



International Society of Biomechanics Newsletter

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AFFILIATE SOCIETIES OF ISB:

American Society of Biomechanics; British Association of Sports Science; Canadian Society of Biomechanics; China Sports Biomechanics Association; Czechoslovak Committee on Biomechanics; French Société de Biomécanique; Japanese Society of Biomechanics; Korean Society of Biomechanics; Polish Society of Biomechanics; Sports Commission of the Soviet Union.

ISB news

Message From The President, Bob Norman

I have had the opportunity and delight to spend the time from mid March to mid June on a sabbatical leave from the University of Waterloo working at the University of Sydney Cumberland College of Health Sciences in the Biomechanics Division of the Department of Biological Sciences. Richard Smith heads up this very active division and, along with the Chairman of the Department, Professor John Sutton, has provided a very productive and highly hospitable environment in which to work. The Cumberland laboratory operation is described later in this newsletter and needs no further elaboration from me. Let me simply say that this laboratory has proven to be an excellent place to spend part of a sabbatical leave.

Although Australia is a huge country, living in Sydney has provided the opportunity for me to visit several other universities, including our next ISB Congress site, the University of Western Australia in Perth, LaTrobe University and Footscray University in Melbourne, Ballarat University west of Melbourne, Wollongong University south of Sydney, the University of Queensland in Brisbane and, the University of New South Wales and Worksafe (affiliated with the University of Sydney) both in Sydney. All displayed established or burgeoning biomechanics research programs in well equipped laboratories in attractive surroundings.

These short sojourns gave me an opportunity to talk to the organisers and see the facilities where both the main ISB Congress in Perth and several pre and post Congress satellite meetings are to be held.

The main Congress site at the University of Western Australia is beautiful and convenient for moving from lecture hall to lecture hall as simultaneous sessions require. My wife and I stayed in one of the student residences that will be used for housing delegates, St. George's College. The rooms are comfortable and clean and the breakfasts which were included in the price were excellent. This accommodation is located about a ten minute walk through a tropically treed forest-like campus from the lecture halls. I plan to stay in one of these rooms at the Congress in December, although before I saw them I was uneasy about staying in student residences at conferences because of previous experiences at other universities.

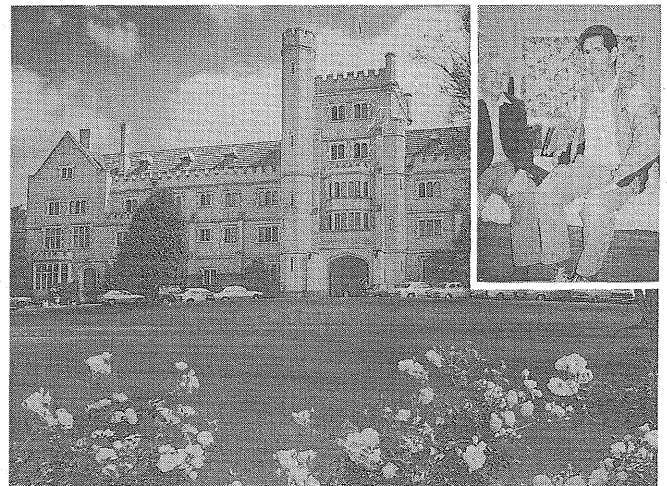
Of course housing is not the most important feature of a successful congress, the quality of the papers and the organisation of the meeting are critical. More than 400 papers have been submitted. I have read about 90 of them and have continued to be impressed with the steady improvement, over a period of nearly 20 years of participating in our congresses, in the importance of the research questions asked and the rigour of approaches to attempting to answer them. I am sure that you too will be impressed with the scientific quality of the papers at the Perth Congress. Moreover, Graeme Wood, Bruce Elliott, Bob Marshall, Tim Ackland and Brian Blanksby have given a great deal of thought to the grouping and timing of the presentations, never an easy task when simultaneous sessions are necessary. The scope represented by the selection of

invited speakers, the equipment exhibit and the social program all show that the organisation of the Congress is in experienced hands and well under control.

An added attraction to travelling to Australia for this ISB Congress is the unprecedented number of satellite congresses to be held before and after the main meeting in Perth. The problem for us all will be having to choose. They are scattered from coast to coast, with one travelling from Adelaide to Perth by train. However, this wide choice has the benefit of providing the opportunity to see several different parts of this extremely varied country. Refer to your Newsletter issues 40 and 41 for some details on the topics and the end of this issue to check dates, locations and contact people. Plan to participate in one or two. You are guaranteed to be graciously treated.

The satellite meeting most closely tied to the ISB is the Third International Symposium on Computer Simulation in biomechanics being organised by Bob Marshall and Mont Hubbard on behalf of the ISB Working Group on Computer Simulation in Biomechanics (Dec. 4-5 in Perth). There have been two extremely successful meetings of the WGCSB at Davis California prior to the UCLA ISB Congress and in Poland prior to the ISB Congress in Amsterdam. Another pre-congress meeting on Human Propulsion will be held at Cumberland College in Sydney, hosted by Richard Smith and Greg Gass (Dec. 5-6). A meeting on Occupational EMG will be hosted by Tim Bach and Owen Evans from LaTrobe University in Melbourne and will be held on a train travelling from Adelaide to Perth (Dec. 4-5). A meeting on Isokinetic Dynamometers will be hosted by Geoff Strauss and Peter McNair from Curtin University and The University of WA in Perth (Dec. 6), while a Psycho-motor symposium is planned by the Psychology staff at Curtin University for the following two days (Dec. 7-8). Finally, following the ISB Congress, Peter Milburn will host a conference at the beautiful campus of the University of Wollongong, about an hour train ride south of Sydney, on The Teaching of Biomechanics.

The XIIIth Congress of the ISB in Perth (Dec. 9-13) and the satellite meetings being held around the coast of Australia promises to be the most memorable in ISB history. Don't pass up this once in a career opportunity to warm up down under before a Christmas or New Year northern hemisphere winter break.



St. George's College, one of the accommodation places where XIIIth Congress delegates will stay at while in Perth. Inset shows President Bob Norman and Congress Chairman Graeme Wood testing the quality of the beds !

Proposed Changes in ISB Constitution (7/3/90 and 6/25/87)

Words in *Italics* indicate proposed changes in the current constitution.

(Approved by ISB Council 8/29/90)

Current Statement

Article 1 - The International Society of Biomechanics ISB is an international organization with headquarters in the locality of where the President resides.

Rationale: The President changes every two years where the Treasurer would normally have a longer tenure of office

Article 3, Section 3.3 - Collective members who shall be national associations on Biomechanics or related organizations with approved and effective by-laws.

Rationale: Executive Council voted to change name of collective members to affiliate members.

Article 3 - The society shall consist of three categories of members.

Rationale: Two new categories of membership have been defined by Council.

Article 5, Section 5.1 - A President, President-Elect and Past-President and Council Members representing various disciplines in biomechanics shall constitute the Executive Council. A Treasurer and Secretary are appointed by the President with approval of the Council.

Rationale: Newsletter Editor has become a very important function in organization, as are officers needed for specific jobs.

Article 5, Section 5.10 (new)

Rationale: Required wording in some countries to better protect people who volunteer to serve on Council or as officers, and who may become involved in litigation against ISB.

Article 6, Section 6.4 - Honorary members may be nominated by any full member. Honorary members are recommended by the Executive Council and elected by the General Assembly.

Rationale: Defines process of determining Honorary Members.

Article 6, Section 6.5 - The General Assembly shall approve and grant all collective memberships. Nominations are made by the Executive Council and approval shall be by open vote.

Rationale: Affiliate members submit constitution and by-laws to the President who presents the affiliate member to the Executive Council for a formal recommendation.

Proposed Revision

The International Society of Biomechanics (ISB) is an international organization with headquarters *at the address of the Treasurer.*

3.3 *Affiliate* members who shall be national associations on biomechanics or related organizations with approved and effective by-laws.

The Society shall consist of *five* categories of members:

3.4 *Emeritus Members who shall be retired, due to age or illness, from professional employment in biomechanics, and have made outstanding contributions to the field of biomechanics and the Society for at least five years.*

3.5 *Student Members shall be full time students in an academic program related to biomechanics.*

5.1 A President, President-Elect and Past-President and Council Members representing various disciplines in biomechanics shall constitute the Executive Council. A Treasurer, *Secretary-General, and Newsletter Editor* are appointed *officers* with approval of the Council.

