

MBEC NEWS



No. 2 March 1978

International Federation for Medical & Biological Engineering

WORKING GROUPS IN THE FEDERATION

by IFMBE Secretary-General J. A. Hopps

At a meeting of the Administrative Council on 16th September 1977 it was agreed that the IFMBE should promote the development of working groups. Oivind Lorentsen proposed the following two groups: one on clinical engineering and a second on rehabilitation engineering. It was also suggested that we should examine the context of the First International Biomedical Engineering Workshop Series held in Dubrovnik during 1972 and 1973, as potential topics for Federation working groups.

Series

The Workshop Series was organised in a collaborative effort by the American Institute of Biological Sciences and the Yugoslav Committee for Electronics and Automation at the instigation of the funding body, the National Science Foundation of the United States. The publications of the workshops were supported by the Fannie E. Rippel Foundation.

Chairmen

The titles and chairmen of the five technical workshops were as follows:

- (i) Biomedical equipment maintenance service programmes; Chairman, J. A. Hopps, Canada
- (ii) Assistive devices for the disabled; Chairman, Pierre Rabischong, France
- (iii) Technology for mobile and remote medical care delivery; Chairman, James L. Craig, USA
- (iv) Communications technology applied to medical care; Chairman, Antoine Rémond, France
- (v) Technology in management of medical care; Chairman, John H. Busser, USA

Following the five technical workshops, a final session was held:

(vi) International prospectives for biomedical engineering

This reviewed the total programme, with each workshop chairman summarising the outcome of his sessions. As in the case of each of the earlier sessions, a report was published subsequently.

It is apparent from these subjects that they are more specific than the interdisciplinary categories proposed

by Lorentsen. In fact most of them could be considered as facets of Clinical Engineering. We must now decide on a policy for designating Federation working groups for their maximum productivity. We invite you to send your views to *MBEC News* or to the Secretariat. Do you want broad subject working groups or ones that deal with specific topics? Should they be developed as regional activities to facilitate the planning of seminars or workshops?

Ethical considerations

The International Federation for Medical and Biological Engineering: *observes* that although the document wording adopted by the 29th World Medical Assembly in the so-called Declaration of Tokyo concerns Medical Doctors only, the ethical obligations apply in principle to other health professions as well; *takes into account* the growing evidence that biomedical engineering principles, particularly in the field of electrical stimulation are being applied in several countries for the purpose of interrogation and torture; *adopts* the following ethical principles:

- (1) Engineers and scientists engaged in design of biomedical instrumentation, or in sales, maintenance or application thereof, shall refuse to allow their professional or research skills to be exploited in any way for the purpose of torture, interrogation or punishment, nor shall they participate in the training of others for such purposes.
- (2) Biomedical engineers and scientists should remain scrupulously vigilant to the possibility that

their research may be used for purposes contrary to the original intent of the investigation, and should avoid involvement in any work which seems likely to be so abused.

Workshop Proceedings

The Federation's Secretary General writes to say that he has available a small stock of the 9th ICMBE (Melbourne) Workshop Proceedings. These are free for single copies, and a nominal postal charge for multiple copies. (Eight Workshops in separate reports.)

He also has a supply of the journal *Medical Progress through Technology* Vol. 4 no. 1/2 July 1976 which included the tutorials for the 11th ICMBE (Ottawa). Single copies are free, and a nominal postal charge is made for multiple copies.

Copies of the Digest of the 11th ICMBE are available at \$25, Canadian postage paid, and there are also a few copies of the digests of former ICMBEs. Enquiries to Dr. J. Hopps, National Research Council, Ottawa K1A 0R8, Canada.

The Nightingale Prize 1978

MOCKROS, L. F. and GAYLOR, J. D. S.
(1975) Artificial lung design: tubular membrane units. *Med. & Biol. Eng.* 13, 171-181.

GAYLOR, J. D. S. and MOCKROS, L. F.
(1975) Artificial lung design: sheet membrane units. *Med. & Biol. Eng.* 13, 425-435.

The Nightingale Prize is awarded biennially from the papers published in *Medical & Biological Engineering & Computing*. The paper or papers chosen therefore represent a high standard of research. The papers of Mockros and Gaylor were chosen because they are considered to combine a good theoretical approach with a sound practical knowledge in an area which is clinically relevant.

The design of artificial lungs is an important area in biomedical engineering because in this field engineering techniques can be used directly in saving lives.

The human lung is, of course, a very complex structure both anatomically and functionally. For example, the maintenance of blood oxygen levels is a process which must be carried out over the correct time

scale. Consequently, the design of an effective artificial lung is a difficult engineering problem. In their papers these authors have started with a detailed study of the relevant physiology which leads to a more biophysical interpretation.

In the work there is a very detailed study of the problems involved in designing oxygenators with sheet membrane and tubular channels. Different types of channels are compared critically. The question of the most suitable type of artificial membrane is also thoroughly investigated.

Engineering programmes

J. B. Oakes of the Applied Physics Laboratory, Johns Hopkins Road, Laurel, Maryland 20810, has compiled a list of 20 US Institutions which offer clinical engineering programmes. Those who would like further information on the courses and the persons to contact, or who would like to have courses added to the list, should contact Mr. Oakes.

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and Bioengineering

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Further information:
Medex 78
P.O. Box
CH-4021 Basle/Switzerland
Telephone 061 26 20 20
Telex 62 685 fairs ch

The accompanying events:

Technical meeting about
Computer tomography (CAT) and
Ultra-sound tomography
(June 6. and 7. 1978).

Congress of the Union of
Swiss Surgical Societies
(June 8.-10. 1978).


MEDEX 78

Programme for

BIOENG '78

The UK Biological Engineering Society is holding its 8th International Conference on Recent Advances in Biomedical Engineering at the University of Sheffield from the 17th-21st April 1978. The programme for the conference is as follows.

Plenary session speakers

Prof. G. D. Sims: 'Technology in medicine—a matter of discipline and patience'.

Prof. J. I. E. Hoffman: 'The effect of intramyocardial forces on intramyocardial blood flow'.

Dr. J. C. A. Raison: 'Bioengineering and clinical physics: freewheel or keep on pedalling?'

Prof. G. H. du Boulay: 'Investigation of the cranial circulation'

Prof. I. D. Cooke: 'The clinical need for biochemical screening'.

Themes

Biological control systems and modelling

Life support systems

Diagnostic techniques and instrumentation

Prosthetics, orthotics and aids for the handicapped

Physiological measurement

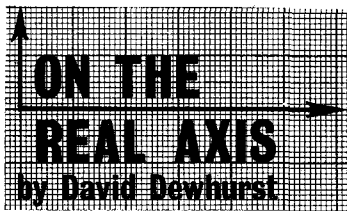
Tissue mechanics and properties

Biochemical analyses

The conference will be held in Ranmoor Hall at the University of Sheffield, which is the largest hall of residence at the university and can accommodate 500 delegates. It is intended to hold the entire conference proceedings including scientific sessions and exhibitions in this building to enable delegates to have the maximum amount of contact.

The registration fee is £60 to BES members, £70 to members of the HPA and societies affiliated to the IFMBE and £80 to others. The fee covers registration, full discussion papers, lunches, coffee, banquet, receptions and any necessary local transport.

The Chairman of the Conference Committee is V. C. Roberts and the Secretary-General K. Copeland. All enquiries should be addressed to: Bio Eng 78 Secretariat, Weston Park Hospital, Whitham Road, Sheffield S10 2SJ, England (Telephone: Sheffield (0742) 686071 ext 342).



BLUEPRINTS IN HEAVEN

Most biomedical engineers have taken their first professional qualification in one of the physical sciences, usually in engineering or physics. This training provides a sound basis for the practice of biomedical engineering; it also leaves the new graduate with certain set patterns of approach to new problems, and these are not always the appropriate patterns where the life sciences are involved.

In his great dialogue 'The Republic' Plato puts forward the notion that the things we see on this earth are shadows of reality, and that from these shadows we can make deductions about the real objects that cast them. Most scientists and engineers are Platonists; they believe that every imperfect and unpredictable process in the world around them has its perfect counterpart or blueprint in heaven, and that it is their business to find out what is on

that blueprint. Every mathematical treatment and every model of a real system implicitly leads in this direction.

When the would-be biomedical engineer is first introduced to the life sciences, he receives an unpleasant surprise. His first experiments on living systems show that not only is there a large variance in the results obtained, but that there is a steady drift due to the experimental object dying, drying out, or just getting bored. The biologist's counterpart of Murphy's Law is the Harvard Rule. 'If you take a group of animals, all of the same strain, and all bred to have identical characteristics, and you perform on them an experiment under carefully controlled conditions, each animal will do exactly what it feels like at the time'.

