



# American Society of Biomechanics Newsletter

Vol. 7

June, 1994

No. 1

## From the President

Tom Brown

Greetings from Iowa City! I'd first like to report briefly on the Executive Board's mid-year meeting, which was held on February 20th. The final report from our 17th Annual Meeting held in Iowa City showed a budget surplus of approximately \$8,000, due largely to the excellent support from exhibitors and sponsors, and especially thanks to a \$5,000 grant from the Whitaker Foundation. ASB's financial reserves are now very strong. Consistent with preserving enough flexibility to cover foreseeable contingencies, there was a lengthy discussion about how to manage the Society's cash reserves more effectively. The Board approved parts of a proposal from IDS Financial Services, involving some changes in the management of our checking account, as well as moving a portion of our assets to risk-free certificates bearing interest according to an index linked to the S&P 500. (Based on recent years' performance, this risk-free IDS certificate represents a substantial improvement over the yield from our current account with T. Rowe Price.) The board also voted to submit for membership consideration, at the upcoming Business Meeting in Columbus, a portion of the IDS proposal involving conservative (but not risk-free) investment in a growth-oriented mutual fund. The Board appointed a task force (Jill McNitt-Gray, Mark Grabiner, Melissa Gross, and Tom Brown) to draft a plan for the Society's long-term financial posture and financial goals.

As you may have heard, we recently had a request from ISB to join in their international effort to coordinate professional assistance to our biomechanical colleagues in European countries currently undergoing financial hardship. The Board voted an immediate financial allocation (\$500) to ISB for that purpose. More importantly, we need grassroots help from ASB members in identifying surplus equipment, books and journals, or any other items that might prove helpful to our less fortunate colleagues. Alan Litsky (Meeting Chairperson) and Bob Gregor (Program Chairperson) and their respective committees have been busy with the nuts-and-bolts planning for the 1994 Annual Meeting in Columbus. The latest details on the venue for

that meeting are here in the newsletter. Please especially encourage students to attend - we again are fortunate to have a grant from the Whitaker Foundation specifically to help underwrite student participation. Students may be particularly interested in the very informative slate of "pre-meeting" tutorial presentations organized by Jill McNitt-Gray and the Education Committee. This year, rather than a breakfast, the time set aside for the student meeting will be at lunch on Friday.

Finally, I want to direct your attention to a broad issue regarding the Society's future. In recent years, concerns have repeatedly been voiced regarding erosion of the original balance between ASB's five disciplinary categories: health sciences, engineering/applied physics, exercise/sports science, ergonomics, and biology. Besides consistently encouraging the Program and Education Committees to choose keynote speakers and tutorials which appeal to the Society's lesser-represented disciplinary categories, the Board this year voted to expand the Award, Nominating, and Membership Committees to ensure that all the categories are directly represented. Some of the recent new member demographics have been encouraging, but this is an issue that will require continued attention and special effort if we are to preserve the Society's unique multi-disciplinary nature. Your ideas on furthering that goal would be most welcome.

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**Don't Forget !!**



**Vote For  
President &  
Program Chair**

## **From the Secretary/Treasurer**

**Mark Grabiner**

The ballot included in this mailing has three important items upon which the Executive Board hopes that you will vote. Of primary importance is the election of the President-Elect and Program Chair Elect whose brief biographical sketches are on the ballot. Additionally, there has been a proposed change to the ASB By-Laws that would affect the composition of the Nominating Committee. Presently, the By-Laws require that the Nominating Committee be comprised of members from three of the five ASB disciplinary categories. The proposed change would cause the Nominating Committee to be comprised of members from all five disciplinary categories.

The Past-President chairs the Nominating Committee and the members are elected by a majority vote at the annual Business Meeting. This leads into the general topic of the annual Business Meeting. The Minutes of last year's business Meeting are included in the mailing and approval of these Minutes will be voted upon at this year's Business Meeting at Ohio State. Attendance at last year's Business Meeting at Iowa was not good (abysmal, actually) and reflected, in part, its scheduled time slot. However, this year's Business Meeting will take place at a more convenient time during our stay in Columbus, Ohio. Now many of you may think that the only thing less interesting than a Business Meeting is a Newsletter item about a Business Meeting. However, I feel compelled to mention that the Business Meeting is the time that is set aside, each year, to invite participation of *all* ASB members in the affairs and plans of the Society.

During this year's Business Meeting the financial status and plans of the Society will be a topic presented to the membership. The Society is presently in sound financial condition; a situation made possible, to a large extent, by the successful organization of recent Annual Meetings. Given this condition, an *ad hoc* committee was formed earlier this year, chaired by Tom Brown and consisting of Melissa Gross, Mark Grabiner and Jill McNitt-Gray. The purpose of this group was to develop an initial, conceptual framework for a long-term financial strategy for the Society. This framework, and the initial plans, will be presented by Tom Brown at the Business Meeting. Please plan to attend. There will be an open bar, buffet dinner, a band and we will also be giving away a new car!

## **For Sale**

For those of you who may be interested, there are extra copies of NACOB II abstract books, and the tote bags, available. Contact Mark Grabiner (his details are on page 4) about these or other ASB conference proceedings that you wish to purchase.



**UNIVERSITY of LIMERICK**  
OILESCOIL LUIMNIGH

### **DEPARTMENT OF PHYSICAL EDUCATION AND SPORT SCIENCES**

The Department of Physical Education and Sport Sciences is located in the College of Science at the University of Limerick. The Department offers undergraduate degrees in Physical Education, Sport and Exercise Science and postgraduate degrees to doctorate level. A post-graduate Diploma in Dance will be offered for the first time in September 1994. The Department wishes to make the following new faculty appointment.

#### **LECTURER IN SPORTS BIOMECHANICS**

Applicants should be committed to developing a new biomechanics course, aiming to enable students to understand and apply mechanical and biomechanical terminology and concepts to human movement in both theoretical and practical situations. They should have demonstrated a research commitment in the area.

Candidates should hold a first degree in sports science or related discipline together with a postgraduate degree in a biomechanical area.

**Salary Scale: IR£21,457 — IR£35,217 p.a.**

A detailed Curriculum Vitae should be submitted to:

**The Personnel Department,  
University of Limerick, Limerick, Ireland.**

**Tel: +353 - (0) 61-333 644**

**Fax: +353 - (0) 61-331 881**

**to arrive no later than Friday 24th June 1994.**

## **U.S. Olympic Committee Grant Program**

Each year the USOC's Sport Science and Technology Committee awards funding through the grant program for studies in applied sport science. Funding will be considered for research and development in the following areas:

- competition equipment
- training equipment
- safety equipment
- optimal methods for training and competing
- talent identification needs

The committee administers an annual grant program designed to further service the needs of the USOC members by tapping into national resources in academia, industry, and private individuals. The deadline for proposals is **September 1, 1994**. Please contact Walt Wilson, Division Director, for information and guidelines at (719) 578-4851.