5.10 *To the fullest extent permitted by the law of the State or Nation in which the Society is headquartered, as the same now exists or may hereafter be amended, an Executive Council member or any member of the Society appointed by the Council to undertake a specific task shall not be liable to the Society or its members or any of them for monetary damages for breach of fiduciary duty as a Council member or for any other cause excepting only willful misconduct.*

6.4 *Honorary members may be nominated by three full members through correspondence to the Executive Council, who shall award this status by two-thirds majority vote of the Executive Council.*

6.5 The General Assembly shall approve and grant *affiliate* membership *upon recommendations by the Executive Council.* Approval of affiliate membership shall be by open vote.

Article 6, Section 6.10 - Honorary members and full members shall have one vote each. Each collective member (organization) shall have one vote.

6.10 Honorary members, *student members*, *emeritus members* and full members shall have one vote each.

Rationale: Added student and emeritus members as voting members.

Article 6, Section 6.13 (new)

6.13 *Emeritus members shall be nominated by the Awards Committee and approved by two-thirds majority vote of the Executive Council.*

Article 6, Section 6.14 (new)

6.14 *Student members shall be accepted upon receipt of a completed application form, annual dues, and a letter from their academic institution attesting to their status as a full-time student.*

Rationale: Defines process of determining Emeritus and Student Members.

Article 8, Section 8.1 - Dues of at least \$5. For individuals, or an equivalent credit slip, per annum must be paid by January 1st to the treasurer for administrative expenses. (Annual dues changed to \$15. U.S. in August, 1981).

8.1 *Annual dues for individual members are payable to the Treasurer on January 1st of each year. Student membership dues will be lower than those of full membership.*

Rationale: Eliminate statement of exact amount of dues which are set by the General Assembly (Article 6, Section 6.7).

Article 8, Section 8.2 - Honorary members shall be exempt whereas collective members pay an amount of \$30.00.

8.2 *Honorary, Emeritus and affiliate members shall be exempt from annual dues.*

Article 8, Section 8.3 (new)

8.3 *Honorary members shall be invited to attend the biennial Meeting of the Society, and shall have the registration fee waived.*

Rationale: Recognizes special status of these members.

Article 8, Section 8.4 (new)

8.4 *Individual members who fail to remit annual dues for three successive years shall be automatically placed on the inactive list and shall forfeit all privileges of the Society. Members placed on an inactive status for non-payment of dues may be reinstated to full membership upon payment of an amount equivalent to three years of annual dues. Members who resign from active membership and are not in arrears in dues may be reinstated to active membership upon payment of one year's annual dues.*

Rationale: This is the policy under which the Treasurer now operates yet there is no written statement to follow. This provision eliminates the possibility of a member being able to pay dues on an irregular basis and return to full membership without fulfilling financial obligations.

MUYBRIDGE MEDAL RECIPIENT FOR 1991



Professor *Robert McNeill Alexander* has been chosen by the ISB Honours Awards Committee to be a recipient of the *Muybridge Medal* award for his outstanding contributions to the development of Biomechanics. Professor McNeill Alexander is the Professor of Zoology in the Department of Pure and Applied Zoology at the University of Leeds in the United Kingdom. He is the author of at least 15 books and well over 150 scientific papers, many of which present his original works on the mechanics and energetics of animal locomotion.

Professor McNeill Alexander will receive this award as well as deliver his *Muybridge Lecture* at the *XIIIth Congress of ISB* to be held in Perth, Western Australia in December of this year.

Paavo V. Komi
Chair, ISB Honours Committee

Robert W.K. Norman
President, ISB

PROPOSAL FOR ADDITION TO CONSTITUTION TO COVER THE OPERATION OF WORKING GROUPS AND TECHNICAL GROUPS WITHIN ISB.

(a) The present constitution is organized as follows:

Article

- 1 Name and Headquarters
- 2 (Purpose)
- 3 Membership
- 4 Governing Boards
- 5 Executive Council
- 6 General Assembly
- 7 Fiscal Year
- 8 Annual Subscription

It is proposed that a new Article 9. "Technical Groups" be inserted in the constitution.

(b) The present Article 4, "Governing Boards," states:

The Boards of the International Society of Biomechanics shall be:

- a. The Executive Council.
- b. The General Assembly of Members.

It is proposed that a new item c. "The Technical Groups approved by the Executive Council." be added.

(c) It is proposed that the new Article 9 should read as follows:

"9.1 Technical groups of ISB. shall be created from time to time for the purpose of advancing knowledge in a specialized area, or on a specific topic, within the field of biomechanics.

9.2 Members of ISB. who have worked together informally to advance knowledge In a specialized area, or on a specific topic, for a period of at least four years (during which time they may be referred to as a Working Group) may submit an application to the Executive Council for their group to be designated as a Technical Group of ISB.

9.3 Applications for designation as a Technical Group of ISB shall be decided on a majority vote of those members of the Executive council present at the meeting for which the formation of the group has been proposed as part of the circulated agenda.

9.4 The activities of Technical Groups shall be administered by an Executive Board consisting of a Chairperson, a Secretary-General, and five to seven Members.

9.5 The officers and members of the Executive Board shall serve for a maximum of two terms, each of four years duration.

9.6 An election of officers and members of the Executive Board shall be conducted by postal ballot of Group members every four years.

9.7 The Executive Board shall appoint a Nominating Committee, chaired by a member of the Board, to develop a slate of candidates. At least two candidates shall be nominated for each post and the number of candidates for membership of the Committee shall exceed the number of vacancies.

9.8 The results of each election shall be announced at a general meeting of the Technical Group held in conjunction with a biennial Congress of the ISB.

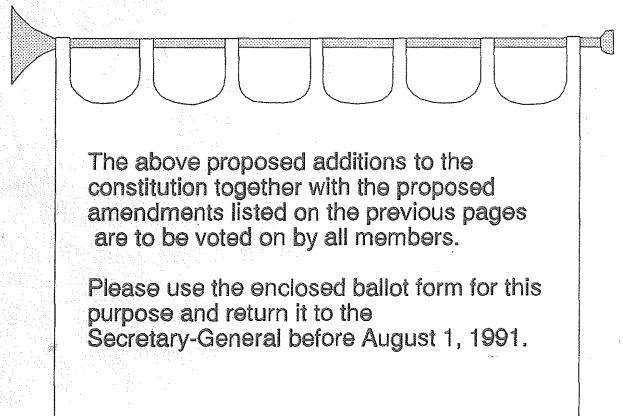
9.9 The Board of each Technical Group shall meet at least once every two years.

9.10 Technical Groups shall plan and conduct professional meetings, provided that prior approval for such meetings is obtained from a committee consisting of the President-Elect, President (Chairperson) and Past-President of ISB (hereinafter referred to as the Committee of Presidents).

9.11 Technical groups shall enter into agreements with other organizations only after obtaining approval of the Committee of Presidents.

9.12 The Chairperson of each Technical Group, or a person designated by him or her, shall present in person a written report of the activities of the Technical Group to the Executive Council of ISB, at the time of each biennial Congress of ISB.

9.13 Technical Groups may be disbanded by the Executive Council of ISB when, through failure to meet the obligations of any of the clauses of this Article, or for other reasons, they cease to serve the best interests of ISB."



Laboratory feature

THE BIOMECHANICS DIVISION DEPARTMENT OF BIOLOGICAL SCIENCES CUMBERLAND COLLEGE OF HEALTH SCIENCES, THE UNIVERSITY OF SYDNEY

Brief History

Cumberland College of Health Sciences was incorporated as a College of Advanced Education in 1974 to provide teaching and research in the clinical and academic aspects of the health sciences. After the beginning years of operation in five inner city campuses with rented premises, the College moved to the current site at East Street, Lidcombe, a suburb of Sydney, in 1978. From the 1st January, 1990 the College was re-established as an Academic College of The University of Sydney.

Undergraduate and graduate programs to PhD level are offered in two Departments (Biological Sciences and Behavioural Sciences) and eight schools (Communication Disorders, Community Health, Health Information Management, Medical Radiation Technology, Nursing, Occupational Therapy, Orthoptics and Physiotherapy).

