

American Society of Biomechanics Newsletter

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www.asb-biomech.org

From the President Walter Herzog

Back to the basics:

It is a confusing time for academic scientific researchers. In mid-career, the expectations are that you do excellent scientific research, that you teach classes on the graduate and undergraduate level, and that you serve on university and professional committees. Some scientists have the talent and capacity to do it all, and do it well; but most do not. Therefore, choices need to be made about what is important and needs to be done carefully and with excellence, and what can be done in the business sense of "fit for purpose".

When I walk through the hallways of my University and encounter colleagues, the consensus seems to be that they are busy, tired, and they look forward to the end of the semester when "they can do what they really want to do." Why is that, and does it have to be this way? Are the professional pressures so big that they promote this tiredness, business, and sometimes even confusion about what is important in our lives?

Of course not! All of us can make choices of how much research we want to do, and how many graduate students and postdoctoral trainees we can supervise and educate effectively. We may not always be free to choose on how many classes we are required to teach, but we can say "no" to committee service, to appointments on editorial boards and to positions in professional organizations. So why would one, in these busy times, want to serve the American Society of Biomechanics (or any other professional organization) with time and effort, in a schedule that seems to preclude such activities? There seems to be no good reason. You do not earn money, there are really no privileges associated with serving on the executive board of the ASB, and you still pay your travel and registration fees like a regular member of the society when attending the yearly conference.

The key to all this seems to be that most academic scientists love what they do. They get great pleasure from being in the lab, and learning new techniques and understand how nature works. They love to interact with the brightest young people, and educate them in a careful and challenging manner. They love to be part of professional organizations that make decisions about what science is all about in their respective society, and they love to chat to like-minded people at conferences and in the coffee shops of their University.

I have learnt over the years that I cannot do it all. Back to the basics, therefore means that I have to make decisions about what I am willing to do, and where I need to protect my time so that my students and family are not cut short. A good balance can be hard to achieve, and all of us have been in situations where balance was lost and life seemed out of control. Back to the basics, therefore means, to evaluate on a continuous basis what is important, and to distinguish carefully between what is important and what is urgent. It seems to me that in this hectic world of ours, these two terms, important and urgent, are often confused, and often so with severe consequences to researchers, their environment, and their professional effectiveness.

As president of the American Society of Biomechanics, I had to make choices of what I want to do and what is important to me regarding this society. Of course, as president, there are a series of mundane tasks that need to be done on a weekly basis, but these are the urgent and not the important things. I worked hard to introduce the Jim Hay Award for the best paper in the area of "Biomechanics of Sports and Exercise Science" for the upcoming ASB conference in Portland 2004. This was an important task for me for a variety of reasons. Some of these reasons are personal and emotional, as I was a student at Jim's place for more than six years and knew him well. Some of them are professional, because Jim has made enormous contributions to the ASB specifically and biomechanics in general. However, at this point, the motivations for introducing this award are not relevant anymore. What is important now is that we celebrate this award to the best of our abilities, and with it the achievements of a great teacher, educator and scientist, to show our appreciation and give our thanks now because we might not have done that when he was still among us. It is never too late to say "thank you," but it is much nicer when you are able to say it to the people who live around you right now. That is important, so let's go back to the basics and explore what is truly important to us.



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Editorial Board

Editor/Layout Andy Karduna karduna@uoregon.edu

Calendar **William Ledoux** wrledoux@u.washington.edu

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Editors Note - The newsletter editorial board is a little lean for this issue. As of the next issue, Michelle Stabick will be responsible for advertising. I am looking for another person or two for the editorial board. If your interested, please get in touch with me

Newsletter Advertising

The Editorial Board invites various businesses and corporations that have products or services of interest to members of the Society to advertise in the ASB Newsletter. Advertising space may also be purchased for job postings or other special announcements.

The current advertising rates are as follows:

1/4 page	\$100
1/2 page	\$200
full page	\$400
back page	\$600
separate insert	\$600

If you are interested in learning more about advertising in the ASB newsletter, please email Michelle Sabick at MSabick@boisestate.edu.

ASB Involvement

If you are interested in becoming more active in the Society (e.g., serving on a committee or chairing a conference session), contact Steve McCaw (smccaw@ilstu.edu), Education Committee Chair with your name, address, phone/fax number, email address, and your desired involvment. This information will be included in a data base which is periodically updated and distributed to the Executive Board.

Graduate Programs

The ASB maintains an on-line database of universities and colleges with graduate programs in biomechanics. The database is organized alphabetically by country and state and currently includes more than 70 institutions from Canada, the United Kingdom, and 32 different states within the US. This is a great resource for undergraduate students who may be considering graduate school as well as for anyone who just wants to find out what's going on at other institutions.

Is your institution included in the database? If not, new information can be sent to Kathy Simpson at the University of Georgia viaemail: ksimpson@uga.edu. Because the information contained in these listings may gradually become outdated as equipment and personnel at laboratories change over time, all institutions are encouraged to review and update their information periodically.

New and updated program information can be transmitted directly in an e-mail. Alternatively, an online form can be used to submit updated graduate program details.

The graduate program database can be accessed through the Society's homepage at: *www.asb-biomech.org*

Secretary/Treasurer

Ted Gross

As a lame duck, this column represents my last newsletter column as Secretary-Treasurer of ASB. For those of you that were not aware, Don Anderson will begin his term as Secretary-Treasurer at the 2004 Annual Meeting. Don and I have begun working to make this a smooth and transparent transition. Hopefully. A brief update on our society finances and membership:

Finances

As of the mid-year Executive Board meeting in March, Society funds have reached an all-time high. The total ASB portfolio stood at nearly \$158,000. In comparison, at the end of 2002, our funds totaled \$102,000. The increase was derived from three sources: 1) mutual fund appreciation as the markets have improved, 2) profit from the 2003 Toledo meeting, and 3) a slight diminishment in the total grants and awards made by the society in 2003. After extensive discussion at the Executive Board meeting, we have established three financial goals related to our increased net worth. First, ASB will increase the number of Grant-In-Aid awards for 2004. Second, we will invest a portion of our current cash in mutual funds to gain further appreciation of society resources. Third, we will begin to develop a strategy to build a small endowment that will enable ASB to defray student meeting registration in perpetuity.

Membership

The society membership appears to have attained a plateau. The total number of members (student, regular, and commercial) ranged between 605 and 620 from 1999 through 2002, before dropping slightly to 570 in 2003. Following our final 2004 invoice notice (again, apologies to those who were inadvertently included on the e-mail list even though we had already received your dues), we now stand at nearly 500 members for 2004. Given our previous trends regarding new membership and renewals trickling in over the course of a year, we will end 2004 with approximately 600 members. As the executive board discussed at the midyear meeting, this may be an ideal membership level for the society as too much of an increase would necessitate substantial changes in our annual meeting (i.e., more sessions, more days, bigger venues). We would welcome any input from the membership on this issue.

