

MONDAY A.M.

SESSION 1

SYMPOSIUM

**MOLECULAR FORCES IN THE MECHANICS  
OF CELL MEMBRANE**

Room 1105 Basic Science Bldg.

CHAIRMEN - RICHARD SKALAK, Columbia University, New York  
SHELDON WEINBAUM, City University of New York

- 9:00 Structural and Dynamic Aspects of Red Cell Membranes (1.1)  
R.F. BAKER, University of Southern California, School  
of Medicine, Los Angeles, Ca.
- 9:35 Molecular Movements of Cell Surface Receptors (1.2)  
M. POO, University of California, Irvine, Ca.
- 10:05 Mechanical Calorimetry of Red Cell Membrane (1.3)  
E.A. EVANS, Duke University, Durham, N.C.
- 10:35 INTERMISSION
- 10:50 Molecular Forces Between and Within Lipid Membranes (1.4)  
V.A. PARSEGIAN<sup>1</sup>, R.P. RAND<sup>2</sup>, N. FULLER<sup>2</sup> and M. McALISTER<sup>2</sup>,  
<sup>1</sup>NIH, Bethesda, Md.; <sup>2</sup>Brock University, St. Catharines,  
Ontario, Canada.
- 11:20 Theoretical Models of Vesicular Transport and Endothelial  
Membrane Interaction (1.5)  
S. WEINBAUM, The City College of the City University of  
New York, N.Y.

MONDAY A.M.

SESSION 2

SYMPOSIUM

**SOFT TISSUES AROUND A DIARTHRODIAL JOINT**

Room 2100 Basic Science Bldg.

CHAIRMEN - SAVIO WOO, University of California, San Diego, Ca.  
STEVE KUEI, University of California, San Diego, Ca.

- 9:00 Biorheology of Soft Tissues: The Need for Inter-Disciplinary  
Studies (2.1)  
S. WOO, University of California, San Diego, Ca.
- 9:10 The Multicomposite Structure of Tendon Collagen-Relationships  
between Ultra-Structure and Mechanical Properties (2.2)  
E. BAER, Case Western Reserve University, Cleveland, Oh.
- 9:40 Collagen: Its Structure and Function in Normal and  
Pathological Connective Tissues (2.3)  
M.E. NIMNI, P.D. BENYA, C. KENNEY and A.J. KEYSER,  
University of Southern California, School of Medicine,  
Los Angeles, Ca.
- 10:10 INTERMISSION
- 10:30 Biphasic Rheological Analysis of Cartilage Creep and Stress  
Relaxation (2.4)  
V.C. MOW<sup>1</sup>, S.C. KUEI<sup>2</sup> and W.M. LAI<sup>1</sup>, <sup>1</sup>Rensselaer  
Polytechnic Institute, Troy, N.Y., and <sup>2</sup>University of  
California, San Diego, Ca.

- 11:00 Application of Enzyme Probes in Connective Tissue Biomechanics (2.5)  
A.S. HOFFMAN, University of Washington, Seattle, Wa.
- 11:30 Mechanical Imperatives for Synovial Joint Homeostasis: The Present Potential for their Therapeutic Manipulation (2.6)  
W.H. AKESON, D. AMIEL, S.L. -Y. WOO and F. HARWOOD, University of California, San Diego, Ca.

MONDAY P.M.

SESSION 3

SYMPOSIUM

**MUCO-CILIARY TRANSPORT**

Room 1105 Basic Science Bldg.

CHAIRMEN - THEODORE Y.T. WU, California Institute of Technology, Pasadena, Ca.  
STANLEY A. BERGER, University of California, Berkeley, Ca.

- 1:30 The Rheology and Molecular Organization of Epithelial Mucus (3.1)  
A. SILBERBERG, The Weizmann Institute of Science, Rehovot, Israel.
- 2:00 Tracheal Muco-Ciliary Clearance (3.2)  
A.T.W. CHEUNG and A.T. CHWANG, California Institute of Technology, Pasadena, Ca., and University of Iowa, Iowa City, Ia.
- 2:30 Flagellar Propulsion of Sperm in Cervical Mucus (3.3)  
D.F. KATZ and S.A. BERGER, University of California, Berkeley and Davis, Ca.
- 3:00 INTERMISSION
- 3:15 Chemical Aspects of Mucus Rheology (3.4)  
M. LITT, University of Pennsylvania, Philadelphia, Pa.
- 3:45 Fluid Propulsion in a Muco-Ciliary Channel (3.5)  
J.R. BLAKE and H. WINET, Division of Mathematics and Statistics, CSIRO, Australia; and Southern Illinois University, Carbondale, Ill.
- 4:15 Cervical Mucus as a Sustained-Release Hydrogel System for Spermatozoa (3.6)  
R.M. NAKAMURA, M. SAGA, F. FLORIANI, D. TREDWAY, V. DAVAJAN and G. BERNSTEIN, Univesrity of Southern California (USC), Los Angeles, Ca.; St. Marianna University, Kawasaki City, Japan; Kaiser Permanente Hospital, Bellflower, Ca.; University of Chicago; USC; and USC, Los Angeles, Ca.

MONDAY P.M.

SESSION 4

**CELL MEMBRANE AND CHROMATIN**

Room 2100 Basic Science Bldg.

CHAIRMEN - BRUNO ZIMM, University of California, San Diego, Ca.  
V.I. VOROB'EV, Institute of Cytology, Academy of Sciences, USSR

- 1:30 Effect of Temperature on the Viscosity of Red Cell Membrane (4.1)  
R.M. HOCHMUTH, E.A. EVANS and K. BUXBAUM, Duke University, Durham, N.C.

- 1:50 Membrane Mechanical Properties of ATP-Depleted Human Erythrocytes (4.2)  
H.J. MEISELMAN, E.A. EVANS and R.M. HOCHMUTH, University of Southern California, School of Medicine, Los Angeles, Ca.; Duke University, Durham, N.C.; and Washington University, St. Louis, Mo.
- 2:10 Viscoelastic Properties of Red Cell Membrane (4.3)  
S. CHIEN, K.-L.P. SUNG, R. SKALAK and A. TOZEREN, College of Physicians and Surgeons, Columbia University, N.Y.; and Department of Civil Engineering and Engineering Mechanics, Columbia University, N.Y.
- 2:30 Buckling of the Red Blood Cell Membrane (4.4)  
T.M. FISCHER<sup>1</sup>, C.W.M. HAEST,<sup>1</sup> M. STOHR-LIESEN<sup>1</sup>, H. SCHMID-SCHONBEIN,<sup>1</sup> and R. SKALAK<sup>2</sup>, <sup>1</sup>Medizin.-Theoret. Institute der RWTH, Aachen, West Germany; and <sup>2</sup>Columbia University, N.Y.
- 2:50 INTERMISSION
- 3:05 Charge Relaxation Effects in Membrane Breakdown (4.5)  
J.M. CROWLEY, University of Illinois, Urbana, Ill.
- 3:25 Rheological Changes of Growing Cells: Effect of Auxin and Fusicoccin on Collenchyma (4.6)  
M. JACCARD and P.E. PILET, Institute of Plant Biology and Physiology of the University, Lausanne, Switzerland.
- 3:45 Rheological Studies of Chromatin (4.7)  
V.I. VOROB'EV and L.V. KUKHAREVA, Institute of Cytology of the Academy of Sciences of the USSR, Leningrad, USSR.
- 4:05 The Dynamic Equilibrium Model of Cytoplasmic Microtubules and the Oxalate-Induced Radial Segmentation of the Nuclei of Mononuclear Blood Cells (4.8)  
B. NORBERG and A. NORBERG, University Hospital of Lund, Lund, Sweden.