## **Course on Bone Cell and Tissue Mechanics**

A one week long course on bone cell and tissue mechanics will be given at the International Center for Mechanical Sciences in Udine, Italy from 9 to 15 July 1995. The lecturers include Elisabeth Burger of the Free University in Amsterdam, John Currey of the University of York in England, Stephen Cowin of the City University of New York, Rik Huiskes of the University of Nijmegen in Holland, and Lance Lanyon of the Royal Veterinary College in London. Information may be obtained by contacting:

Centro Internazionale di Scienze Meccaniche  
Palazzo del Torso, Piazza Garibaldi, 18  
33100 Udine  
Italy

tel: 39 432 294989  
fax: 39 432 501523

## **Sustaining Members**

The sustaining membership category is aimed at encouraging affiliation by commercial organizations that market products which are used by the biomechanics research community, or companies that are otherwise engaged in activities that fall within the Society's general interest areas. Each member contributes \$500 per annum to the Society. We are happy to acknowledge and thank the following companies for their support as Sustaining Members:

**Aircast**

**DePuy**

**Howmedica**

**Interpore Orthopaedics**

**Kistler Instrument**

**Motion Analysis**

**MTS**

**Orthofix**

**Orthomet**

**Zimmer**

We invite all members of the Society to suggest names of potential sustaining members. Please send your suggestions to Melissa Gross (Membership Committee Chairperson) at the address indicated on page 4 of this newsletter. If you have a particular contact person at the company, please make sure to include his/her name.

# Executive Board

## 1993-1994

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e-mail: tjkoh@acs.ucalgary.ca

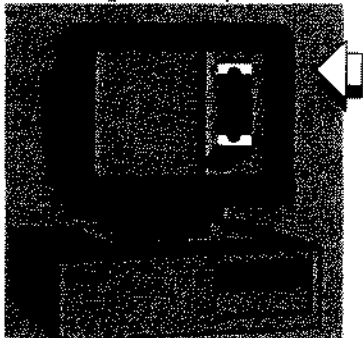
# The $\int \int \int$ INERTIATOR™

The INERTIATOR™ is the first and only system on the market that measures the inertial properties of body segments. The procedure is subject-specific, non-invasive, accurate and inexpensive.

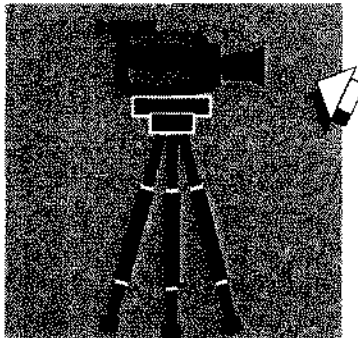
The INERTIATOR™ is an MS-Windows™ application that captures images of a body segment, processes them and calculates their inertial properties.

The system is applicable to adult and pediatric subjects.

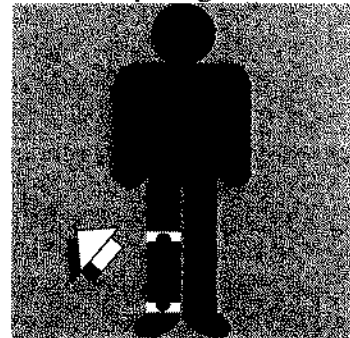
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The output of the system combines images of the measured body segment and its inertial parameters, namely the volume, mass, center of mass and the main moments of inertia. Typical errors are on the order of  $\pm 2\%$ .

The *OsteoKinetics Corporation* is dedicated to the development of advanced processing and analysis tools for the fields of biomechanics, clinical orthopedics, ergonomics and anthropometry sciences. It pioneered the implementation of *BioTRACK™*, the first complete six degrees of freedom kinematic analysis program (developed at MIT), on a variety of passive and active marker systems.

***OsteoKinetics***  
Corporation

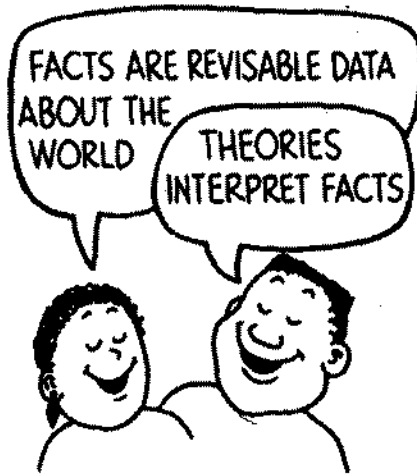
82 Stuart Road, Newton, MA 02159 Phone: (617) 235-4426 Fax: (617) 235-8953

# A View from the Academical Village

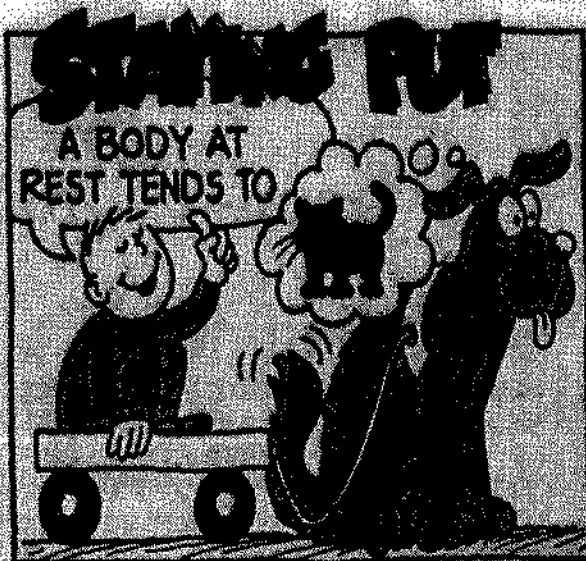
Kit Vaughan

In this issue of the Newsletter, we have included two articles which should be of interest to members. Mike Whittle, who holds the Cline Chair of Rehabilitation Technology at the University of Tennessee in Chattanooga, kindly agreed to have his BIOMCH-L posting reproduced. He provides excellent (some would say redundant!) advice for conference organizers on their audiovisual requirements. All of us who host meetings (including Alan Litsky and his team at Ohio State University) would be well-advised to pay attention to Mike's suggestions. The second article to which I would draw your attention is by Brian Davis of the Cleveland Clinic Foundation. He takes a tongue-in-cheek look at the peer-review process for publishing a research paper in a scholarly journal. In my previous editorial, I encouraged you to submit your work for publication in the archival literature. I trust that Brian's article does not deter you from following up on my suggestion!