Student's Corner Max Kurz

It is hard to believe that summer is already upon us and we are thinking about the annual ASB meeting. When making your plans to attend the meeting, you should consider applying for a student travel grant. These awards are intended to offset the cost of travel to the annual meeting in Portland, Oregon. Application for these awards should only be made after receiving notification of an abstract's acceptance. A copy of the accepted abstract, acceptance letter, and a letter from the student's faculty advisor indicating a need for assistance should be submitted to Dr. Joan Bechtold. See the ASB awards web page for further details:

www.asb-biomech.org/conference_04/ASBAwards2004.htm

I am please to announce that this year we will initiate the first annual ASB Mentoring Program. The goal of the program is to increase the educational and professional experiences of the students attending the conference. How does it work? Any student who is going to attend the annual meeting can request to be matched with a senior scientist. The ASB executive board will then do its best to find a suitable mentor match, and if possible will meet special mentor matching request. We envision that the following interactions will take place between the student and the mentor at the ASB meeting: 1) the mentor will introduce the student to his/her colleagues to help establish a professional network, 2) the mentor will spend time with the student discussing research, education and vocational goals, 3) the mentor will share his/her career experiences, 4) the mentor will provide constructive feedback on the student's presentation. I hope that you share my enthusiasm for this program. So how do you sign up? Send me an e-mail at mkurz@mail.unomaha.edu and I will start processing your request. Please include the following information in your email: your contact information, one paragraph describing your research interest, your career stage and any special requests. In addition to the ASB Mentor Program, I am currently working on a "Women in Science Breakfast" and a "Student Meets the Industry" panel discussion. More information on these programs should appear soon on the ASB student webpage.

In Portland, we will elect the next ASB student representative during the student business meeting. Please consider contributing to the society by running for this position. The position is quite rewarding because you get to see the inner workings of the society and work with some of the top researchers in our field. Duties as the student representative include developing student programs and attending the executive board meetings that are held twice a year. Send me an e-mail if you would like to run for the student representative position or would just like further information.

See you in Portland

ASB Executive Board 2003–2004

President

Walter Herzog University of Calgary Faculty of Kinesiology Calgary, AB T2N 1N4 CANADA Phone: (403) 220-8525 Fax: (403) 284-3553 Email: walter@kin.ucalgary.ca

Past-President

Joan Bechtold Midwest Orthopaedic Research Foundation Orthopaedic Biomechanics Lab Minneapolis, MN 55404 Phone: (612) 336-6609 Fax: (612) 336-6619 Email: bechto1@attglobal.net

President-Elect

J.J. Trey Crisco Brown medical School/Rhode Island Hospital Department of Orthopaedics Coro West, Suite 404 Providence, RI 02903 Phone: (401)444-4231 Fax: (401)444-4418 Email: joseph_crisco@brown.edu

Secretary/Treasurer

Ted Gross University of Washington Department of Orthopaedics and Sports Medicine Seattle, WA 98104-2499 Phone: (206) 341-5604 Fax: (206) 341-5611 Email: tgross@u.washington.edu

Secretary/Treasurer-Elect

Don Anderson University of Iowa, Department of Orthopaedic Surgery 2182 Westlawn Iowa City, IA 52242-1100 Phone: (319) 335-8135 Fax: (319) 335-7530 Email: don-anderson@uiowa.edu

Program Chairperson

Steve Robinovitch Simon Fraser University School of Kinesiology Burnaby, B.C., V5A 1S6, Canada Phone: (604) 291-3566 Fax: (604) 291-3040 Email: stever@sfu.ca

Meeting Chairperson

Michael Bottlang Research Director, Biomechanics Laboratory Legacy Clinical Research and Technology Center Portland, OR 97232 Phone: (503) 413-5457 Fax: (503) 413-4942 Email: mbottlang@legacyhealthresearch.org

Program Chairperson-Elect

Art Kuo University of Michigan Department of Mechanical Engineering Ann Arbor, MI 48109-2125 Phone: (734) 647-2505 Fax: (734) 615-0430 Email: artkuo@umich.edu

Communications Committee Chairperson

Kathy Simpson University of Georgia, Department of Exercise Science Athens, GA 30602-6554 Phone: (706) 542-4385 Fax: (706) 542-3148 Email: ksimpson@uga.edu

Membership Committee Chairperson

Julianne Abendroth-Smith Willamette University, Department of Exercise Science Salem, OR 97301 Phone: (503) 370-6423 Fax: (503) 370-6379 Email: jabendro@willamette.edu

Education Committee Chairperson

Steven McCaw Illinois State University School of Kinesiology and Recreation 5120 Illinois State University Normal, IL 61790 Phone: (309) 438-3804 Fax: (309) 438-5559 Email:smccaw@ilstu.edu

Newsletter Editor

Andy Karduna University of Oregon, Department of Human Physiology Eugene, OR 97403 Phone: (541)346-0438 Fax: (541)346-2841 Email: karduna@uoregon.edu

Student Representative

Max Kurz University of Nebraska–Omaha HPER Biomechanics Laboratory Omaha, Nebraska 68182-0216 Phone: (402) 554-2670 Fax: (402) 554-3693 Email: mkurz@mail.unomaha.edu

ASB Travel Awardee David Gabriel

I have been working to advance a form of interference pattern (IP) analysis to make inferences about the underlying motor unit (MU) firing. Work thus far has shown a strong correlational link with traditional power spectral analysis, but this particular form of IP analysis has yet to be validated with indwelling recordings of MU activity. One problem though, I have never performed indwelling recordings of MU activity, or even know how to reduce and analyze that type of data. I therefore applied for the ASB travel fellowship to visit a laboratory that specialized in recording MU activity.

Gary Kamen agreed to host me in the Motor Control Laboratory at the University of Massachusetts at Amherst, to teach me how to use indwelling quadrifilar needle electrodes. My first attempt caused a graduate student to almost faint, but I got "much" better after that.

Learning to insert the electrodes and get good recordings is only

part of the indwelling technique. Equally difficult is using the signal decomposition program which identifies individual motor unit action potentials based on the interference patterns observed at the three recording surfaces. Detection involves both an automatic component and one that is highly user interactive, requiring a great deal of practice.

The travel fellowship has allowed me to become proficient at a technique required to successfully meet the objectives of a recently obtained operating grant from the National Sciences and Engineering Council (NSERC) of Canada. As a real bonus, we refined the experiment in enough time to collect data suitable for the first planned project from the operating grant. That project will be presented as the 2004 ASB Conference in Portland.

I would like to acknowledge the hard work of J. Greig Inglis, Anita Christie, Scott Rubinstein, and, of course, my host Gary Kamen - all whom made the visit an extraordinary success. There is a very important note at this point. Six weeks before my scheduled arrival Gary Kamen survived a single-engine plane crash. Only two weeks out of the hospital, he was in the laboratory guiding our efforts, a truly Herculean feat. His dedication to fulfilling the goals of the travel fellowship was inspirational.