MONDAY P.M.

SESSION 5

**BIORHEOLOGY OF LUNG, AIRWAY AND SKIN**

Room 274 Clinical Science Bldg.

CHAIRMEN - SIDNEY S. SOBIN, University of Southern California, Cardiovascular Research Lab., Los Angeles, Ca.  
CLIFFORD ASTILL, National Science Foundation, Wash. D.C.

- 1:30 Homogeneity and Isotropy of Lung Parenchyma (5.1)  
G.C. LEE and R. TAI, State University of New York at Buffalo.
- 1:50 Elastic Properties of Lung Parenchyma: The Effect of Pressure-Volume Hysteresis on the Behavior of Large Blood Vessels (5.2)  
S.J. LAI-FOOK, Mayo Clinic, Rochester, Minn.
- 2:10 A Finite Element Analysis of the Whole Lung (5.3)  
D.L. VAWTER, Virginia Polytechnic Institute and State University, Blacksburg, Va.
- 2:30 On the Measurement of the Elasticity of the Airway (5.4)  
T. NAKAGAWA, Y. SEGUCHI and Y.C. FUNG, University of California, San Diego, Ca.

- 2:50 Possible Aerodynamic Instability in the Airway Due to Flow Separation and Interaction of Flow with Elastic Wall (5.5)  
Y. MATSUZAKI and Y.C. FUNG, National Aerospace Laboratory, Japan; and University of California, San Diego, Ca.
- 3:10 INTERMISSION
- 3:30 Mechanical Properties of Human Skin (5.6)  
T.H. COOK, The Pennsylvania State University, University Park, Pa.
- 3:50 The Rheological Behavior of the Skin: Experimental Results and a Structural Model (5.7)  
Y. LANIR, Technion-Israel Institute of Technology, Haifa, Israel.
- 4:10 The Role of the Microcirculation on the Dynamic Mechanical Behavior of Human Skin (5.8)  
S.T.J. PENG,<sup>1</sup> R.F. LANDEL,<sup>1</sup> G.S. BRODY<sup>2</sup> and G. GARSDIE,<sup>2</sup> Jet Propulsion Laboratory,<sup>1</sup> California Institute of Technology, Pasadena, Ca.; and <sup>2</sup>Rancho Los Amigos Hospital, Downey, Ca.

TUESDAY A.M.

SESSION 6

SYMPOSIUM

**RECENT ADVANCES IN HEMORHEOLOGY**

Room 1105 Basic Science Bldg.

CHAIRMEN - SHU CHIEN, Columbia University, New York, N.Y.  
HERBERT MEISELMAN, University of Southern California,  
Los Angeles, Ca.

- 8:45 Flow of Blood through Narrow Capillaries: Rheological Mechanisms Determining Capillary Hematocrit and Apparent Viscosity (6.1)  
P. GAEHTGENS, Universitat, Köln, W. Germany.
- 9:25 Red Cell Interactions in Macromolecular Suspensions (6.2)  
K.-M. JAN, Columbia University College of Physicians and Surgeons, N.Y.
- 10:00 Viscoelastic Study of Aggregation of Red Blood Cells (6.3)  
E. FUKADA and M. KALBARA, The Institute of Physical and Chemical Research, Saitama, Japan.
- 10:35 INTERMISSION
- 10:50 Parameters for Blood Rheology (6.4)  
G.B. THURSTON, The University of Texas at Austin, Austin Tx.
- 11:25 Platelet Motions and Interactions in Tube Flow (6.5)  
H.L. GOLDSMITH, McGill University Medical Clinic, Montreal, Canada.

TUESDAY A.M.

SESSION 7

SYMPOSIUM

**RHEOLOGY OF BLOOD VESSELS**

Room 2100 Basic Science Bldg.

CHAIRMEN - KITTY FRONEK, University of California, San Diego, Ca.  
HANS WERNER WEIZSACKER, University of Graz, Austria

- 8:45 Viscoelastic Characteristics and Architecture of Venous Walls (7.1)  
M. HASEGAWA and T. AZUMA, Shinshi University Medical School, Matsumoto, Japan.
- 9:25 Mathematical Characterization of the Nonlinear Rheological Behavior of the Vascular Tissue (7.2)  
R.N. VAISHNAV, The Catholic University of America, Washington, D.C.
- 10:00 Mechanical Properties of Arteries as a Function of Topography and Age (7.3)  
K. FRONEK and Y.C. FUNG, University of California, San Diego, Ca.
- 10:35 INTERMISSION
- 10:50 Mechanical Properties of Human Cerebral Arteries (7.4)  
K. HAYASHI,<sup>1</sup> K. MORITAKE,<sup>1</sup> A. OKUMURA,<sup>1</sup> S. NAGASAWA,<sup>1</sup> H. NIIMI,<sup>2</sup> and H. HANDA,<sup>1</sup> <sup>1</sup>Kyoto University, Kyoto, Japan; and <sup>2</sup>National Cardiovascular Center, Osaka, Japan.
- 11:25 Regional Species and Age-Related Variations in the Mechanical Properties of Arteries (7.5)  
R.H. COX, Bockus Institute, University of Pennsylvania, Philadelphia, Pa.

TUESDAY A.M.

SESSION 8

**MUCUS RHEOLOGY**

Room 274 Clinical Science Bldg.

CHAIRMEN - MICHAEL LITT, University of Pennsylvania, Philadelphia, Pa.  
ALEX SILBERBERG, Weismann Institute, Rehovot, Israel.

- 8:45 Tracheal Mucus Viscosity and Elasticity (8.1)  
L.A. GATTO and E. AIELLO, Fordham University, Bronx, N.Y.
- 9:05 Transport and Rheology of Bronchial Secretions in Chronic Bronchitis (8.2)  
E. PUCELLE and J.M. ZAHM, U. 14 Inserm Vandoeuvre-les-Nancy, France.
- 9:25 Effect of Pharmacologic Interventions on the Relationship between the Mechanical Properties of Mucus and Mucociliary Transport (8.3)  
M. KING, Meakins-Christie Labs., McGill University, Montreal, Canada.
- 9:45 In Vitro Drug Induced Changes in Mucus Rheology (8.4)  
C. MARRIOTT, M. LITT and C.K. SHIH, University of Pennsylvania, Philadelphia, Pa.

- 10:05 In Vivo Drug Effects on the Physicochemical Properties of Canine Tracheal Mucus (8.5)  
C.K. SHIH, M. LITT and L.W. CHAKRIN, University of Pennsylvania, Philadelphia, Pa.; and Smith Kline and French Laboratories, Philadelphia, Pa.
- 10:25 Ciliary Inhibitory Factor in Sputum of Asthmatic Patients (8.6)  
T.M. CHEN and M.J. DULFANO, Veterans Administration Hospital, Brooklyn, N.Y.
- 10:45 The Effect of Sodium 2-Mercapto-Ethane Sulphonate and Hypertonic Saline Aerosols on Bronchial Clearance in Chronic Bronchitis (8.7)  
S.W. CLARKE, M.T. LOPEZ-VIDRIERO, D. PAVIA and M.L. THOMSON, The Royal Free Hospital; the University of London; the Royal Free Hospital; and the London School of Hygiene and Tropical Medicine, London.
- 11:05 Studies on the Viscosity of Human Cervical Mucus (8.8)  
M. SAGA, R.M. NAKAMURA, H. HAMADA and G. MATSUMURA, St. Marianna University, Kawasaki, Japan; University of Southern California, Los Angeles, Ca.; St. Marianna University, Japan; and Showa University, Tokyo, Japan.
- 11:25 Flow Permeation Studies of Cervical Mucus (8.9)  
P.Y. TAM, D.F. KATZ and S.A. BERGER, University of California, Berkeley and Davis, Ca.
- 11:45 The Clinical Parallel Tube Sputum Viscometer (8.10)  
S.R. HIRSCH, J.H. LINEHAN and R.T. BALMER, VA Center, Milwaukee; Marquette University; and University of Wisconsin, Milwaukee, Wis.
- 12:05 A Material Ratchet - The Pedal Mucus, the Slug Ariolimax columbianus (8.11)  
M. DENNY, Dept. of Zoology, the University of British Columbia, Vancouver, B.C., Canada.