At this point in his career, the new graduate must either adapt his ideas, or retreat into the familiar and orderly world of machines and mathematics. If he does the latter, he cannot claim to be a bioengineer. To do the former, he must realise that living organisms are not 'messy' because they do not conform to a fixed blueprint; they offer a challenge to the investigator because they are constantly trying new methods of carrying out a repetitive task, and constantly adapting to a changing environment. I consider that every new graduate wishing to become a

biomedical engineer should seek formal training, including practical classes, in the life sciences. This will give him a number of advantages, both in handling his own problems and in handling those of his medical or biological colleagues. First, he will gain insight into the special problems of providing instrumentation for measurement of phenomena in living systems. Secondly, he will be able to use his basic training to study the structure and function of living systems themselves. Thirdly, he will be able to communicate with his colleagues. The man who remains a 'pure' physical scientist is like an English-speaking person who intends to live and work in France, but who refuses to learn to speak French. Even if he is absolutely convinced that English is the best of all possible languages, and even if he speaks English very slowly and loudly, he will be far less successful than a man who at least attempts to learn some French.

When we are approached by our medical colleagues with problems, we cannot expect them to be posed in engineering terms. We must be able to meet the engineer on his own ground. Any practising biomedical engineer will recognise the opening gambit 'Can you build this for me?' The correct response, phrased as tactfully as possible, is 'What do you want to use it for?'.

21 years at Royal College of Surgeons

On 6th January 1978, the Research Department of Anaesthetics of the Royal College of Surgeons of England celebrated 21 years of existence with an Open Day for its many friends and supporters. The Department opened in 1957 under its first Director, Prof. Ronald Woolmer, who was the first President of the UK's Biological Engineering Society. Following Prof. Woolmer's death, Prof. J. P. Payne became Director—a post which he still holds. From the outset, the Department was staffed on a multi-disciplinary basis with well equipped mechanical- and electronic-workshop facilities.

Both the Joint Editors of *Medical & Biological Engineering & Computing* currently work in the Department. Dr. J. Bushman is Deputy Director and Dr. Hill—Reader in Medical

Physics—was one of the founder members. Ten London University Higher degrees have been awarded to staff members for theses on a variety of biomedical engineering topics, and the Department has two online digital-computer systems. Co-operative research projects have been arranged with many hospitals, and close links have been built up with

the St. Peter's Hospital Group.

In November 1977, Prof. Payne accepted the post of Professor of Anaesthetics at the London Hospital in Whitechapel. This is a large teaching hospital, and access to the full range of clinical specialities should provide a fruitful continuation of the Department's activities in both research and teaching

Diagnostic ultrasound report

A new publication of the US Alliance for Engineering in Medicine and Biology is entitled 'System design of a clinical facility for diagnostic ultrasound'. This Report was commissioned by the US National Science Foundation. It deals with both the establishment and the subsequent management of clinical units, and

should be of particular value to health-care institutions considering new diagnostic ultrasound facilities.

Further information from: The Alliance for Engineering in Medicine and Biology, Suite 404, 4405 East-West Highway, Bethesda, Maryland 20014, USA.

AUSTRIAN SOCIETY NEWS

Several communications have been received from the Austrian Society for Biomedical Engineering which demonstrate the vigour and enthusiasm of a growing fraternity of biomedical engineers. They have established a rapport with prominent medical colleagues in the GDR, FGR, Yugoslavia and Switzerland, and have sent reports of exchange and invited guest speakers attending various international meetings during 1977.

Guest speakers

The President of the Society—Prof. Schuy—and the Secretary—Mr. Leitgeb—produced a joint report on their visit to the 1977 Congress in Leipzig from September 28–30th sponsored by the GDR Society for biomedical Engineering. As a result of close collaboration between the GDR and Austrian societies, guest speakers are invited to each society's conference, and three speakers from Austria were invited to Leipzig. Dr. H. Thoma spoke on 'Conclusions drawn from experience in clinical practice of mechanically assisting the circulatory system', Mr. H. Maesch spoke on 'The use of the Walsh Transform for the optimal filtering of evoked potentials', and Mr. D. Mostler spoke about 'Biomedical Engineering projects at the Sewarzpunkt Hospital in Klagenfurt'. Dr. Schuy was present and gave a talk on 'Ultrasound diagnosis employing a special distribution of the echo pattern'.

Main themes

The main themes of the Congress were: Automatic information processing; Biomedical engineering advances in therapy; Electronics in patient care and observation; Modelling; Signal acquisition; Safety and organisational problems. There were 14 sessions with a total of 129 papers, and scientific exhibits from 11 research centres. The Institute for Applied Biophysics at the Martin Luther University in Halle provided an excellent demonstration of developments in ultrasound for the B-scanning of heart and kidneys.

The Austrian Society held its

second annual 3-day meeting at the Technical University of Graz. 150 speakers took part from eight cities, under the general theme 'Medical electronic and laboratory technology—technical and clinical aspects'. There were two seminars, one scientific meeting and an exhibition of modern laboratory analytical apparatus, measurement systems, signal acquisition and prosthesis equipment. Emphasis was placed upon the need for interdisciplinary consultation to keep the ever-increasing technical facilities within economic bounds and the perspective of clinical applications. In particular, stress was laid on the impact that the micro-processor is bound to make. Even now, developments to incorporate microprocessors into medical instrumentation are well advanced, but with what implications in terms of cost-effectiveness to the hospital?

This topic was introduced by Mr. H. S. Wolff of London, who was the Conference's principal guest speaker.

The Society was able to entertain a number of visitors during 1977 including: Professor Vossius of Karlsruhe; Dr. Biegelmeier of Vienna; Dr. Kraft of Leipzig; Dr. Jaros of Pretoria and Dr. Van der Werff of Capetown. The Society looks forward in 1978, to the pleasure of the company of Dr. Antoni of Freiburg and Prof. Schaldach of Erlangen. It is endeavouring to maintain contact with its members and international circle of friends by means of a Newsletter in spite of the economic difficulties encountered by most societies and especially by a group in the first years of its development. Further details from Mr. N. Leitgeb, Austrian Biomedical Engineering Society, Infieldgasse 18, 8010 Graz, Austria.

Coronary-bypass surgery

In September 1977 the Cleveland Clinic Educational Foundation sponsored a Symposium marking the completion of the first decade of coronary-bypass surgery. This era of cardiovascular-disease management began with Dr. Rene Favaloro at the Cleveland Clinic and Dr. Johnson in Milwaukee in 1967 following the development of coronary angiography in the 1960s by Dr. F. M. Sones Jun.

Apart from the surgical aspects, the meeting considered the use of stress testing, portable tape-recorder monitoring, echocardiography and

myocardial scanning evaluation techniques. Controversy still remains concerning myocardial preservation in coronary surgery, and Dr. Mundth from the Massachusetts General Hospital chaired an interesting discussion on this topic. Various speakers showed improved results by using a variety of means ranging from cardioplegic solutions to hypothermia and pulsatile flows. Dr. Leon Golding of Cleveland hoped that mechanical circulatory assistance can be introduced into the surgical treatment of coronary artery disease.

THROMBOTIC PROCESS WORKSHOP

A 4-day Workshop on the Thrombotic Process in Atherogenesis was held from 16th to 19th October 1977, at the Sheraton Conference Centre, Reston, Virginia, USA.

Sponsored jointly by the National Heart, Lung and Blood Institute and the American Heart Association, the Workshop brought together experts on blood coagulation and atherosclerosis from all over the country. They discussed current concepts of

the complex interactions among cholesterol and other blood fats, blood platelets and other elements of the coagulation system, the endothelial lining and smooth-muscle cells of the arterial wall, blood-vessel injury, and other factors in the development of the artery-clogging deposits of atherosclerosis.

The Proceedings of the Workshop will be published by the National Heart, Lung and Blood Institute.

future conferences

Diagnosis and therapy

On Friday 8th September 1978, at the Hotel Meridien, Paris, a workshop will be held on Diagnosis and Therapy using microwaves. It will follow the 8th European Microwave Conference, which is to be held from 4th-7th September 1978.

Since it is very important when the opportunity arises to have all current and previous research reported, a workshop has been scheduled to allow more in-depth general discussions, on papers presented at the 8th European Microwaves Conference.

The aim of this international workshop is to make a state-of-the-art survey of the possibilities offered by microwaves in the medical field, and to study the progress achieved in the treatment of cancer.

