

Michael W. Chapman, M.D.
Editor

Michael Madison, Ph.D.
Managing Editor

Operative Orthopaedics

Volume 2
L. D. Anderson
J. O. Johnston
A. J. Weiland
R. M. Szabo

Operative Orthopaedics

Volume 2

Edited by

Michael W. Chapman, M.D.

Professor and Chair

Department of Orthopaedics

University of California, Davis

Davis, California

Michael Madison, Ph.D.

Managing Editor

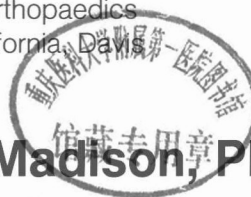
196 Contributors



J.B. Lippincott Company
Philadelphia

London Mexico City New York
St. Louis São Paulo Sydney

NOT FOR RESALE



Acquisitions Editor: Darlene Barela Cooke
Developmental Editor: Richard Winters
Manuscript Editor: Patrick O'Kane
Indexer: Barbara Littlewood
Developmental Designer: Susan Blaker
Design Coordinator: Michelle Gerdes
Production Manager: Carol Florence
Production Coordinator: Barney Fernandes
Compositor: TAPSCO Inc.
Printer/Binder: Halliday Lithograph Corp.

Copyright © 1988, by J.B. Lippincott Company.
All rights reserved. No part of this book may be used or reproduced in any manner whatsoever without written permission except for brief quotations embodied in critical articles and reviews. Printed in the United States of America. For information write J.B. Lippincott Company, East Washington Square, Philadelphia, Pennsylvania 19105.

3 5 6 4 2

LIBRARY OF CONGRESS

Library of Congress Cataloging-in-Publication Data

Operative orthopaedics/edited by Michael W. Chapman;
Michael Madison, managing editor.

p. cm.

Includes bibliographies and index.

1. Orthopedic surgery. I. Chapman, Michael W.

II. Madison, Michael,

[DNLM: 1. Orthopedics. WE 168 061]

RD731.064 1988

617'.3—dc19

DNLM/DLC

for Library of Congress 87-34225

CIP

ISBN 0-397-50919-7 (vol. 1)

ISBN 0-397-50920-0 (vol. 2)

ISBN 0-397-50921-9 (vol. 3)

ISBN 0-397-50772-0 (3 vol. set)

The authors and publisher have exerted every effort to ensure that drug selection and dosage set forth in this text are in accord with current recommendations and practice at the time of publication. However, in view of ongoing research, changes in government regulations, and the constant flow of information relating to drug therapy and drug reactions, the reader is urged to check the package insert for each drug for any change in indications and dosage and for added warnings and precautions. This is particularly important when the recommended agent is a new or infrequently employed drug.

Associate Editors

LEWIS D. ANDERSON, M.D.

Professor and Chairman
Department of Orthopaedics
University of South Alabama
College of Medicine
Mobile, Alabama
Infections

WILLIAM L. BARGAR, M.D.

Assistant Clinical Professor
Department of Orthopaedics
University of California, Davis
Davis, California
Department of Surgery, Orthopaedic Section
Sutter General Hospital
Sacramento, California
Joint Reconstruction

DANIEL R. BENSON, M.D.

Professor of Orthopaedics
University of California, Davis
Davis, California
Chief, Spinal Deformity Service
University of California, Davis Medical Center
Sacramento, California
The Spine

TIMOTHY J. BRAY, M.D.

Assistant Clinical Professor of Orthopaedics
University of California, Davis
Davis, California
Reno Orthopaedic Clinic
Reno, Nevada
Fractures and Dislocations

MICHAEL W. CHAPMAN, M.D.

Professor and Chairman
Department of Orthopaedics
University of California, Davis
Davis, California
Surgical Principles and Techniques
Amputations

DAVID B. COWARD, M.D.

Assistant Clinical Professor of Orthopaedic Surgery
University of California, Davis
Davis, California
Department of Surgery, Orthopaedic Section
Sutter General Hospital
Sacramento, California
Arthroscopic Surgery

JAMES O. JOHNSTON, M.D.

Clinical Professor of Orthopaedics
University of California, San Francisco
Chief, Department of Orthopaedics
Kaiser Foundation Hospital
Oakland, California
Tumors

ROGER A. MANN, M.D.