Although the Department of Biological Sciences began with the establishment of the College it was not until 1986 that the Biomechanics Division was established separate from the other Divisions of Anatomy, Applied Physiology, Physical Science and Physiology.

The Biomechanics Division teaches in programs offered by the Schools of Occupational Therapy and Physiotherapy as well as the Department of Biological Science's own program in Exercise and Sports Science. The subjects taught in these areas covers the range from basic biomechanics to specialisations such as biomechanics of physiotherapy of the spine, occupational biomechanics and sport biomechanics.

The division currently has four PhD and eight Masters Degree students working in the area. Six academic staff, Julie Armour, Margy Galloway, Michael Lee, Bruce Power, Peter Sinclair, Richard Smith, and four technical staff Diane Eager, Ray Patton, Tim Turner, and Robert West support the programs.



Figure 1: Biomechanics Division Staff (from left to right): Ray Patton, Michael Lee, Peter Sinclair, Diane Eager, Julie Armour, Margy Galloway, Bob Norman, Bruce Power, Tim Turner, Robert West, and Richard Smith.

During the first half of 1991 the Division has been fortunate to have on campus the current President of the International Society of Biomechanics, Prof. Bob Norman, as a visiting fellow. During his stay Prof. Norman has contributed significantly to our programs through a seminar series, joint research projects, and informal discussions.

Research Interests

Current research themes of the Division are Biomechanics of Human Propulsion and Biomechanics of Physiotherapy with Occupational Biomechanics a developing area. In the Human Propulsion area the main activity is in the sport of rowing, cycling (able-bodied and disabled), wheelchair propulsion (sport and everyday). The persons involved are listed at the end of the description of each project.

BIOMECHANICS OF PHYSIOTHERAPY

Mechanics of Spinal Manipulation

Currently work is under way to investigate various aspects of the mechanisms of spinal manipulative procedures used by physiotherapists. The techniques being studied involve the use of postero-anterior force applied to the spinous process of the patient. Techniques of this type involve either high speed thrusts, known as "manipulations", or slow cyclical movements, known as "mobilisations". The objective of the research is to establish the mechanical effects of the manipulation on the various tissues involved, under a variety of conditions. (Michael Lee and staff of the School of Physiotherapy.)

Mobilisation techniques are being studied with the use of a motor driven device, the "Spinal Physiotherapy Simulator", which simulates the physiotherapist's mobilisation. The applied force and body surface deformations are measured to estimate the responses of the underlying bones. The Spinal Physiotherapy Simulator operates at frequencies of up to 1.5 Hz, applying forces up to 160 N to the mid-lumbar spine. To date only normal subjects have been studied but it is hoped that in the future subjects with low back pain can be studied to investigate whether there are differences in response patterns between normals and low back pain patients, as reported by clinicians. (Michael Lee and staff of the School of Physiotherapy.)

Pelvic Floor Muscle Strength

Urinary incontinence in women is a significant problem in the community, affecting women of all ages. One type of incontinence is thought to be due to insufficiency of the muscles of the pelvic floor. Present methods of measurement of pelvic floor strength have not proven to be completely satisfactory and so the relationship between pelvic floor strength and incontinence has not been clearly established. To overcome inadequacies of existing instruments a new type of perineometer is being developed. It is hoped that in addition to providing information which was not previously available, the new perineometer will prove to be more reliable and accurate than previous instruments. (Michael Lee and staff of the School of Physiotherapy.)

Movement Coordination in Infants

The aim of this project is to understand how infants learn to control and coordinate movement. Movements of many body joints are measured simultaneously to produce an extensive

library of quantitative information that will document the normal development of coordination from birth to one year. Analysis of these data will enable several specific research issues concerning infant coordination to be resolved and will provide insight into the information-processing mechanisms underlying the control of movement. This insight will expand our understanding of brain information processing in cognitive activity and will lead to practical applications in such diverse areas as robotic control and the treatment of movement disorders. (Dr. Peter Neilson and Dr. Nick O'Dwyer (University of New South Wales) Louise Ada (Physiotherapy) and Richard Smith)

Age Related Changes in Functional Activities

Data regarding trunk and pelvic motion during functional activities such as walking and lifting is being collected from a large number of subjects covering the age range 20 - 80 years. This will provide a database of normals and will allow subsequent comparison of "abnormal" subject groups. (Dr. Jack Crosbie and Roongtiwa Vachalathiti (Physiotherapy) and Richard Smith)

Three Dimensional Analysis of the Stance Phase Kinematics of the Foot in Patients with Osteoarthritis of the Knee.

The range and duration of rearfoot pronation in three dimensions and the flatness of the medial longitudinal arch of the foot throughout stance, and the angular velocity of plantarflexion of the foot following heelstrike in patients with osteoarthritis of the knee is being compared with normal subjects. The objective description of these observations is considered important for an understanding of loading patterns at the knee joint and for the creation of a database for normal walking. (Robyn Gant and Marg de Jersey (Physiotherapy) and Richard Smith)

BIOMECHANICS OF HUMAN PROPULSION

Cycling

The main theme is muscle function during cycling and the "effectiveness" of different cycling patterns. The division is involved in several large collaborative projects in the College which, among other things will investigate the effects of functional electrical stimulation (FES) of paraplegics, and, in particular, the effect of FES cycling. This project has required the building of an instrumented cycle ergometer and the development of suitable stimulation paradigms to produce effective cycling. (Dr Glen Davis (Applied Physiology) Peter Sinclair)

Rowing

An instrumentation system has been designed and built which measures the force on two oars, the angle of the oars, and the velocity of the boat. This information is telemetered to the coach's boat where it can be displayed in real time and/or recorded on the sound track of a video cassette recorder allowing for feedback immediately on the water or afterwards with the kinetic information superimposed on the video image.

This system has been used to collect a database of novice to elite rowing performance.

Research is being carried out on the best forms of feedback to the rower, for example, in-boat concurrent visual feedback versus coach feedback.

In another experiment, lumbar disc compression during maximal rowing is being studied using surface EMG of two sites of erector spinae and the EMG-based estimate of lumbar disc compression developed by Potvin, Norman and Wells (1990). An analysis of both static and dynamic movement is being undertaken.

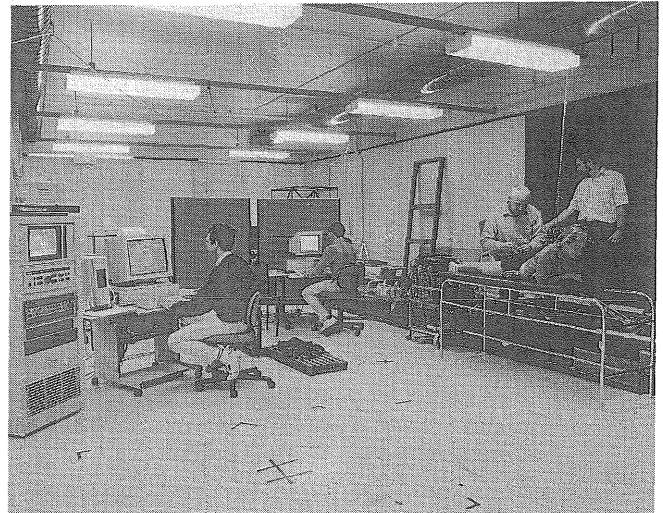


Figure 2: Preparation for an ergometer rowing experiment involving kinetic and emg data collection in the Biomechanics laboratory. From left to right: Peter Sinclair on Video Processor and Sun Workstation, Ray Patton on analogue sub-system, Bob Norman on electrode preparation, Margy Galloway as subject, and Richard Smith conducting !

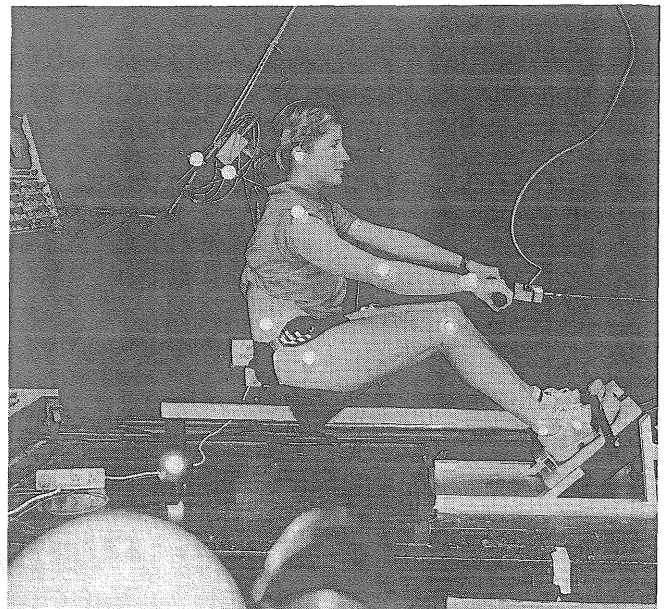


Figure 3: Margy Galloway with markers, electrodes and force transducers at the extremities.