The workshop topics will be as follows:

- (i) Diagnosis: thermography, non-invasive microwave methods (applicator systems, dosimetry technics . . .)
- (ii) Therapy: cancer therapy, hyperthermia, combined techniques, laboratory and clinical experiments, microwave hyperthermia systems
- (iii) Combined thermography and microwave hyperthermia
- (iv) Other topics

Further details are available from the Chairmen: M. Gautherie, Université de Strasbourg, Faculté de Médecine, 11 Rue Humann, 67085 Strasbourg, France, and A. Priou, ONERA-CERT, Microwave Department (DERMO) BP 4025, 31055 Toulouse, France

Computer programs

A new directory of existing US computer programs in Medical Computer Sciences is now available. Further details are available from Dr. J. Mischevich, The University of Texas, Health Science Centre at Dallas, Department of Medical Computer Science, 5323 Harry Hines Boulevard, Dallas, Texas 75235, USA.

Bioengineering

The 6th Annual New England Bioengineering Conference will be held on 23rd and 24th March 1978 at the University of Rhode Island, Kingston, Rhode Island. The conference will include scientific sessions in the areas of artificial organs, bioelectric phenomena, biomaterials, biomechanics, cardiovascular systems, computer applications in medicine, instrumentation, modelling and simulation, signal processing and ultrasound.

There will be a special tutorial on recent advances in biomedical imaging followed by a special session on the subject. There will also be special sessions on sports medicine and biomedical engineering education.

For information regarding registration and lodging, write to Dr. Dov Jaron, Biomedical Engineering Programme, Department of Electrical Engineering, University of Rhode Island, Kingston, Rhode Island 02881, USA.

Mechanics in medicine and biology

The First International Conference on Mechanics in Medicine and Biology will be held at Aachen from 30th August to 1st September 1978. It will have five main sessions with three topics running in parallel. Each session will be introduced by an invited Keynote Speaker. There will also be three Workshops. The Conference is sponsored by the IFMBE, and a number of other bodies. The tentative list of topics is as follows: Cardiac mechanics; Cardiovascular mechanics; Respiratory mechanics; Biorheology—gas and surface interactions—Cryogenics; Bio-heat and mass transfer; Modelling of biological systems and phenomena; Neuro-sensory-muscular mechanics; Muscular-skeletal-joint mechanics; Limb and body motion; Sports and athletics mechanics; Renal-ureter-bladder mechanics; Ergonomics; Mechanics of injuries; Mechanics of living systems; Principles of measurement techniques in medicine and biology.

All submitted abstracts will be published in a conference digest and a cross-section of the papers will appear in a special conference

Cybernetics

The 1978 International Conference on Cybernetics and Society, is sponsored by the IEEE and the Systems Man and Cybernetics Society. It will take place in Tokyo from 3rd to 5th November and in Kyoto on 7th November. The meeting will consist of a number of symposia of which one will be on 'biomedical systems and cybernetics—artificial organs and limbs, visual and auditory assistant systems, pattern processing for diagnosis, artificial intelligence in medicine, medical simulation, pharmacodynamics, medical causation, physiological regulation and the neural system. The Symposium Director is Prof. E. Patrick of the School of Electrical Engineering, Purdue University.

Further details are available from: ICCS-78, Keiei-Kagaku Shinko-Zaidan, 4-1-13, Sendagaya, Shibuya-Ku, Tokyo, Japan.

proceedings volume. The Conference will be held in the Karman Auditorium of the Rhine-Westphalia Technical University in Aachen. Further details from: Mrs. G. M. Stohr, Helmholtz Institute of the RWTH, Goethe Strasse 27/29, D-5100, Aachen, West Germany.

International biophysics

The Sixth International Biophysics Conference, to be held in Kyoto on 3rd to 9th September 1978, is organised by the International Union for Pure and Applied Biophysics. It will include symposia dealing with Primary processes in muscle contraction; movement in sperm, cilia and bacterial flagella; Physical methods; Analysis of visual information by the nervous system; mathematical models in biophysics; Biorheology. The conference language will be English. Further details are available from: Prof. F. Oosawa, Department of Biophysical Engineering, Osaka University, Toyonaka, Osaka 560, Japan.

IFMBE PUBLICATIONS

During the Sorrento Conference, in September, in Italy, there were, besides Scientific Meetings on a high level, very fruitful meetings of the Administrative Council and the Publications Committee of the IFMBE.

In two meetings of the Publications Committee the following matters were proposed to and approved by the Administrative Council:

- The subscription rate for members of Member Societies of the IFMBE has been maintained for some years at £6.00. This rate has to equal the run-on costs of the Journal. Since the run-on costs have increased considerably, the member rate has been determined as £8.00 for the year 1978.
- On the basis of the results of a questionnaire about *MBEC-News* (see below) and on the suggestions of the Meeting of National Secretaries, it was decided to continue printing and distributing *MBEC-News* in 1978 in the same way as was done in 1977.
- From the National Secretaries Meeting in Ottawa 1976, the suggestion was made to initiate an inquiry about biomedical engineering courses and programmes going on in the member countries. A questionnaire has been prepared. It was decided that the Publications Committee should send 10 copies of the questionnaire to each National Secretary. These Secretaries will select bodies who are dealing with biomedical engineering and will send a copy of the questionnaire to these bodies. After gathering in the completed questionnaires, the National Secretaries will send them to the Publications Committee. The

chairman of the Publications Committee will issue the results in the form of a booklet. On the suggestion of the chairman of the National Secretaries Meeting, it was decided that the chairman of the Publications Committee has the authority to decide to continue with or to stop the preparation of this booklet, depending on the response of the questionnaire.

In July 1977, a questionnaire about *MBEC-News* was sent out to the 20 National Secretaries. By then three issues of the *MBEC-News* had been published. 12 Secretaries returned the completed questionnaire. The most important results of this questionnaire were as follows:

- The National Secretaries are pleased with the contents and size of the bi-monthly issue of *MBEC-News*.
- The most important item to be published in *MBEC-News*, indicated by the National Secretaries, is the announcement of meetings. Secondly, the reports of meetings was mentioned and, thirdly, research activities.
- Four times (33%) the suggestion was made to publish a calendar with activities in the biomedical engineering field (not only international, but also national).
- The information flow from the National Secretaries to *MBEC-News* has to be improved. Only four Secretaries (33%) provided one or more items of information of their national activities to the editor.

B. VAN EIJSBERGEN

Methodological problems

A workshop on methodological problems with the transcutaneous monitoring of blood gases took place, on the 18th and 19th November 1977, at the Anaesthesia Research Centre of the University of California Medical Centre in San Francisco. The session topics were: Problems imposed by the skin; Sensor designs; Membrane and electrolyte manipulations; Clinical considerations and problems in transcutaneous monitoring; Skin

measurements of pO_2 and skin measurements of pCO_2 . The techniques covered both transcutaneous pO_2 and pCO_2 electrodes and the use of quadrupole mass spectrometers. More than 30 papers were presented.

Further details are available from Dr. J. W. Severinghaus, Anaesthesia Research Centre, HSE 1386, University of California Medical Centre, San Francisco, California 94143, USA.

Scientific journal publication

The establishment of a scientific journal by an international organisation such as the IFMBE, requires them to liaise with a publisher in its production.

Important factors

The following two factors are important:

- (i) The Federation needs to establish, and maintain, a good standard for the journal.
- (ii) The journal should be financially viable.

The first point requires the appointment of an editor, who would then be responsible to the Federation for the standard of the journal. The second involves negotiation of a contract with a publisher and co-operation with him on organisational matters.

Publication problems

A problem for international organisations is that, in order to be democratic, the officers and committees should be representative of countries from all parts of the world, making effective communication difficult. The control of a journal by the Federation demands a much closer liaison with both the publishers and the editors who are responsible for the actual production of each issue. To facilitate this, a sub-committee of the Publications Committee was established, the Federation Journal Committee (FJC), with members resident in the country of the publishers, at present the UK. This committee maintains close contact with the publishers and editors and holds occasional meetings with them, either jointly or separately. It has the responsibility for making decisions with respect to the journal, unless these are considered to be matters of substance, in which case they are referred to the chairman of the Publications Committee.

Committee members

The FJC comprises the following three members in the UK: W. J. Perkins (Chairman), D. Simpson, K. Copeland, and B. van Eijnsbergen (ex-officio as Chairman of the Publications Committee).