Associate Clinical Professor of Orthopaedic Surgery
University of California, San Francisco
Chief of Foot Surgery
Samuel Merritt Hospital
Oakland, California
The Foot

GEORGE T. RAB, M.D.

Associate Professor of Orthopaedic Surgery
University of California, Davis
Davis, California
Chief, Section of Children's Orthopaedics
University of California, Davis Medical Center
Sacramento, California
Pediatric Disorders

RICHARD S. RIGGINS, M.D.

Professor of Orthopaedics
Emory University School of Medicine
Atlanta, Georgia
Arthrodesis

JUAN J. RODRIGO, M.D.

Associate Professor of Orthopaedics
University of California, Davis
Chief, Adult Reconstructive Service
University of California, Davis Medical Center
Sacramento, California
The Knee

PHILLIP G. SPIEGEL, M.D.

Professor and Chairman

Department of Orthopaedic Surgery

University of South Florida

Tampa, Florida

Malunions and Nonunions

ROBERT M. SZABO, M.D.

Assistant Professor of Orthopaedics

University of California, Davis,

Davis, California

Chief, Hand & Microvascular Service

University of California, Davis Medical Center

Sacramento, California

The Hand

ANDREW J. WEILAND, M.D.

Professor, Department of Orthopaedic Surgery

Division of Plastic Surgery and

Department of Emergency Medicine

Chief, Division of Upper Extremity Surgery

Johns Hopkins University School of Medicine

Baltimore, Maryland

Microvascular Surgery

Contributors

PAUL J. ABBOTT, JR., M.D.
Virginia Beach Sports Medicine
Virginia Beach, Virginia

BEHROOZ A. AKBARNIA, M.D.
Professor and Vice Chairman
Department of Orthopedic Surgery
St. Louis University School of Medicine
Director of Orthopedics
Cardinal Glennon Children's Hospital
St. Louis, Missouri

A. HERBERT ALEXANDER, M.D.
Captain, Medical Corps, United States Navy
Clinical Associate Professor
Uniformed Services University of the Health Sciences
Bethesda, Maryland
Chairman, Department of Orthopaedic Surgery
Naval Hospital
Oakland, California

DANIEL D. ANDERSON, M.D.
Resident in Orthopaedic Surgery
University of California, Davis Medical Center
Sacramento, California

LEWIS D. ANDERSON, M.D.
Professor and Chairman
Department of Orthopaedics
University of South Alabama
College of Medicine
Mobile, Alabama

T. A. ANDREW, M.Sc., M.B.B.S.(Hons.), F.R.C.S.,
F.R.C.S.(Ed.)
Consultant Orthopaedic Surgeon
Corbett Hospital
Stourbridge, West Midlands
England

JAMES R. ANDREWS, M.D.
Clinical Professor
Department of Orthopaedics
Section of Sports Medicine
Tulane University School of Medicine
Orthopaedic Surgeon
South Highlands Hospital
Birmingham, Alabama

WILLIAM L. BARGAR, M.D.
Assistant Clinical Professor
University of California, Davis
Davis, California
Department of Surgery, Orthopaedic Section
Sutter General Hospital
Sacramento, California

JAMES E. BATEMAN, M.D., F.R.C.S.(C)
Associate Professor of Surgery
University of Toronto
Surgeon-in-Chief (Emeritus)
Orthopaedic & Arthritic Hospital
Toronto, Ontario
Canada

LOUI G. BAYNE, M.D.
Clinical Associate Professor of Orthopedics
Emory University
Director Hand Clinic
Scottish Rite Children's Hospital
Atlanta, Georgia

ALFRED BEHRENS, M.D., F.R.C.S.(C)
Associate Professor of Orthopaedic Surgery
University of Minnesota
St. Paul Ramsey Medical Center
St. Paul, Minnesota

DEBORAH BELL, M.D., F.R.C.S.(C)
Lecturer, Division of Orthopaedic Surgery
University of Toronto
Orthopaedic Surgeon, Hospital for Sick Children
Toronto, Ontario
Canada

DANIEL R. BENSON, M.D.
Professor of Orthopaedics
University of California, Davis
Davis, California
Chief, Spinal Deformity Service
University of California,
Davis Medical Center
Sacramento, California

MARVIN H. BLOOM, M.D.