TUESDAY P.M.

SESSION 9

**DYNAMICS OF THROMBOSIS AND PLATELETS**

Room 1105 Basic Science Bldg.

CHAIRMEN - HELMUT H. HARTERT, University of Kaiserslautern, FR Germany.  
EUGENE F. BERNSTEIN, University of California, San Diego, Ca.

- 1:30 The Molecular Mechanism of Erythrocyte Aggregation (9.1)  
D.E. BROOKS, J. CHARALAMBOUS and J. JANZEN, University of British Columbia, Vancouver, Canada.
- 1:50 Platelet Response to Shear Stress: Changes in Serotonin Uptake, Serotonin Release, and ADP-Induced Aggregation (9.2)  
G.H. ANDERSON,<sup>1</sup> J.D. HELLUMS,<sup>1</sup> J.L. MOAKE,<sup>2</sup> and C.P. ALFREY, Jr.,<sup>3</sup> <sup>1</sup>Rice University; <sup>2</sup>University of Texas Medical School; and <sup>3</sup>Baylor College of Medicine, Houston, Tx.
- 2:10 Rheological and Morphological Studies on the Structure of Fibrin Network (9.3)  
M. KAIBARA,<sup>1</sup> E. FUKADA,<sup>1</sup> and K. SAKAOKU,<sup>2</sup> <sup>1</sup>The Institute of Physical and Chemical Research, Saitama, Japan; and <sup>2</sup>Tokyo University of Agriculture and Technology, Tokyo, Japan.

- 2:30 Thromboscillography, A Method to Differentiate Physiological Qualities of the Blood Clot (9.4)  
H.H. HARTERT, Stadt. Krankenhaus, University of Kaiserslautern, FR Germany.
- 2:50 INTERMISSION
- 3:05 The Action of Differing Heparin Preparations on the Viscoelasticity of Surface Layers of Fibrinogen (9.5)  
R.G. KING and A.L. COPLEY, Polytechnic Institute of New York, Brooklyn, N.Y.
- 3:25 Rheological Investigations on Fibrin Clots (9.6)  
H.A. UNGER and H.H. HARTERT, Universitat Kaiserslautern, Federal Republic of Germany.
- 3:45 Fibrinolysis and Coagulation in Human Plasma (9.7)  
J.P. KIRKPATRICK,<sup>1</sup> L.V. McINTIRE<sup>1</sup> and J.L. MOAKE,<sup>2</sup>  
<sup>1</sup>Rice University; and <sup>2</sup>The University of Texas Medical School at Houston, Houston, Tx.
- 4:05 Influence of Some Antibiotics of the  $\beta$ -Lactam Group upon Rheological Properties of Blood and Platelet Aggregation (9.8)  
L. HOUBOUYAN, S. GAILLARD, A. GOGUEL and J.F. STOLTZ, Centre de Transfusion Sanguine-Brabois, Vandoeuvre-Les-Nancy, France.
- 4:25 Platelet Function Abnormality as Measured by the Platelet Count Correlation (PCC) Technique (9.9)  
K.V. BENNER, H. BOEHME and E. HUETTEL, Technical University, Munich; and Central Clinic, Gauting, Germany.

TUESDAY P.M.

SESSION 10

**BIORHEOLOGY OF MUSCLES**

Room 274 Clinical Science Bldg.

CHAIRMEN - JAMES W. COVELL, University of California, San Diego, Ca.  
ALLAN J. BRADY, University of California, Los Angeles, Ca.

- 1:30 Series-Coupled Myogenic Behavior of the Arteriolar Network (10.1)  
P.C. JOHNSON, M.E. BURROWS, S.M. SULLIVAN and B.J. LaLONE, University of Arizona, College of Medicine, Tucson, Ariz.
- 1:55 Modelling of the Mechanical Response of Endothelium and Smooth Muscle Layers in Arterioles (10.2)  
J. LEE, B.R. DULING and R.W. GORE, University of Virginia, Charlottesville, Va.
- 2:20 Assessment of Cardiac Mechanics during Isovolumic Systole (10.3)  
M. LANDOWNE and E.W. ROSS, Jr., U.S. Army Res. Inst. Env. Med.; and U.S. Army Res. & Develop. Command, Natick, Ma.
- 2:45 INTERMISSION
- 3:00 Macroscopic Inhomogeneities in the Mechanical Response of Papillary Muscle (10.4)  
J.G. PINTO, University of California, San Diego, Ca.

- 3:25 Cardiac Muscle Mechanics (10.5)  
P.J. HUNTER, University of Oxford, England.
- 3:50 Stress-Strain-History Relation of Passive Taenia coli Smooth Muscle (10.6)  
J.M. PRICE,<sup>1</sup> P. PATITUCCI<sup>2</sup> and Y.C. FUNG,<sup>2</sup> <sup>1</sup>Dept. of Physiology, College of Medicine, University of South Florida, Tampa, Fla.; and <sup>2</sup>University of California, San Diego, Ca.
- 4:15 An Examination of Isometric Contraction of Uretal Smooth Muscle (10.7)  
P.F. ZUPKAS, Y.C. FUNG and J.G. PINTO, University of California, San Diego, Ca.

TUESDAY P.M.

SESSION 11

**MATHEMATICAL BIOFLUID DYNAMICS**

Room 2100 Basic Science Bldg.

CHAIRMEN - OTTO H. MAHREHOLTZ, Institut für Mechanik,  
Technische Universität Hannover, FR Germany  
GEORGA K. LEA, National Science Foundation, Wash. D.C.

- 1:30 The Influence of Wave Shape on Peristaltic Transport (11.1)  
O.H. MAHREHOLTZ, M.G. MANK and R.U. ZIMMERMANN, Institute für Mechanik, Technische Universität, Hannover, FR Germany.
- 1:50 Finite Element Methods for Studying Mechanical Factors in Blood Flow (11.2)  
N. DAVIDS, Pennsylvania States University, University Park, Pa.
- 2:10 Effect of Fluid Filtration on Apparent Blood Viscosity in the Microcirculation (11.3)  
H.D. PAPENFUSS and J.F. GROSS, Ruhr-University Bochum, Bochum, West Germany; and University of Arizona, Tucson, Ariz.
- 2:30 A Re-examination of the Lighthill-Fitzgerald Theory (11.4)  
J. AROESTY, W. KING and J. LAMAR, The Rand Corporation, Santa Monica, Ca.
- 2:50 INTERMISSION
- 3:05 Pressure-Flow Relationships of Blood in the Mammalian Kidney (11.5)  
A.H. PURDY, National Institute for Occupational Safety and Health, Rockville, Md.
- 3:25 Indirect Determination of Rheological Properties of Fluid-Filled Viscoelastic Tubes Modelizing Arterial Hemodynamics (11.6)  
D. GEIGER, P. FLAUD and C. ODDOU, Laboratoire de Biorheologie et d'Hydrodynamique Physiologique, Université Paris, France.
- 3:45 A Rotated Disc Electrode for Characterization of Transport in Membranes (11.7)  
D.A. GOUGH, J.K. LEYPOLDT and M. DAVIS, University of California, San Diego, Ca.
- 4:05 Mathematical Simulation of Axisymmetric Biological Liquids (11.8)  
A.M. SHCHERBAKOV, M.J. NEGINSKI, I.V. SHIRKO and V.M. ZAIKO, Institute of Transplantation of Organs and Tissues, Moscow, USSR.



