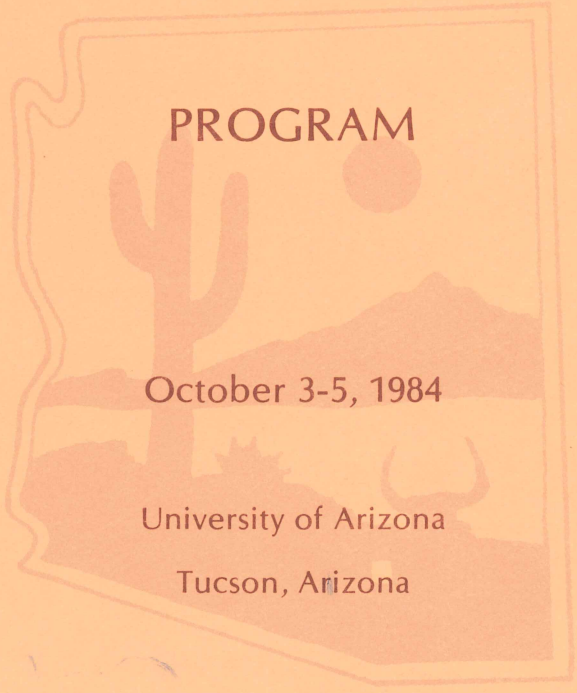
8th Annual Meeting

AMERICAN SOCIETY of BIOMECHANICS



PROGRAM

October 3-5, 1984

University of Arizona

Tucson, Arizona

The American Society of Biomechanics was founded in October 1977 to provide a forum for the exchange of information and ideas among researchers in biomechanics from a wide range of disciplines and application areas. This purpose is accomplished primarily through an annual scientific meeting and by the Society's affiliation with the Journal of Biomechanics.

The Executive Board which has governed the Society during the past year comprises the following members:

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Albert B. Schultz
University of Michigan

For information concerning the Ninth (1985) Annual Meeting:

Steven A. Goldstein
University Hospital
Department of Orthopedic Surgery
C4002 Outpatient Building
Ann Arbor, MI 48109

SCHEDULE

Wednesday, October 3, 1984*

1300-1700 Registration — Plaza Hotel main lobby
Laboratory tours

1800-2000 Welcoming reception
Plaza Hotel Conference Center (Salons B & C)

2000-2200 Executive Committee Meeting
Plaza Hotel Conference Center(Board Room)

Thursday, October 4, 1984*

0600-0700 6-mile group run or lap swim - meet in Plaza Hotel lobby

0730-1130 Registration - Conference Center lobby

0750-0800 Introduction, Welcome, Announcements (Conference Center, Salon C)

0800-0900 Sport Biomechanics — Elite Athlete Symposium (Salon C)
C. Dillman, The Elite Athlete Program
J.G. Hay, Biomechanics of the Horizontal Jump
C. Kyle, Cycling Aerodynamics

0900-0915 Break

0915-1015 **Session A** - Sport Biomechanics (Salon C)
Session B - Calcified Tissue Properties (Salon A)

1015-1030 Coffee Break

1030-1130 **Session C** - Fluid Mechanics (Salon C)
Session D - Calcified Tissue Properties (Salon A)

1130-1200 Society Business Meeting (Salon C)

1200-1300 Lunch - Plaza Hotel

1300-1415 **Session E** - Spine Mechanics (Salon A)
Session F - Biology (Salon C)

1415-1425 Break

1425-1500 Keynote Lecture
D. Speer, Growth Plate Injuries (Salon C)

1500-2200 Tour of and cookout at the Desert Museum
Buses depart from the front of the Plaza Hotel at 1520

Friday, October 5, 1984*

0600-0700 6-mile group run or lap swim - meet in Plaza Hotel lobby

0730-0800 Authors set up poster presentations (Salon A)

0800-0905 Biology — Locomotion Symposium (Salon C)