Associate Clinical Professor of Orthopaedic Surgery
University of California, San Francisco
Director, Sports Medicine Clinic
San Francisco General Hospital
San Francisco, California

DR. RENATO BOMBELLI

Specialist in Orthopaedics and Radiology
L. D. Clinica Ortopedica
University of Milano
Consultant in Orthopaedics and Traumatology
Hospital of Busto Arsizio
Legnano, Italy

LAWRENCE B. BONE, M.D.

Assistant Professor of Orthopaedic Surgery
State University of New York at Buffalo
Director, Musculoskeletal Trauma Service
Erie County Medical Center
Buffalo, New York

F. WILLIAM BORA, JR., M.D.

Professor of Orthopaedic Surgery
University of Pennsylvania
School of Medicine
Chief of Hand Surgery
Hospital of the University of Pennsylvania
Philadelphia, Pennsylvania

MICHAEL J. BOTTE, M.D.

Assistant Professor of Surgery
Chief, Foot and Ankle Surgery
University of California, San Diego
Chief of Hand Surgery
Veterans Administration Hospital
San Diego, California

J. RICHARD BOWEN, M.D.

Pediatric Orthopedic Surgeon
Alfred I. DuPont Institute
Wilmington, Delaware

PAUL W. BRAND, C.B.E., M.B., F.R.C.S.

Clinical Professor of Orthopaedics and Surgery
Louisiana State University Medical School
Senior Consultant
Gillis W. Long Hansen's Disease Center
Carville, Louisiana

TIMOTHY J. BRAY, M.D.

Assistant Clinical Professor of Orthopaedics
University of California, Davis
Davis, California
Reno Orthopaedic Clinic
Reno, Nevada

HUGH P. BROWN, M.D.

Clinical Assistant Professor of Orthopaedic Surgery
University of Tennessee College of Medicine
Chattanooga, Tennessee

WILTON H. BUNCH, M.D., PH.D.

Professor, Department of Surgery
University of Chicago Pritzker School of Medicine
Dean of Medical Affairs
University of Chicago Hospitals & Clinics
Chicago, Illinois

B. D. BURDEAUX, JR., M.D.

Assistant Clinical Professor of Orthopaedic Surgery
Baylor College of Medicine
Associate Clinical Professor
Department of Surgery
University of Texas
Health Science Center at Houston
Houston, Texas

WILLIAM E. BURKHALTER, M.D.

Professor and Vice-Chairman
Department of Orthopaedics and Rehabilitation
Chief, Division of Hand Surgery
University of Miami
Jackson Memorial Medical Center
Miami, Florida

J. KENNETH BURKUS, M.D.

Assistant Clinical Professor
Department of Orthopaedic Surgery
University of California, Davis Medical Center
Sacramento, California
Director, Spine Clinic
Department of Orthopaedic Surgery
Naval Hospital
Oakland, California

CHARLES CARROLL IV, M.D.

Instructor of Orthopaedic Surgery
Northwestern University Medical School
Chicago, Illinois

RICHARD B. CASPARI, M.D.

Clinical Associate Professor of Orthopaedics
Medical College of Virginia
Richmond, Virginia

JOSEPH R. CASS, M.D., M.S.

Orthopaedic Surgeon
Midwest Orthopaedic Center
Sioux Falls, South Dakota

MICHAEL W. CHAPMAN, M.D.

Professor and Chairman of Orthopaedics
University of California, Davis
Davis, California

LARRY K. CHIDGEY, M.D.
 Department of Orthopaedic Surgery
 University of California, Davis Medical Center
 Sacramento, California

WILLIAM G. CLANCY, JR., M.D.
 Professor and Head
 Section of Sports Medicine
 Division of Orthopaedic Surgery
 University of Wisconsin
 Madison, Wisconsin

THOMAS H. COMFORT, M.D.
 Associate Professor of Orthopaedics
 University of Minnesota
 Chief, Orthopaedic Surgery
 St. Paul-Ramsey Hospital
 St. Paul, Minnesota

MICHAEL J. COUGHLIN, M.D.
 Clinical Assistant Professor
 Division of Orthopaedics and Rehabilitation
 Oregon Health Sciences University
 Portland, Oregon
 Chief of Orthopaedic Surgery
 St. Alphonsus Regional Medical Center
 Boise, Idaho