- 4:25 Mathematical Simulation of the Motion of a Catheter in a Vascular Channel (11.9)  
I.V. SHIRKO, Institute of Transplantation of Organs and Tissues, Moscow, USSR.
- 4:45 Pulsatile Blood Flow with Couple Stress Theory (11.10)  
P. CHATURANI and V.S. UPADHYA, Indian Institute of Technology, Bombay, India.
- 5:05 Mathematical Model of the Blood Flow in the Artificial Ventricle Cavity during Systole (11.11)  
V.M. SHUMAKOV and V.M. ZAIKO, Institute of Transplantation of Organs and Tissues, Moscow, USSR.

WEDNESDAY A.M.

SESSION 12

**HEMORHEOLOGY: VISCOELASTICITY**

Room 1105 Basic Science Bldg.

CHAIRMEN - EIICHI FUKADA, Institute of Physical & Chemical Research, Wako-Shi, Saitama, Japan.  
PETER GAETGENS, Institut für Normale und Pathologische Physiologie der Universität, Köln, FR Germany.

- 8:45 Rheological Equations for Whole Human Blood (12.1)  
C.R. HUANG, New Jersey Institute of Technology, Newark, N.J.
- 9:05 Yield Stress Measurements in Red Cell Suspensions (12.2)  
H. KIESEWETTER, G. KOTITSCHKE and H. SCHMID-SCHONBEIN, Rein-Westf. Techn. Hochschule, Aachen, FR Germany.
- 9:25 Low Shear Rate Viscosity of Fresh Blood (12.3)  
A. DOWNS, M. LITT and R.E. KRON, University of Pennsylvania, Philadelphia, Pa.
- 9:45 Rheological Hysteresis of Blood at Low Shear Rate (12.4)  
M. BUREAU,<sup>1</sup> J.C. HEALY,<sup>1</sup> D. BOURGOIN<sup>1</sup> and M. JOLY,<sup>2</sup>  
<sup>1</sup>Faculte de Medicine Pitie-Salpetriere, Paris; and  
<sup>2</sup>Faculte de Medecine, Strasbourg, France.
- 10:05 Mathematical Analysis of the Hysteresis Rheogram of Human Blood (12.5)  
W. FABISIAK and C.R. HUANG, New Jersey Institute of Technology, Newark, N.J.
- 10:25 INTERMISSION
- 10:40 Rheological Modeling of Fresh Blood from Transient Flow Measurements (12.6)  
G. YEPSON, D. BOUTIN and M. LITT, University of Pennsylvania, Philadelphia, Pa.
- 11:00 The Mechanical Transfer Function of Blood: Modifications by Some Biological Factors (12.7)  
B. OBRECHT,<sup>1</sup> P. RUSCH<sup>2</sup> and J.C. HEALY,<sup>2</sup> <sup>1</sup>Universite Louis Pasteur, Strasbourg; and <sup>2</sup>Faculte de Medecine, Strasbourg, France.
- 11:20 Influence of the Various Plasma Substitutes upon the Visco-elastic Properties of Blood. Comparison with Albumin (12.8)  
S. GAILLARD, A. LARCAN and J.F. STOLTZ, Centre de Transfusion et d'Hematologie, Brabois et Service de Reanimation, Nancy, France.

- 11:40 In Vivo and In Vitro Viscosity Influences of Different Plasma Substitutes (12.9)  
D. INGEMAR, University of Gothenburg, Surgery Dept. I, Sweden.

WEDNESDAY A.M.

SESSION 13

**ATHEROSCLEROSIS**

Room 2100 Basic Science Bldg.

CHAIRMEN - MARGOT R. ROACH, University of Western Ontario, London, Canada.  
SYOTEN OKA, National Cardiovascular Center, Osaka, Japan.

- 8:45 Flow Factors in Atherosclerosis (13.1)  
M.R. ROACH, University of Western Ontario, London, Ontario, Canada.
- 9:05 Interaction of Blood Pressure and Flow with Arterial Wall (13.2)  
C.G. CARO, Imperial College, London, England.
- 9:25 Effects of Oscillatory Strain on Macromolecular Uptake by Artery Wall (13.3)  
S. CHIEN,<sup>1</sup> S. USAMI,<sup>1</sup> K.-M. JAN,<sup>1</sup> S. WEINBAUM,<sup>2</sup> and C.G. CARO,<sup>3</sup> <sup>1</sup>Columbia University College of Physicians and Surgeons, New York; <sup>2</sup>City College of New York, CUNY; and <sup>3</sup>Imperial College of Science and Technology, London.
- 9:45 Flow Separation and Vortex Formation in Blood Vessel Models (13.4)  
K. KIKUCHI, T. AZUMA and T. FUKUSHIMA, Shinshu University Medical School, Matsumoto, Japan.
- 10:05 Turbulence Generation in Stenotic Blood Vessel Models (13.5)  
T. AZUMA and T. FUKUSHIMA, Shinshu University Medical School, Matsumoto, Japan.
- 10:25 INTERMISSION
- 10:40 Human Blood Cells in Models of Stenoses and Bifurcations (13.6)  
T. KARINO and H.L. GOLDSMITH, McGill University Medical Clinic, Montreal General Hospital, Montreal, Canada.
- 11:00 Flow Disturbance at Branching Sites in the Abdominal Aorta (13.7)  
T. FUKUSHIMA, K. KIKUCHI and T. AZUMA, Shinshu University Medical School, Matsumoto, Japan.
- 11:20 Role of Stress Concentration in Arterial Walls in Atherogenesis (13.8)  
H. NIIMI, National Cardiovascular Center, Research Institute, Suita, Osaka, Japan.
- 11:40 Numerical Study on Bifurcating Flow in a Blood Vessel (13.9)  
M. KAWAGUTI and A. HAMANO, Dept. of Physics, Keio University, Yokohama, Japan.

WEDNESDAY A.M.

SESSION 14

**CAPILLARY BLOOD FLOW**

Room 274 Clinical Science Bldg.

CHAIRMEN - BENJAMIN ZWEIFACH, University of California,  
San Diego, CA.  
JEN-SHIH LEE, University of Virginia, Charlottesville,  
Va.