Clinical engineering programme

The University of Arizona at Tucson has established a clinical-engineering academic programme which is offered as an option in the Master of Science course in the department of electrical engineering. The option was initiated with support from the W. K. Kellogg Foundation as part of a statewide effort to provide clinical-engineering assistance to health-care facilities in Arizona. The clinical engineering course requires approximately two years to complete, and includes a paid hospital internship and a variety of interdisciplinary courses. It results in an M.S.E.E. degree.

Thesis project

There is a thesis project and students must also obtain an M.S. with a major in electrical engineering. Required course work includes: physiology, medical instrumentation, clinical engineering, administration, and electrical-engineering courses. Optional courses are available in microprocessors, computer interfaces, medical imaging with X-rays and ultrasonics. Courses in biochemistry, biomedical transport, biophysics, biomechanics, human performance, health-systems management are also able to be included.

Further details can be obtained from: Dr. Kenneth C. Mylrea, Director, Clinical Engineering, Building 20, University of Arizona, Tucson Arizona 85721, USA.

Computer medicine

The Society for Computer Medicine has published as a second edition its Manual of Computers in Medical Practice. The manual has 154 pages and contains 16 articles. The price will be 'approximately \$16'. Further details are available from Dr. A. Jenkin, Executive Director, The Society for Computer Medicine, 5100 Edina Industrial Boulevard, Suite 231F, Edina, Minneapolis 55435, USA.

Bio-fluid mechanics

The First Mid-Atlantic Conference on Bio-Fluid Mechanics will be held at Virginia Polytechnic and State University, Blacksburg, Virginia from 10th to 12th August 1978. The Conference will be conducted by the Department of Engineering Science and Mechanics in co-operation with the Extension Division of the University.

Broad areas which will be emphasised include: Haemodynamics in arteries and veins; Cardiac fluid mechanics; Transport in capillaries; Renal function and dialysis; Respiration; Heart-lung devices; Fluid dynamic interaction of animals with their environment; Windblast; Intra-

cellular and extracellular fluid mechanics; Transplants and prosthetics; The flight of birds; Mechanics of swimming; Fluid mechanics of Sweating; Joint lubrication.

About 40 to 50 papers will be accepted, in addition to three invited lectures, and a luncheon talk and an evening banquet seminar will be held. The Conference Proceedings will be published as full-length papers in book form. Further details from: Dr. D. J. Schneck, Department of Engineering Science and Mechanics, Virginia Polytechnic and State University, 227 Norris Hall, Blacksburg, Virginia 24061, USA.

Ambulatory monitoring

The Fourth Annual Conference on Ambulatory Monitoring will take place at the Boston Park Plaza Hotel, Boston from 18th to 20th May 1978. The main sessions are: Prediction and prognosis—Holter monitoring; Special studies—Ambulatory monitoring of systolic time intervals, Foetal monitoring, Peripheral and cerebral vascular studies; Clinical studies—cost effectiveness of

ambulatory monitoring, quantification of ectopic beats; standards; Surgery and drug studies; Event recorders and new technology; Significant arrhythmias.

Details are available from: Dr. S. R. Yarnall, MCSA, 315 University District Building, 1107 NE 45th Street, Seattle, Washington 98105, USA.

Photo-optical instrumentation

The 22nd International Symposium of the US Society of Photo-Optical Instrumentation Engineers will be held at San Diego from 28th to 31st August 1978. At this meeting there will be 14 in-depth seminars of which the following have a medical interest: Image understanding systems—these extract relevant information from images for automatic applications in a variety of areas.

Basic techniques include segmentation, edge and curve detection; shape analysis and object recognition; knowledge-based systems; Modern utilisation of infra-red technology; Laser spectroscopy; Visual simulation and image realism; Recent and future developments in medical imaging—here emphasis will be devoted to the presentation of trends and recent developments in medical imaging, improved instrumentation, new methodology and quantitative aspects. Topics of interest will include roentgenography, fluoroscopy, nuclear medicine, ultrasound and computerised tomography

(both emission and transmission modes).

Further details are available from: The Society of Photo-Optical Instrumentation Engineers, PO Box 10, Bellingham, Washington 98225, USA.

Medical instrumentation

The 13th Annual Meeting of the US Association for the Advancement of Medical Instrumentation will be held at the Washington Hilton from 28th March to 1st April 1978.

The main areas of the papers will be as follows: Standards and legislation, Hospital areas, Diagnostic instrumentation, Therapeutic instrumentation and Biomedical research. A number of awards for papers and achievements will be presented.

Further details of this major meeting from AAMI, 1901 North Fort Myer Drive, Suite 602, Arlington, Virginia 22290, USA.

Co-ordination between IFMBE and IOMP

On the 12th and 13th December 1977, representatives of the International Federation for Medical & Biological Engineering and the International Organisation for Medical Physics met at the IFMBE Secretariat in Ottawa to discuss matters relating to the co-ordination of future joint conferences and the mechanism for a closer liaison between the two bodies.

At the Ottawa meetings the IOMP was represented by the president Prof. R. Mathieur, the vice-president Prof. J. Mallard and by Prof. R. Clarke of the Canadian affiliate to IOMP. The president Dr. L. Goodman and the secretary-general J. A. Hopps represented the IFMBE.

The 1979 Israeli conference committee had expressed a need for an agreement on financial aspects and the subject had been reviewed by the Federation's Administrative Council at Sorrento and the IOMP Council at Rio de Janeiro. The Ottawa meeting confirmed an agreement for sharing costs and profits on a *per capita* basis. Other aspects of the combined conference were discussed and will be reviewed by the councils of the two organisations before the meeting arrangements are finalised.

A decision on the site of the 1982 combined meeting awaits further information. Recommendations will then be forwarded to the two councils for early action, to provide the maximum planning time for the host country.

The major agenda item at the Ottawa meeting was the drafting of a proposal for organising an international union which would comprise initially the IOMP and IFMBE as founding bodies. It is anticipated that other international organisations might seek affiliation. The purpose of

forming a union is to achieve association with the International Council of Scientific Unions (ICSU) to co-ordinate our scientific meetings and facilitate a closer liaison in our international activities while preserving the autonomy of the member organisations.

A discussion document was prepared in 1976 by Clarke and Hopps. It was examined by the councils of the IFMBE and IOMP and reviewed by a joint meeting at the 11th ICMBE in August 1976. At that time a liaison committee was authorised to obtain and report a detailed proposal. To obtain such information, the committee met with an official of the National Research Council, Canada's National Academy of Science. These national academies play a vital role in establishing and financing international unions. They appoint the national members, usually from the membership of national affiliates within the unions. We require the support of at least three national sponsors and three scientific unions. The statutes of the union must delineate the objectives, the method of direction, the scale of dues payable by national adhering organisations and the procedure for voting.

The 1976 document proposed that the international union be administered by a president, vice-president, secretary-general, treasurer and six elected members of council. The Ottawa meeting recommended that as an initial step, the first three officers of the IFMBE and of the IOMP form the nucleus of the union administration. A timetable prepared by the committee members schedules completion of a final draft of the terms of union before 31st December 1978 and a decision by the two organisations at the 12th ICMBE/5th ICMP in August 1979.

CLINICAL MEDICINE

In conjunction with the 13th Annual Meeting in Washington DC of the US Association for the Advancement of Clinical Medicine, to be held from 31st March to 1st April 1978, the Association, in cosponsorship with the Society for Computer Medicine, has arranged a 2-day course on computers in medicine. The subjects to be covered included the anatomy and physiology of a computer; Medical systems analysis; History taking and counselling; Medical records; Computer-assisted e.c.g. analysis; Radiology systems; Physician's office systems; Office accounting systems; Computerised axial tomography; Ambulatory patient management systems; Health information systems and their role in future medical practice. The course was designed to suit practising clinicians, nurses and medical administrators.

Symposium

The published proceedings of an AAMI symposium on 'Hospital infection control' are obtainable at \$10 for AAMI members and \$12 for nonmembers. Basic descriptions and analyses of sepsis, economic and legal ramifications and practices including sterilisation, packaging, gowns and drapes, laminar-flow systems and operating-room clean-up procedures are included.

The proceedings are available from AAMI, 1901 North Fort Meyer Drive, Suite 602, Arlington, Virginia 22209, USA.

AAMI Proceedings

The Proceedings of the 1977 12th Annual Meeting containing 370 condensed papers are available at \$15 per copy for AAMI members and \$20 for nonmembers from AAMI, PO Box 460, Springfield, Virginia 22150, USA.

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Joint Editors: D. W. HILL and J. A. BUSHMAN, Royal College of Surgeons of England, Lincoln's Inn Fields, London WC2A 3PN, England

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book reviews

The Practice of Clinical Engineering edited by C. A. Caceres, *Academic Press*, 1977, 481 pp. \$26.50.