MARK B. COVENTRY, M.D., M.S.
 Emeritus Professor
 Mayo Medical School
 Emeritus Orthopaedic Consultant
 Mayo Clinic
 Rochester, Minnesota

DAVID B. COWARD, M.D.
 Assistant Clinical Professor, Orthopaedic Surgery
 University of California, Davis
 Davis, California
 Department of Surgery, Orthopaedic Section
 Sutter General Hospital
 Sacramento, California

EDWARD V. CRAIG, M.D.
 Assistant Professor, Orthopaedics
 University of Minnesota
 Minneapolis, Minnesota

JAMES J. CREIGHTON, JR., M.D.
 Assistant Chief, Hand Surgery Service
 Maricopa Medical Center
 Phoenix, Arizona

JOHN CSONGRADI, M.D.
 Assistant Professor of Surgery (Orthopaedics)
 Stanford University School of Medicine
 Stanford, California

R. RAYMOND CUNNINGHAM, M.D.
 Orthopaedic Surgeon
 St. John's Hospital
 Jackson, Wyoming

AVRON DANILLER, M.D., F.R.C.S.
 Professor and Chief
 Division of Plastic Surgery
 University of California, Davis Medical Center
 Sacramento, California

LAWRENCE D. DORR, M.D.
 Consultant Orthopaedics, Rancho Los Amigos Medical Center
 Assistant Clinical Professor
 University of California, Irvine
 Associate, Kerlan-Jobe Orthopaedic Clinic
 Centinela Hospital
 Inglewood, California

KAREN DUANE, M.D.
 Instructor in Orthopaedic Surgery
 New York Medical College
 Valhalla, New York

DR. H. G. ENDER
 University of Vienna
 Oberarzt at the Unfallkrankenhaus Lorenz Bohler
 Vienna, Austria

JOHN A. FEAGIN, JR., M.D.
 Orthopaedic Surgeon
 St. John's Hospital
 Jackson, Wyoming

HARRY E. FIGGIE III, M.D.
 Assistant Professor of Orthopaedic Surgery
 Case Western Reserve University
 School of Medicine
 Cleveland, Ohio

HENRY A. FINN, M.D.
 Assistant Professor, Department of Surgery
 Section of Orthopaedics and Rehabilitation Medicine
 The University of Chicago
 Pritzker School of Medicine
 Attending Physician, Department of Surgery
 Section of Orthopaedics and Rehabilitation Medicine
 Adult Reconstruction and Orthopaedic Oncology
 The University of Chicago Medical Center
 Chicago, Illinois

J. P. FLANAGAN, F.R.C.S., F.R.C.S.(Ed.)
 Consultant Orthopaedic Surgeon
 Black Notley Hospital
 Braintree—Bloomfield Hospital
 Chelmsford, Essex
 England

JOSEPH C. FLYNN, M.D.

Clinical Teaching Staff
Post Graduate Orthopaedic Education
Clinical Instructor of Orthopaedics
Emeritus Chairman
Department of Orthopaedic Surgery
Orlando Regional Medical Center
Medical Director
Florida Elks Children's Hospital
Orlando, Florida

ALVIN A. FREEHAFFER, M.D.

Professor of Orthopaedics
Case Western Reserve University
School of Medicine
Director of Orthopaedics
Chief of Spinal Cord Injury Center
Cuyahoga County Hospital
Cleveland, Ohio

ALAN E. FREELAND, M.D.

Professor, Department of Orthopaedic Surgery
University of Mississippi Medical Center
Chief, Hand and Upper Extremity Surgery
Department of Orthopaedic Surgery
Jackson, Mississippi

ROBERT W. GAINES, JR., M.D.

Associate Professor of Orthopaedics
University of Missouri School of Medicine
Columbia, Missouri

RICHARD H. GELBERMAN, M.D.

Professor of Orthopaedic Surgery
Harvard Medical Center
Chief of Hand and Upper Extremity Surgery
Massachusetts General Hospital
Boston, Massachusetts

DAVID H. GERSHUNI, M.D., F.R.C.S.(ENG)
F.R.C.S.(EDIN)

Associate Professor of Orthopaedic Surgery
University of California, San Diego
Co-Chief, Fracture Service
University of California Medical Center, San Diego
Chief, Orthopaedic Surgery
VA Medical Center
San Diego, California

DALE B. GLASSER, M.S.

