This is a rewarding book and will be of very great interest not only to neuroendocrinologists but to psychiatrists, neurophysiologists and biochemists. Areas of research have been reviewed in which there have been advances, innovations and controversies, and I for one, and I am sure many other people, look forward to the second volume. D. EXLEY

BIOMEDICAL COMPUTING

Computer Programs in Biomedicine

Vol. 1, No. 1. Quarterly. (North Holland: Amsterdam, January 1970.) Hfl. 108; $30 per volume.

International Journal of Bio-Medical Computing

Vol. 1, No. 1. Quarterly. (Elsevier: Amsterdam, London and New York, January 1970.) 150s; $18 per volume.

THESE are, I believe, the first two journals devoted exclusively to biomedical computing problems to be published in Europe, but both are avowedly international and the *Journal of Bio-Medical Computing* has four out of seven papers from the United States and *Computer Programs in Biomedicine* two out of five.

To judge adequately the usefulness of all the programs published in this first issue of *Computer Programs in Biomedicine* would require a greater range of expertise than I possess. Of the five programs presented, three deal with standard applications: time series analysis of neuronal impulses, radiation dosage planning and computation of survival tables, one with the analysis of data on the performance of a prosthetic leg, and one with the automatic analysis and documentation of Rorschach tests. The Fortran IV survival table program does not add much to that available in the IBM scientific sub-routine package, and the input and output facilities are much less comprehensive than the BMD program. I cannot fairly assess the value of the others because this depends very much on the equipment available to potential users. The neurophysiological programs, which are written in assembly language, may be of value to PDP8 users with the right hardware configuration, but that for analysis of leg prosthesis seems to be of very limited general interest. The program for Rorschach tests requires 23·5 K of 48 bit word storage on a CDC3600 plus an optical reader connected with an IBM1130 computer, and the radiation dosage program 32 K of core store on the IBM7094/11 which might limit their general usefulness in this country. Both are in Fortran IV.

The aims of this journal as indicated by its title could serve a very useful purpose. They may, however, be regarded with some reservations by potential users. Even in the era of efficient high-level compilers, transfer of programs from one computer to another can be a surprisingly difficult and frustrating business (as many of those who have used the UCLA Bio-Med series will testify) unless an exactly similar machine, compiler and even operating system are used. If a program is of any length and complexity its author may well find himself committed to an extensive and difficult correspondence, and its users be involved in an adaptation process which may in the end be more trouble than writing their own program from scratch.

In other fields it has been found that there is considerable scope for relatively short self-contained algorithms of the kind published by the Association for Computing Machinery and the Royal Statistical Society, and one hopes that these will find a place in this new journal as well as more ambitious and comprehensive programs and program systems.

The *International Journal of Bio-Medical Computing* contains both review articles and those devoted to more limited technical problems. I found the two articles on computers in the hospital laboratory interesting and down to earth. Of the other articles, one on "Doctor, Medical Laboratory and Pharmacy On-line", seems to be based on no system actually in operation, and one on "A Community Health System Model" hangs a good deal of cybernetic philosophizing about a rather modest practical achievement in documenting abdominal hysterectomy patients.

The technical articles are straightforward, but I would criticize one which spells out in detail, once again, the familiar mathematics of fitting single and double exponential curves to compartmental flow data by least-squares. The authors make no mention of the very extensive literature on this subject and seem to be unaware that the successive approximation procedure need apply only to the exponential constants, the linear constants being determined at each stage of the iteration by the least squares equations; nor do they derive sampling errors for the estimates. These omissions greatly reduce the value of their paper and program. The space could have been much better used in exploring the fallacies of this process which arise from the extreme non-orthogonality of successive exponential terms. It is now 13 years since Lanczos drew attention to these difficulties in a standard textbook, and records of experience of their practical importance would be valuable.

It is, of course, impossible to judge either of these journals fairly on the first issue. Biomedical computing is expanding rapidly and there is little doubt that both of them have a useful contribution to make in this field.

C. C. SPICER

MATHEMATICAL MEDICAL PHYSICS

Theoretical Foundations of Medical Physics

By Willem Klip. Vol. 1: Mathematics for the Basic Sciences and Clinical Research. Pp. xii+406. $15. Vol. 2: An Introduction into Medical Physics (with an Emphasis on Cardiovascular Research). Pp. x+447. $20. (University of Alabama Press: University, Alabama, December 1969.)

PROFESSOR KLIP is clearly a disciple of the late H. C. Burger who developed the outstanding department of medical physics at Utrecht, one which might well be described as a department of medical mathematics. A more explicit title for his book would be "A Mathematical Treatment of Selected Topics in Medical Physics". It is not for the medical undergraduate seeking general information as to how physics is being applied in medicine. It is specifically for the advanced researcher and then only for the stout-hearted. Volume one is entirely mathematical. It is rather disappointing. It is difficult to read except by a highly trained mathematician and seems to deal with equations for equations' sake. It lacks the stimulus of physical examples so that its object is obscure—until volume two is reached. It is worthwhile to compare the first volume with another book which one of us has found very useful in teaching applied physics to biologically orientated students—*Mathematical Methods in the Physical Sciences*, by Mary L. Boas (Wiley). To quote one example: in the treatment of forced oscillations, Boas spends nine pages backed by reference to mechanical and electrical situations; Klip treats it as an exercise relevant only to a general discussion of differential equations with constant coefficients—the practical importance only appears in volume two. We cannot agree with the author that volume one might stand by itself as a possible textbook for undergraduates.

Volume two is a different proposition, and it will be welcomed by workers in medical physics, especially by those in the cardiovascular field, for the depth and rigour of its argument. The clinical applications discussed include the principles of ballistocardiography and of electrocardiography; measurement of blood velocity; waves in electric lines and blood vessels; the vascular system and the filter concept; and radioisotopes and X-rays. This treatment is, of course, mathematical and

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