Other experiments include the relationship between stroke rate, power output, force technique and boat velocity, the distribution of mechanical energy fractions during ergometer and on-water rowing, (Richard Smith, Margy Galloway, Peter Sinclair, Prof Bob Norman, Dr. Roger Adams, (Behavioural Sciences), Donna O'Connor, and Warwick Spinks (UTS, Kuring-gai))

Wheelchair Propulsion

Patterns of force application and power output of the conventional wheelchair user on a treadmill and during simulated wheelchair propulsion on an electro-mechanical dynamometer are being investigated. (Tom Gwinn, Dr. Greg Gass (Rehabilitation Research Centre) and Richard Smith)

OCCUPATIONAL BIOMECHANICS

Manual materials handling, effects of shoe design on gait, validation of computer lifting models. The design of computer-based training programs for occupational health and safety in industry, tool and workspace design. (Michael Lee, Bruce Power, Julie Armour, Peter Sinclair, Bob Norman)

Other areas

The relationship of physical activity and the mechanics of large lung volumes. (Julie Armour)

The control of muscle stiffness and efficiency during sub-maximal stretch-shortening cycles of the lower limb.

(Belinda Giles and Richard Smith)

Consulting Activities

Rowing

The Biomechanics Division provides a consulting service to the New South Wales Rowing Association for biomechanical testing of performance and for the transmission of relevant research outcomes to coaches and rowers and has representation on the National Rowing Research Committee.

Funding

The research activities have been funded by grants from the Australian Research Council, National Health and Medical Research Council, Australian Sports Commission, Australian Heart Foundation, Sydney University Research Grants Scheme, and Cumberland College Research Grants Scheme.

Technical Support

The laboratory and its research activities is supported by highly skilled technical staff. The contributions of Ray Patton, laboratory manager and custom equipment constructor; Robert West, programmer; Tim Turner, biomedical engineer; and Diane Eager, technical officer are essential elements of the Division's teaching and research program.

Laboratory Facilities

The heart of the laboratory is the movement analysis system which has six camera 60 Hz or two camera 200 Hz capability with an integrated, synchronised, 32 channel, 1000 Hz, analogue data acquisition unit (Motion Analysis Corporation). The system automatically digitises the retro-reflective marker outlines and the accompanying software includes all the functions such as calibration and tracking to produce the two or three dimensional coordinates of the marker centroids and additional processing functions. Additional specialised software is used for whole body, bilateral gait analysis and more generalised body movements. To complement this system there are two three dimensional force platforms (Kistler) an eight channel EMG system (Medelec) and the usual assortment of video cameras, VCRs, chart recorders, oscilloscopes, load cells, and associated analog signal processing equipment.

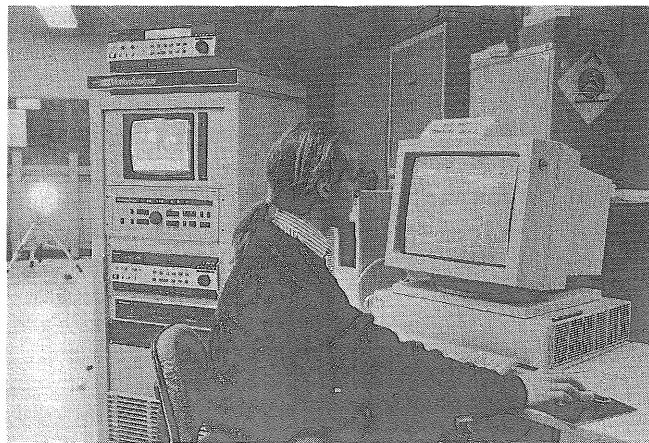


Figure 4: Robert West at the Sun workstation checking video files.

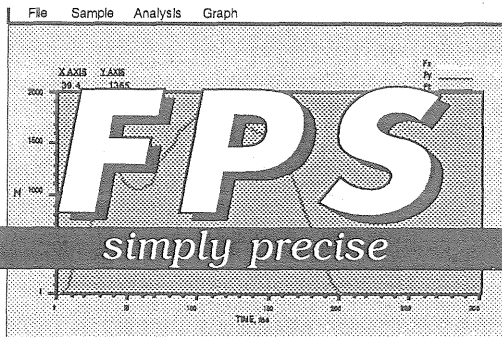
Visitors Welcome

Anyone who is interested in visiting the Division as a visiting or post-doctoral fellow, PhD or Master's student (Australian or foreign) or just passing through should contact:

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P.O. Box 170 Lidcombe 2141, AUSTRALIA
(e-mail: BI_RSMITH@COCO.CCHS.SU.OZ.AU)

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BIOMCH-L and Eastern Europe, the U.S.S.R. and the Peoples' Republic of China

The recent political developments worldwide have a beneficial effect on scientific communication with formerly rather inaccessible countries as seen through West-European eyes. In IEEE Computer 24/3, pp. 81-84 of March 1991, there is a highly interesting article "International electronic mail gains significance in the Soviet Union and Eastern Europe" by Joel M. Snyder, A. Tomasz Jarmoszko & Seymour E. Goodman at the University of Arizona, and the current 'bible' on electronic networking, John S. Quarterman's "The Matrix -- Computer Networks and Conferencing Systems worldwide" (Digital Press, Bedford, MA/USA 1990) mentions one public email channel with the People's Republic of China. A few months ago, another book (not yet seen by me) of a perhaps more practical nature was also published by Digital Press: Tracey L. LaQuey (Ed.), "The User's Directory of Computer Networks" (1990 - Paperbound - 630 pp., order No. EY-C200E-DP). The publisher's flyer quotes Stephen Wolff, Director of DNCRI, US National Science Foundation as follows: "Full of poetry, history and facts both useful and arcane, the *Directory* is at once a networker's almanac and a browser's delight", and it goes on by saying: "Here's how to track down virtually every network available to academics and researchers. This new book, with its detailed compilation of host-level information, provides everything you need to locate resources, send mail to colleagues and friends world-wide, and answer questions about how to access major national and international networks ...".

Since the "Biomch-L Update" in the previous ISB Newsletter, the first two sources have been useful starting points to explore email connections with mid-European and Eastern countries. While email is only beginning to evolve there, some new subscribers have joined Biomch-L from Czechoslovakia, Poland and the USSR, so Biomch-L is beginning to serve its intended purpose of a truly international, fast and rather informal communication channel that might complement usually more formal and slow, classical communication forms such as private letters, this Newsletter, Conference presentations, and published journal articles. At the time of writing (3 June 1991), Biomch-L has more than 300 subscribers on all six continents.

This article is mainly intended to provide some information on email networking in general, with special emphasis on our 'Eastern' colleagues, and some familiarity with these channels is expected. Since my main experience is with EARN/BITNET communication, I am somewhat biased in this respect. EARN, the European Academic Research Network, with extensions into Asia and Africa, is fully integrated with the USA's CREN/BITNET, Canada's NETNORTH, and Japan's BITNETJP. Usually, the name BITNET encompasses all these administratively distinct partners.

In Eastern Europe, Czechoslovakia, Hungary, Poland and Yugoslavia are currently full partners in EARN, and the USSR is expected to join EARN later this year. Names of BITNET-nodes can be found in the file BITNET NODELST which can be retrieved with the following request from an automatic fileserver NETSERV@backbone.BITNET, where 'backbone' is the name of any BITNET country's major node for international communication:

```
SEND BITNET NODELST (NB: not NODELIST) F
```

you do not know which one this is for your country, send the request to NETSERV@BITNIC.BITNET if you are in America, and to NETSERV@HEARN.BITNET if you are located elsewhere.