Research Coordinator
Orthopaedics
Memorial Sloan-Kettering Cancer Center
New York, New York

J. LEONARD GOLDNER, M.D.

James B. Duke Professor and Chief Emeritus
Department of Orthopaedics
Duke University Medical Center
Durham, North Carolina

STUART B. GOODMAN, M.D., MSc., F.R.C.S.C.

Assistant Professor of Surgery
Stanford University Medical Center
Stanford, California

JOHN S. GOULD, M.D.

Professor and Chairman
Department of Orthopaedic Surgery
Medical College of Wisconsin
Milwaukee, Wisconsin

JAMES A. GOULET, M.D.

Clinical Instructor
Section of Orthopaedic Surgery
The University of Michigan Medical Center
Ann Arbor, Michigan

STEVEN M. GREEN, M.D.

Clinical Associate Professor of Orthopaedic Surgery
Mt. Sinai Medical School
Assistant Chief of Hand Services
Mt. Sinai Hospital and Orthopaedic Institute
Hospital of Joint Diseases
New York, New York

WILLIAM L. GREEN, M.D.

Assistant Clinical Professor
University of California, San Francisco
School of Medicine
Children's Hospital
San Francisco, California

SIGVARD T. HANSEN, JR., M.D.

Professor, Department of Orthopaedics
University of Washington School of Medicine
Orthopaedist-in-Chief, Harborview Medical Center
Seattle, Washington

KEVIN D. HARRINGTON, M.D.

Clinical Associate Professor of Orthopaedic Surgery
University of California, San Francisco
San Francisco, California

LELAND G. HAWKINS, M.D.

Orthopaedic Surgeon
Mercy Hospital and St. Lukes Hospital
Cedar Rapids, Iowa

KINGSBURY G. HEIPLE, M.D.

C. H. Herndon Professor and Chairman
Department of Orthopaedics
Case Western Reserve University
School of Medicine
Director, Department of Orthopaedics
University Hospitals of Cleveland
Cleveland, Ohio

AARON A. HOFMANN, M.D.
Associate Professor of Orthopaedic Surgery
University of Utah School of Medicine
Staff Physician, Orthopaedic Surgery
University of Utah Medical Center
Salt Lake City, Utah

JACK C. HUGHSTON, M.D.
Clinical Professor, Department of Orthopaedics
Division of Sports Medicine
Tulane University School of Medicine
Hughston Sports Medicine Hospital
Columbus, Georgia

WILLIAM G. HUMPHREYS, M.D.
Resident Physician
University of Missouri, Columbia
Resident Physician
University of Missouri Hospital and Clinics
Columbia, Missouri

ALLAN E. INGLIS, M.D.
Professor of Clinical Surgery
Professor of Anatomy in Cell Biology and Anatomy
Cornell University Medical College
Director, Comprehensive Arthritis Service
The Hospital for Special Surgery
New York, New York

MICHAEL E. JABALEY, M.D.
Clinical Professor of Surgery (Plastic)
University of Mississippi Medical Center
Jackson, Mississippi

DOUGLAS W. JACKSON, M.D.
Director
Southern California Center for Sports Medicine
Medical Director
Memorial Bone and Tissue Bank
Long Beach, California

RAE R. JACOBS, M.D.
Professor of Surgery (Orthopaedic)
University of Kansas
Chief, Problem Spine Clinic
Kansas University Medical Center
Chief, Orthopaedic Section
VA Medical Center
Kansas City, Kansas

KURT E. JACOBSON, M.D.
Staff Surgeon, Hughston Orthopaedic Clinic
Hughston Sports Medicine Hospital
Columbus, Georgia

ROBERT J. JOHNSON, M.D.
Professor of Orthopaedic Surgery
Head, Division of Sports Medicine
University of Vermont
Attending Physician
Medical Center Hospital of Vermont
Burlington, Vermont

JAMES O. JOHNSTON, M.D.
Clinical Professor of Orthopaedics
University of California, San Francisco
Chief, Department of Orthopaedics
Kaiser Foundation Hospital
Oakland, California

JESSE B. JUPITER, M.D.
Assistant Professor of Orthopaedic Surgery
Harvard Medical School
Assistant Orthopaedic Surgeon
Massachusetts General Hospital
Boston, Massachusetts