Meeting Chairperson Michael Bottlang

www.biomechresearch.org

Preparing the 2004 ASB meeting in Portland, Oregon, has been an extremely enjoyable and rewarding effort so far. Many ASB members have encouraged us with their excitement about visiting Portland and confirmed this by submitting a record number of abstracts! Throughout Oregon, we have been met with open doors when it came to institutional support, collaboration, and student volunteers. The team of the Legacy Biomechanics Laboratory equally shares tasks for the 2004 ASB meeting with impressive enthusiasm.

Mark Sommers created a database for registration, printing of name badges, receipts, and various meeting statistics. He has already received six registrations. If you are not one of them, you can locate the registration form on the conference webpage (www.biomechresearch.org). Larry Ehmke has excelled in arranging catered events. The opening wine & cheese reception at the conference hotel on Wednesday night is shaping up to be an excellent gathering place to sample finger foods and enjoy a glass of Northwest wine, while reacquainting with old friends. The banquet at the Portland Classical Chinese Garden will have quite an assortment of delectable food options, including Northwest regional cuisine featuring fresh salmon, and Pan-Asian fare with an on-site wokery. A Chinese Lion Dance and live music will complete the cultural experience. Marcus Mohr is constantly updating the conference webpage with the latest information and diligently prepares all the equipment required for poster and podium presentations and exhibits.

As meeting chair, one of my key priorities is fundraising to ensure a fiscally sound meeting. To date, we have secured support from the Whitaker Foundation, the NIH (NIAMS), local institutions (Legacy, Oregon Health & Science University, Oregon Graduate Institute), and industry (Synthes, Stryker Europe, Zimmer, Nike). This aggressive fundraising enables us to offer FREE student registration (for early registration student members only), while keeping all other registration fees in line with the previous meeting. As an added convenience, you can choose to receive a printed version of the conference proceedings for \$10 in addition to the complementary proceedings CD.

Laboratory tours and workshops will be offered on Wednesday, September 8th. Mario Lafortune, Research Director of the NIKE Sport Research Laboratory, has offer to conduct two tours of his world-class facility. On the registration form, you can select either the 12:30 pm or 3:30 pm tour. Only the 12:30 pm tour will return in time for the workshops. For further information on the conference program, which has been superbly organized by program chair Steve Robinovitch, please see page 11 of this newsletter (and look at the "meeting at a glance" section on the conference webpage for updated information). Our desire is to provide a convenient and comfortable meeting venue together with an inspiring, and effective meeting among colleagues. For this reason, we selected the Doubletree Lloyd Center Hotel as the conference site. You can reach the hotel from the airport by light-rail for \$1.50. The same light-rail will provide free transportation throughout downtown Portland. All poster and podium presentations and industry exhibits will be at the conference hotel. A discount rate of \$115 double-occupancy for ASB attendees has been negotiated, which includes breakfast. While we reserved a large block of rooms for ASB attendees, the hotel typically is fully booked during September. Only your early hotel registration will ensure you the convenience of staying at the conference hotel.

It is a great pleasure and privilege to host our 2004 conference, and I greatly appreciate any suggestions you may have (mbottlan@lhs.org).



Program Committe Steve Robinovitch

On behalf of the program committee and the meeting chair, I wish to extend our thanks to all authors who submitted abstracts for the 2004 ASB conference, to be held Sept 8-11, 2004 in Portland, Oregon. We received 365 abstract submissions – a record number, which reflects the continued growth of the ASB annual meeting as a premiere gathering place for biomechanics researchers. Abstracts are currently under review, and decisions regarding acceptance should be communicated by June 15.

For the first time this year, abstracts were submitted "online" over the Internet. This has streamlined the abstract submission and review process, and many thanks are due to Art Kuo, Ph.D., ASB Program Chair-Elect, who led the development of this system.

Those who submitted their abstracts on the deadline date (April 1) may have shared in the drama and excitement (!) of the website crashing during the final hours leading up to the deadline. Luckily, we were able to fall back immediately on email submissions, and Art had the website back up the next day. I would like to thank all authors involved for your impressive poise and patience.

This year's meeting will include a wonderful selection of keynote lectures from world-reknown scientists: "Muscle Power: The Biomechanics Behind History," by Steven Vogel, Ph.D., "So You Want To Be An Expert? Lessons From Forensics Injury Biomechanics," by Wilson C. (Toby) Hayes, Ph.D., "Biomechanics And Arthritis: From Organism To Organelle," by Farshid Guilak, Ph.D., and "Useful Signals From The Motor Cortex," by Andrew B. Schwartz, Ph.D.

Additional highlight include symposia, tutorials, and laboratory tours. There will be two symposia, one on Joint Neuromechanics scheduled for Thursday Sept 9, and the other on Cell and Tissue Biomechanics, scheduled for Friday Sept 10. Each will include 4-5 excellent speakers. The Education Committee has planned two exciting tutorials on the afternoon of Wednesday Sept 8. Rick Leiber, Ph.D., will lead a tutorial on "The Use Of Molecular Biology In Biomechanics," and Walter Herzog, Ph.D. will lead a tutorial on "Muscle Mechanics." For details on the tours, consult the conference website at: <u>www.biomechresearch.org</u>

There will be greater emphasis this year on poster sessions, since there are not enough time slots to accommodate even one-third of submitted abstracts as podium presentations. All posters will be on display through the entire meeting, with poster sessions scheduled on both Thursday Sept 9 and Friday Sept 10. Given the small number of podium slots available, authors should realize that acceptance of an abstract for podium (versus poster) presentation depends as much on its "match" with a given session theme, as it does on abstract quality as reflected by reviewer scores.

For additional details regarding the meeting schedule and ASB Awards to be presented at the meeting, see contributions in this newsletter from the ASB Past-President (Joan Bechtold, Ph.D.), Meeting Chair (Michael Bottlang, Ph.D.), and Education Chair (Steve McCaw, Ph.D.), and consult the conference website.



Education Committe Steve McCaw

Spring is here, and the time for wandering off the fairway in search of errant golf balls is upon us. That coriolis force definitely plays havoc with my score. Golf is such a great game because success is measured in so many small, but positively reinforcing, ways: the reduction in the packages of balls lost per round, the one shot per round that even Tiger Woods might be proud of, encroachment on par on more holes this round than the last round, and, of course, the refreshing beverages at the 19th hole (if not sooner). But enough idle daydreaming, there is much happening in the realm of the communication committee.

ASB Graduate Student Grant-in-Aid Program

After a brief hiatus, this popular program is again up and running. The Grant-in-Aid program makes available to graduate students money to support research endeavors conducted as part of a degree program. In this cycle, eight applications were received for Grant-in-Aids. With the funding dollars available, ASB will provide five awards. My thanks to grant reviewers Lorin Maletsky (University of Kansas), Irene McClay Davis (University of Delaware) and Jean McCrory (University of Pittsburgh).