I have chosen the *hypothesis* as my theme for this issue. The Oxford Dictionary defines hypothesis as "supposition made as basis for reasoning, without assumption of its truth, or as starting-point for further investigation from known facts". I was reminded of the importance of hypotheses when assisting my daughter, who's just completed her freshman year in high school, with a course in conceptual physics. The textbook, written and illustrated by Hewitt (1992), is an excellent one which I was very



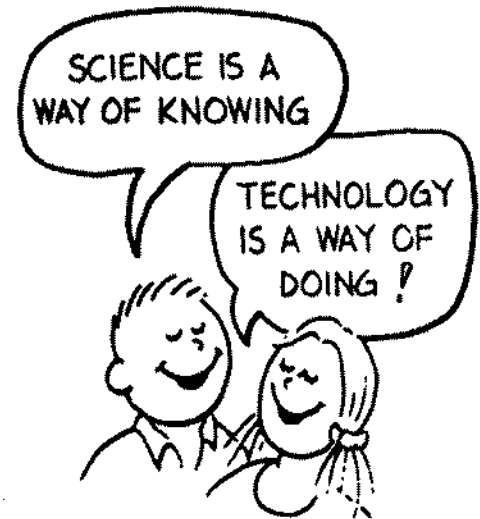
tempted to use for my undergraduate class in kinesiology this past Spring semester. With Paul Hewitt's permission, I have reproduced some of his cartoons to illustrate this editorial. He defines a scientific hypothesis as an educated guess that is only presumed to be factual when demonstrated so by experiment. When hypotheses have been tested over and over again and have not been contradicted, they become known as *laws* or *principles*. A scientific *theory* is a synthesis of a large body of information that encompasses well-tested hypotheses about the natural world. Hewitt goes on to state that for a hypothesis to be considered scientific, there must be a test for proving it wrong. Consider the hypothesis "Intelligent life exists on other planets somewhere in the universe". This is not a scientific hypothesis, it is speculation. In contrast, the hypothesis "Atoms are the smallest particles of matter that exist" is scientific because there is a test for its incorrectness (in fact it has been proved wrong!).





One reason scientific hypotheses are important is that they form a critical component of a research proposal to Federal agencies such as the NIH. In a book designed to assist scientists with preparing a proposal, Ogden (1991) states that the hypothesis is the most important part of the introductory section. Unless a specific hypothesis can be stated and tested, the proposed research is nothing more than a fishing expedition. While it is true that descriptive research is important for the study of a new field, there are very few such new fields of study. Ogden warns that a trap awaits us all when an "interesting observation" forms the foundation for a research proposal. He stresses that phenomenological proposals are weak and tend to end up on the rocks, while a proposal is strengthened by a hypothesis that is clearly identified and relates logically to a broad theoretical model. Although it is advantageous to incorporate a hypothesis into your proposal, Ogden cautions the grant writer to avoid trivial hypotheses. These are common, representing poor grantsmanship and weak analytical thinking, and often result from attempts to force a hypothesis into a project that is phenomenological. An example of a *scientifically* trivial hypothesis is "A test of blood alcohol can be based on analysis of expired air". On the positive side, Ogden believes that it is possible to transform a study founded on phenomenologic hypotheses into one involving basic mechanisms and scientifically important hypotheses. In the above example, a hypothesis which focused on the transport of alcohol through the lipid bilayer of alveolar membrane might address basic mechanisms but involve the same research.

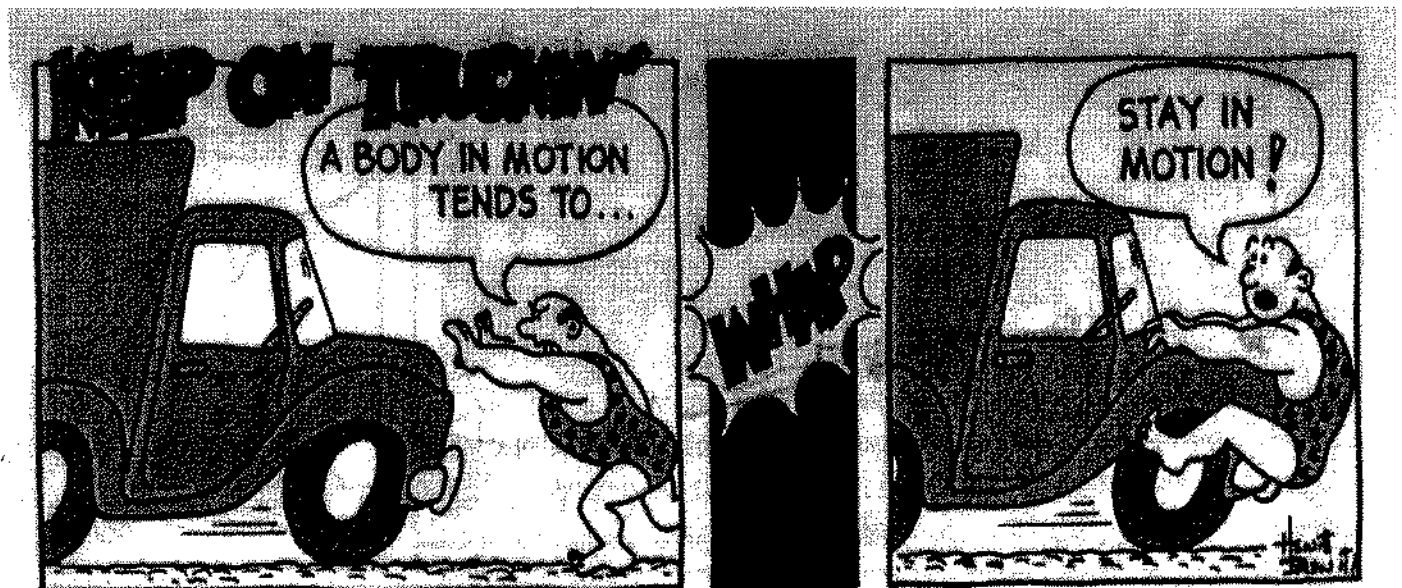
What about our own field of biomechanics? How are we doing with regard to hypothesis-driven research? I can't provide you with definitive answers to these questions,



but I would guess that we're not doing too well. Pick your favorite journal the next time you are in the library and read the abstract plus introduction of a few articles. Check to see if there is a hypothesis stated explicitly. Then evaluate the hypothesis critically to see if it can be proven incorrect (Hewitt, 1992) and that it is scientifically non-trivial (Ogden, 1991). I would submit that much (perhaps the vast majority!) of the research in biomechanics, including my own, tends to be descriptive. I would like to challenge each of you, whether you are a graduate student writing a thesis proposal or a faculty person preparing a grant application, to base your work on scientifically testable hypotheses.