WILLIAM J. KANE, M.D., PH.D.
Professor of Orthopaedic Surgery
Northwestern University Medical School
Attending in Orthopaedic Surgery
Northwestern Memorial Hospital
Attending in Orthopaedic Surgery
Children's Memorial Hospital
Chicago, Illinois

MARY ANN E. KEENAN, M.D.
Assistant Clinical Professor of Orthopaedic Surgery
University of Southern California
School of Medicine
Director of Neuromuscular Research
The Adult Head Trauma Service
Rancho Los Amigos Medical Center
Downey, California

MICHAEL W. KEITH, M.D.
Assistant Professor of Orthopedics
Hand Surgeon
University Hospital
Cleveland, Ohio

JAMES F. KELLAM, M.D., F.R.C.S.(C)
Assistant Professor
University of Toronto
Clinical Director
Sunnybrook Hospital
and Regional Trauma Unit
Toronto, Ontario
Canada



HOWARD A. KING, M.D.

Clinical Associate Professor of Orthopaedic Surgery
University of Washington
Chief Spine Section
Children's Hospital and Medical Center
Seattle, Washington

HOWARD W. KLEIN, M.D., F.R.C.S.(C)

Assistant Professor of Surgery
Division of Plastic and Reconstructive Surgery
University of California, Davis
Davis, California

L. ANDREW KOMAN, M.D.

Associate Professor, Section on Orthopaedic Surgery
Wake Forest University Medical Center
North Carolina Baptist Hospital
Winston-Salem, North Carolina

RICHARD F. KYLE, M.D.

Assistant Chairman, Department of Orthopaedics
Hennepin County Medical Center
Clinical Assistant Professor
Department of Orthopaedic Surgery
University of Minnesota
Minneapolis, Minnesota

KENNETH L. LAMBERT, M.D.

Orthopaedic Surgeon
St. John's Hospital
Jackson, Wyoming

JOSEPH M. LANE, M.D.

Professor of Orthopaedic Surgery
Cornell University Medical College
Chief, Metabolic Bone Disease Unit
The Hospital for Special Surgery
Chief, Orthopaedic Division
Memorial Sloan-Kettering Cancer Center
New York, New York

ROBERT L. LARSON, M.D.

Orthopaedic Consultant
University of Oregon Athletic Department
Clinical Associate Professor of Orthopaedics
University of Oregon Medical School
Eugene, Oregon

ROBERT D. LEFFERT, M.D.

Associate Professor of Orthopaedic Surgery
Harvard Medical School
Chief, Department of Rehabilitation Medicine
and the Surgical Upper Extremity Rehabilitation Unit
Massachusetts General Hospital
Visiting Orthopaedic Surgeon
Massachusetts General Hospital
Boston, Massachusetts

ROSS K. LEIGHTON, M.D., F.R.C.S.(C)

Lecturer, Dalhousie University
Orthopaedic Surgeon, The Moncton Hospital
Moncton, New Brunswick
Canada

DAVID W. LHOWE, M.D.

Instructor in Orthopaedic Surgery
Harvard Medical School
Staff Physician
Massachusetts General Hospital
Boston, Massachusetts

TERRY R. LIGHT, M.D.

Associate Professor of Orthopaedics and Rehabilitation
Loyola University School of Medicine
Attending Surgeon
Loyola University Medical Center
Shriners Hospital for Crippled Children
Chicago, Illinois

JAMES A. LILLA, M.D.

Assistant Clinical Professor of Plastic Surgery
University of California, Davis
Davis, California

PAUL R. LIPSCOMB, M.D.

Professor Emeritus, Mayo Foundation and Clinic
Professor Emeritus, University of California, Davis
Davis, California

WILLIAM LONON, M.D.

Department of Orthopaedic Surgery
Naval Hospital
Oakland, California

G. DEAN MACEWEN, M.D.

Professor and Chief, Department of Orthopaedics
Section of Pediatric Orthopaedics
Louisiana State University Medical Center
Chairman, Department of Pediatric Orthopaedics
Children's Hospital
New Orleans, Louisiana

MICHAEL MADISON, Ph.D.

Orthopaedic Research Laboratories
University of California, Davis
Davis, California

BRUCE A. MALLIN, M.D.