Research projects selected for funding include: *Effects of trunk stimulation on seated wheelchair function after spinal cord injury*, from Yushang Yang of the University of Pittsburgh (\$2095); *Can a runner's arm motion and running economy be changed withfeedback training?* from Laura Malczewski of SUNY-Buffalo (\$1443); *Muscular demand and balance control during locomotion* fromHeng-Ju Lee of the University of Oregon (\$2500); *Walking symmetry: Is symmetry the key to lower metabolic costs of walking?* from Jeremy D. Smith of the Pennsylvania State University (\$2500); and *Evaluation of age related alterations in mouse femora* fromTobias Kummer of the University Hospital in Hamburg, Germany (\$2220).

Congratulations to all awardees. Watch for announcements of next years Grant-in-Aid program in the Fall newsletter and on the web.

Tutorials at the Annual Meeting

The Portland meeting is fast approaching, since yet-to-arrive summer always passes so quickly. Details are posted on the meeting website (www.biomechresearch.org), with regular updates as more details are finalized. Two tutorials will be offered on the afternoon of Wednesday, September 8, prior to the opening ceremony. Following are brief descriptions of the two tutorials:

Rick Lieber (Professor of Orthopaedics and Bioengineering at the University of California and V.A. Medical Centers in La Jolla) will present "The use of molecular biology in biomechanics research". Quoting from Dr. Lieber's proposal "The scientific community has experienced a virtual explosion in applications of molecular biological methods to the fields of medicine, technology, computing and engineering. In this tutorial, the basic tenets of molecular biology will be presented including basic cell structure and the flow of information from DNA to RNA to proteins. The most common methods used to study cells and tissues will be reviewed including gene cloning, sequencing, blotting methods and the use of reverse transcription (RT) and the polymerase chain reaction (PCR). Finally, application of these methods will be illustrated using examples of vascular, muscle and ligament cell response to mechanical signals provided by applications of exercise, strain fields and temperature. The thesis of this presentation is that molecular biological methods provide powerful tools for studying tissue response, but the careful mechanical characterization of cells, receptors and even isolated proteins remains within the area of expertise we know as biomechanics." More information on Dr. Lieber's research is available from his laboratory web page http://muscle.ucsd.edu.

Walter Herzog (Co-Director of the Human Performance Lab, Canada Research Chair in Molecular and Cellular Biomechanics, Professor, Faculty of Kinesiology, and Associate Dean Research, Kinesiology at the University of Calgary [and current ASB president]) will present a tutorial on Muscle Mechanics: History and current applications. This tutorial will cover the historical background on the mechanisms of contraction, including Hills' experiment on heat production and the Hill model, H. Huxley's and A.F. Huxley's model of sliding filaments, conceptual advances on the sliding filament theory including the multiple attachment cross-bridge model, cross-bridge structure, and also current thinking on cross-bridge mechanics and energetics, with discussion and examples of applications and transfer of these molecular concepts to whole muscle mechanics. A tutorial on muscle mechanics was suggested by Cecile Smeesters from the University of Sherbrooke in Quebec, Canada; for her suggestion, Cecile has earned free registration to the ASB meeting in Portland.

You can register for the tutorials on the same form that you use to register for the conference (see the the meeting webpage for details).

New Meeting Service: Mentoring Program

At the Portland meeting, ASB will initiate a mentoring program between junior and senior members of the society. The program is modeled after the successful program developed by the Mathematical Biology Society. Basically, the program provides an opportunity for students and recent graduates to receive mentoring from active scientists during one-on-one conversations/ dinners/lunches/sessions/coffee breaks/whatever can be agreed upon during the annual meeting. The ASB will act as the go between to arrange the mentorship. Sort of a "Dream Camp" for biomechanists, without the million dollar salaries. If you are interested in serving as a mentor or as a mentee, read the column of student representative Max Kurtz, and go to the ASB website.

Same Old Stuff: Regional Student Meetings

In disappointing news, NO ONE requested ASB support for a student meeting! (*Editor's Note: Just prior to press time, a request for a student meeting was received and approved by the Executive Board. See details of the Upper Midwest Student*

Meeting elsewhere in this newsletter). In the past, two regional meetings have regularly received funding: The biennial meeting of the Southern California biomechanics society is held in odd years, so no funding request was expected; however, this past year marks the first time in this reporter's memory that there has not been a Midwest Graduate Students' Biomechanics Symposium (for a variety of reasons).

Regional meetings are too useful and too fun to be smoothed out (better than saying let fall by the wayside). ASB has committed funding for multiple meetings, and the executive board looks forward to having to develop a new disbursement policy in case the request for funds exceeds the available amount.

Organizing and hosting a regional meeting is about as simple as organizing and hosting a meeting can be. A regional meeting can take on any one of a variety of formats: addition to an existing regional meeting or a stand alone meeting, held over a full weekend, a single day, or Friday evening & Saturday, whatever will work for your group.

To apply for ASB support (support that ASB is eager to provide), provide the following information to me (smccaw@ilstu.edu) in an email:

Name of a Contact person: That person's email: That person's phone number: Name of the expected host institution: That institution's address: Anticipated date(s) of the Meeting: (flexible within reason) Proposed format of the meeting: in general terms. (see www.cast.ilstu.edu/mccaw/midwest_graduate_students.htm for the actual format used for the 2002 Midwest Graduate Students Biomechanics symposium; feel free to vary from this format or blindly steal it and use it; your proposal need not be so detailed, just a general outline of intended sessions)

Budget: possible categories include but are not limited to honorarium, travel expenses, hotel and per diem expenses for the speaker; student worker payments; photocopying; and refreshments.

Budget Explanation: Justify selection of the speaker and associated expenses, and provide rationale for the proposed expenses in each budget category.

The ASB has limits on funding available for any one regional meeting, but is committed to providing as much support as feasible. There are no deadlines for applications, so don't worry about missing one. Host one, you'll like it.

See you all in Portland.

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28th Annual Meeting of the **American Society of Biomechanics**

Portland, Oregon

September 8-11, 2004

Meeting at a Glance

for updates, please visit www.biomechresearch.org

WEDNESDAY, SEPTEMBER8

11:00	Registration Opens
12:30 to 3:30	ASB Executive Board Meeting I
12:30 to 3:30	Lab Tours I (Nike, Legacy Research Park, Neurological Sciences Institute)
3:30 to 5:30	Lab Tours II (Nike, Neurological Sciences Institute)
4:00 to 6:00	Parallel Workshops
	- Rick Lieber, Molecular Biology in Biomechanics
	– Walter Herzog, Muscle Mechanics
6:30 to	Welcome Reception

THURSDAY, SEPTEMBER9

7:45 to 8:00	Welcome Remarks - Michael Bottlang and Steve Robinovitch KEYNOTE: Steven Vogel, <i>Comparative Biomechanics: Life's Physical World</i>		
8:00 to 9:00			
Parallel Sessions	Α	В	
9:15 to 10:45	Symposium I (Joint Neuromechanics)	TBA	
11:00 to 12:30	TBA	TBA	
2:00 to 3:30	Award Session I - Young Scientist Awards		
3:30 to 5:00	Poster Session I		
5:00 to 6:30	ASB General Meeting		