- 8:45 The Role of Blood Cellular Elements as Determinants of Apparent Viscosity in the Microcirculation (14.1)  
H.H. LIPOWSKY, S. USAMI and S. CHIEN, Dept. of Physiology, Columbia University, N.Y.
- 9:05 The Interaction of White and Red Blood Cells in Capillary and Postcapillary Vessels (14.2)  
G.W. SCHMID-SCHOENBEIN, S. USAMI and S. CHIEN, Dept. of Physiology, Columbia University, N.Y.
- 9:25 Microcirculation by Model Material (14.3)  
R. TAKAKI and K. YASUZAMI, Tokyo University of Agriculture and Technology, Japan.
- 9:45 Hematocrit Distribution in Microvasculature (14.4)  
R.T. YEN and Y.C. FUNG, University of California, San Diego, Ca.
- 10:05 The Interaction between Oxygen Tension Levels and the Flow of Sickle-Cell Blood in the Capillaries (14.5)  
S.A. BERGER and W.S. KING, University of California, Berkeley; and the RAND Corporation, Santa Monica, Ca.
- 10:25 INTERMISSION
- 10:40 Erythrocyte Motion through a Narrow Capillary Constricted by Surrounding Tissue Pressure from Optic Disc Edema in Anterior Ischemic Optic Neuropathy (14.6)  
S. E. MOSKOWITZ, The Hebrew University, Jerusalem, Israel.
- 11:00 Blood Flow in Curved Capillary Glass Tubes (14.7)  
T.-C. HUNG, T.-K. HUNG and G. BUGLARELLO, University of Houston; University of Pittsburgh; and Polytechnic Institute of New York.
- 11:20 Pulsatile Blood Flow in Arteriole of Frog Web (14.8)  
M. HORIMOTO, T. KOYAMA, H. MISHINA and T. ASAKURA, The Research Institute of Applied Electricity, Hokkaido University, Sapporo, Japan.
- 11:40 Basic Hydrodynamic Resistance Behaviour of Erythrocyte Suspensions in Capillaries from 5-7  $\mu$ m Diameter (14.9)  
P.S. LINGARD, Children's Medical Research Foundation, Sydney, New South Wales, Australia.

THURSDAY A.M.

SESSION 15

**RED BLOOD CELLS**

Room 1105 Basic Science Bldg.

CHAIRMEN - MARCOS INTAGLIETTA, University of California,  
San Diego, Ca.  
EVAN EVANS, Duke University, Durham, N.C.

- 8:45 Method to Determine the Deformability (Pore Passage Time) of Single Erythrocytes (15.1)  
K. MUSSLER, H. KIESEWETTER and H. SCHMID-SCHÖNBEIN,  
Medizin.-Theoret. Institut. der RWTH, Aachen, West Germany.
- 9:05 Deformation of a Red Blood Cell in a Simple Shear Flow.  
II. Experimental Study with Optical Methods (15.2)  
J.F. STOLTZ, J.C. RAVEY, M. GUILLOT and P. MAZERON,  
Centre Régional de Transfusion - Brabois, Vandoeuvre-  
lès-Nancy, France.
- 9:25 Deformation of a Red Cell in a Simple Shear Flow: I.  
Theoretical Study, Case of a Sphered Cell (15.3)  
D. BARTHES-BIESEL and B. GUERLET, UTC, BP 233 Compiègne,  
France, and Groupe d'Hemorheologie, CRTS 5400 Nancy,  
France.
- 9:45 Apparent Elastic Constant and Adhesiveness of Red Cells  
from Calf, Dog and Human (15.4)  
L.W. SHEN, T.C. HUNG and N.H.C. HWANG, Institute for  
Cardiovascular Studies, University of Houston, Houston, Tx.
- 10:05 INTERMISSION
- 10:20 Application of Centrifugal Flexibility Measurements to  
Sickle Cell Anemia Erythrocytes (15.5)  
B.F. CAMERON and P.E. SMARIGA, Cincinnati Comprehensive  
Sickle Cell Center, Cincinnati, Oh.
- 10:40 Material Properties of Erythrocytes in Muscular Dystrophy  
(15.6)  
Y.F. MISSIRLIS and M.C. BRAIN, McMaster University,  
Hamilton, Ontario, Canada.
- 11:00 Influence of Pentoxifylline on Erythrocyte Filtrability  
and Microrheology - A Pharmacological Study (15.7)  
J.F. STOLTZ, M. GUILLOT and G.A. MARCEL, Centre  
Régional de Transfusion - Brabois, Vandoeuvre-lès-Nancy,  
France.
- 11:20 Analysis of Flow Velocity by Means of Fluorescent Angiography  
and Low Light Level Video System (15.8)  
B. ENDRICH and M. INTAGLIETTA, University of California,  
San Diego, Ca.
- 11:40 A.C. Electrophoresis of Human Red Blood Cells (15.9)  
P.C.Y. CHEN, University of California, San Diego, Ca.

THURSDAY A.M.

SESSION 16

**MECHANICAL PROPERTIES OF ARTERIES AND VEINS**

274 Clinical Science Bldg.

CHAIRMEN - TAKEHIKO AZUMA, Shinshu University School of  
Medicine, Matsumoto, Japan.  
RAMESH N. VAISHNAV, Catholic University of  
America, Wash. D.C.

- 8:45 Chairman's Review on the Present Status of Arterial  
Mechanics  
R.N. VAISHNAV, Catholic Univ. of America, Wash. D.C.

- 9:10 An Investigation into the Fracture Mechanics of Cerebral Arteries and Aneurysms (16.1)  
A.D. HARMAN, University of British Columbia, Vancouver, B.C., Canada.
- 9:35 Alteration of Rheological Properties of Canine Thoracic Aorta in Experimental Hypertension (16.2)  
M.G. SHARMA and J.P. JACOBUS, Pennsylvania State University, University Park, Pa.
- 10:00 INTERMISSION
- 10:15 Identification of the Rheological Properties of the Arterial Wall: Problems Arising from Reflexions (16.3)  
C. KOPP, Groupe de Biomecanique et Institut de Mecanique des Fluides, Strasbourg, France.
- 10:40 A Rubber-Like Protein from Octopus Arteries (16.4)  
R. SHADWICK, University of British Columbia, Vancouver, B.C., Canada.
- 11:05 On a Problem of Arteries (16.5)  
C. PALLOTTI and G. PALLOTTI, Gruppo Nazionale per la Fisica Matematica del C.N.R. Istituto di Fisica "A Righi" e Istituto di Fisiologia Veterinaria del Universita di Bologna, Italy.
- 11:30 Review on the Mechanics of Vein  
T. AZUMA, Shinshu University, Matsumoto, Japan.
- Nonlinear Viscoelastic Properties of Arteries (16.6)  
A.G. HUDETZ, E. MONOS and A.G.B. KOVACH, Experimental Research Institute, Semmelweis Medical University, Budapest, Hungary.
- Stress-Strain Relationship for Human Arteries (16.7)  
S. STOYCHEV, Institute of Mechanics and Biomechanics Bulgarian Academy of Sciences, Sofia, Bulgaria.

THURSDAY A.M.

SESSION 17

**HEMORHEOLOGY AND HEMODYNAMICS**

Room 2100 Basic Science Bldg.

CHAIRMEN - HARRY L. GOLDSMITH, McGill University and Montreal General Hospital, Montreal, Canada.  
J. F. STOLTZ, Centre de Transfusion Sanguine - Brabois, Vandoeuvre-les-Nancy, France.

- 8:45 Quantitative RBC Aggregation Deduced from Viscometry (17.1)  
D. QUEMADA, Laboratoire de Biorheologie et d'Hydrodynamique, Physiologique UER Physique, Universite Paris VII, Paris, France.
- 9:10 A New Look at the Erythrocyte Sedimentation Rate (17.2)  
D.M. STASIW, L.C. CERNY, R. WILLIAMS and M. ZONGRONE, Utica College and Masonic Medical Research Laboratory, UTICA, N.Y.
- 9:35 The Influence of Normal and Rigid Red Blood Cells on Suspension Rheology - Viscometric Flows and Instability Measurements (17.3)  
W.M. PHILLIPS and W.A. DANIELS, The Pennsylvania State University, University Park, Pa.