G.E. Goslow, Vertebrate Locomotion
P. Webb, Fish Locomotion
A.T.W. Cheung, Locomotion of Micro-organisms

0905-0915 Break

0915-1030 **Session G** - Soft Tissue Mechanics (Salon C)

Session H - Gait (Salon B)

1030-1045 Coffee Break

1030-1200 **Poster Session** (Salon A)

1200-1300 Lunch
Executive Committee Meeting (Board Room)

1300-1345 Borelli Lecture

T. Brown, Some Aspects of the Biomechanics of Femoral Head Osteonecrosis (Salon C)

1345-1400 Break

1400-1530 **Session I** - Ergonomics (Salon C)

Session J - Joint Function (Salon A)

1530-1545 Coffee Break

1545-1715 **Session K** - Skeletal Muscle Mechanics (Salon C)

Session L - Locomotion (Salon A)

1715 Close of Conference

* Room numbers refer to meeting rooms of the Plaza Hotel Conference Center.

CONFERENCE PROGRAM

Thursday, October 4

0750-0800

Opening, Welcome and Announcements

0800-0900

SPORT BIOMECHANICS — Elite Athlete Symposium
Chairperson: D.I. Miller

0800 C. DILLMAN
The Elite Athlete Program

0810 J.G. HAY
Biomechanics of the horizontal jump

0830 C. KYLE
Cycling aerodynamics

0850 Discussion

0915-1015

Session A - SPORT BIOMECHANICS
Chairperson: C.A. Putnam

0915 K.N. AN, B.F. MORREY, & E.Y. CHAO
Individual muscle and joint forces across the elbow in sports.
Mayo Clinic.

0930 W. BODA & L. ABRAHAM
The relationship between arm motion at entry and rip entries in diving.
Dept. Physical & Health Education, University of Texas, Austin.

0945 D.J. KRIELLAARS
Dynamics of an upper extremity striking skill.
School of Physical Education, Dalhousie University.

1000 M. HUBBARD & M.L. HULL
Javelin throw optimization using computer simulation and trajectory instrumentation.
Dept. Mechanical Engineering, University of California, Davis.

Session B - CALCIFIED TISSUE MECHANICS
Chairperson: R.B. Martin

0915 A.A. BIEWENER, S. SWARTZ, & M. LEE
Mechanical loading and skeletal remodeling during growth.
University of Chicago.

0930 T.D. BROWN & D.T. SHAW
Instantaneous in vitro contact stress distributions on the femoral condyles.
Dept. Orthopaedic Surgery, University of Pittsburgh.

0945 W.J.M. CZYZ, J.A. FAIRCLOUGH, I.G. MACKIE, & L.D.M NOKES
Tibial vibration transmission - The effects of incremental osteotomy.
Cardiff Royal Infirmary, Great Britain.

1000 J.A. FAIRCLOUGH, W.J.M. CZYZ, I.G. MACKIE, & L.D.M. NOKES
Time domain vibration analysis in the assessment of stability after internal fixation of tibial fractures.
Cardiff Royal Infirmary, Great Britain.

1030-1130

Session C - FLUID MECHANICS
Chairperson: M. Hubbard

1030 T.D. BROWN, R.H. GABEL, D.R. PEDERSEN, L.D. BELL, & W.F. BLAIR
Some characteristics of laminar flow velocity spectra detected by a 20 MHz pulsed ultrasound Doppler.
Depts. Orthopaedic Surgery and Biomedical Engineering, University of Iowa.

1045 A.T.W. CHEUNG, M.E. MILLER, E.M. WALSH, & R.M. DONOVAN
In vivo studies on leukoemboli formation - an intravital microscopic analysis.
School of Medicine and California Primate Research Center, University of California, Davis.

1100 R.M. DONOVAN, A.T.W. CHEUNG, M.E. MILLER, & E. GOLDSTEIN
A computer-assisted method for measuring cell movement.
School of Medicine and California Primate Research Center, University of California, Davis.