FRIDAY, SEPTEMBER 10

Welcome Remarks - Steve Madey and Tony Melaragno KEYNOTE: Wilson C (Toby) Hayes, <i>Lessons on Forensic Injury Biomechanics</i>		
Α	В	
Symposium II (Cell & Tissue Biomechanics)	TBA	
TBA	TBA	
KEYNOTE: Andrew Schwartz, Useful Signals from	m Motor Cortex	
Poster Session II		
Award Session II - Clinical Biomechanics, ASB Microstrain, J Biomechanics Awards		
Banquet - Classical Chinese Garden		
	Welcome Remarks - Steve Madey and Tony Melar KEYNOTE: Wilson C (Toby) Hayes, <i>Lessons on J</i> A Symposium II (Cell & Tissue Biomechanics) TBA KEYNOTE: Andrew Schwartz, <i>Useful Signals fro</i> Poster Session II Award Session II - Clinical Biomechanics, ASB Mi Banquet - Classical Chinese Garden	

SATURDAY, SEPTEMBER 11

7:45 to 8:00	Welcome Remarks - Marie Shea and Stephen Hanson	
8:00 to 9:00	KEYNOTE: Farshid Guliak, Biomechanics & Arthritis	
Parallel Sessions	Α	В
9:15 to 10:45	TBA	TBA
11:00 to 12:30	Award Session III - Borelli Award	
12:30 to 2:00	ASB Executive Board Meeting I	

Upper Midwest Student Meeting Joan Bechtold

We are very pleased that the ASB executive board approved our application to host the 2004 ASB Upper Midwest Regional Student Meeting. Our organizing committee has broad representation both geographically and in different disciplines, which we hope will help to draw a large pool of talented and interested students. Following tradition of previous regional meetings, in addition to ample free communications for student presentations and posters, we will have an ASB keynote speaker. Due to co-locating this meeting with the Hennepin County Medical Center 34th annual Trauma seminar, we will also have a HCMC Keynote (Dr. Thomas Einhorn). Here is the basic information.

2004ASB UPPER MIDWEST REGIONAL MEETING

Minneapolis, Minnesota, November 12-13, 2004

Conference Organizers:

Joan E. Bechtold, Ph.D., Minneapolis Medical Research Foundation, Hennepin County Medical Center (HCMC), and University of Minnesota Donald Anderson, Ph.D., University of Iowa

Program Co-Chairpersons:

Kai-nan An, Ph.D., Mayo Clinic Joe Hale, Ph.D., University of Minnesota and Raymedica, Inc. Kent Kaufman, Ph.D., Mayo Clinic Lou Kidder, Ph.D., Hennepin County Medical Center Michel Ladouceur, PhD, University of Iowa Jack Lewis, Ph.D. University of Minnesota Paula Ludewig, Ph.D., University of Minnesota Michael Schwarz, Ph.D., University of Minnesota

Meeting Location:

Minneapolis Convention Center and Midwest Orthopaedic Research Foundation Learning Center.

<u>Meeting Dates</u>: November 12-13, 2004 <u>Tentative abstract submission date</u>: October 15, 2004.

This meeting will be held in conjunction with the Hennepin County Medical Center (HCMC) 34th annual Orthopaedic and Trauma Seminar and Current Concepts in Orthopaedic Research (www.orthotrauma.us). By collocating the ASB Regional meeting with the clinical HCMC Orthopaedic Trauma Seminar and Current Concepts seminar, we hope to build upon existing infrastructure and organization, while still allowing the ASB regional meeting to retain its distinct and more relaxed atmosphere.

Please look for email announcements to the membership, as well as announcements in BIOMCH-L. We hope to draw from our large regional pool of biomechanics students, and to make this both educational and fun. In the meantime, if you have questions or would like to volunteer, please contact me (bechto 1@attglobal.net) or Don Anderson (don-anderson@uiowa.edu).

Past Program Chairperson Rodger Kramm

By many measures, the 2003 ASB meeting at the University of Toledo was a great success. As deposed Program chair, I appreciate the opportunity to thank all who helped make it happen.

I begin with some of my personal recollections. I was a little worried about how Michael Dickinson's keynote address on "How flies fly" would be received but it seemed to me that the audience was abuzz afterwards. I was relieved when Jesse Grizzle from nearby Ann Arbor serendipitously substituted at the last minute with a keynote lecture on his bipedal walking robot. Jesus Dapena and Rick Hinrichs organized a heartfelt symposium on the contributions of the late Jim Hay. For me, it was inspiring to see how a caring but demanding mentor can encourage their students to achieve great things. Being in the home state of Lebron James, I also pondered the paradox of why 18 year olds are paid millions to dunk a ball while most sports biomechanists must rely on ingenuity and meager grants. Art Kuo organized a spirited symposium on the classic Determinants of Gait. The podium participants presented data that showed many weaknesses in the approach. However, many gait practitioners in the audience felt that the ideas still have clinical teaching relevance and provide a framework for describing gait abnormalities. The enthusiastic line up at the microphone to ask questions prompted Dr. Kuo to relinquish his presentation time so that more debate could occur. It was a fine finish to the meeting to have Borelli Award winner, Prof. R. McNeill Alexander, give a delightful overview of his career that covered several hundred million years. That is, the topics spanned T-rex to robots; his career has not been that long!

Organizing the rest of the regular program was a challenge because of the sheer number and quality of abstract submissions. Fortunately, Gary Heise handled the electronic abstract process which was an enormous amount of work. With the new abstract system, Gary is reduced to telling stories about how he had to walk to school though 6 feet of snow both ways uphill just to access the internet. OK, let's do the numbers. 287 abstracts eventually were evaluated and 276 were judged acceptable by a panel of reviewers. Every abstract was scored by at least two and usually four scientists. I am profoundly indebted to all of the anonymous reviewers who were remarkably diligent. After slicing the two and a half days into 15 minute slots, factoring in the keynotes, coffee breaks, symposia, banquet, etc. etc. I defined 8 thematic podium sessions. With the number of abstracts growing, future program chairs will have to wrestle even more with the issue of having two vs. three or more parallel podium sessions. The 222 poster presentations were divided into two days. I did my best to allow sufficient time to view them and the Toledo folks somehow found the space. Program chairs of the future should think creatively about how we might accommodate presentations of computer simulations/data displays. A hybrid between podium and poster is needed. It was the first year for a stand alone ASB meeting to have abstracts on CD ROM, but that happened remarkably easily, and I heard no complaints. In the end, a total of 387 attended the meeting including 200 students.