Associate in Surgery
The University of Arizona
Chief of the Medical Staff
Phoenix Memorial Hospital
Phoenix, Arizona

ROGER A. MANN, M.D.

Associate Clinical Professor of Orthopaedic Surgery
University of California, San Francisco
School of Medicine
Chief of Foot Surgery
Samuel Merritt Hospital
Oakland, California

PAUL R. MANSKE, M.D.

Fred C. Reynolds Professor and Chairman
Orthopaedic Surgery
Washington University School of Medicine
St. Louis, Missouri

RANDALL E. MARCUS, M.D.

Assistant Professor of Orthopaedics
Case Western Reserve University
School of Medicine
Attending Surgeon
University Hospitals of Cleveland
Cleveland, Ohio

RICHARD A. MARDER, M.D.

Assistant Professor of Orthopaedics
University of California, Davis
Davis, California

JOEL M. MATTA, M.D.

Associate Professor of Orthopaedic Surgery
University of Southern California School of Medicine
Director of Orthopaedic Reconstruction Service
Los Angeles County/University of Southern California
Medical Center
Los Angeles, California

PETER MATTER, M.D.

Professor Dr. med.
University of Basle
Chief of Surgery
Hospital of Davos
Davos, Switzerland

RICHARD C. MAURER, M.D.

Clinical Professor of Orthopaedic Surgery
Vice Chairman, Department of Orthopaedic Surgery
University of California, San Francisco
Chief of Orthopaedic Surgery
Veterans Administration Medical Center
San Francisco, California

JACK K. MAYFIELD, M.D., M.S.

Chairman, Section of Orthopaedic Surgery
Phoenix Children's Hospital
Phoenix, Arizona

PAUL C. MCAFEE, M.D.

Assistant Professor of Orthopaedic Surgery
Assistant Professor of Neurological Surgery
Chief of Spinal Reconstructive Surgery
The Johns Hopkins Hospital
Baltimore, Maryland

DOUGLAS J. McDONALD, M.D.

Mayo Graduate School
Department of Orthopaedics
Rochester, Minnesota

DANA C. MEARS, M.D., Ph.D.

Associate Professor
Department of Orthopaedic Surgery
University of Pittsburgh School of Medicine
Pittsburgh, Pennsylvania

ALAN C. MERCHANT, M.D., M.S.

Clinical Professor of Surgery (Orthopaedic Division)
Stanford University School of Medicine
Stanford, California
Active Staff Surgeon
Department of Orthopaedic Surgery
El Camino Hospital
Mountain View, California

FREDERICK N. MEYER, M.D.

Assistant Professor, Orthopaedic Surgery
Chief, Division of Hand Surgery
University of South Alabama Medical Center
Mobile, Alabama

GARY MILLER, M.D.

Hand Fellow
Department of Orthopaedic Surgery
University of Pennsylvania School of Medicine
Philadelphia, Pennsylvania

ROBERT H. MILLER III, M.D.

Clinical Instructor
University of Tennessee Center for Health Sciences
Baptist Memorial Hospital, Regional Medical Center
Memphis, Tennessee

H. MILLESI, M.D.

Professor of Plastic Surgery
University of Vienna Medical Faculty
Chief of Plastic Surgery
I. Chirurgische Universitätsklinik Wien
Director of the Ludwig-Boltzmann-Institute of
Experimental Plastic Surgery
Vienna, Austria

ROBY MIZE, M.D.

Assistant Clinical Professor of Orthopaedic Surgery
University of Texas Southwestern Medical School
Staff Orthopaedic Surgeon
Presbyterian Medical Center of Dallas
Dallas, Texas

PASQUALE X. MONTESANO, M.D.

Instructor of Orthopaedics
University of California, Davis
Orthopaedic Surgeon
University of California, Davis Medical Center
Sacramento, California

J. RUSSELL MOORE, M.D.

Associate Professor
Department of Orthopaedic Surgery
Johns Hopkins University School of Medicine
Baltimore, Maryland

THOMAS J. MOORE, M.D.

Medical Director
Charlotte Rehabilitation Hospital
Miller Orthopaedic Clinic
Charlotte, North Carolina

JOHN R. MORELAND, M.D.