#### References

- Hewitt, PG (1992) *Conceptual Physics*, 2nd edition, Addison-Wesley, Menlo Park, CA.  
Ogden, TE (1991) *Research Proposals. A Guide to Success*, Raven Press, New York, NY.



# An Open Letter to Conference Organizers

Mike Whittle

Last year I attended two International conferences that were significantly marred by problems with the audiovisual aids. I will not name the conferences, since I do not wish to detract from the considerable efforts which the organizers put into running these meetings, but rather would like to make a few suggestions for those organizing conferences in the future.

1. **Dual Projection:** In many cases dual projection is used without good reason, simply because it is fashionable. However, the organizers need to realize that many (perhaps most) presenters nowadays will use dual projection, and that the projector/screen arrangements must be adequate to show two slides at once, with any mix of vertical and horizontal formats.

2. **Projectionist:** This is probably a more important job than the Chairperson - an incompetent projectionist can really mess up a session! Rather than assign this tedious task to the most junior member of the team, it should be given to someone who is technically extremely competent. They should have the necessary eyesight, technical knowledge and interest in the proceedings to monitor and if necessary focus the slides. If the projector is at the back of a long room they should use binoculars for this purpose. They also need to be able to remove jammed slides, and to immediately and correctly replace any slides inserted backwards or upside down - this is a skill which can be learned!

3. **Language:** Anyone involved in the "technical" aspects of the meeting (projection, lights, microphones, etc.) should be fluent in the official language(s) of the conference. Trying to sort out problems with the addition of a language barrier is a real mess. This may seem obvious, but it happened last summer!

4. **Microphones:** If microphones are used, they should be checked to make sure they work all the time - intermittent breaks in communication, crackles, hums and whistles are not acceptable. The person in charge of the amplifier should be instructed not to increase the gain above a pre-set limit, to avoid feedback howl. There should also be a clear policy as to whether questioners from the floor must use microphones - if they do, they should not be permitted to start a question until they are speaking into a working microphone, or to repeat the question, if the microphone arrives late!

4. **Chairpersons:** The chair of a session has a number of responsibilities. Most chairs are good at introducing speakers, timekeeping and asking questions at the end if there is little response from the audience. However, they should also take command of the technical side of the session, giving appropriate directions to the speaker ("please speak into the microphone"), the projectionist ("could you focus that slide, please"), other staff ("please dim the lights and turn the amplifier gain down") and questioners ("please wait for the microphone").

I hope this list doesn't sound too negative. Conferences are one of the best parts of being a scientist, so let us all strive to make them as good as we can!

## Calendar of Events

### 26 June - 1 July 1994

12th U.S. National Congress of Applied Mechanics, Seattle, Washington. Engineering Continuing Education; University of Washington, GG-13; Seattle, WA 98195; Tel. 206-543-5539 FAX. 206-543-2352

### 30 June - 2 July 1994

IVth EMED User Group Meeting, Dept. Unfallchirurgische Forschung und Biomechanik, Universitdt Ulm, Germany D. Rosenbaum, H. P. Becker; Abteilung Unfallchirurgische Forschung und Biomechanik; Universitdt Ulm; Helmholtzstr. 14; D-89072 ULM Germany Tel. (country code) 731-502 3492 or 3481 FAX. ( ) 731-502 3498 diro@sirius.medizin.uni-ulm.de

### 2-6 July 1994

ISBS '94: XII International Symposium of Biomechanics in Sports, Budapest - Siofok, HUNGARY ISBS '94 Symposium Secretariat; Department of Biomechanics; Hungarian University of Physical Education; H-1123 BUDAPEST; Alkotás u.44.; HUNGARY

### 5-8 July 1994

International Conference on Clinical Gait Analysis, Dundee, SCOTLAND. Mrs Jean Whyte; Dundee Limb Fitting Centre; 133 Queen Street; Broughty Ferry; Dundee DD5 1AG; Scotland. Tel. ++ 44 (0)382 730104 FAX ++ 44 (0)382 480194

### 5-8 July 1994

Third International Symposium on 3-D Analysis of Human Movement, Stockholm, SWEDEN; Dr. Paul ALLARD, Ph.D., P.Eng.; Permanent Secretariat; International Symposium on 3-D Analysis of Human Movement; Centre de Recherche; Sainte-Justine Hospital; 3175 Cote Ste-Catherine; Montreal, PQ, H3T 1C5, CANADA Tel. +1-514-345-4740 FAX. +1-514-345-4801 allard@ere.umontreal.ca



**10-15 July 1994**

Second World Congress of Biomechanics, Amsterdam, the Netherlands; Biomechanics Section; Institute of Orthopaedics; University of Nijmegen; P.O. Box 9101; 6500 HB NIJMEGEN The Netherlands Tel. +31-80-613366 FAX. +31-80-540555

**16-19 July 1994**

3rd International Symposium on Biofluid Mechanics Munich, Federal Republic of Germany; Prof. Dr. Dieter Liepsch; The Institut für Biotechnik; Lothstrabe 34; 8000 München 2; Federal Republic of Germany; Tel. 49-89-1265-1533 FAX. 49-89-1265-1502

**31 July - 5 August 1994**

8th Gordon Research Conference on Bioengineering and Orthopaedic Science, Andover, New Hampshire, USA; Stephen B. Trippel, M.D.; Conference Chairman; Dept. of Orthopaedic Surgery; Jackson 11th Floor; Massachusetts General Hospital; Boston, MA 02114; Tel. 617-726-8524 FAX. 617-724-3846

**18-20 August 1994**

Canadian Society for Biomechanics VIIIth Biennial Conference, The University of Calgary, Calgary, Alberta, CANADA. Margaret-Anne Stroh; Conference and Special Event Services; The University of Calgary - Olympic Volunteer Center; 1833 Crowchild Trail, NW; Calgary, Alberta T2M 4S7; CANADA Tel. (403) 220 6229 FAX. (403) 284 4184

**21-26 August 1994**

World Congress on Medical Physics and Biomedical Engineering, Rio de Janeiro, Brazil General Secretariat; Congrex do Brasil s/a; Rua do Ouvidor, 60/414; 20040-030 Rio de Janeiro, RJ Brazil Tel. +55-21-224-6080 FAX. +55-21-231-1492

**26-27 August 1994**

The Lumbar Spine: A Basic Science Approach, First International Symposium Brussels, Belgium. International Society for the Study of the Lumbar Spine; c/o Sunnybrook Medical Centre, Room A 309; 2075 Bayview Avenue; CDN-Toronto, Ontario, Canada; M4N 3M5 Tel. (416) 480-4833 FAX. (416) 480-6055