- 10:00 INTERMISSION
- 10:15 Blood Flow through Columns of Rigid Spheres: A Tissue-Perfusion Analog (17.4)  
G.R. COKELET, R. MOUNTAIN, P. KIMMET and M. EVONIUK,  
Dept. of Chemical Engineering, Montana State University,  
Bozeman, Mt.
- 10:40 Effects of Red Cell Rigidity and Aggregation on Resistance to Flow (17.5)  
A.H. SACKS, K.W. KIRK, P.N. NORTH and R. SUE, Palo Alto  
Medical Research Foundation, Palo Alto, Ca.
- 11:05 Some Biophysical Properties of Artificial and Whole Blood Mixtures (17.6)  
L.C. CERNY and D.M. STASIW, Utica College and Masonic  
Medical Research Laboratory, Utica, N.Y.
- 11:30 On Thermal Hemolysis and Heat Transfer in Blood Rheology (17.7)  
T. ARIMAN, University of Notre Dame, Notre Dame, Ind.
- 11:55 Non-Newtonian Flow in Tube - Determination of the Shear Dependent Apparent Blood Viscosity (17.8)  
M. ARPAD and F. KORNEL, Biophysical Institute Medical  
University, Pecs, Hungary.

THURSDAY P.M.

## CONVOCATION

Room 2722 Undergraduate Science Bldg.

CHAIRMAN - ALEX SILBERBERG, Weizmann Institute, Israel  
President of the International Society of Biorheology

- 1:30 Chairman's Address
- 1:35 From Colloidal Science to Biorheology - A Historical Reminiscence  
B. TAMAMUSHI, Nezu Chemical Institute, Musashi University,  
Tokyo, Japan.
- 1:55 Prospects of Biorheology  
A.L. COPLEY, Polytechnic Institute of New York, Brooklyn, N.Y.  
Past President, International Society of Biorheology
- 2:10 Presentation of Poiseuille Medal to the 1978 Awardee:  
M. JOLY.  
Introduction by A. SILBERBERG, President, Int. Society of  
Biorheology.  
Presentation by S. OKA, previous Poiseuille Medal Awardee
- 2:15 Poiseuille Lecture: Biorheology, a Factor of Scientific Progress  
M. JOLY, Laboratoire de Biophysique, Faculté de Médecine  
Pitié - Salpêtrière, Paris, France.

THURSDAY P.M.

SESSION 18

### NEW HYPOTHESES IN HEMORHEOLOGY AND MUSCLE CONTRACTION

Room 2722 Undergraduate Science Bldg.

CHAIRMAN - ROY SWANK, University of Oregon, Portland, Ore.

- 3:00 Rheology of Thrombotic Processes Occurring in Flow: The Interaction of Erythrocytes and Thrombocytes (18.1)  
H. SCHMID-SCHONBEIN, P. RICHARDSON, G.V.R. BORU, H. RIEGER, R. FROST and I. ROHLING-WINKEL, Rhein-Westf. Techn. Hochschule, Aachen. FR Germany.
- 3:40 Physical Theory of Permeability of Vascular Walls in Relation to Atherogenesis (18.2)  
S. OKA, National Cardiovascular Center, Research Institute, Suita, Osaka, Japan.
- 4:20 Biorheology of Muscle: A Synthetic Approach (18.3)  
T. IWAZUMI, University of Washington, Seattle, Wa.

THURSDAY P.M.

SESSION 19

SYMPOSIUM

### HEMORHEOLOGY IN ASTRONAUTICS

Room 1105 Basic Science Bldg.

CHAIRMEN - GEOFFREY V.F. SEAMAN, Univ. of Oregon Health Sciences Center, Portland, Ore.  
ROBERT S. SNYDER, Chief, Separation Processes Branch, Marshall Space Flight Center, Ala.

- 3:00 A Review of Hematology Studies Associated with Space Flight (19.1)  
S.L. KIMZEY, Johnson Space Center, Houston, Tx.
- 3:20 Biorheology in Space: Some Speculations (19.2)  
G.V.F. SEAMAN, University of Oregon Health Sciences Center, Portland, Ore.
- 3:40 Aggregation of Red Cells and Blood Viscosity under Near-Zero Gravity (19.3)  
L. DINTENFASS, Kanematsu Memorial Institute, Sydney Hospital, Sydney, Australia.
- 4:00 Certain Aspects of Hemorheology in a Near-Zero Gravity Environment (19.4)  
A.L. COPELEY, Polytechnic Institute of New York, Brooklyn, N.Y.
- 4:20 Interpretation of Fluid Phenomena in Weightlessness (19.5)  
D. SAVILLE, Princeton University, Princeton, N.J.
- 4:40 Panel Discussion  
A.L. COPELEY, L. DINTENFASS, H. GOLDSMITH, S.L. KIMZEY, D. SAVILLE and L. VROMAN.

THURSDAY P.M.

SESSION 20

**BONE AND CARTILAGE**

Room 274 Clinical Science Bldg.

CHAIRMEN - WAYNE AKESON, Univ. of Calif., San Diego, Ca.  
VAN C. MOW, Rensselaer Polytechnic, Troy, N.Y.

- 3:00 Permeability and Transport Properties of Articular Cartilage (20.1)  
 S.S. GORDON<sup>1</sup>, V.C. MOW<sup>1</sup>, R. LEE<sup>2</sup>, and A.J. GRODZINSKY<sup>2</sup>,  
 Rensselaer Polytechnic Institute, Troy, N.Y. and  
<sup>2</sup>Massachusetts Institute of Technology, Cambridge, Ma.
- 3:25 A Theory of Strength for Bone and Wood (20.2)  
 S. COWIN, Tulane University, LA.
- 3:50 The Effects of Pressure and Time on the Permeability of Articular Cartilage (20.3)  
 J.P. RENAUDEAUX, Universite Pierre et Marie Curie, Orsay, France
- 4:15 Rheological Measurement of Interarticular Cartilage Surface Shearing Forces In Vitro (20.4)  
 L.L. MALCOM, F.R. CONVERY, S.L-Y. WOO and W.H. AKESON,  
 University of Calif., San Diego, Ca.
- 4:40 Rheological Study of Human Knee Joint (20.5)  
 T. TATEISHI, Y. SHIRASAKI and Y. MIYANAGA<sup>2</sup>,  
 Mechanical Engineering Laboratory, Igusa 4-12, Suginamiku, Tokyo; <sup>2</sup>Faculty of Medicine,  
 University of Tokyo, Japan.
- Evaluation of the Adaptation of Long Bones to Bending Stress (20.6)  
 B. KUMMER, Anatomisches Institut der Universitat, Koln, Germany.
- Quadripole Model of Bone Piezoelectricity (20.7)  
 G. BRANKOV and N. PETROV, Institute of Mechanics and Biomechanics, Bulgaria.

THURSDAY P.M.

SESSION 21

**TISSUE SPACE**

Room 2100 Basic Science Bldg.

CHAIRMAN - HAROLD WAYLAND, California Institute of Technology  
 Pasadena, Ca.

- 3:00 Macromolecular Transport in Connective Tissue (21.1)  
 H. WAYLAND, California Institute of Technology, Pasadena, Ca.
- 3:25 Protein Movements in the Extravascular Space (21.2)  
 S. WITTE, Diakonissen-Krankenhaus, West Germany.
- 3:50 Water Movement Through Swelling Connective Tissue (21.3)  
 I. FATT and P. TAM, University of Calif., Berkeley, Berkeley, Ca.



- 4:15 Blood Flow Properties in Human Veins Under Various Hydrostatic Conditions (21.4)  
A.M. EHRLY, University Medical School, Frankfurt, West Germany
- 4:40 Mathematical Model of Substance Diffusion in Tissue with Nonlinear Absorption (21.5)  
V.M. ZAIKO and A.N. SHARIKOV, Institute of Transplantation of Organs and Tissues, Moscow, U.S.S.R.