On reading through the list of contributors to this volume, one realises how Cinderella must have felt on studying the list of guests for the ball! Almost the entire US biomedical engineering establishment must be present. The main topic groups are: a definition of clinical engineering; education; accreditation; insurance, liability and legislation; management and hospital-administration premises; the environment of the work; maintenance; industry and the clinical engineer.

With the increasing diversity and complexity of the instrumentation now found in hospitals, and the current emphasis on patient safety and device legislation it is apparent that trained engineers must be deployed in clinical situations where they assist in the choice of apparatus and its subsequent maintenance. By virtue of their skills and character, they have to win the respect of their medical, nursing and technician colleagues. Working in these surroundings is not easy, and this book provides a timely addition to the documentation on the US experience with clinical engineers.

Between them the various authors have produced much in the way of anecdotes, philosophy and factual information. On the question of peer review, it is interesting to note the wax cndlers of London in 1371 expressed the need for Masters to oversee the defaults that are committed in their trade. Four hundred years later it behoves us to speculate as to which Masters should serve on Certification Boards!

The section on the environment of the work contains instructive accounts of practical situations; e.g. intensive care and surgical units, anaesthesiology, coronary care. The section on coronary care includes some case problems dealing with faulty ground-

ing, nurse training, defective defibrillators and electrically operated beds. Cautionary tales are also provided such as the patient who suffered brain damage from anoxia due to a kinked ventilator hose and was awarded \$270 000 in damages. In that i.c.u. there was no resuscitator available and the heart monitor was not connected. The patient became blind and it can be argued that this could have been prevented by a system which provided for clinical engineers and better staff training and discipline.

This is essentially a book for browsing, and, if present in a library, will be read by clinical engineers and equipment technicians and hospital administrators concerned with providing an efficient equipment service. Cesar Caceres pays tribute to the Fannie Rippel Foundation for funding the first department of clinical engineering in a university. Nevertheless, he then points out that this pioneering effort was unsuccessful in the initial setting due to some conventional pressures, on which were superimposed outside pressures from government agency personnel that opposed the concept. Although the general establishment of clinical engineering services is a worthy goal, the way ahead is not easy, and our thanks are due to the contributors for putting their experiences between covers.

D. W. HILL

Medical computing edited by M. Laudet, J. Anderson, F. Begon. *Taylor and Francis*, 1977, 602 pp. £30.

A prime object of a conference should be to provide a forum for delegates with a common interest to meet and discuss their subject. To enable them

to select the lectures of interest, a digest of the papers is necessary, but conference organisers then need to decide whether a more detailed record of the meeting, in the form of proceedings, is desirable. If so, the complete papers could be obtained beforehand, which tends to limit the subject to an explanation of past work, or alternatively, speakers can discuss current work and be invited to submit papers for publication after the meeting. In this case an editor has a major task in getting all the papers in within a reasonable time so a complete record of the proceedings is not feasible. The editors of this volume adopted the first approach, and succeeded in producing a complete record of the International Symposium on Medical Informatics, in printed form, within six months.

Medical Computing has two quite distinct areas of application: large computer systems on the one hand and minicomputers on the other. These also are tending to divide, with networks being added to the first area and microcomputers to the second. This symposium was concerned primarily with large computer systems covering health care, public health, diagnosis and decision making. The difficulties of portability were also discussed, and the possibility of avoiding them by the use of networks. The other area of application was included in a chapter on the potential application of microprocessors in cardiology, respiratory physiology, haematology and care of the physically handicapped.

Unfortunately, the papers are produced in either French or English and, being equally divided, demand of the reader some linguistic ability in both. Si vous parlez bien en Francais et Anglais, c'est possible que cette libre ne sera pas trop difficile, otherwise the brief abstracts in both languages may only serve to frustrate.

W. J. PERKINS

Computers in ultrasonic diagnostics by P. N. T. Wells and J. P. Woodcock. *Research Studies Press, 1977*, xiv + 94 pp. \$14.95.

When confronted with leading questions about the possible applications to ultrasound of digital computing techniques, one is sometimes tempted to retort that ultrasound is so good that it has no need for computers, and, in a sense, this is true. As an imaging method, for example, ultrasound can generate high-quality tomograms without resort either to computerised reconstruction or to the image-enhancement techniques that have been applied in efforts to improve the relatively noisy and ill-defined images obtained with radioisotopes. Ultrasound can also present considerable problems in digital data technology as a result of the sheer abundance, and rapidity of production, of the information that it can generate.

It is for reasons of this sort that digital computing techniques have hitherto been slow in achieving any major impact on diagnostic ultrasound, and it was thus an act of some courage to undertake a book on the subject. The result is a short descriptive review that must surely record about every idea and suggestion that has been published. As one would expect from the authors, this job is done systematically and accurately, and is supported by much useful discussion, for the benefit of the nonspecialist, of topics such as the methods of generation of information by ultrasonic devices, and analytical techniques of particular value for information processing.

Thus we have a useful compendium of knowledge, but one would like also to share some of the authors' wisdom and judgment on the subject. This, however, is largely absent from this book, as the material is generally presented without comment on its relevance to the real needs and problems in the field. A page is devoted, for example, to methods of improving axial resolution of pulse-echo images by digital deconvolution of the echo waveform, but there is no mention there that the real problem is usually in achieving good resolution lateral to the beam, which is much more difficult to cope with by digital methods. Again, from the discussion of reconstruction techniques, the uninitiated might well

not appreciate either the severely limited practical applicability of transmission reconstruction methods or the potential interest in acoustic velocity tomography in its own right, which is presented here merely as a means to the end of correcting for refraction aberrations in attenuation images.

Much of the problem that the authors have found stems from the paucity of good publications and a large proportion of the literature that has been available to them for review (almost all of which has appeared in the last four or five years) can hardly be considered to be much more than grant bait. Undoubtedly, and as the book shows, computing techniques have enormous potential for application in ultrasonic diagnostics but much of this may prove to be in relation to analytic rather than to purely imaging methods. The next ten years will yield considerable and fascinating developments; meanwhile this book will provide a useful record of how it all started.

C. R. HILL

Medinfo 77 edited by D. B. Shires and H. Wolf *North Holland Publishing Company, 1977*, 1100 pp. \$95.00.

Medical informatics is the name given to the process of disseminating information in the medical field. Judging by this book, the proceedings of the Second World Conference on the subject, the name includes any application to which computers have been put in the health-care field. The topics range from modelling, to computer-aided diagnosis, physiological signal analysis, image processing statistics and prognostic index, to clinical data-base management systems and, of course, to hospital information systems. There is something for everyone who has an interest in computing in health-care, even if it is only a source of reference to enable him or her to delve deeper into a particular subject. Certainly, the proceedings of the first conference have been useful to me in this respect. Like *Medinfo 74* these proceedings do not include any discussion, but this volume does have a hard cover.

Among the 200 papers in the volume a number will be of particular

interest to readers of this journal; reviews of the place of computers in cardiology and neurophysiology, a paper on the storage and processing of obstetric signals, another on a stereoscopic display of echocardiographic images, another on a technique for assessing the information content of e.c.g. lead systems, and so on.

In conclusion, I think that the diversity of subjects in this volume will make a library's acquisition of it worthwhile.

P. J. BOURDILLON

Neurosurgical standards

The Neurosurgical Standards Committee of the US Association for the Advancement of Medical Instrumentation has developed a draft Transcutaneous Electrical Nerve Stimulator Standard, and, as required under the American National Standards Institute procedures, AAMI is now releasing this draft standard for public review. The standard contains requirements for labelling and performance of portable battery-powered transcutaneous electrical nerve stimulators for use outside the human body. Referee test methods and terminology are included.

Copies of the standard are available at a nominal cost. For ordering information please contact Mary Wills, Assistant to the Manager for Technical Development, AAMI, Suite 602, 1901 North Fort Myer Drive, Arlington, Virginia 22209, USA.

Guidelines

Guidelines for the procurement of technology in health-care institutions have been prepared by the US Alliance for Engineering in Medicine and Biology with support from the US National Science Foundation and the Fannie Rippel Foundation. There is a detailed section on the calibration, maintenance and repair of equipment. Copies of the complete guidelines are available from the Alliance.

Those interested in the guidelines should write to Patricia Horner, Administrative Director, The Alliance for Engineering in Medicine and Biology, 4405 East West Highway, Bethesda, Maryland 20014, USA.