**1-2 September 1994**

First International Seminar on the Effect of Whole Body Vibration on the Spine, Visby, Gotland, Sweden; Marianne Magnusson, Dr. Med. Sc.; Dept. of Orthopaedics; Occupational Unit; Sahlgren Hospital; S-413 45 Gothenburg; Sweden FAX. 46-31-416924

**22-24 September 1994**

First International Symposium on Medical Robotics and Computer Assisted Surgery, Pittsburgh, Pennsylvania, USA; MRCAS '94 Symposium; Dept. of Continuing Medical Education; Shadyside Hospital; 532 South Aiken Avenue; Aiken Professional Building, Suite 412; Pittsburgh, PA 15232; Tel. 412-623-2393 FAX. 412-623-3010

**27 September - 1 October 1994**

4th Conference of the International Society for Fracture Repair, Kobe, Japan; c/o Japan Convention Services, Inc.; Kobe Branch

, 6-9-1; Minatojima Nakamachi, Chuo ku; Kobe, Japan 650; Te. 81-78-303-1101 FAX 81-78-303-3760

**4-7 October 1994**

Visualization in Biomedical Computing 1994 (VBC '94) Rochester, Minnesota, Richard A. Robb, Ph.D.; Mayo Foundation/Clinic; Medical Sciences Building 2-135; 200 First St., SW; Rochester, MN 55905

**13-15 October 1994**

18th Annual Meeting of the American Society of Biomechanics, Columbus, OH. ASB Conference Administrator; Office of Continuing Education - Conference Unit; The Ohio State University; 225 Mount Hall; 1050 Carmack Road; Columbus, OH 43210-1002 Tel. (614)292-8571 FAX. (614)292-0492

**27-30 October 1994**

SIROT '94 Societe Internationale de Recherche en Orthopedie - 3rd Inter-Meeting Boston, MA, USA Henry J. Mankin, M.D.; Department of Orthopaedics; Massachusetts General Hospital; Boston, MA, USA 02114 Tel. (617)726-2943.

**6-11 November 1994**

The International Mechanical Engineering Congress and Exposition: ASME Winter Annual Meeting Chicago, IL; Michael J. Askew, Ph.D.; Musculoskeletal Research Laboratory; Summa Health System; Akron City Hospital; 525 East Market Street; Akron, Ohio 44309-2090; Tel. 216-375-3833 FAX: 216-375-3978

**7-10 December 1994**

8th International Conference on Biomedical Engineering, Singapore; The Secretariat; 8th ICBME 1994; 336 Smith Street, #06-302; New Bridge Centre; Singapore 0105; Tel. 65-227-9811 FAX. 65-227-0257

**2-6 July 1995**

XVth Congress of the International Society of Biomechanics, Jyväskylä, Finland. XVth ISB Congress; Jyväskylä Congresses; P.O. Box 35; FIN -40351 Jyväskylä; FINLAND Tel. +358 41 603 664 FAX. +358 41603 621 tvanttin@jyu.fi

# Job Opportunities in Biomechanics

## DOCTORAL POSITIONS

**Post-Doctoral Biomechanics of Human Movement.** Computer modeling and simulation of musculoskeletal dynamics. Scott Tashman, PhD, Head, Section of Motion Analysis, Bone and Joint Center, Henry Ford Hospital, 2799 West Grand Boulevard, Detroit, MI 48202 tel: 313-876-7572 fax: 313-873-4031 tashman@bjc.hfh.edu

**Post-Doctoral Biomechanics of Hard Tissue.** Finite element analysis programming experience necessary. David P. Fyhrie, PhD, Head, Section of Biomechanics, Bone and Joint Center, Henry Ford Hospital, 2799 West Grand Boulevard, Detroit, MI 48202 tel: 313-876-7572 fax: 313-876-8064 fyhrie@bjc.hfh.edu

**NIH Fellowship** on biomechanics of the spine or knee for recent PhD's or MD's. James C. Howe, MD, Chairman, c/o Carole Godbout, Dept of Orthopaedics and Rehabilitation, University of Vermont, College of Medicine, Robert T. Stafford Hall, Room 401, Burlington, VT 05405-0084 tel: 802-656-2250 fax: 802-656-4247

**Pre- & Post-Doctoral Research Positions** Areas of interest include movement biomechanics, applied motor control, neuroscience, robotics/prosthetics, and intracortical recording. Gary T. Yamaguchi, PhD, Bioengineering Program, Dept of Chemical, Bio & Materials Engineering, Arizona State University, Tempe, AZ 85287-6006. tel: 602-965-8096 yamaguch@asuvas.eas.asu.edu

**Post-Doctoral in Ergonomics/Biomechanics** Responsible for investigating the relationship between seated posture and muscle activity. Herbert M. Reynolds, PhD, Dept of Biomechanics, Michigan State University, East Lansing, MI 48824-1316 reynolds@bim.msu.edu

**Post-Doctoral in Biomaterials Technology** One year position open to recent PhD's in biomechanics. Active research in bone remodeling, prosthesis biomechanics and prosthetic implant evaluation. Prof. Armando Giunti, Laboratorio di Tecnologia dei Materiali, Istituti Ortopedici Rizzoli, Bologna, Italy tel: 0039-51-6366864 fax: 0039-51-6366863 ita0940@appleLink.apple.com

**Post-Doctoral in Hand Biomechanics** Development of instrumentation and associated software on the etiology of carpal tunnel syndrome. Dr. John M. Agee, MD, 77 Scripps Drive, Suite 104, Sacramento, CA 95825 tel: 916-923-5073 fax: 916-923-2215

## RESEARCH POSITIONS

**Biomechanics/Human Factors Engineer** Basic and applied research related to motor-vehicle transportation. PhD and 1-5 years research experience required. Head, Biosciences Division, The University of Michigan Transportation Research Institute, 2901 Baxter Road, Ann Arbor, Michigan 48109-2150 tel: 313-763-3582 fax: 313-747-3330 lawrence.w.schneider@um.cc.umich.edu

**Intern** Studies of footwear design using material tests and human subject tests. MS preferred. Bob Rich, Human Performance Engineering Lab, Reebok International Ltd., 100 Technology Center Drive, Stoughton, MA 02072 tel: 617-341-7635 fax: 617-297-4800

**Engineer** to perform biomechanical analyses of in vivo forces and ranges of motion for pacemaker/defibrillator lead models. PhD required. Cardiac Pacemakers, Inc., Attention: Steve Haik, Mail Stop A270, 4100 Hamline Ave. N., St. Paul, MN 55112-5798 tel: 612-582-4492 hum@lilly.com