The meeting chairs, Vijay Goel and Danny Pincivero and their numerous colleagues from the University of Toledo, did a remarkable job of organizing. Moreover, they went the extra mile to accommodate special needs, provide last minute shuttles to the motels and even clean up the auditorium themselves on Friday night. Please don't report them to the janitorial union. Hosting an ASB meeting is a chance to show off and I was really impressed by the science done by the strong core of biomechanists at the U of T. But, they are not a group who rests on their laurels. Many of them also served as our session chairs and utilized their engineering Ph.D.s to fix our finicky laptops and projectors. Thanks you guys! See you in Portland.

Past President Joan Bechtold

As Past-President, it is my honor to chair the **NOMINATIONS COMMITTEE** and the **AWARDS COMMITTEE**.

As you see in this newsletter, the <u>nominations committee</u> (voted on at our annual meeting, comprised of Roger Enoka, Phil Martin, Walter Herzog and Trey Crisco) has come up with a stellar slate of individuals to run for the positions of President-Elect and Program Chair-Elect. In keeping with a US election year theme, remember the phrase on my daughter's T-shirt... "Voting is cool". And, as Al Franken says in a video on the same theme... (paraphrasing) "You might say that your one vote doesn't count. You're right, it doesn't. But.... One plus one is Two. And, Two plus Two is ... Four. And, Four plus Four is EIGHT! ... you get the picture... VOTE!" I am sure that we scientists can certainly get this picture!

Regarding the <u>awards committee</u>, you all have already done your work and submitted materials for the Young Scientist awards, and the Borelli award. Now it is our turn. We will evaluate submissions in the coming months. We will also evaluate the abstracts following their program committee review, for those to be considered for separate awards. Students, please remember to submit for travel awards, once the program committee has accepted your abstract for presentation.

MENTORSHIP-cross-disciplinary and junior-senior

This promising activity is gaining steam, and our Student Representative (Max Kurtz), and the Education Committee (chaired by Steve McCaw) have developed plans to implement mentoring at our meeting in Portland. Please refer to their columns for more information. If you have thoughts or suggestions, or would like to contribute to this process, please do contact any of us. The best way to reach me is with email: bechto1@attglobal.net.

Commercial Members

Commercial membership categories are 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. Based on the level of financial support required and upon benefits provided, commercial membership categories in decreasing order are Sustaining Member, Supporting Member, Contributing Member, and Corporate Member. Companies wishing to become a Commercial Member are encouraged to contact Julianne Abendroth-Smith, Membership Committee Chairperson, at the address indicated on page 4 of this newsletter. Additionally, all members of the Society are invited to suggest names of potential commercial members to Julianne. The ASB Executive Board is pleased to recognize:

CORPORATE MEMBERS Aircast DePuy Orthofix, S.R.L. Peak Performance Technologies, Inc. Tekscan, Inc.



NOMINATIONS FOR OFFICE IN THE ASB

The nominating committee chaired by Joanie Bechtold has provided an outstanding set of candidates for the offices of President-elect and Program Chair-Elect:

President-elect: Ted Gross and Rodger Kram

Program Chair-elect: Joe Hamill and Irene McClay Davis

Here are the biographical sketches provided by the candidates nominated to run. Please consider these sketches carefully as you vote. It is very important that the membership of our society take an active role in determining who will fill these positions. Since the current Secretary/Treasurer (Ted Gross) is a candidate for President-Elect, Don Anderson will be handling the election as the Secretary/Treasurer Elect. In early June, you should receive voting instructions by e-mail. Please remember to VOTE AT THAT TIME. We will announce the results at the annual meeting in Portland. If you do not receive an e-mail, please contact Don (contact information on page 3).

PRESIDENT-ELECT CANDIDATES

Ted Gross, Ph.D.

I currently hold a primary appointment as an Associate Professor and the Director of the Orthopaedic Science Laboratories in the Department of Orthopaedics and Sports Medicine at the University of Washington. I also hold an adjunct appointment in the Department of Bioengineering. Following undergraduate studies in Mechanical Engineering at Trinity University in San Antonio, I received a M.S. in Sport Biomechanics from The Pennsylvania State University. After a brief period in industry, I completed my Ph.D. at the State University of New York at Stony Brook in 1993 and then pursued post-doctoral work in the McCaig Centre for Joint Injury at the University of Calgary. Our research group broadly studies how bone cells and bone tissue perceive and respond to mechanical stimuli. The topic is approached using a multi-disciplinary integration of molecular and cell biology, physiology, imaging, mechanics, and mathematical modeling. My current research interests are focused upon examining how cellular hypoxia may function as a mechanotransduction pathway in bone and identifying novel low magnitude loading regimens capable of augmenting bone mass. I have been the recipient of the Orthopaedic Research Society New Investigator Recognition Award and the ASB Post-Doctoral Award. I have participated as a member of variety NIH review panels, and on review panels for the CIHR, Army, and the Wellcome Trust. I am currently a regular member of the NIH Skeletal Biology Skeletal Regeneration Panel. I review for a variety of journals including American Journal of Physiology: Cell, FASEB, and the Journal of Bone and Mineral Research. With respect to ASB, I attended my first meeting in 1985, and became a member ASB in 1986. Since 1997, I have served the society in a number of capacities including the Grant-In-Aid, Awards, and Program Committees, and will complete my three year term as Secretary-Treasurer at the 2004 Portland meeting. Having begun participating in ASB as a M.S. student, I have always appreciated the essential role this society plays in developing young scientists. If elected, I will focus on enhancing three unique aspects of ASB: 1) the nurturing environment for students, 2) the multi-disciplinary scope of the society, and 3) the societal commitment to fund student research and education.

Rodger Kramm, Ph.D.

I earned my B.A. in Biology from Northwestern University, M.S. at Penn State and Ph.D. in Biology from Harvard in 1991. After a post-doc on insect locomotion, I was appointed to the faculty at UC Berkeley in the Human Biodynamics, Bioengineering and Integrative Biology Departments. Since 2000, I have been an associate professor in the Integrative Physiology Dept. at the University of Colorado, Boulder where I co-direct the Locomotion Lab with my wife, Claire Farley. My primary research interest is the biomechanical basis for the energetic cost of locomotion. My research has a strong comparative zoological component. I have studied more than 40 animal species ranging from ants to antelopes to elephants. I have published over 30 research articles, book chapters and invited review articles. My human locomotion research is primarily funded by NIH. I attended my first ASB meeting in 1986 and have attended/presented at 8 of the 10 most recent meetings. I have been a contributor to the newsletter, an abstract reviewer for the annual meeting, a session chair and the scientific program chair for the 2003 meeting in Toledo. I am a member of other scientific societies, but I find ASB to be the most personally rewarding. I believe that one of ASB's strengths is our relatively small size. Our meetings are not held in football stadiums and they run on a concise schedule. ASB operates on a relative shoestring with no paid staff because of a tremendous amount of volunteer time and energy. It is relatively cheap to join and attend ASB meetings and they are intimate enough for students to have lunch with the Borelli award winner. Many of us keep coming back to ASB meetings like family or classmate reunions. Yet, it is important for ASB to remain fresh by reaching out to other biomechanists who don't normally attend ASB. Our annual meeting provides the opportunity to catch up on recent developments in our own areas but also to be exposed to the diversity of research that more broadly comprises biomechanics. Our membership and meeting base of engineering, exercise science and ergonomics seems strong. If elected President, one of my goals would be to recruit participants/members from the Biophysical Society, the American Society of Plant Biomechanics and the Society for the Integrative and Comparative Biology (formerly American Society of Zoologists). Finally, I would like to revive the NACOB conference, which has been the occasional combined meeting of ASB and the Canadian Society of Biomechanics.