Dissolved-oxygen meter

The Gallenkamp mains-run dissolved-oxygen meter has a range-selector switch that allows the meter to be set to 0-100%, 0-30% or 0-10% oxygen saturation. The instrument has a carrying handle and has multiturn potentiometers fitted for sensitive setting up of zero and scan.

A. Gallenkamp Co. Ltd., PO Box 290, Technico House, Christopher Street, London EC2P 2ER, England

Frequency/voltage convertor

The 13-4618-20 frequency/voltage convertor permits direct measurement and recording of the frequency or repetition rate of input signals from 10 Hz to 50 kHz. Any convenient frequency or frequency range can be selected on one of 36 calibrated ranges to produce a full-scale



output of 5V d.c. The instrument responds equally well to input signals of amplitudes from 10 mV r.m.s. to 500 V r.m.s. and has an input impedance of 100 k Ω . The convertor can be used with unipolar signals and also has calibrated zero suppression with a resolution of 0.1% permitting suppression of the static portion of a complex signal. Any waveform can be accepted.

Gould Advance Ltd., Roebuck Road, Hainault, Essex, England

Fluorometer/densitometer



The Corning semi-automation fluorometer/densitometer will scan any flat clear electrophoresis media and allows quantitation of isoenzyme electrophoresis tests by colourimetric and fluorometric methods. Simple quantitations can be done in 12.5 s and results are presented as tracings on data cards. The instrument includes a microprocessor to control

its automated functions, which include automatic zeroing and signal gain. Each sample fraction is displayed digitally as a percentage of the total sample scanned and the temperature is controlled within 1°C throughout the process.

Corning Medical, Corning Ltd., Halstead, Essex CO9 2DX, England

Cardiac output recorder

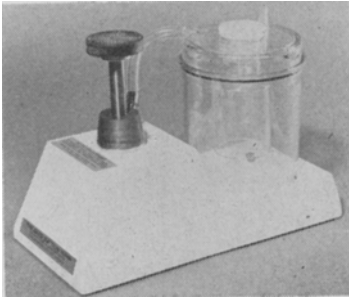
The *Cardiotherm 500-X*, measures cardiac output and calculates stroke volume. An optional printer is available for printing selected parameters. *Cardiotherm-500-X* can also be used as a patient temperature and heart-rate monitor. When interfaced with the printer, it works as temperature and heart-rate trend recorder. Printing intervals are selectable from 1 to 99 min. Patient temperature can be monitored either via thermistor catheter, rectal or skin surface probe. An optional dye densitometer is available for measurements of cardiac output by dye dilution method. Densitometer can be used

separately for dye-curve recording or plugged into *Cardiotherm 500-X* to obtain numerical values of stroke volume and cardiac output. *Cardiotherm 500-X* is both battery and line operated. The unit can operate for 12 h on one battery charge. In case of emergency and a low battery level, the instrument can be powered from the line. Thermistor input is completely isolated by isolation amplifier and floating with respect to earth.

Columbus Instruments, 950 No. Hague Avenue, Columbus, Ohio 43204, USA.

Suction pump

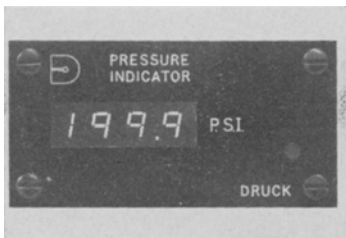
The Mk II Cape foot-operated suction pump has a clear polycarbonate container and suction valve which is autoclavable in high-temperature steam up to 135°. An



overflow device prevents aspirated fluid entering the pump. The pump weighs 5 kg complete with cover.
Cape Engineering Company Ltd., The Cape, Warwick CV34 5DL, England

Pressure-indicator unit

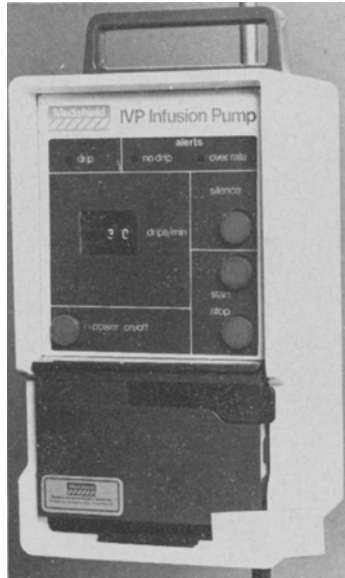
The DPI 200 digital pressure-indicator unit measures and indicates pressures directly in any specified units, has a full scale of 1999 and an accuracy of 0.1% full scale. Pressure ranges from 0.14 kg f/cm² (2 lbf/in²) to 700 kgf/cm² (10 000 lbf/in²) can be measured, with reduced accuracy above 70 kgf/cm².



The pressure transducer can either be fitted in the unit or be remote. The indicator has an aluminium case designed to fit a standard DIN panel cutout (92 x 45 mm).
Druck Ltd., 8 Fir Tree Lane, Groby, Leics. LE6 0FH, England

Infusion pump

The Medishield IVP digitally controlled infusion pump dispenses sterile liquids at any rate between one and 99 drops per minute. The unit incorporates a failsafe system which shuts off the pump and activates audio/visual alarms. The pump stops automatically when the



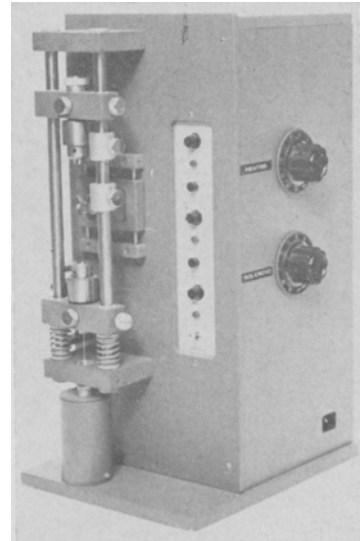
intravenous container is empty. Weighing 5 kg, the pump is supplied with an integral pole clamp, is mains powered and can also be operated from an external 12 V supply.
BOC Medishield, Priestley House, Priestley Way, London NW2 7AG, England

Sphygmomanometer

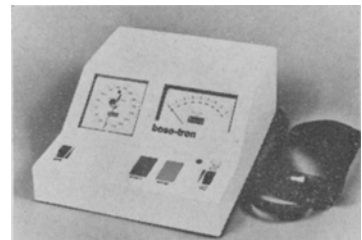
The Boso-Tron automatic sphygmomanometer can vary over a wide range the amplification of the Korotkoff signal produced by the patient. An automatic electronic control system matches the amplification to the optimum value to suit the differences in intensity of the Korotkoff signal of each individual patient produced at rest and under stress. The pulse rate is shown after two impulses have occurred at systolic, with the meter reading being retained until the instrument is switched off. The rate of deflation of the cuff can be regulated, and as the needle descends the Korotkoff signals are shown visually by a light emitting diode and are also audible.

Micro-electrode puller

The Searle semi-automatic micro-electrode puller relies on gravity to commence the 'pull' when the glass tube, held in a pair of vertically aligned chucks, becomes malleable. As the lower chuck falls it actuates the first of two microswitches which triggers a solenoid, thus accelerating



the downward movement. The second microswitch cuts off the power to the heating element. Heater temperature and solenoid 'pull' are variable, and the positions of the chucks, the element and the microswitches are adjustable.
Searle BioScience, Harbour Estate, Sheerness, Kent, England



After the diastolic has been read the pressure in the cuff is automatically released. The Boso-Tron sphygmomanometer costs £375.
Andrew Stephens (1947) Co., 41 Dickson Road, Blackpool, Lancs., England

Artificial heart and kidney instrumentation

The Chirana Research Institute for Medical Engineering in Brno and the Central Council of the Czechoslovak Scientific and Technical Society in Prague are to hold an international symposium on 'Instrumentation for an artificial heart and artificial kidney' in the year of the 60th anniversary of the formation of Czechoslovakia.

Programme

The symposium is a part of the scientific programme connected with the International Engineering Trade Fair in Brno in 1978 and a continuation of a series of similar symposia in the past:

- 1965 Instrumentation for Heart Surgery
- 1967 Instrumentation for Intensive Care Units
- 1969 Instrumentation for Heart Transplantation and Replacement
- 1971 Instrumentation for Resuscitation
- 1976 Ergonomy and Rationalization in Dentistry

In contrast to meetings of either a purely technical or medical character all these symposia were international meetings of a combined character—both technicians and doctors had the possibility to describe their experience and views on special problems of medical engineering. The symposia of this character have formed a long professional tradition and were well accepted.