**Bioengineer** Research related to biomechanics of the spine. Philip C. Noble, Director of Orthopedic Research, Joseph Barnhart Dept of Orthopedic Surgery, Baylor College of Medicine, MSF 102, 6565 Fanin, Houston, TX 77030

## OTHER POSITIONS

**Biomechanical Software Engineer** to develop computer graphics software to represent the human musculoskeletal system. MusculoGraphics, 1840 Oak Avenue, Evanston, IL 60201 fax: 708-866-1808 jloan@merle.acns.nwu.edu

**Physical Therapist** with interest in sports biomechanics and kinesiology electromyography. John Brault, Centinela Hospital Biomechanics Lab, 555 E. Hardy St., Inglewood, CA 90307 tel: 310-673-2086 fax: 310-671-5923

**Electrophysiology (MS/PhD)** Research related to the electrical function of the heart. **Biomechanics/Anatomy (PhD)** Study of human anatomy from biomechanical perspective with emphasis on cardiovascular and upper thoracic applications. Brian Jackley, Jackley Search Consultants, 7400 Metro Blvd. #112, Edina, MN 55439 tel: 612-831-2344 fax: 612-831-9101

**Biomechanical Engineering (BS/MS)** Research in area of movement analysis and computerized exercise systems. Scott Smith, Exercise Countermeasures Project, c/o June Richmond, Human Resources, Suite 120, Krug Life Sciences, 1290 Hercules, Houston, TX 77058

**Biomechanics Software Design Engineer** Wilbert Murdock, Chairman, Motiontronics for Sports Multimedia, Inc., Hillside Station, PO Box 690127, Bronx, NY 10469 tel: 718-798-7497 fax: 718-798-5717 jufj69a@prodigy.com

## FACULTY POSITIONS

**Bioengineering** Jr/Sr tenure-track position with specialization in applied motor control, robotics system theory & control, or powered prosthetic devices. Gary T. Yamaguchi, PhD, Chair of the Search Committee, Dept of Chemical, Bio and Materials Engineering, College of Engineering and Applied Sciences, Arizona State University, Tempe, AZ 85287-6006 tel: 602-965-8096 yamaguch@asuvox.eas.asu.edu

**Physical Education/Biomechanics** Assoc Prof. Responsibilities include teaching undergraduate & graduate level biomechanics and research. Dr. Shirley Wood, Chair, Iowa State University, Dept of Health and Human Performance, 237 Physical Education Building, Ames, IA 50011

**Mechanical Systems** Tenure-track position. Research interests related to musculo skeletal biomechanics. Don Bartel tel: 607-255-4918 bartel@hip.tn.cornell.edu or Professor David A. Caughey, Director, Sibley School of Mechanical and Aerospace Engineering, 105 Upson Hall, Cornell University, Ithaca, New York 14853

**Exercise Physiology** 9 month tenure-track appointment at Ass't Prof level. Ms. Sheryl Was, Search Secretary, Dept of Health and Human Development, Herrick Hall 219, Montana State University, Bozeman, MT 59717 tel: 406-994-3242

**Mechanical Engineering** Two tenure-track positions at Ass't or Assoc Prof level. Teaching and research in the area of engineering materials. Prof. Ali Sadegh, Chair, Mechanical Engineering Dept, The City College of New York, Convent Ave. at 138th Street, New York, New York 10031

**Biomechanics** Academic position with focus on clinical/rehabilitation biomechanics, computer simulation, biomedical engineering, and functional anatomy. Julie R. Steele, Dept of Biomedical Science, University of Wollongong, Northfields Ave, Wollongong NSW 2522 Australia fax: 61-42-214 096 j.steele@uow.edu.au

**Applied Biomechanics** Tenure-track position in Physical Therapy graduate program. Dr. Gary L. Smidt, Chair, Search Committee, Physical Therapy Graduate Program, 2600 Steindler Building, University of Iowa, Iowa City, Iowa 52242 tel: 319-335-9804 fax: 319-335-9707

**Physical Therapy** PhD preferred, masters required. Research interests in neurology, therapeutic exercise, orthopedics, physiology, pathology, pediatrics or geriatrics. Gad Alon, PhD, PT, Chair of Search Committee, University of Maryland School of Medicine, Dept of Physical Therapy, 100 S. Penn Street, Baltimore, MD 21201 jwhitall@cosy.ab.umd.edu

**Scientist/Bioengineer** Tenure-track position (open rank) in orthopedic research with emphasis on joint kinematics, computer modeling, material testing, or biophysiology. William P. Cooney, MD, Vice Chair for Research, Dept of Orthopedics, Mayo Clinic, 200 First Street S.W., Rochester, MN 55905

**Director, Medical and Biological Engineering.** Develop plan for graduate program and coordinate faculty research in MBE. Dr. Wendell F. McBurney, Chair, Director MBE Search and Screen Committee, Indiana University Purdue University Indianapolis, ET 1219, 799 West Michigan Street, Indianapolis, IN 46202

**Assoc Dean for Research,** School of Engineering and Technology Responsible for facilitating individual and collaborative faculty research. Dr. Larry A. Abel, Chair, Assoc. Dean for Research Search and Screen Committee, Indiana University Purdue University Indianapolis, ET 1219, 799 West Michigan Street, Indianapolis, IN 46202

**Physical Therapy** Tenure-track position (PhD) - administer Masters degree program. Faculty positions (MS) - teaching and participation in faculty practice plan. Clayton Gable, PhD, PT, Dept of Physical Therapy, Texas Tech University Health Sciences Center, 3601 4th Street, Lubbock, TX 79430 tel: 806-743-3226 fax: 806-743-3249 ptycg@tthsc4.hsc.ttu.edu

**Upper Extremity/Soft Tissue Biomechanics** Two tenure-track positions at the Ass't/Assoc Prof levels. Savio L-Y Woo, PhD, Vice Chairman for Research, Dept of Orthopaedic Surgery, University of Pittsburgh, Suite 1010, 3471 Fifth Ave, Pittsburgh, PA 15213

**Sports Medicine** Endowed chair responsible for undergraduate teaching and research. Office of Personnel Services, Troy State University, Troy, AL 36082

**Bioengineer** Director of Orthopaedic Research Labs. Experience in stress analysis and kinematic modeling. Regina T. Foley, Dept of Orthopaedics, University of Southern California, 2025 Zonal Ave, GNH 3900, Los Angeles, CA 90033

**Bioengineer** Medical faculty position (open rank). Michael G. Ehrlich, MD, Professor and Chairman, Dept of Orthopaedics, Rhode Island Hospital, 593 Eddy Street, Providence, RI 02903 tel: 401-444-5895 fax: 401-444-6243

## GRADUATE ASSISTANTSHIPS / SCHOLARSHIPS

**Physical Education** Master's level position assisting in development of teaching techniques in Biomechanics and research related to gait analysis and motor control factors. Julianne Abendroth-Smith, Utah State University jabsmith@cc.usu.edu

**Biomechanics** Scholarships for incoming MS students. Charles Worringham, Div of Kinesiology, University of Michigan, tel: 313-747-2708 cjw@ginger.kines.umich.edu

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NOTE: Applicants are strongly encouraged to contact the listing individual / institution directly to determine current status and to obtain additional information.