1115 T.W. SECOMB & J.F. GROSS
Red blood cell mechanics and blood flow in narrow capillaries.
Dept. Physiology, University of Arizona.

Session D - CALCIFIED TISSUE MECHANICS
Chairperson: T. Brown

1030 J.B. KOENEMAN
An improved 2-D finite element model of the proximal femur.
Harrington Arthritis Research Center, Phoenix.

1045 R.B. MARTIN
Computer modeling of temporal effects in bone remodeling physiology.
West Virginia University.

1100 T.E. ORR & D.R. CARTER
Stress analysis of porous ingrowth joint arthroplasty in the proximal humerus.
VA Medical Center, Palo Alto and Mechanical Engineering Department, Stanford University.

1115 R. SUMNER
Material and geometric properties of the human femur during growth.
Dept. Anthropology, University of Arizona

1300-1415

Session E - SPINE MECHANICS
Chairperson: A.H. Soni

1300 M.R. GUDAVALLI & A.H. SONI
Flexibility properties of normal and injured lumbar spine.
Mechanical and Aerospace Engineering, Oklahoma State University.

1315 T. JAKOBS, J.A.A. MILLER, & A.B. SCHULTZ
Lateral movement of the upper body in response to static lateral moments.
Dept. Mechanical Engineering, University of Michigan.

1330 J.M. LIPKA & H.S. RANU
Comparison of an in vivo spondylolysis fracture to those obtained in vitro.
Dept. Biomedical Engineering, Louisiana Technical University.

1345 J.A.A. MILLER, H. STEEN, L.B. SKOGLUND, & A.B. SCHULTZ
Paravertebral muscle recruitment patterns in the thoracic and lumbar spine.
Sophies Mindes Orthopaedic Hospital, University of Oslo, Norway and Dept. Mechanical Engineering, University of Michigan.

1400 B.R. SIMON, J.S.-S. WU, J.H. EVANS, & L.E. KAZARIAN
Poroelastic structural models for human spinal motion segments.
Aerospace and Mechanical Engineering, University of Arizona, Strathclyde University, Glasgow, Scotland, and Wright-Patterson Air Force Base, Dayton.

Session F - BIOLOGY
Chairperson: A.T.W. Cheung

1300 D.B. BURR & M.B. SCHAFFLER
Structural-mechanical indicators of limb specialization in primates.
Dept. Anatomy and Orthopedic Surgery, West Virginia University.

1315 J.H. HEBRANK & S.A. WAINWRIGHT
Elastic recoil in the marlin backbone.
Duke University

1330 N.H. MENDELSON
Growth dynamics of bacterial macrofiber fragments.
Dept. Microbiology and Immunology, University of Arizona

1345 M.E. MORBECK
Biomechanics and human evolution.
Dept. Anthropology, University of Arizona.

1400 M.B. SCHAFFLER & D.B. BURR
Bone microstructure: a study in comparative locomotion.
Dept. Anatomy and Orthopedic Research Lab, West Virginia University.

1425-1500

KEYNOTE LECTURE

1425 D. SPEER
Growth plate injuries

1455 Discussion

Friday, October 5

0800-0905

BIOLOGY — LOCOMOTION SYMPOSIUM
Chairperson: R.A. SATTERLIE

0800 G.E. GOSLOW
Vertebrate locomotion.

0820 P. WEBB
Fish locomotion.

0840 A.T.W. CHEUNG
Locomotion of micro-organisms

0915-1030

Session G - SOFT TISSUE MECHANICS
Chairperson: G. Pijanowski

0915 D.I. BYLSKI, T.J. KRIEWALL, N. AKKAS, & J.W. MELVIN
Mechanical behavior of fetal dura mater in axisymmetric biaxial tension.
University of Michigan, Surgical Products Division, 3M Company, and Middle East Technical University, Ankara, Turkey.

0930 R.N. HINRICHS, P.H. WERNER, J.E. RINK, T.W. JACKMAN, & R.A. JOSEPHS
Impact forces upon landing from a height in children.
Dept. Physical Education, University of of South Carolina.