The NETSERVer will provide you with a list of about 3500 EARN/BITNET nodes, and possibly inform you of a NETSERVer closer to your location. For each entry, there is a 2-letter code (preceded by a comma) for the country in which the relevant node is located, e.g. ",NL" for The Netherlands, ",UK" for the United Kingdom, ",PL" for Poland, and ",US" for the USA. If you wish to know what nodes are located in any particular country, just scan the BITNET NODELST file for the relevant country code with the comma. If you don't know the 2-letter country code for a particular country, just send the request SEND COUNTRY ISOCODES to the NETSERVer.

Each entry usually contains a summary description (organisation, location); once you know the node_name of a particular EARN/BITNET station, further details can be obtained by sending the request:

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SEND NODENTRY node_name
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to the NETSERVer; this entry contains names, telephone numbers, postal and email addresses of relevant contact persons. For example, there are currently 6 EARN nodes in Czechoslovakia, 2 in Hungary, 15 in Poland, and 4 in Yugoslavia. From the coordinators preparing the Russian EARN partnership I have received a list of more than 100 institutions planning to join EARN throughout the USSR.

Other networks such as the Internet and UUCP/EUnet/EurOpen have a large number of connections with our Eastern friends including the Baltic republics. One organisation mentioned in the IEEE Computer article is RelCom in the USSR, with about 125 connections of which some 40 are on-line; the remaining ones have to dial in by telephone at their own discretion to retrieve and to send email. The Chinese Academic Network (CANET) has a small number of partners using the special email connection between the Institute for Computer Applications in Beijing and the University of Karlsruhe in Germany.

Electronic addresses on these other networks are not as easy to come by as in the case of BITNET; however, some contact persons are mentioned below (work is in progress to provide netwide directories, but the present state is far from ideal). Funding of these new partners in 'Netland' is a major problem; for example, the USSR's EARN connection is funded for one year by American sources, and a call for funding support for CANET was posted from Karlsruhe onto Usenet's soc.culture.china email newsgroup last November (Usenet is a worldwide electronic discussion and news propagation system also accessible in Eastern Europe and in the USSR; for the USSR, just send the one-line email requests HELP and LIST to news@kiae.su or to news%kiae.su@ussr.eu.net. However, Biomch-L is currently not accessible via Usenet.

Hopefully, the entries below will be useful for our fellow-biomechanicians from Eastern Europe, the USSR and the P.R. China, and help them to improve their contacts with the rest of the world. There are many fine groups in these countries as apparent from presentations at previous ISB Congresses, and I understand that there are many more submissions for this year's meeting in Perth. Further details are available in Quarterman's book mentioned above, and at the

computer centres of many academic and research institutions in East and West. Also, I'll be happy to entertain any particular questions if received via my email forwarding address on the Numerical Analysis discussion forum mentioned below.

Herman J. Woltring, Eindhoven/NL
<na.woltring@na-net.ornl.gov>
Moderator, Biomch-L@hearn.bitnet /
Biomch-L@nic.surfnet.nl

CZECHOSLOVAKIA: EARN backbone CSEARN
Contact: Petr Kral, PKL@CSEARN (+42 2 3110275)
University Regional Computing Centre
Czech Technical University
Zikova 4
CS - 166 35 Prague 6, Czechoslovakia

HUNGARY: EARN backbone HUEARN
Contact: Sandor Aranyi, IB001ARA@HUEARN
(+36 11497984)
Computer and Automation Institute
Hungarian Academy of Sciences
Victor Hugo 18-22
HU - 1132 Budapest, Hungary

POLAND: EARN backbone PLEARN
Contact: A.Smereczynski, OEK05@PLEARN
(+48 22 200381 448)
Informatics Center of Warsaw University
ul.Krakowskie Przedmiescie 26/28
PL - 00-927 Warsaw, Poland

YUGOSLAVIA: EARN backbone yubgss21.bitnet
Contact: Mirjana Tasic, SYSTEM3@YUBGSS21
(+38 11 419 895)
Republicki Zavod za Statistiku Srbije
Milana Rakica 5
YU - 11000 Beograd, Yugoslavia

USSR/EARN: Future EARN backbone SUEARN
Contact: Evgeny Mironov, KEL2BS@VMS2.UNI-C.DK
(+7 095 1354133)
Chief Network Administrator (fax +7 095 1355328)
SUEARN NIC BBS (X.25): (0)2502160315 Evgeny M

USSR/RELCOM: USSR EUnet backbone site
Dmitry Volodin, DVV@HQ.DEMOS.SU
(+7 095 231 2129)
Demos Co-operative
pod.1 d.6 Ovchinnikovskaya nab.
SU - 113035 Moscow, USSR

PRC: At present, CANET is accessible for any academic community in China through CHINAPAC (national X.25 PDN) or dialup telephone links.

The participants should pay the international communication fees between Karlsruhe and China, and the initial installation fee. Administrative contact is:

Tian-Bai Qian
Institute for Computer Applications (ICA)
P.O. Box. 2418-26, 10 Che Dao Gou St.
Beijing, 100081, P.R. China
Tel. +86 +1 8413654 Fax +86 +1 8414913
EMAIL: qian@ica.beijing.canet.cn
or qian%ica.beijing.canet.cn@ira.uka.de

Announcements

Positions Available

LECTURER IN PHYSICAL EDUCATION: Exercise and Testing Prescription

Applications are invited from suitably qualified persons for a post of lecturer (equivalent to a North American tenure-track assistant professor) in the area of Exercise Testing and Prescription in the School of Physical Education. The lecturer will be responsible for teaching students the theoretical basis of exercise initiation, participation and adherence, and practical skills for testing and prescribing exercise. The main criteria for appointment are effectiveness and achievement in teaching, academic scholarship and research. It is expected that applicants will have completed a doctorate and have experience in the teaching or management of exercise testing and prescription.

Initial enquiries can be made to the Acting Dean, Professor LRT Williams, electronic mail to psed01@otago.ac.nz or telephone (64)(3) 479 8995; Facsimile (64)(3) 477 8811.

Salary: Initial appointment will be made at a step on the lecturer's scale, within the range \$NZ37,440 - \$NZ49,088 with a bar at \$NZ45,448, according to qualifications and experience. Exceptionally well qualified candidates may be considered for appointment at a higher level.

Intending applicants should write for further information including a description of the School, available from the Secretary-General, Association of Commonwealth Universities (Appointment), 36 Gordon Square, London, WC1H 0PF, or from Mr D W Girvan, Registrar, PO Box 56, Dunedin, New Zealand. Applications quoting reference number A91/11 close in New Zealand and London on 30 June, 1991. Equal opportunity in employment is University policy.

Educational Courses

The PRAGM/PERMED University-Enterprise Training Partnership (The Rhône-Alpes Pole of Biomedical Engineering / Performance Assessment of Medical Equipment and Technology)

Three Courses on the Performance Assessment of Medical Equipment and Technology will be held at the Swiss Federal Institution of Technology, in Lausanne. Details are as follows:

23-27 September, 1991: Biomaterials & artificial organs
Physico-chemical basis of biocompatibility, polymers and metals; use for the realization of artificial organs, prosthesis and implants.

30 September - 4 October, 1991: Medical imaging
Physical basis of the medical imaging: X-rays, endoscopy, magnetic resonance imaging, ultrasonics, objective definition of image quality, checking and improvement of the performances of the installations, numerical radiology, archiving systems and image transmission (PACS).

7-11 October, 1991: Instrumentation

In the fields of surgery and microsurgery, laser, percutaneous operations, mechanical ablation techniques, photo-ablation, photodynamic treatment.

For registration and information, please contact:

Mrs Seppey Bianca
Laboratoire de Génie Médical
Champs-Courbes 1
CH-1024 Ecublens (Switzerland)
Phone: 4121-691 3716; 4121-691 8261
Facsimile: 4121-691 7916

THE FUTURE OF ORTHOPAEDIC IMPLANTS

Co-sponsored by the International Society of Biomechanics and other Orthopaedic Associations and Scientific Bodies

29 November 1991, IMechE, London

This one day seminar will provide a forum where professionals in the field of orthopaedic implants will consider the issue of what the future trends, in terms of new design, materials and technologies, are likely to be.

There is a great deal of uncertainty surrounding the potential performance of new technologies and their cost. This seminar aims to identify the role of these new technologies, examine their cost effectiveness, and consider the likely benefit to patients.