# William Harvey and his Publishing Woes

Brian Davis

As many ASB members are aware, the history of research into human locomotion dates back to the times of Aristotle (384-322 B.C.) and Galen (131-210 A.D.). For an account of this history, readers are referred to "Biocomotion: A century of research using moving pictures", (Cappozzo, Marchetti and Tosi, 1992). Despite the fact that this and other historical accounts of biomechanical research outline major breakthroughs in our understanding of gait, the work of one researcher—William Harvey—is often overlooked. While his work entitled "De Motu Locali Animalium" (Of Local Movement in Animals), may be less significant than his discovery of blood circulation, it nevertheless makes for interesting reading. What follows is a fictional account of why Harvey may have elected to postpone publishing his research in the area of animal locomotion. It is assumed that there might have been a journal (just like the *Journal of Biomechanics*) to which Harvey submitted his manuscript. Since biomechanics researchers in the 1600's were hard to come by, it is further assumed that Rene Descartes and Galileo Galilei were the reviewers. We get to see the comments made by (i) the editor-in-chief, (ii) Descartes and (iii) Galileo.

## Notes from the Editor-in-Chief to William Harvey

I regret to inform you that the consensus of our referee panel recommends against publication of your manuscript in its current form. While you obviously devoted a considerable amount of time and effort in developing your ideas (9 years or so), the referees identified several major problems. I enclose their comments. If you believe you can address these comments, please return the manuscript along with three neatly handwritten copies to my office one year from now, January 1638. Begin each new section with a succinct restatement of why you have developed your approach. In your discussion, refer to data in your Results section (parenthetically referring to figures or tables). I apologize for the lengthy review process. I routinely seek three reviews, but have yet to receive the comments of Referee #3. I have heard that he may have succumbed to a pestilence raging in Sicily.

## Referee #1. (Rene Descartes)

### Major Comments.

1. Much of what is in Harvey's manuscript are Aristotlean ideas. For instance, "Nature in the making of muscles is concerned with two things, namely with their actions and their functions, or with the perfecting of action. Therefore

in muscle are two things to be considered, namely the composition of the muscle for the sake of the action which it has to perform, and the mechanical construction for the sake of the strength and power it requires."

While I approve of the term 'muscle actions', I think much of what Harvey has to say about them has already been published, and need not be repeated here.

2. The section that includes the statement "nothing can both move itself and be moved in relation to the same action", is somewhat confusing! When Harvey talks about leaping out of a boat (p. 56), is he interested in his motion or that of the boat? This is an interesting issue that should be taken up in the future.

3. The author seems to be undecided about the merits of his classification of different types of movement (e.g., he appears confused about scratching). In my opinion there is no question that these are reflex (i.e., automatic) movements. I have recently published on this topic, and the author should acknowledge my efforts in this respect.

### General Comments.

Although most of my colleagues have notoriously bad handwriting, Harvey's is of such poor quality that there were large sections that I had to gloss over. Indeed, this is the main reason why I would like to see another version of this manuscript. Specific cases are:

1. He uses the abbreviation Ap or A:p. Could the author confirm whether this is an abbreviation for Fabricus who is otherwise known as Aquapendente?

2. He seems to make the genitive plural ending -orum or -arum by curving upwards the last stroke of the letter preceding the ending, and by crossing it horizontally. Is this correct?

3. This manuscript is full of corrections and alterations, some words being written on top of others, and some squeezed into the margins. I would like the author to indicate what is new and what he would like omitted from the final text.

## Referee #2. (Galileo Galilei)

### Major Comments.

1. Only two experiments are mentioned in this article. One deals with the movement of a chicken whose arteries had been tied and head cut off but which had been given artificial ventilation. The author should reference the work done by Vesalius in this respect. He (Vesalius) has described artificial ventilation, and has shown that the power

of a muscle lies in the muscular substance, not in the fibres of the ligament or tendon which spread out into the muscle's belly. Thus when Harvey points out that there are muscles (e.g., those of the eyes) that do not have one tiny fibre of sinewy material, he needs to go beyond the work of Vesalius and Fabricus and explain what it is in the muscles that causes the power to develop.

The second experiment showing that movements of a frog continue after removal of the heart, but not after the removal of the brain, seems to contradict the first experiment. Why does a chicken not need a brain to move and yet a frog stops moving once it is decapitated?

2. My main reason for not accepting the work in its present form is that there is a general lack of mathematical detail in this treatise. The following will serve as an example (though there are other instances where mathematical details should be included).

The author states "Where there is a transference from one foot to the other there must be surrendering and receiving and where this occurs equally there must be two limbs. Where there are two there must of necessity be a common point which is at rest and there the movement involved is a triangular one." My questions are (i) Are the rates of surrendering and receiving equal? This could be stated in the form of a simple equation, and (ii) What does the author mean by "triangular"? A geometrical sketch would be most helpful.

#### General Comments

1. Much of what is written in the manuscript is repetitive—possibly due to the author forgetting what he has already dealt with in previous sections. This needs some attention.

2. Harvey's handwriting is bad and obscure. With regard to language, I had no trouble making sense of the sections written in Latin, but the English parts are often unintelligible. I would like to see a cleaner, shorter version next time.

#### Footnote

Much of this fictional account was taken from Gweneth Whitteridge's translation of William Harvey's work "De Motu Locali Animalium". She published her translation of his work in 1959, for the Royal College of Physicians at the University Press, Cambridge. Many of the "referee" comments were questions she raised in her Introduction to the book.

## Help Students in Argentina

I will start teaching an upper undergraduate level Ecology class at the University of Mar del Plata (Argentina), and one of the major problems is lack of literature. Unfortunately, Argentina suffers from a stringent economic situation which has resulted in poorly furnished libraries. Due to this fact, I am requesting help of members of this society to build a library. If you have reprints of your own work, or of others that you no longer use, you will help many students by sending them to Argentina. We will also welcome books and serial publications no longer needed in your laboratory. The University of Mar del Plata will properly acknowledge any donation. Thank you very much for your cooperation.