0945 G.J. PIJANOWSKI, R.V. ALLHANDS, & S.A. KINCAID
Use of force plate data to screen young pigs for osteochondrosis.
Dept. Veterinary Biosciences and Bioengineering Program, University of Illinois, and Dept. Anatomy, Purdue University.

1000 H.S. RANU
Modeling of the human skin with particular reference to radiotherapy effects.
Dept. Biomedical Engineering, Louisiana Technical University.

1015 G.A. VALIANT & P.R. CAVANAGH
An in vivo determination of the mechanical characteristics of the human heel pad.
Nike Sport Research Laboratory and Pennsylvania State University.

Session H - GAIT
Chairperson: A.E. Atwater

0915 S. Yu. ALESHINSKY
Total, external, and internal work for human movement.
Pennsylvania State University.

0930 P.E. MARTIN
Mechanical work done on the lower extremities during the recovery phase of loaded running.
Dept. Health & Physical Education, Arizona State University.

0945 D.I. MILLER & C.F. MUNRO
Joint torque patterns of below-knee amputees during running stance.
Faculty of Physical Education, University of Western Ontario and Dept. Kinesiology, University of Washington.

1000 C.A. PUTNAM
Segment interaction in treadmill running at four different speeds.
School of Physical Education, Dalhousie University

1015 K.R. WILLIAMS & J.L. ZIFF
Changes in rearfoot motion associated with systematic variations in running style.
University of California, Davis.

1030-1115

POSTER SESSION I

A.T. BAHILL
Baseball players cannot keep their eyes on the ball.
Systems and Industrial Engineering, University of Arizona.

J. DANOFF, W. SCHNEIDERWIND, B. MOY, B. THORNTON, L. GERBER, A. RICH, & J. LEDERMANN
Variable force coil spring hand splint.
Dept. Rehabilitation Medicine, NIH.

J. DANOFF, T. WAGGONER, & G. HUNT
Assessment of footpad dependability.
Dept. Rehabilitation Medicine, NIH.

D.R. PEDERSEN, T.D. BROWN, & R.J. SINGERMAN
Quantitation of Fuji prescale film pressures using digital image scanning.
Depts. Orthopaedic Surgery and Biomedical Engineering, University of Iowa.

M.S. PINZUR, P. DIMONTE-LEVINE, R. SHERMAN, J. TRIMBLE, & K. HAAG
Temporal gait analysis by inter-ankle distance monitoring.
Hines VA Hospital and Dept. Orthopaedics and Rehabilitation, Loyola University.

J. RICHARDS
An application of photoelastic techniques to the measurement of tibial stiffness.
Institute of Science and Technology, University of Wales, Cardiff, United Kingdom.

G.L. SCHEIRMAN & P.J. CHEETHAM
Temporal and kinematic characteristics of skilled tracking movements.
Dept. Biomechanics and Computer Services, United States Olympic Center.

D.S. SCHNUR & J.L. LEWIS
Structural modeling and design of knee orthoses.
Harrington Arthritis Research Center, Phoenix and Northwestern University.

1115-1200

POSTER SESSION II

M. SHARAN, M.P. SINGH, & A. AMINATAEI
Two layer model for the oxygenation of blood in pulmonary capillaries.
Centre for Atmospheric and Fluids Sciences, Indian Institute of Technology, New Delhi, India.

J.H. STAGALL & L.D. ABRAHAM
Effects of arm action on the height attained in a maximal vertical jump.
Dept. Physical and Health Education, University of Texas, Austin.

E.K. STAUFFER, R.S. POZOS, & R.F. PIERCE
Spectral analysis of tremor patterns associated with stuttering speech.
Depts. Physiology and Communicative Disorders, University of Minnesota.

J.J. TRIANO
Accurate determination of motion from plane films.
University of Illinois and National College.