Organisers

We may expect that the 1978 symposium dealing with the problems of the artificial heart and artificial kidney will continue the best traditions of the past and provide a suitable atmosphere for exchanging viewpoints and experience, thus contributing to better healing delivery.

The organisers of the past symposia, the Central Council of the Czechoslovak Scientific and Technical Society and the Research Institute for Medical Engineering in Brno, co-operated with other scientific organisations in preparing this meeting. Initial co-operation was with the Institute for Transplantation of

Organs and Tissues in Moscow (director Prof. Schumakoff), the Czechoslovak Scientific Society for Pathologica and Clinical Physiology (President Prof. J. Vašku) and the Czechoslovak Nephrological Society (President Ass. Prof. A. Válek).

The symposium is sponsored by Ladislav Šupka, Minister for Technical and Investment Development and Academician Bohumil Kvasil, president of the Central Council of the Czechoslovak Scientific and Technical Society.

Exposition

The symposium will take place in Brno from 12th to 15th September 1978.

Apart from the meetings of experts the symposium programme also includes a visit to the medical engineering exposition of the 20th Brno International Trade Fair, and a visit to a hospital. The programme is complemented with a sightseeing tour of Brno, a festival concert and other interesting events.

Fee

Simultaneous translation of both the delivered papers and the discus-

sion into Czech, Russian and English will be provided. Each participant at the symposium will receive one copy of the symposium proceedings published after the symposium.

The symposium fee (2000 Czechoslovakian crowns) covers the congress fee, accommodation and board, social programme, the visit to the Brno Trade Fair, excursions, insurance during the symposium and one copy of the proceedings. Travel expenses to Brno and from Brno after the end of the symposium are not included.

Information

Further information is available on request from the symposium secretariat at the Chirana Research Institute for Medical Engineering, Kamenico 3, 658 09 Brno, Czechoslovakia (phone: 335511, telex 62684).

We expect the leading experts from all countries to take part in the symposium. We know that a lot of problems exist in this branch of medicine, and hope that the symposium will contribute to their solution.

Clinical technology at Lyon

Dr. C. Fourcade, Director of the Centre for the Study of Clinical Technology at Lyon, France, has sent an interesting report on the work of the Centre which forms part of the French National Institute of Health and Medical Research (INSERM). In addition to the Director there are four full-time research workers, two research students and three undergraduates each on a six-month visit.

Research

The main fields of research are: Automation, biotelemetry, the control of biomedical processes, measurements of cardiovascular and pulmonary function, ultrasonic investigations, bioelectric investigations, biological instrumentation and ultrahigh-frequency techniques. Some of the research projects are as follows: the design of a cell separator; the automatic measurement on a semi-continuous basis of blood coagulation where there is multiplication of

bacteria; the ultrasonic study of rouleaus formation; the study of erythrocyte sedimentation; an automatic regulator for coagulation time; the rheographic exploration of the breasts; the application of microprocessors to the rheographic measurement of blood flow; a foetal cardiac-rhythm detector; echography of fine structures; velocity measurements in small blood vessels in connection with microsurgery; an artificial urthral sphincter; urodynamics investigations; instrumentation for the food industry (the effect of foie gras on liver tissue!).

Programme

Clearly, this is an active biomedical engineering centre and those interested in its programme of work should contact Dr. C. Fourcade, Centre D'Etude et de Technologie Appliquées a la Clinique, 18 Avenue du Doyen-Lepine, 69500 Bron, France.

FIRST QUARTER REPORT

The First Quarter Report for the fiscal year 1977/78 from Medtronic Inc. of Minneapolis contains an interesting account by the Chairman of the Medtronic Board—Earl Bakken—of the work of the company's corporate research team, of which he is the leader. This has now been incorporated into one research activity in Medtronic's St. Anthony building.

One part of the team is the applied research group under the leadership of Peter Mulier. It contains some leading electrochemists who are working on the development of power supplies for implanted devices. An electronics group, also reporting to Mulier, is developing advanced systems for communicating vital information from implanted devices by means of external read outs. The materials group works on studies of advanced equipment in encapsulation and mechanical structures, critical elements in devices that must survive for years in the hostile environment of the body. Another group handles statistical analysis—an essential part of any research activity is to be able to analyse, to program, to develop models of the systems to know where they are going and where to direct the research activities. Mulier also heads the new pacing concepts group, dealing with research into new applications of pacing systems.

A second part of the Research Division is the circulatory-assist activity under Dr. Lester Goodman (IFMBE President). For several years, the main activity in this area has been the Medtronic blood pump. This research has given rise to a venture group, and the company is now ready to move forward with the blood-pump activity as a business. Other groups under Goodman are 'research build', and an activity known as tachyarrhythmia research, an attempt to build devices to prevent the sudden-death phenomenon which occurs so frequently. A third part of the research team is the functional research group, at present this is primarily concerned with neurological research. One of its projects is electrospinal instrumentation for correcting spinal curvature—scoliosis. This activity has shown very good long-term results, and will be moving forward towards venture status in the near future. Functional Research also includes the cerebellar

stimulation work which involves electrical stimulation to treat epilepsy and other spastic conditions.

Some time ago, Medtronic put the activities of their 'neuro' Group into a venture, or business, status. This has progressed very well, and is now operating profitably as the use of electricity for the control of pain is becoming more and more accepted on a world basis. Dr. Charles Ray (well known in IFMBE circles) is a key member of the team, acting as a consultant to all the other groups and spending much of his time working with Jerry Donahue, who manages the 'neuro operations' division.

Another part of the research effort is in the New England Research Centre in Boston, led by Barouh Berkovitz who invented the d.c. defibrillator and the demand pacemaker, and is now working on atrio-ventricular sequential pacing systems.

Medtronic purchase

Medtronic has agreed to buy the business and assets of Medical Data Systems, a division of the Warner-Lambert Company, for approximately \$6.5 million in cash. Medical Data Systems provides data-processing equipment and software systems for medical nuclear imaging. One of the most exciting areas of nuclear imaging currently is cardionuclear dynamics, and Medtronic indicate that these studies should be important in expanding the use of heart pacemakers and other cardiac prosthetic devices.

Medtronic has also announced plans to build a production and technical facility in northern France. This will be the second European plant, the other is at Kerkrade in Holland. The 1200 m² facility is expected to be fully operational by January 1979. It will cost approximately \$1.2 million and will employ 55-60 people in the production of pacemaker pulse generators.

Pain and analgesic compounds

The Eleventh Miles International Symposium, entitled 'The mechanisms of pain and analgesic compounds', will integrate and correlate the current knowledge of pain and analgesia with developing trends in biomedical research. The Symposium will be held at the Turner Auditorium, John Hopkins Medical Institutions, Baltimore, from 7th to 9th June 1978. Highlights of current clinical and laboratory studies of neurophysiological models of pain, the biochemical basis of pain, endogenous substances with an analgesic action, and the outlook for the development of new analgesic compounds will be presented. The topics to be discussed reflect a current surge of interest in pain and its relief, and will appeal to many investigators involved in neurochemical, pharmacological and clinical research. For further information contact: Edward G. Bassett, Ph.D., Symposium Co-ordinator, Miles Laboratories, Elkhart, Indiana 46514 USA.

Medical computing

A leaflet from the Medical Computing Society of America lists a number of publications of interest to biomedical engineers; e.g. 'Ambulatory e.c.g. monitoring', 'Clinical and research uses of ambulatory monitoring', 'The scope of ambulatory monitoring in ischaemic heart diseases', 'Testing for electrical safety in hospitals' and a number of problem-oriented patient records.

Further details from: MCSA, University District Building, Suite 315A, 1107 North East 47th Street, Seattle, Washington 98105, USA.

NATO study Institutes

The North Atlantic Treaty Organisation has announced another in its most successful series of Advanced Study Institutes. The Institutes comprise lectures by international experts and stimulating discussion sessions. The title of the new Study Institute is 'Advanced Technobiology' and it will be held from 30th June to 13th July 1978 with two days at the University of Caen, in Normandy, and the rest in Paris. The Director is Prof. Boris Rybak, University of Paris III, 19 Rue des Bernardins. F 75005, Paris, France, from whom further details may be obtained.

UN University project

The ways in which the rural poor in developing countries often bypass more effective traditional methods and misuse modern technology are among the questions to be considered in a new project of the human and social development programme of the United Nations University in Tokyo. For example, an automobile engine bolted on to a chassis on a Detroit or Stuttgart assembly line was not designed to operate a water pump in a Southeast Asian paddy field. Moreover, the petrol used to run it is among the costliest of petroleum products—a kerosene engine could pump the water more economically than one taken from an ageing, abandoned, car. 'All types of efficient rational technology, both traditional and modern, should exist side by side' says Dr. Chandra Soysa, Director of the Marga Institute, Colombo, Sri Lanka.