Oscar Iribarne

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## Students' Corner

Tim Koh

I hope all of you in the States are enjoying the same gorgeous weather we are in Calgary. If this continues, I'll have to retract all of my disparaging comments about the climate here ...

Most of you received an e-mail newsletter describing the happenings at the mid-year meeting. For those of you not in the e-mail database, I'll briefly summarize that communication. As is surely stated elsewhere in this newsletter, the Annual Meeting this year is October 13-15 in Columbus, OH. Rooms at the Holiday Inn are \$68.29 (including tax) for 1-4 people. If a student from Ohio State or somewhere nearby could supply me with information on even cheaper accommodation near the meeting site, I would appreciate it. The Holiday Inn seems to be a good deal if you can find some roommates. On that note, if you are looking for a roommate for the conference, send me a request, and I will put you in touch with others who are similarly needy. You can then work out the arrangements amongst yourselves. The fee for students at the Annual Meeting will be \$30. This includes registration, the student lunch, the Borelli lunch, the banquet, *and* tutorials. *That* is a steal.

The student lunch will take place on Friday, October 14. We will have our student meeting, elections for the student representative, and a talk by Kit Vaughan on how to give a great (not just good) presentation. Kit will have to give a great presentation himself to live up to all I've heard about his skills. We have one candidate for student representative, and we need more. Send me an e-mail to nominate yourself soon. The ASB is willing and able to support student involvement in biomechanics and in the society, so now is a great time to help direct this support.

Many of the responses to the e-mail newsletter expressed an interest in a career opportunities seminar. The American Physiological Society puts on a similar seminar and includes speakers from different academic departments, from industry, and from the government. I think this would be a great addition to our Annual Meeting, perhaps in 1995 at Stanford. I've only received one request for speakers and topics, so I ask again for such requests. Otherwise I'll move on without direction ...

If any of you have any questions, concerns, or ideas about students in ASB, feel free to contact me. And now back to the dissertation.

## Membership Chair's Report

Melissa Gross

The Membership Committee continues to receive a growing number of applications for membership. Of the 87 applications received in 1993, 79 new members were welcomed into ASB. Typical of past years, most of the applicants are in the area of Engineering/Applied Physics (55%). The Exercise/Sport Sciences and Health Sciences areas each received 12% of the applicants, and the Biological Sciences and Ergonomics/Human Factors areas each received 10% of the applications. A small number did not declare a discipline area (3%). 45% of the total number of applicants were students.

Membership activity is well underway for 1994, with 61 individuals applying in the first 5 months of the year. Distribution of applicants by discipline area is very similar to 1993, and 34% of the applicants are students.

Who serves on the Membership Committee? They are: (1) Melissa Gross, Chair, Exercise/Sport Sciences, (2) Scott Delp, Engineering/Applied Physics, (3) Claire Farley, Biological Sciences, (4) Irene McClay, Health Sciences, and (5) Mark Redfern, Ergonomics/Human Factors.

To continue the growth and vigor of the Society, the Membership Committee is issuing a challenge to all members to encourage your colleagues and students to apply for membership. If you have ideas about corporate sponsors for potential Sustaining Membership in ASB, the Membership Committee welcomes your suggestions.

## We Need Your Contribution

Members are encouraged to contribute to the newsletter. A note, a letter to the editor, a lead on an interesting story, information about a scientific meeting, in fact anything of interest to the ASB membership, would all be most welcome. Send information scrawled in longhand, via e-mail, or on computer diskette (5.25" or 3.5") for IBM or Macintosh. Plain ASCII text files are preferred! If you have any other ideas, please get in touch. The next newsletter will be published in December, 1994. Deadline for submission of material is 15 November 1994!



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## 1994 ASB Annual Meeting

The 18th Annual Meeting of the ASB will be held at The Ohio State University on October 13-15. All sessions will be held at the Meeting headquarters, the Holiday Inn on the Lane, at the edge of The Ohio State University. The conference rate is \$59 plus tax per night. Room availability cannot be guaranteed after September 23, 1994.

### Tutorials

**Mechanical Power and Work in Human Movements**  
Vladimir Zatsiorsky

**Nicolai Bernstein and His Famous Problem**  
Mark Latash

### Lab Tours

Biodynamics Laboratory  
Biomedical Engineering Center, Bevis Hall  
Gait Analysis Laboratory

### Keynote Symposia

**Controlling Chaos**  
Alan Garfinkel, Ph.D.

**Skeletal Muscle Injury Mechanics**  
Richard Lieber, Ph.D.

**Neural Control of the Circulation During Exercise**  
Jere Mitchell, M.D.

Registration Fees	before 9/16	after 9/16
member	\$ 125	\$ 150
non-member	\$ 150	\$ 175
student	\$ 30	\$ 45
tutorials	\$ 25 (each)	\$ 35 (each)
guest-ticket	\$ 45	\$ 50

For more information or to register, contact:  
The Ohio State University  
Office of Continuing Education  
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Columbus, Ohio 43210-1002  
TEL: (614) 292-8571  
FAX: (614) 292-0492

## ASB Tutorial Presentations

**Mechanical Power and Work in Human Movements**  
Vladimir Zatsiorsky, Pennsylvania State University

Various analytical techniques for the determination of mechanical work and power used in biomechanical research have resulted in ambiguous results. In classical mechanics, the notion of power of force (work of force) rather than simply power (work) is defined. During mechanical analysis, an actual force system can be replaced by an equipollent force system. This operation does not change the movement of the system. The operation does, however, change the estimation of the power of the involved forces which, therefore, must be explicitly defined. The various approaches used in contemporary biomechanical research estimate the power of different forces and consequently bring about different results. The aim of this tutorial is to present a synopsis of the issue.

### Nicolai Bernstein and His Famous Problem

Mark Latash, Rush-Presbyterian-St.Luke Medical Center

1. Life and personality of Bernstein
2. Contributions to biomechanics, motor control, and physiology of activity
3. Experiments illustrating the problem of redundancy
4. Experiments illustrating higher variability of joint angle profiles vs limb endpoint trajectory
5. Studies of spinal frog wiping reflex
6. Notions of kinematic degrees of freedom and degrees of freedom at a control level
7. Two formulations of Bernstein's problem (peripheral and control levels)
8. Inverse problems in human motor control and robotics
9. Problem for multijoint movements
10. Problem for single joint movements
11. Problem for single muscle control; Henneman's principle as a coordinative rule
12. Ill-posed and "worse than ill-posed" problems
13. Promising directions for addressing Bernstein's problem: dynamic pattern generation, search for independently controlled variables, search for coordinative rules at different levels