B. TURAN, A. VILMAZ, & H.S. RANU
Spin lattice relaxation time of human blood: an NMR study.
University of Ankara and University of Dicle, Turkey and Dept. Biomedical Engineering, Louisiana Technical University.

J. M. WINTERS & L. STARK
Analysis of fundamental human movement patterns by using in-depth antagonistic muscle models: examples of knee and elbow movements.
Dept. Engineering Science, University of California, Berkeley.

Y.G. ZORBAS & I.O. MATVEYEV
Effect of hypokinesia on man's desirability in performing physical activities.
Instituto di Medicina dello Sport, CONI, Rome, Italy.

1300-1345

BORELLI LECTURE

1300 J.G. HAY, Introduction

1305 T. BROWN
Some aspects of the biomechanics of femoral head osteonecrosis.

1340 Discussion

1400-1530

Session I - ERGONOMICS
Chairperson: T. Armstrong

1400 M. ADRIAN & G. SMITH
The kinematics and kinetics of swinging two types of railroad hammers.
University of Illinois.

1415 R.O. ANDRES, D.S. BLOSWICK, & D.B. CHAFFIN
A biodynamic model for investigating industrial push/pull tasks.
Center for Ergonomics, University of Michigan.

1430 K.L. KREUTZBERG & R.O. ANDRES
Field study methods for applying a biodynamic model to investigate push/pull tasks.
Center for Ergonomics, University of Michigan.

1445 T.J. ARMSTRONG, M. ROBERTSON, B. BUCHHOLZ, B.S. JOSEPH, C. WOOLLEY, & B. SILVERSTEIN
A system for analysis of postures and forces in manual work.
Center for Ergonomics, University of Michigan.

1500 M. KRAG, L. GILBERTSON, & M.H. POPE
A test of the hypothesis of abdominal pressure as a disc load-reducing mechanism: a study using quantitative electromyography.
Dept. Orthopaedic Surgery, University of Vermont.

1515 K.S. LEE, L. HALL, & F. CHEN
Musculoskeletal stress evaluation of microscopist using electromyography.
Dept. Industrial and Systems Engineering, Ohio University.

SESSION J - MECHANICS OF JOINT FUNCTION
Chairperson: J.G. Andrews

1400 K. FUKUDA, K.N. AN, E.V. CRAIG, R.H. COFIELD, & E.Y.S. CHAO
Ligamentous restraints to acromioclavicular joint motion: A biomechanical study.
Mayo Clinic and Dept. Orthopedics, University of Minnesota.

1415 S.A. GOLDSTEIN, T.L. GREENE, D.S. LOUIS, W.S. WARD, & L.S. MATTHEWS
A biomechanical evaluation of the function of the digital pulleys.
University of Michigan Medical Center.

1430 C. JOHNSON & M.L. HULL
Torsional load-deformation characteristics of the human leg in vivo.
Dept. Mechanical Engineering, University of California, Davis.

1445 M.W. MARZKE & R.F. MARZKE
The function of the third metacarpal styloid process: a force analysis employing magnetic resonance imaging.
Depts. Anthropology and Physics, Arizona State University.

1500 D.J. RAPPERPORT & D.R. CARTER
Contact finite element stress analysis of the hip joint and acetabular region.
Dept. Mechanical Engineering, Stanford University and Veterans Administration, Palo Alto.

1515 J.R. TOLBERT, W.F. BLAIR, J.G. ANDREWS, & R.D. CROWNINSHIELD
The kinetics of normal and prosthetic wrists.
Depts. Mechanical Engineering and Orthopaedics, University of Iowa.

1545-1715

Session K - SKELETAL MUSCLE MECHANICS
Chairperson: K. An

1545 J.G. ANDREWS
Strength curves for multiple-joint single degree of freedom exercises.
Dept. Mechanical Engineering, University of Iowa.

1600 P.E. CRAGO & S.V. ZACHARKIW
Fatigue-induced changes in stiffness of the flexor pollicus longus in human subjects with intact reflexes.
Depts. Biomedical Engineering and Orthopaedic Surgery, Case Western Reserve University.