The meeting will be relevant to Orthopaedic Surgeons, Biomedical and Biomechanical Engineers and Researchers, Scientists, Product Engineers, Marketing and Sales Personnel, and Government and Regulatory Officials.

It will provide an ideal opportunity for these different professional groups to meet and increase their awareness of the present status and future possibilities in the field of orthopaedic implants.

The day will be divided into five sessions: Pointers to the Future; Indications for Higher Cost Implants; Emerging Technologies; Cost Benefit Procedures and The Future of Orthopaedic Implants. Papers include:

Swedish Experience with Joint Implant Registration: A failure Analysis - Prof L Lidgren, Uni Hospital, Sweden.

Pre-clinical Design & Evaluation Methods - Prof R Huiskes, Inst of Orthopaedics, The Netherlands.

Lower Limb Alignment, Ligament Balance, Polyethylene Wear - Dr J L Briard, Clinique de Cedre, France.

Safety & Standards in the UK - Mr R Allen, DH&SS, UK
Why Porous Coating? - Prof L Lidgren, Uni Hospital, Sweden.

The Future of Endoprosthetic Replacement in Primary

Bone Tumours - Mr R Sneath, The Royal Orthopaedic Hospital, UK.

Intra-Operative Manufacturing of Custom-Made Hip Prosthesis using Mould-Making Techniques & CAD-CAM Technology - Dr M Mulier, Pullenburg Hosp, Belgium.

An Isoelastic Prosthesis using a New Composite Material - Dr D Taylor, University of Dublin Ireland.

Manufacturing Technologies - Dr I A Brown, Zimmer Ltd, UK.

Calcium Phosphate Plasmaspray Coating and their Biostability- Dr C Klien, University of Leiden, The Netherlands.

Ion Implantation and Ion-Assisted Coatings for Orthopaedic Materials - Dr G Dearnley, AEA Technology, UK .

European Regulation of Orthopaedic Implants - Dr L Faro, Institute of Orthopaedics, The Netherlands.

Ceramic Hip Joints - Current Concepts Review - Prof P Christel, Laboratoire de Recherches Orthopaediques, France.

Techniques for the Prediction of the Long Term Stability of a Prosthetic Component - Mr M Freeman. Royal London Hospital Trust Medical College, UK.

Future European Legislation- Mr H A Schultz, 3M Medica GmbH, Germany.

For full programme and registration details, please contact:

Marion Blower
Engineering in Medicine Group Secretary
IMechE, 1 Birdcage Walk, London SW1H 9JJ
Tel: 071 973 1262 Fax: 071 233 1654

Conference news

More Details on - SATELLITE SYMPOSIA TO XIIIth ISB CONGRESS

HUMAN PROPULSION:- AN INTEGRATION OF MUSCLE AND MACHINE

Cumberland College of Health Sciences,
The University of Sydney
Lidcombe, Sydney, Australia

5 - 6 December, 1991

The conference will bring together experts from the disciplines of biomechanics, physiology and technological applications to present an integrated approach to maximise performance from human-machine propulsion systems, with emphasis on cycling, rowing and wheelchair propulsion.

International Speakers

Dr Chester Kyle is a recognised authority on the aerodynamics and mechanics of cycling. He was head of the group that designed the bicycles used by the U.S. cycling team in the 1984 Olympic Games. He is co-founder and past president of the International Human Powered Vehicle Association and has designed human-powered vehicles that have set a number of world records. He has been adjunct professor of mechanical engineering at California State University and is currently editor of *Cycling Science*.

Dr Luc van der Woude has performed extensive experimental work combining ergonomic, biomechanical and physiological perspectives in the description of wheelchair propulsion. He is a lecturer in the faculty of Human Movement Sciences of the Free University, Amsterdam, The Netherlands.

Dr Richard Powell has a particular interest in arm-powered vehicles, and has investigated the relative efficiency of different arm drive systems, seating configurations, work/rest intervals as well as other ergonomic factors. He works in the Department of Physical Education, New Mexico State University, La Cruces, USA.

Professor Peter Engel, who is Head of Department of Rehabilitation Research at the University of Marburg in Germany, has extensive interests in the physiological and technological aspects of rehabilitation. Because of Professor Engel's wide experience he will have a major role in the interactive workshops.

Conference Outline

The conference will combine biomechanical, physiological and technological approaches to cycling, rowing and wheelchair propulsion with the aim of producing an integrated approach to maximising performance from both the person and the machine in these propulsion systems. The conference will also explore common technical problems in recording biomechanical and physiological performance data. To achieve the most from the conference it is anticipated that participants should have a good understanding of either biomechanics, physiology or technical aspects of transducers and signal processing, or be involved in top-level coaching of either rowing, cycling or wheelchair athletes.

Workshops

Human/machine propulsion systems are intrinsically complex, and maximising performance from such systems requires a dialogue between professionals of widely differing backgrounds. Traditionally cross-discipline communication between these professionals has remained sparse. Two series of concurrent workshops will seek to bring together individuals with a common interest in the optimisation of human-powered systems to facilitate a dialogue between experts with a range of skills.

Call for Free Communications and Posters

Scientists and technical officers wishing to contribute to the conference are invited to submit free communications or posters in any of the following areas as they pertain to human-powered propulsion systems. Although the main focus of the conference will be on cycling, rowing and wheelchair propulsion, presentations on other human-powered land or water vehicles, or on human-powered flight, are invited. Presentation Areas: Biomechanics, Physiology, Motor Control, Aerodynamics and

Structural Design, Transducer Design, Signal Acquisition and Processing, Telemetry, and Computer Modelling.

The conference is sponsored by the Motion Analysis Corporation.

Registration Fee :- \$150 includes conference and workshop attendance, lunches, morning and afternoon teas, and the buffet/barbecue dinner on Thursday evening. (All fees are in Australian dollars)

Forms for free communications or posters, and registration forms can be obtained from:-

Dr Greg Gass
Rehabilitation Research Centre
Cumberland College of Health Sciences
P.O.Box 170, Lidcombe, NSW, 2141
AUSTRALIA

Telephone: 61-2-646 6659; Facsimile: 61-2-646 4853
E-mail (INTERNET):

BI_RSMITH@COCO.CCHS.SU.OZ.AU

MOTOR CONTROL AND HUMAN SKILL RESEARCH WORKSHOP

Presented by the Motor Neurosciences Interest Group
Research Centre for Applied Psychology
Curtin University of Technology, Perth, Western Australia

7 - 8 December, 1991

The theme of the Workshop concerns motor control and sensory-motor processes involved in the co-ordination and the serial organisation and integration of action. Issues related to development, impairment, adaptation and learning are relevant. Research into the emergent properties and dynamics of the system as well as the prescriptive and computational processes contributing to human skill and human performance are of interest.

Invited speakers include:

Dr Bruce Abernathy, University of Queensland
Dr J. Brinkman, Australian National University, ACT
Dr M. Cook, Australian National University, ACT
Assoc. Prof. J. Laszlo, The University of WA
Professor I. McCloskey, University of NSW
Dr P. Neilson, St. Vincent's Hospital, NSW
Dr J. Summers, University of Melbourne, VIC

For further information contact:

Prof. D. Glencross (Chairman)
Dr Jan Piek (Secretary)
The School of Psychology
Curtin University of Technology
GPO Box U 1987, Perth
Western Australia 6001
Telephone: (009) 351 7279
Facsimile: (09) 351 2464

Calendar of scientific events

July 28-31, 1991

International Symposium on 3-D Analysis of Human Movement, Hotel des Gouverneurs, Montréal, Québec, Canada. Secretariat: Laboratoire d'étude du mouvement, Centre de recherche pédiatrique, Hôpital Sainte-Justine, 3175 Côte Ste-Catherine, Montréal, PQ, H3T 1C5, Canada.

September 30-October 1, 1991

Biomechanica '91 - Symposium on the Biomechanics of the Movement Apparatus, Technical University, Hamburg-Harbury, Germany. Contact: Prof. Dr. Erich Schneider, Arbeitsbereich Biomechanik, Technische Universität Hamburg-Harbury, Denickestrasse 15, D-2100 Hamburg 90, Germany. Tel: +49.40.7718 3058; Fax: +49.40.7718 2288

October 4-5, 1991

First World Congress on Arts Medicine, World Trade Center, Rotterdam, The Netherlands. Hobeken Congress Organisation, Erasmus University of Rotterdam, Postbus 1738, NL-3000 DR Rotterdam, The Netherlands. Tel: +31.(0)10.408-7879; Fax: +31.(0)10.436-7271.