Addendum from Joanie Bechtold, Chair, Nominating Committee

This year the suggestion was made (by candidates) to have Co-Chairs for the position of Program Chair-Elect. After lengthy discussion by the executive board and nominating committee (which had strong proponents each way!) we decided to leave the ballot as is this year. We recognized that the Program Chair can invite others to the Program Committee (and select a Co-Chair), to take advantage of collegiality and broad expertise. If you (as an ASB member) have a strong feeling, comment, observation, wisdom, etc. that you'd like to share for future years, please do let me know! (contact information on page 3).

PROGRAM CHAIR-ELECT CANDIDATES

Irene Davis, Ph.D., PT

Irene Davis received her BS in Exercise Science from the University of Massachusetts, a BS in Physical Therapy from the University of Florida, an MS in Biomechechanics from the University of Virginia, and her PhD in Biomechanics from The Pennsylvania State University. Currently a tenured Full Professor in the Department of Physical Therapy at the University of Delaware, Dr. Davis has served as the Director of Research for Joyner Sportsmedicine Institute from 1997 to present. Her research is focused on understanding the relationships between lower extremity structure, mechanics and injury with the goal of developing optimal strategies for injury prevention. Current areas of study include the injury mechanics of stress fractures, anterior cruciate ligament tears and patellofemoral disorders. Dr. Davis has published in a wide range of biomechanical journals and has served on the editorial boards of Clinical Biomechanics, the Journal of Applied Biomechanics, and the Journal of Orthopedic and Sports Physical Therapy. In addition, she serves as a reviewer for numerous journals including Foot and Ankle, Intl., Journal of Biomechanics and Medicine and Science in Sport and Exercise. Dr. Davis has been an active member of ASB since 1985 and has served on the membership committee from 1995-2001. She has served as an abstract reviewer, as well as a reviewer of ASB student grants proposals. Dr. Davis is a member of ISB, the American Physical Therapy Association, and a Fellow of the American College of Sports Medicine. She has served on a number of organizing committees including the 3rd International Symposium on 3D Movement. She has served as the Program Chair and Organizer for two research retreats on "The Gender Bias in ACL Injuries" held in 2001 and 2003, and research retreats on "Static and Dynamic Classification of the Foot" held in Annapolis, MD in 2000, and "Forward and Inverse Dynamic Models of the Foot" in Los Angeles in 2004. If elected program chair, Dr. Davis will strive to uphold the tradition of creative and innovative programming for the annual ASB meeting with the intent of providing programming for all facets of the membership.

Joseph Hamill, Ph.D.

Joseph Hamill is Professor in the Department of Exercise Science at the University of Massachusetts and has been the director of the Biomechanics Laboratory for the past 18 years. He received a BA from York University, Toronto, a BS from Concordia University, Montreal, and both an MS and PhD in biomechanics from University of Oregon. Dr. Hamill's research interests are focused on lower extremity biomechanics during normal and pathological locomotion. His current projects include studies on coordination variability in the determination of overuse injuries and the interaction of biomechanical and biochemical factors in ligamentous injuries. He has authored over 65 research papers and 75 research proceedings. He has also presented over 100 papers at both national and international conferences. He is a Fellow of the American College of Sports Medicine and the Research Consortium of AAHPERD and was recently elected as a Fellow of the Academy of Kinesiology. Professionally, he has served on the Executive Boards of the New England Chapter of the American College of Sports Medicine, the International Society of Biomechanics, the Canadian Society of Biomechanics and the International Society of Biomechanics in Sports. Dr. Hamill has been a member of the American Society of Biomechanics since 1987. He has served ASB as an *ad hoc* reviewer for the Journal of Biomechanics and as a member of the Membership Committee from 1992-96. If elected, his goal would be to design a meeting program that would integrate biomechanics, biology and bio-engineering featuring speakers from these groups to promote scientific discussion/debate.



Remember, when voting, try and avoid those pesky hanging chads....

Program Chair-Elect Art Kou

The ASB Executive Board is pleased to announce that next year's 29th Annual Meeting of the American Society of Biomechanics will be held August 1-5, 2005, in Cleveland, Ohio. This meeting will be in conjunction with the 20th Congress of the International Society of Biomechanics, organized by Brian Davis and Ton van den Bogert of the Cleveland Clinic. ASB award and symposium activities will take place on a single day, Thursday, August 4. The venue will be Cleveland State University, conveniently located downtown. This combined meeting will attract a much larger number of participants than the usual ASB Annual Meetings, and promises to have an exceptional scientific program. Cleveland is home to the Rock and Roll Hall of Fame, Stouffer's Frozen Entrees, and Big Al's Diner. When taking a break from the meeting itself, attendees can take a stroll through the Zoo or on Lake Erie, and tour the famed cultural mecca known as University Circle.



Hello Cleveland!



ISB Colleagues:

Please accept this invitation to join us in Cleveland, USA, for the XXth Congress of the ISB in August 2005. Cleveland has an extremely interactive biomechanics community, as well as being home to the Cleveland Museum of Natural History (whose scientists discovered the Lucy fossil), NASA Glenn Research Center, Great Lakes Science Center, the renowned Cleveland Orchestra, the Rock and Roll Hall of Fame, numerous art institutions and all the major-league sports.

When you join us in Cleveland, you will have an exceptional experience in a unique environment. Within a short driving distance of Cleveland is a range of tourist attractions, from Six Flags World of Adventure and recordbreaking roller coaster rides at Cedar Point, to more serve visits to Cleveland Metroparks and the Amish areas south of the city. Whether you visit Ohio for its attractions or for intellectual stimulation, you are guaranteed to have a world-class experience.

Brian Davis and Ton van den Bogert For the Organizing Committee

Conference Secretariat, Dept. of Biomedical Engineering, ND20, 9500 Euclid Ave, Cleveland, OH 44195, USA

These Go to Eleven Andy Karduna

"I have been struck by how much effort it can take to generate so little text of such little significance."

- Don Anderson

Looking for another enlightening editorial from Don? Maybe something like his insightful views on powerpoint presentations and Iowa cornfields? Well, you are just going to have to settle for the inspirational quote above. Don has moved on to bigger and better things at the ASB, as he is now secretary/treasurer elect, so you are stuck with me. Don put together a total of seven outstanding newsletters and I want to thank him for his service (I also have some choice words related to his sticking me with his old job, but this is supposed to be a family publication).