1615 S.L. LEHMAN
Control of human wrist movements during adaptation to inertial loads.
Rehabilitation Institute, Chicago.

1630 S.-P. MA & G.I. ZAHALAK
The mechanical response of the active human triceps brachii to very rapid lengthening and shortening.
Dept. Mechanical Engineering, Washington University.

1645 M.H. MOEINZADEH, L.D. METZ, L.R. WHITE, & J.L. GROPPEL
Biomechanical force analysis of the leg motion for the standard and supine recumbent bicycle pedaling.
Depts. General Engineering and Physical Education, University of Illinois.

1700 J.M. WINTERS & L. STARK
Interaction between ongoing eccentric/concentric movement and fast movements for the limb.
Dept. Engineering Science, University of California, Berkeley.

Session L - LOCOMOTION AND PROPULSIVE MOVEMENTS
Chairperson: K. Williams

1545 J. DAPENA
Systematic error in 3D coordinates within a large object-space when using DLT and NLT methods of 3D cinematography.
Dept. Physical Education, Indiana University.

1600 M. HUBBARD, E.G. PATERSON, & A.E. ORCUTT
Theoretical prediction of energetically optimal step length-velocity programming in biped locomotion.
Dept. Mechanical Engineering, University of California, Davis.

1615 B.J. JAEGER, S.A. OLIVARES, & M.C. WETZEL
Control of human electromyographic activity during different walking velocities.
Dept. Psychology, University of Arizona.

1630 L.W. LAMOREUX
A computerized system for real-time visualization of ground reaction forces in walking.
Shriners Hospital for Crippled Children, San Francisco.

1645 D.N. TIBAREWALA
A multidimensional approach to objective assessment of lower extremity disability.
National Institute for the Orthopaedically Handicapped, Calcutta, India.

1700 F.E. ZAJAC, W.S. LEVINE, Y. M. CHO, & M.R. ZOMLEFER
Maximal height jumping: optimal strategies based on a study of the heel-off to lift-off phase of propulsion.
Dept. Mechanical Engineering, Stanford University, Veterans Administration, Palo Alto, and Electrical Engineering Dept., University of Maryland.

The University of Arizona College of Medicine's Continuing Medical Education activities are accredited by the ACCME. This program meets the criteria for 17 credit hours in Category I of the Physician's Recognition Award of the American Medical Association.

REGISTRATION FORM

Eighth Annual Meeting
AMERICAN SOCIETY OF BIOMECHANICS
October 3-5, 1984

Name _____

Address _____

City/State/Zip _____

Phone (_____) _____

Title or Position _____

The registration fee includes meeting materials, a barbecue at and tour of the Desert Museum, coffee breaks, and lunch on Thursday. There are no partial fees. Acceptance of a paper for presentation does not defer the registration fee.

_____ $70.00 Regular

_____ $35.00 Student

There is a $10.00 late-registration fee after September 3, 1984.

Make check payable and mail to:

Office of Continuing Medical Education
Arizona Health Sciences Center
Tucson, Arizona 85724
(602) 626-6173

If you are disabled, will you require any special services?

____ Yes ____ No (We will contact you for specifics.)

A block of rooms has been reserved for our use at the Plaza International Hotel, 1900 E. Speedway, Tucson, Arizona 85719; (602) 327-7341. Special rates are $39.00/$41.00 for single/double occupancy plus 7% tax. To make your reservation, please call or write the hotel directly and identify yourself as a participant in the Biomechanics Meeting in order to receive the special rate. The room block will be held until September 3, 1984; after this date rooms will be on a space-available basis.

Inquiries concerning the Meeting organization should be directed to:

Roger M. Enoka, Ph.D.
Department of Physical Education
University of Arizona 85721
(602) 621-4850
(602) 621-4702

The American Society of Biomechanics gratefully acknowledges the generous support of the following companies:

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