October 13-16, 1991

7th International Conference on Mechanics in Medicine and Biology, Ljubljana, Yugoslavia. Enquiries to: Dr Uros Stanic, Joseph Stefan Institute, Jamova 39, YU-61000 Ljubljana, Yugoslavia. Tel: +38-61-214-299; Fax: +38-61-219-385.

October 16-18, 1991

15th Annual Meeting of the American Society of Biomechanics, Tempe, Arizona, USA. Enquiries to: Philip E. Martin, PhD, Department of Exercise Science and Physical Education, Arizona State University, Tempe, Arizona 85287-0404. Tel: (602) 965-1023; Fax: (602) 965-8108

October 26-31, 1991

Second IOC World Congress on Sport Sciences, Barcelona, Spain. Enquiries to: Josefina Cambra, Organising Committee Secretariat, Edifici Hèlios, c/ Mejia Lequerica s/n, 08028 Barcelona, Spain. Tel: (343) 410 1992/490 1992; Fax: (343) 411 2092; Tlx: 99892 COOBE.

December 4-5, 1991

International Symposium on Occupational Electromyography, aboard the "Trans Australian" railway between Adelaide and Perth, Department of Human Biosciences, LaTrobe University, Carlton Campus, 625 Swanston Street, Carlton, Victoria 3053, Australia. Tel: 61-3-342 0311; FAX: 61-3-347 9939.

December 5-6, 1991

Symposium on Human Propulsion - An integration of Man and Machine, Cumberland College of Health Sciences, Sydney, Australia, c/o Rehabilitation Centre, PO Box 170, Lidcome, NSW 2141, Australia. Tel: 61-2-646 6403; Fax: 61-2-646 4853.

December 5-6, 1991

Third International Symposium on Computer Simulation in Biomechanics, Perth, Western Australia. Congress Secretariat: Ms Rosemary Ingham, Department of Human Movement Studies, The University of Western Australia, Nedlands, WA 6009, Australia.

December 9-13, 1991

XIIIth ISB Congress on Biomechanics, Perth, Western Australia. Congress Secretariat: Ms Rosemary Ingham, Department of Human Movement Studies, The University of Western Australia, Nedlands, WA 6009, Australia. Tel: 61-9-380 2360; Fax: 61-9-380 1039.

December 16-17, 1991

The Teaching of Biomechanics, University of Wollongong, NSW, Australia. Contact: Dr Peter D. Milburn, Department of Human Movement Studies, The University of Wollongong, P.O. Box 1144 (Northfields Avenue), Wollongong, NSW 2500, Australia. Tel: 61-42-27 0881; Fax: 61-42-27 0486.

February 2-7, 1992

International Scientific Congress associated with the 1992 Winter Olympic Games and devoted to sport sciences related to mountain sports. Enquiries to: CERNA, B.P. 35, 73202 Albertville Cedex, France.

May 12-14, 1992

International Scientific Conference on Prevention of Work-Related Musculoskeletal Disorders, Stockholm, Sweden. Conference Secretariat: Ms Gun Carlsson, National Institute of Occupational Health, S-17184 Solna, Sweden. Tel: +46-8-730-9100; Fax: +46-8-730-1967.

June 2-6, 1992

International Conference on Computer Applications in Sport and Physical Education, Wingate Institute, Israel. Conference Secretariat: Int. Conf. on Com. Appl. in Sport and Pys. Ed., Wingate Institute, Netanya 42902, Israel. Tel: 972-53-29548; Fax: 972-53-54374.

June 21-24, 1992

Eighth Meeting of the European Society of Biomechanics, in association with the European Society of Biomaterials. Conference Secretariat: ESB92, Istituto di Fisiologia Umana, Università 'La Sapienza', Piazzale Aldo Moro 5, 00185 Rome, Italy. Tel: 39-6-490673; Fax: 39-6-4452824.

August 3-8, 1992

Eighth International Congress of Biorheology, Yokohama, Japan. Executive Secretary: Dr. Takuo Yokose, 3rd Dept. of Internal Medicine, Jikei University School of Medicine, 3-25-8 Nishi-Shinbashi, Minato-ku, Tokyo 105, Japan. Fax: +81-3-3578-9753.

August 24-28, 1992

Second North American Congress on Biomechanics, combining the 16th Annual Meeting of the American Society of Biomechanics (ASB) and the 7th Biennial Conference of the Canadian Society for Biomechanics/Société Canadienne de Biomécanique (CSB/SCB), at the McCormick Center Hotel, Chicago, USA. Conference Co-Chairman: Dr Louis Draganich, Dept. of Surgery, University of Chicago, 5841 South Maryland Avenue, Box 421, Chicago, IL 60637, U.S.A. Tel: +1-312-702-6839.

September 4-5, 1992

International Conference on Experimental Mechanics: Technology Transfer Between High Tech. Engineering & Biomechanics, University of Limerick, Ireland. Organised by the Bioengineering Measurements Group of the British Society for Strain Measurement (BSSM) and co-sponsored by the USA Society of Experimental Mechanics (SEM). Conference Secretariat: BSSM'92; Fax: 353-61-330316 (Ireland, Eire) or e-mail at LittleT@ul.ie

December 2-4, 1992

Seventh International Conference on Biomedical Engineering, National University of Singapore. Secretary: 7th ICBME 1992, Dept. Orthopaedic Surgery, National Hospital, Lower Kent Ridge Road, Singapore 0511. Tel: (65) 772 4424; Fax: (65) 778 0720.

ISB membership news

NEW MEMBERS

ROBBINS, STEVEN
3550 Cote-Des-Neiges, Suite 200
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CANADA (#1188)

ANDO, SHINTARO
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Univeristy of Tsukuba
1-1-1 Tennodai
Tsukuba City, Ibaraki Prefecture 305
JAPAN (#1189)

IKEGAWA, TETSUJI
1-26-6 Furuudai
Suite City, Osaka 565
JAPAN (#1190)

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Los Angeles, CA 90024-1568
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Glasgow, Stratchclyde G40NW
Scotland, GR BRITIAN (#1193)

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Oldenburg D-2900
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Bainer Hall
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08017 Barcelona
SPAIN (#2001)

YOGANANDIAN, NARAYAN
Medical College of WI
Dept. of Neurosurgery
8700 W. Wisconsin Ave.
Milwaukee, WI 53226
USA (#2002)

YIH, TACHUNG
Florida International University
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University Park Campus
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USA (#2003)

SNOW, REBECCA
692-225 Merrillville Rd.
Susanville, CA 96130
USA (#2004)

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1620 Van Horne, Apt. 7
Montreal, Quebec H2V 1L8
CANADA (#2005)

HOLLISTER, ANNE
1000 West Carson St.
Torrence, CA 90509
USA (#2006)

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17 Recreation St.
Redcliffe, Queensland 4020
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41173 Chatford Cove
Tucker, GA 30084
USA (#2008)

LEBIEDOWSKA, MARIA
7541 Spring Lake Dr. #D1
Bethesda, MD 20817
USA (#2009)

JACK, MARTHA
P.O. Box 776
Richlland, WA 99352
USA (#2010)

SINCLAIR, PETER
P.O. Box 170
Lidcombe, NSW 2141
AUSTRALIA (#2011)

BROWN, CHRISTOPHER
WPI, Mech. Eng. Dept.
100 Institute Rd.
Worcester, MA 01609
USA (#2012)

BAKER, DANIEL
2318 E. Kensington
Salt Lake City, UT 84108
USA (#2013)

ROBINSON, JOHN R.
NIKE, Inc
One Bowerman Dr.
Beaverton, OR 97005-6453
USA (#2014)

ALEXANDER, R. McNeil
University of Leeds
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Leeds, LS2 9JT
UNITED KINGDOM (#2015)

BAKER, JOHN
57 Unwin St.
Templestowe, Victoria 3106
AUSTRALIA (#2016)

YAMAGAMI, SHIN_ICHI
Kagawa University
Faculty of Education
1-1, Saiwai-cho
Takamatsu 760, Kagawa
JAPAN (#2017)