For those of you who have read Don's last editorial, it should be no surprise that I am here now. If you didn't, you really should go back and look at it. In additional to a very entertaining discussion of haiku's, he goes into a pretty detailed account of my previous experience as the editor of my elementary school paper. Apparently, it impressed the executive board enough to give me a considerable signing bonus. If you are the type that never reads the newsletter, then, well, I guess there isn't much to say to you, since you probably aren't reading this either. Reminds me of a joke a colleague told me the other day - if a man says something in the forest, and his wife is not there, is he still wrong?

Where was I? Right, about me. To give you a little background, I earned my PhD from the University of Pennsylvania and then accepted a biomechanics faculty position in a Physical Therapy program in Philadelphia. It was quite amazing, within the span of 6 years, thanks to Allegheny's botched attempt to expand east from Pittsburgh, I worked for 5 separate universities without ever changing my office. Bankruptcy in higher education isn't all it's cracked up to be. On the plus side, we made a record number of appearances on the front page of the Philadelphia Inquirer and even graced the pages of the Chronicle of Higher Education. About 2 years ago, I moved to the more stable (albeit wetter) University of Oregon.

As you might have noticed, there are big changes going on in the newsletter. That's right, I have broken with the long standing tradition of having the table of contents on the first page. Not enough? I have also eliminated the black backgrounds that were used for some of the report headings. Still not impressed? OK, I've been saving this one for last, I increased the font size on the president's report. I know, some of these changes are quite radical. When I first mentioned them to my 3 year old son, he said, "that's crazy talk Daddy." But somehow, I think I've made it all work.

Are you still reading this? Apparently you haven't caught on to the fact I really have nothing important to say and that I am simply

trying to fill up space? Clearly, I am fully prepared to fill pages and pages of the newsletter with meaningless drivel (quite a regression from Kit Vaughan's lofty view from the academic village). The best way to control this onslaught is to submit a contribution of your own. A book review, a lead on an interesting story, information about a scientific meeting, tips on grant writing, biomechanical puzzles, recipes from your mother, in fact anything of interest to the ASB membership would be most welcome. And you would be doing everyone else a favor by limiting my contribution.

On a more serious note, I am working on creating a complete online archive of ASB newsletters. I have all newsletters going back to volume 6, but am missing the following issues (assuming that there were 2 issues published every year). If you have copies of these, I would really appreciate it if you could send me an email (karduna@uoregon.edu)

vol 5, no 2 vol 4, no 2 vol 3, no 1 vol 2, no 1 and 2 vol 1, no 1 and 2

Finally, about the title of my report. Of course it is a quote from *This is Spinal Tap* and epitomizes the essence of my "take it up a notch" approach to putting together these editorials (translation - I couldn't come up with anything better). Incidentally, "up to eleven" has made it into the Oxford English Dictionary, meaning "up to maximum volume." Below is the original quote from the movie.

[Context - Nigel (Christopher Guest) is a rock and roll guitar player being interviewed by Marty (Rob Reiner)]

Nigel: The numbers all go to eleven. Look, right across the board, eleven, eleven, eleven and...Marty: Oh, I see. And most amps go up to ten?Nigel: Exactly.Marty: Does that mean it's louder? Is it any louder?

Nigel: Well, it's one louder, isn't it? It's not ten. You see, most blokes, you know, will be playing at ten. You're on ten here, all the way up, all the way up, you're on ten on your guitar. Where can you go from there? Where?

Marty: I don't know.

Nigel: Nowhere. Exactly. What we do is, if we need that extra push over the cliff, you know what we do?

Marty: Put it up to eleven.

Nigel: Eleven. Exactly. One louder.

Marty: Why don't you just make ten louder and make ten be the top number and make that a little louder?

Nigel: [Pause] These go to eleven.



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This technology allows the investigator to thoroughly understand the forces and the nature of the control strategies

Calendar of Events

William Ledoux

$Meeting \, of \, the \, American \, College \, of \, Sports \, Medicine$

June 2-5, 2004, Indianapolis, IN www.acsm.org/meetings/annualmeeting.htm

The IASTED International Conference on Applied Simulation and Modelling - ASM 2004 June 28-30, 2004. Rhodes, Greece

Abstract deadline - past www.iasted.org/conferences/2004/greece/asm.htm

Biannual Conference of the Canadian Society of Biomechanics

August 4-8, 2004, Halifax, Canada Abstract deadline - February 2, 2004 www.csb2004.ca

Pre-Olympic Congress: Sport Science Through the Ages August 6-11, 2004, Thessaloniki, Greece Abstract deadline – past *www.preolympic2004.com*

International Symposium on Biomechanics in Sports

August 9-12, 2004, Ottawa, Canada Abstract deadline – past www.health.uottawa.ca/isbs2004/

Conference of the International Shoulder Group

August 27-28, 2004, Lisbon, Portugal Abstract deadline - past www.fmh.utl.pt/shoulder-ISG2004/index.htm

Annual International Conference of the IEEE Engineering and Medicine in Biology Society September 1-5, 2004, San Francisco, CA

Abstract deadline – past www.ucsfresno.edu/embs2004/

5th Triennial International Hand & Wrist Biomechanics Symposium

September 7, 2004, Syracuse, New York Abstract Deadline - past www.upstate.edu/ortho/handmtg.htm

Annual Meeting of the International Functional Electrical Stimulation Society

September 6-9, 2004, Bournemouth, United Kingdom Abstract deadline - May 1, 2004 www.ifessnet2004.tk

Annual Meeting of the American Society of Biomechanics

September 8-11, 2004, Portland, OR Abstract deadline – past www.biomechresearch.org

5th Conference on Engineering of Sport

September 13-16, 2004, Davis, CA Abstract deadline – past http://www.cevs.ucdavis.edu/Cofred/Public/Aca/ ConfHome.cfm?confid=168

International Workshop on Virtual Rehabilitation

September 16-17, 2004, EPFL, Lausanne, Switzerland Abstract deadline - past www.iwvr.org

Annual Meeting of the Human Factors and Ergonomics Society September 20-24, 2004, New Orleans, Louisiana

Abstract deadline – past hfes.org/meetings/2004menu.html

Annual Meeting of the European Society for Movement Analysis in Adults and Children

September 23-25, 2004, Warsaw, Poland Abstract deadline - past *bobas.czd.waw.pl/~esmac2004/*

ASME International Mechanical Engineering Congress and RD&DExposition

November 13-19 2004, Anaheim, CA Abstract deadline – past www.asmeconferences.org/congress04/

Annual Meeting of the Orthopaedic Research Society February 20-23, 2005, Washington, DC Abstract deadline - July 19, 2005 *www.ors.org*

Congress of the International Society of Biomechanics Summer, 2005, Cleveland, OH *www.isbweb.org*

World Congress of Biomechanics Summer, 2006, Munich, Germany www.wcb2006.org

NOTE: For a more comprehensive international listing, please visit ISB's website at: www.isbweb.org/conferences

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