Research units

The Marga Institute, an associated institution of the United Nations University, will co-ordinate the project with research units in the Philippines, Thailand, Indonesia, Iran, Nepal, Japan and Malaysia. Two billion people, half of mankind, continue to depend on agriculture for their livelihood. Nine out of ten

of them live in the rural areas of developing countries. At least one billion of these people still live in preindustrial conditions and use, largely unmodified, traditional techniques inherited from their ancestors. Modern technology in the developing countries tends to be controlled by elite minority groups at the top of the socio-economic ladder—and is often unrelated to the real needs of the vast majority of people. The rural poor come into contact with modern technology only by chance and often put it to inappropriate use.

Concerted efforts

Concerted and systematic efforts must be made to enhance the ability of the poor to be more fully aware of their own technology, to want to improve it by exchanging information on technology with other communities and by adapting appropriate technology to their needs. Special attention in the project is being given to technological responses related to food, to the protection and care of the human body and to housing. A core aspect will be long-term studies in villages to monitor how and why traditional technology develops. Further details from: Dr. Soysa, Director, Marga Institute, Colombo, Sri Lanka.

Cancer research

The diagnosis, therapy and subsequent rehabilitation of cancer patients occupies much of the working time of many hospital physicists and biomedical engineers. Dr. M. B. Shimkin, Professor of Community Medicine and Oncology of the University of California, San Diego, has written a history of cancer research over the past 5000 years, which should prove of general interest to workers in this important field.

Prof. Shimkin points out that cancer was described and found in mummies dating back to the Egyptian Third to Fifth Dynasties some 5000 years ago and 'it is more than probable that cancer afflicted animals long before man appeared on earth'.

The commentary is divided into historical periods from those preceding written history, through the age of Galen and Hippocrates (500 BC to 500 AD) when cancer was named by the Greeks and ascribed to 'an excess of black bile' one of the 'four humours' of the body—to the development of modern methods of treatment and a growing understanding of the causes of cancer.

The 498-page publication 'Contrary to Nature' (stock number 017-042-00128-5) was made possible by support from the US National Cancer Institute. It is available, price \$12.75, from the Superintendent of Documents, US Government Printing Office, Washington, DC 20402, USA.

Low-back-pain research

To encourage research in the low-back-pain field, the Volvo company of Göteborg, Sweden, has generously sponsored three prizes of US \$3000 each for a scientific competition in the following three areas:

- (i) Clinical studies including epidemiology and treatment.
- (ii) Studies in the bioengineering field relevant to the low-back-pain problem.
- (iii) Work in the basic science areas aimed at clarifying the mechanism of low back pain.

Papers

The papers submitted for the contest must contain original, not previously published, material by one or several authors, who should prepare the manuscript in a form submittable for publication in the Spine (Harper & Row). The deadline for submission of papers is 1st January 1979.

One of the authors should be prepared to come to Gothenburg at the time of the meeting of the International Society for the Study of the Lumbar Spine, to be held from 29th May to 2nd June 1979, to present the paper and to receive the prize.

Referees

The board of referees will be chaired by the undersigned and will contain members from the field of clinical medicine, bioengineering and biochemistry.

Please direct all correspondence to: Prof. Alf Nachemson Vice-President, International Society for the Study of the Lumbar Spine, Department of Orthopaedic Surgery I, University of Göteborg, Sahlgren Hospital, S-413 45, Göteborg, Sweden.

Management course

A short course on the Acquisition and Management of Medical Devices was held, in February 1978, at the School of Engineering and Applied Science of The George Washington University in Washington DC, under the sponsorship of the US Alliance for Engineering in Medicine and Biology.

Further details from: The Department of Continuing Education in Engineering, George Washington University, Washington DC 20052, USA.

Electromedical equipment in hospitals

A National Symposium on 'The use and maintenance of electromedical equipment in hospitals' was held in Hyderabad, India, on 4th and 5th November 1977. The Symposium, organised by Dr. B. N. Garudachar, Director of the Advanced Training Institute for Electronics and Process Instrumentation, and Dr. B. H. Brown, ILO Adviser on Medical Electronics, brought together clinicians, technicians, scientists and engineers to discuss the problems of this fast-growing field.

Discussion areas

Three major areas were discussed. A session, chaired by Wing Cmdr. N. Mohan Murali of the Indian Institute of Technology, Madras, on the state of medical electronic equipment in Indian hospitals, concluded that the major obstacle to the use of equipment is the lack of maintenance units in the hospitals and trained staff, particularly at the Middle technical level, to operate these units. A further session considered the relationship between Manufacturers and users, and also examined the need for safety and constructional standards of medical equipment. This session was chaired by Prof. G. S. Chhina of the All India Institute of Medical Sciences, New Delhi, and noted the very large growth in the availability of indigenous equipment to India. A high percentage of hospital equipment needs can be met by locally produced equipment. However, the reliability and ease of maintenance need to be improved. The fact that the Indian Standards Institution is to adopt International Electrotechnical Commission Standards for electromedical equipment was welcomed, and suggestions were made for the implementation of these standards by manufacturers and users. The final session of the Symposium, chaired by Mr. T. G. Krishnamurthy of Bangalore, studied the facilities for training staff and the opportunities for employment in hospitals. Opportunities for the training of academic biomedical engineers in India are adequate, but there is a need for trained, practical, middle level technologists. This is particularly true for Medical electronics staff in

hospitals and Medical Colleges where the opportunities for employment need development. The Symposium put forward suggestions for the organisation of Medical Electronics with recommended staffing levels for electromedical maintenance units serving several hospitals. Where existing scientific service departments exist, Medical electronics staff should be employed for the development and maintenance of Medical electronics.

Technical training

The Advanced Training Institute for Electronics and Process Instrumentation (ATI-EPI) in Hyderabad, set up by the Government of India, is funded by the Swedish International Development Authority (SIDA) and executed by the International Labour Organisation (ILO). It was set up specifically to train technical person-

nel in the area of domestic electronics, industrial electronics, process instrumentation and medical electronics. The contribution of the Government of India covers the construction of buildings, procurement of indigenous equipment and staffing. The institute is well equipped and is manned by 20 qualified and experienced national staff. Five international experts have already been attached to the Institute, and more experts and consultants will be assisting in future training activities.

Courses in medical electronics will be run during 1978, and will consist of a 1-month course as an 'Introduction to medical electronics and physiological measurement' and a 6-month course on 'The use and maintenance of electromedical equipment'. These courses are aimed, specifically, at hospital medical electronics staff.

Braille system

The UK's Royal National Institute for the Blind has ordered a GEC 4070 computer system for its new printing centre to help speed the publication of a greatly increased range of braille books and periodicals for educational, vocational and recreational purposes. The hardware will include two 4070 central processors each with 192 kbytes of core store and 16 text-entry visual-display terminals for operators to key in text from English originals. The computer then translates data from these inputs directly into braille which is stored in magnetic tape cassettes.

Translation is achieved by means of a FORTRAN-based program DOTSYS-III developed by the Research Unit for the Blind at the UK's Warwick University. The cassettes control embossing machines which automatically punch the braille characters (called cells) on to zinc plates ready for use on a printing press. Alternatively single copies of a document can be produced via direct computer control of a paper embosser. The visual display units allow the operators to edit the text on entry. Separate purpose-built displays are employed for editing the braille cells before committing the output to embossed paper or zinc.

Yoga research

The Indian Institute of Research in Yoga and Allied Sciences is dedicated to conduct research in Yoga Ayurveda and other indigenous systems of medicine. Research in Biomedical Engineering is conducted to support these activities. The patient aetiology, prognosis and assessment is carried out through modern medical, biochemical, pathological and physiological (including electrophysiological) correlates. Research areas of primary interest are as follows:

- (a) Research and interpretation of ancient Indian texts
- (b) Yoga therapy for psychosomatic disorders
- (c) Ayurveda therapy for viral infections
- (d) Brain research for defining states of awareness
- (e) Paranormal phenomena
- (f) Biomedical engineering

The Institute has a 30-bed hospital for carrying out research in these areas.

It is encouraging that this Institute has appointed as its first Director Dr. T. M. Srinivasan, Assistant Professor of the Biomedical Engineering Division, Indian Institute of Technology, Madras, who is also the Secretary of the Biomedical Engineering Society of India.