EDINGTON, CHRIS
Converse, Inc.
One Fordham Rd.
N. Reading, MA 01864
USA (#2018)

HOFFMAN, ALLEN H.
Worcester Polytechnic Inst.
Mechanical Engineering Dept.
100 Institute Rd.
Worcester, MA 01609
USA (#2019)

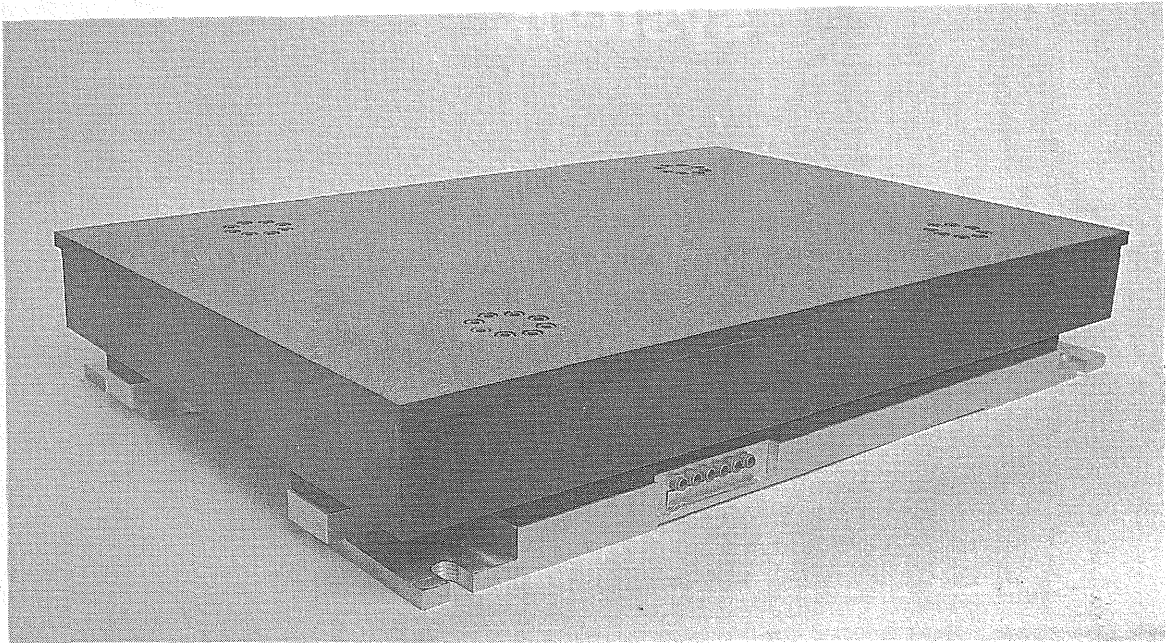
Lee, ANDREA
P.O. Box 3850
Pinehurst, NC 28374
USA (#2020)



BERTEC

A NEW LINE OF FORCE PLATES...

... PRECISION AND ACCURACY MADE AFFORDABLE

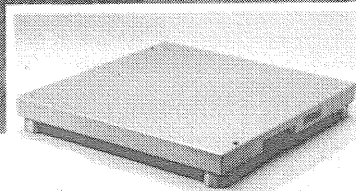
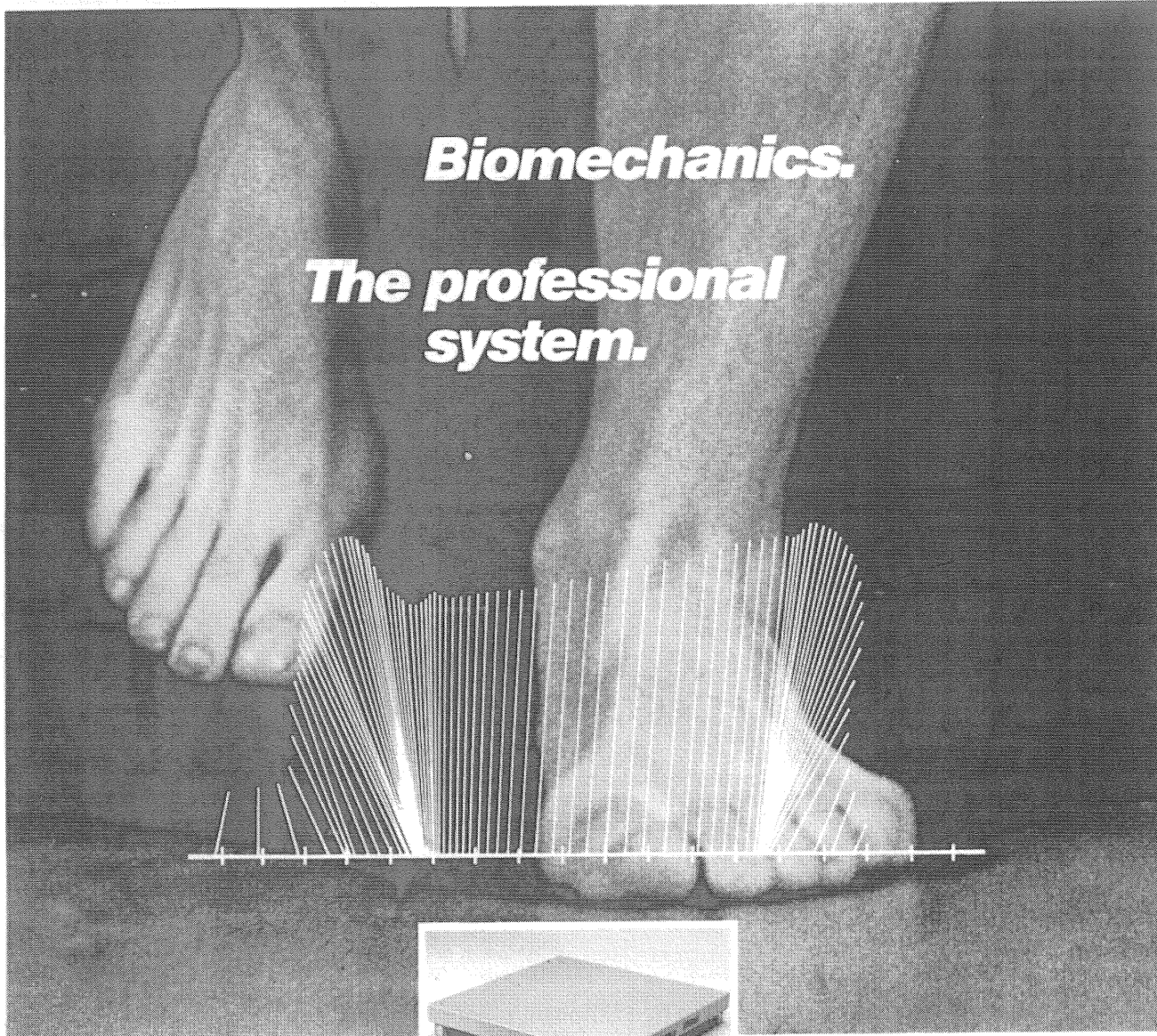


- Custom designed, or available in five different standard sizes:
40 cm x 60 cm 40 cm x 80 cm 60 cm x 90 cm 90 cm x 90 cm 60 cm x 120 cm
- Extremely rigid top plate, therefore very high first natural frequency
- Automatic bridge balancing and zeroing
- Virtually no drift
- Built-in low-noise pre-amplifier; therefore improved signal-to-noise ratio
- No special mounting requirements

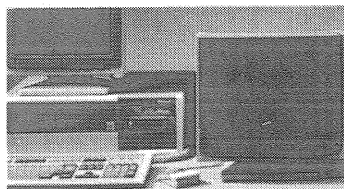
**Bertec Corporation, 819 Loch Lomond Lane, Worthington, Ohio 43085, U.S.A.
Phone and Fax: (614) 436-9966**

Biomechanics.

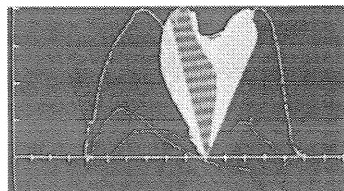
**The professional
system.**



Precisely measured
forces and
torques – the key
to biomechanics.



Over 700 KISTLER
force plates are used
by leading institutions
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