FRIDAY A.M.

SESSION 22

## ELASTIN, COLLAGEN AND TENDONS

Room 274 Clinical Science Bldg.

CHAIRMEN - ERIC BAER, Case Western Reserve University, Cleveland, Oh.  
ANDRUS VIIDIK, Univ. of Aarhus, Aarhus, Denmark

- 8:45 Rheological Analysis of Collagen - with Reference to Morphology and Experimental Techniques (22.1)  
A. VIIDIK, H. OXLUND and T. ANDREASSEN, Institute of Anatomy, University of Aarhus, Denmark.
- 9:15 Electromechanochemical and Reaction-Diffusion Dynamics in Collagen Membranes (22.2)  
N.A. SCHOENFELD, J.H. NUSSBAUM, and A.J. GRODZINSKY, Massachusetts Institute of Technology, Cambridge, Ma.
- 9:45 The Dynamic Mechanical Properties of Elastin (22.3)  
J.M. GOSLINE, University of British Columbia, Vancouver, B.C.
- 10:15 INTERMISSION
- 10:30 Effect of Water on the Mechanical Relaxation of Human Intervertebral Disc Material (22.4)  
N.D. PANAGIOTACOPULOS, R. BLOC, and W.G. KNAUSS, California Institute of Technology, Pasadena, Ca.
- 11:00 Dynamic Viscoelastic Behaviour of Human Tendon In Vitro (22.5)  
H. SCHWERDT, A. CONSTANTINESCO, and J. CHAMBRON, Groupe de Biomecanique, Institut de Physique Biologique, Strasbourg, Cedex, France.
- 11:30 Nonlinear Viscoelastic Behavior of Human and Canine Flexor Tendons in Simple Elongation (22.6)  
F.K. KO, A. PASTORE and F. COLE, Philadelphia College of Textiles and Science; University of Pennsylvania; and Thomas Jefferson University, Philadelphia, Pa.
- 12:00 Rheological Properties of Natural and Reconstituted Collagen Fibers (22.7)  
L.V. KUKHAREVA and V.I. VOROB'EV, Institute of Cytology of the Academy of Sciences of the U.S.S.R., Leningrad, U.S.S.R.

FRIDAY A.M.

SESSION 23

**CLINICAL HEMORHEOLOGY I**

Room 2100 Basic Science Bldg.

CHAIRMAN - LEO DINTENFASS, Kanematsu Memorial Institute,  
Sydney, Australia

- 8:45 Clinical Applications of Blood Viscosity Factors and Functions (Invited Lecture) (23.1)
- 9:15 Clinical Use of Hemorheometry (23.2)  
B.Y. LEE, F.S. TRAINOR, D. KAVNER, J.A. CROSOLOGO,  
L.R.M. DEL GUERCIA and J.L. MADDEN, Veterans  
Administration Hospital, Castle Point, N.Y.
- 9:35 Clinical Blood Rheology (23.3)  
H. CHMIEL, I. ANADERE, H. HESS<sup>2</sup> and G.B. THURSTON<sup>2</sup>;  
Institut für Grenzflächen-und Bioverfahrenstechnik,  
FR Germany; Medizinische Poliklinik der Universität  
München, FR Germany; <sup>2</sup>University of Texas at Austin,  
Austin, Tx.
- 9:55 Reduced Erythrocyte Deformability in Diabetes (23.4)  
D.E. McMillan, N.G. UTTERBACK and J. LA PUMA, Sansum  
Medical Research Foundation, Santa Barbara, Ca.
- 10:15 INTERMISSION
- 10:30 Hemorheological Considerations on Diabetic Microangiopathy:  
What Can be Good Indices for Its Management? (23.5)  
Y. ISOGAI, A. IIDA, K. MOCHIZUKI, T. YOKOSE, H. OKABE,  
M. ASHIKAGA, S. IDEMOTO, T. MAEDA and M. ABE, Department  
of Internal Medicine, Jikei University, Minato-ku,  
Tokyo, Japan.
- 10:50 Abnormal Red Cell Membrane Fluidity in Zieve's Syndrome (23.6)  
K.M. GOEBEL, R. SCHUBOTZ, and J. SCHNEIDER, Department  
of Medicine, University of Marburg, Marburg, Germany.
- 11:10 Fast Determination of Water Mobility in Blood Plasma:  
Investigation of Clinical Significance (23.7)  
A. GANSSEN, H. SCHMID-SCHOENBEIN<sup>2</sup>, H. MALOTTA<sup>2</sup> and  
R. SCHNEIDER<sup>2</sup>, Siemens AG UB Med., Erlangen, Germany;  
<sup>2</sup>Abt. Physiologie, T.H. Aachen, Germany.
- 11:30 The Rheological Behavior of the Abnormal Porteinemia Due  
to Temperature Change and its Clinical Significance (23.8)  
S. SHIGEHIRO, Kitasato University School of Medicine,  
Kanagawa-ken, Japan.

FRIDAY A.M.

SESSION 24

**BIOFLUID DYNAMICS**

Room 1105 Basic Science Bldg.

CHAIRMAN - COLIN G. CARO, Imperial College of Science and  
Technology, London, U.K.

- 8:45 The Characteristics of Secondary Flow and Turbulence in  
a Cone-Plate Apparatus (24.1)

C.F. DEWEY, JR., S.R. BUSSOLARI and H.P. SDOUCOS<sup>2</sup>,  
 Massachusetts Institute of Technology, Cambridge, Ma.;

<sup>2</sup>Institut fur Biomedizinische Technik, Zurich, Switzerland.

- 9:05 The Wall-Shear-Stress Intensification Due to Pulsatile  
 Blood Flow (24.2)  
 Y. MATUNOBU, Keio University, Hiyoshi, Yokohama, Japan.
- 9:25 The Fluid Dynamic Evaluation of the Outflow Tract  
 Stenosis in Cardiac Surgery (24.3)  
 T. TSUJI, K. SUMA, M. SUGAWARA, and Y. SAKURAI, Tokyo  
 Women's Medical College, Tokyo, Japan.
- 9:45 Model Experiment on Genesis of the Korotkoff Sounds (24.4)  
 M. ARAKAWA and Y. MATUNOBU, Keio University, Kiyoshi,  
 Yokohama, Japan.
- 10:05 INTERMISSION
- 10:20 Flow of Blood Through a Curved Duct (24.5)  
 V.S. PRATAP, D.B. SPALDING and V.L. SHAH<sup>2</sup>,  
 Imperial College, London, England.  
<sup>2</sup>University of Wisconsin, Milwaukee, Wi.
- 10:40 Chains of Spheres in Poiseuille Flow: Their Equilibrium  
 Position, Slip-Velocity and Hydrodynamically Induced  
 Forces - A Model for the Rouleaux Formation and Plasma  
 Transport (24.6)  
 K. BAUCKHAGE, Universitat Bremen, Bremen, FR Germany.
- 11:00 Experimental Investigation on the Mass Transfer of CO<sub>2</sub>  
 in Aqueous NaCl Solution Containing Solid Particles (24.7)  
 A. OBERMAYER, Institut fur Thermische Verfahrenstechnik-  
 der TU Clausthal, Leibnizstrasse 15, FR Germany.
- 11:20 Particle Movements and Transverse Fluid Transport - Rates  
 In a Poiseuille Flow of a Suspension of Low Concentration  
 in a Tube with Membraneous Wall - Their Influence on O<sub>2</sub>  
 and CO<sub>2</sub> Mass Transfer as a Model for Blood Flow (24.8)<sup>2</sup>  
 K. HIRSCHMANN and K. BAUCKHAGE, Universitat Bremen,  
 Bremen, FR Germany.
- 11:40 Sensitivity Analysis of the Physical Factors Affecting Flow  
 in a Vascular Segment (24.9)  
 K.P. TEWARI, H.P. Medical College, Simla, India.
- Long Chain Polymers: Their Effect on Pulsatile Blood Flow  
 in Elastic Tubes (24.10)  
 S. EINAV and M. ROSHU, Tel Aviv University, Israel.

