babraham (Environmental Physiology); **Mr K. J. Hill,** Unilever Research Laboratory (Animal Physiology); **Dr W. R. Butt,** United Birmingham Hospitals (Clinical Endocrinology).

Dr Hans Meidner has been appointed to the newly established chair of plant biology in the **University of Stirling.**

Professor Charles L. Miller has been appointed associate dean of the School of Engineering, **Massachusetts Institute of Technology,** and **Professor Peter S. Eagleson** has been named head of the Department of Civil Engineering within the school.