FRIDAY P.M.

SESSION 25

### PROPERTIES OF BIOSOLIDS

Room 274 Clinical Science Bldg.

CHAIRMEN - WILLIAM P. GRAEBEL, Univ. of Michigan, Ann  
 Arbor, Michigan  
 YORAM LANIR, Julius Silver Inst. of Biomedical  
 Eng. Sciences, Technion, Israel.

- 1:30 Biaxial Membrane Inflation Techniques for Identification  
 of Constitutive Equations and Failure Criteria for  
 Soft Biological Tissues (25.1)  
 J.W. MELVIN, N.M. ALEM, and A.S. WINEMAN, The University  
 of Michigan, Ann Arbor, Mi.

- 1:50 Rheology of Biomembranes (25.2)  
D. BOURGOIN, M. JOLY, D. ROBAGLIA, and W. SHANKLAND,  
Faculte de Medecine, Universite Paris, Paris, France.
- 2:10 Biomechanics of the Uterine Cervix (25.3)  
R.W. LITTLE, Michigan State University, East Lansing, Mi.
- 2:30 The Study of Surface and Interfacial Kinetics of Biopolymers  
Using a Normalized Resonance Oscillatory Surface  
Rheometer (25.4)  
B. WARBURTON, The School of Pharmacy, University of  
London, London, England.
- 2:50 Materials Properties of the Living Human Cornea (25.5)  
W.P. GRAEBEL, B.E. COHAN and A.C. PEARCH, The University  
of Michigan, Ann Arbor, Mi.
- 3:10 Mechanical Stresses and Piezoelectricity of Dental  
Tissues (25.6)  
R. OGOLNIK, B. PICARD and D. GEIGER, Universite  
Paris VII, France.
- 3:30 Influence of Freeze-Drying and Gamma Sterilization on the  
Mechanical Properties of Human Dura Mater Grafts (25.7)  
N. PETROV and ST. MECHKARSKY, Institute of Mechanics  
and Biomechanics, and Tissue Bank to the Pirogov  
Institute for Urgent Medical Aid, Sofia, Bulgaria.

FRIDAY P.M.

SESSION 26

### CLINICAL HEMORHEOLOGY II

Room 1105 Basic Science Bldg.

CHAIRMEN - HOLGER SCHMID-SCHONBEIN, Rhein.-Westf. Techn.  
Hochschule, Aachen, FR Germany.  
STANLEY CHARM, Tufts University, Boston, Ma.

- 1:30 The History of the Measurement of the Viscosity of Human  
Blood Serum and Plasma in Relation to Disease (26.1)  
J. HARKNESS, Dept. of Clinical Pathology, Musgrove  
Park Hospital, Taunton, England.
- 1:50 Changes in the Oxygen Pressure of Human Muscle Tissue  
by Variations of the Flow properties of Blood (26.2)  
A.M. EHRLY, and W. SCHROEDER, Dept. of Physiology,  
University Medical School, Frankfurt, West Germany.
- 2:10 Fundamental Mechanisms Controlling Hemorheology (26.3)  
H.L. DAVIS, Depts. of Surgery and Biochemistry,  
University of Nebraska, College of Medicine, Omaha, Ne.
- 2:30 Red Blood Cell Aging as a Model to Influence Pharmacologically  
the Red Cell Deformability (26.4)  
H.-G. GRIGOLEIT, H. LEONHARDT<sup>2</sup>, R. SCHROER and F. LEHRACH,  
Hoechst AG, Werk Albert, Wiesbaden, Germany;  
<sup>2</sup>Klinikum Steglitz der Freien Universitat, Berlin, Germany.
- 2:50 The Behavior of Different Types of Materials in the Dynamic  
Physiological Environment (26.5)  
S.D. BRUCK, Stephen D. Bruck, Associates, Inc., 11300  
Rockville Pike, Rockville, Md.

- 3:10 Evaluation of Blood Microfilter Performance (26.6)  
C.H. TAMBLYN, R.J. KNOX, F.J. NORDT, G.V.F. SEAMAN,  
R.L. SWANK and C.F. ZUKOSKI IV, Dept. of Neurology,  
University of Oregon Health Sciences Center,  
Portland, Or.
- 3:30 Effects of Exercise and Conditioning on Properties of  
Red Blood Cells Significant for Blood Flow (26.7)  
R.E. LOVLIN, L.S. SEWCHAND, J.S. BECK and S. ROWLANDS,  
Division of Medical Biophysics, The University of  
Calgary, Calgary, Alberta, Canada.
- 3:50 Lower Plasma Viscosity of Joggers vs Non-Joggers (26.8)  
S.E. CHARM, H. PAZ and G.S. KURLAND<sup>2</sup>, Tufts University,  
School of Medicine, Boston, Ma.  
<sup>2</sup>Harvard Medical School, Boston, Ma.

FRIDAY P.M.

SESSION 27

**ULTRASOUND APPLICATIONS,  
BIOFLUIDS AND VISCOELASTIC BODIES**

Room 2100 Basic Science Bldg.

CHAIRMEN - SIEGFRIED WITTE, Diakonissen-Krankenhaus, FR Germany  
DAVID GOUGH, Univ. of Calif., San Diego, La Jolla, Ca.

- 1:30 Contribution to the Study of Blood Flow Using Low Frequency  
Spectral Analysis of Doppler Ultrasonic Waves.  
Application to a Pulsed Model (27.1)  
J.C. VERA, M. LEFORT and J.F. STOLTZ, Groupe d'Hemorheologie,  
Ecole des Mines, Nancy, France.
- 1:50 Studying the Formation of Red Blood Cell Aggregates Using  
an Ultrasonic Resonating Technique (27.2)  
D. CATHIGNOL, C. FOURCADE, M. HEITZ<sup>2</sup>, J.C. VERA<sup>2</sup> and  
J.F. STOLTZ<sup>2</sup>, Centre d'Etude et Technologie Appliquees  
a la Clinique, Bron, France; <sup>2</sup>Centre Regional de  
Transfusion de d'Hematologie, Vandoeuvre, France.
- 2:10 Ultrasonic Velocity Measurements and Phase Transitions  
in Liposome Suspensions (27.3)  
A. SAKANISHI, University of Tokyo, Tokyo, Japan.
- 2:30 The Microrheology of Colloidal Dispersions: Some Biological  
Applications (27.4)  
K. TAKAMURA, H.L. GOLDSMITH and S.G. MASON, McGill  
University, Montreal, Canada.
- 2:50 The Viscoelasticity of Normal and Pathological Synovial  
Fluid (27.5)  
I. ANADERE, H. CHMIEL and W. LASCHNER<sup>2</sup>, Institut fur  
Grenzflachen  $\bar{\eta}$  und Bioverfahrenstechnik, Stuttgart,  
FR Germany; <sup>2</sup>Abteilung fur orthopadische Rheumatologie,  
Stuttgart, FR Germany.
- 3:10 The Viscosity of the Urine from Catheterized Patients -  
Problems and Possibilities (27.6)  
U. PARKHEDE, A. NORBERG and B. NORBERG, University