Assistant Clinical Professor of Orthopaedics
UCLA School of Medicine
Los Angeles, California

BERNARD F. MORREY, M.D.

Associate Professor of Orthopedic Surgery
Mayo Medical School
St. Mary's Hospital
Rochester, Minnesota

JAMES M. MORRIS, M.D.

Associate Professor of Orthopaedic Surgery
University of California, San Francisco
San Francisco, California

DAVID S. MORRISON, M.D.

Clinical Instructor in Orthopaedic Surgery
University of California, Irvine
Director of Shoulder and Elbow Surgery
Southern California Center for Sports Medicine
Long Beach, California

VINCENT S. MOSCA, M.D.

Assistant Clinical Professor of Orthopaedics
University of Washington
Head, Orthopaedic Clinical Services
Children's Hospital and Medical Center
Seattle, Washington

SCOTT J. MUBARAK, M.D.

Associate Clinical Professor of Orthopaedic Surgery
University of California, San Diego
Pediatric Orthopaedic Surgeon
Children's Hospital & Health Center
San Diego, California

MICHAEL J. MURPHY, M.D.

Assistant Clinical Professor of Orthopaedic Surgery
Yale University School of Medicine
Attending Spine Surgeon
Yale New Haven Hospital
New Haven, Connecticut

ROBERT J. NEVIASER, M.D.

Professor and Chairman, Department of Orthopaedic Surgery
Director, Hand and Upper Extremity Service
George Washington University Medical Center
Washington, DC

BETH NICHOLSON, OTR

Clinical Instructor,
School of Community and Allied Health
University of Alabama
Birmingham, Alabama

JOHN J. NIEBAUER, M.D.

Clinical Professor of Orthopaedic Surgery
University of California, San Francisco
Former Chief, Department of Hand Surgery
Pacific Presbyterian Hospital
Kentfield, California

TOM R. NORRIS, M.D.

Pacific Presbyterian Medical Center
San Francisco, California

RICHARD D. PARKER, M.D.

Sports Medicine Clinical Research Fellow
Latter Day Saints Hospital
Salt Lake City, Utah

SIR DENNIS PATERSON, M.D., F.R.C.S., F.R.A.C.S.

Clinical Senior Lecturer
University of Adelaide
Director & Chief Orthopaedic Surgeon
The Adelaide Children's Hospital
Adelaide, Australia

MICHAEL J. PATZAKIS, M.D.

Associate Professor of Orthopedic Surgery
University of Southern California
School of Medicine
Los Angeles County-University of Southern California
Medical Center
Los Angeles, California

LONNIE E. PAULOS, M.D.

Clinical Assistant Professor
Division of Orthopedic Surgery
University of Utah School of Medicine
Salt Lake City, Utah

P. HUNTER PECKHAM, Ph.D.

Associate Professor of Biomedical Engineering
Case Western Reserve University
Director, Rehabilitation Engineering
Cleveland Metropolitan General/Highland View Hospital
Cleveland, Ohio

CLAYTON A. PEIMER, M.D.

Associate Professor of Orthopaedic Surgery
Clinical Assistant Professor of Anatomical Sciences
Clinical Assistant Professor of Rehabilitation Medicine
School of Medicine
State University of New York at Buffalo
Chief of Hand Surgery
Department of Orthopaedics
Millard Fillmore Hospitals and
Erie County Medical Center
Buffalo, New York

LANDRUS L. PFEFFINGER, M.D.
 Assistant Clinical Professor
 University of California, San Francisco
 Chief of Foot Clinic
 Children's Hospital of Northern California
 Attending Physician, Samuel Merritt Hospital
 Oakland, California

NORMAN K. POPPEN, M.D.
 Assistant Clinical Professor of Orthopaedics
 University of California, Davis
 Davis, California

MARTIN A. POSNER, M.D.
 Associate Clinical Professor of Orthopaedic Surgery
 Mt. Sinai School of Medicine
 New York, New York

PATRICIA ANNE POST, B.A.
 Coordinator, Orthopaedic Center for
 Education and Research
 Vanderbilt University School of Medicine
 Nashville, Tennessee

DONALD J. PROLO, M.D.
 Clinical Associate Professor of Surgery
 Stanford University School of Medicine
 Stanford, California

MARK PRUZANSKY, M.D.
 Assistant Clinical Professor of Orthopaedics
 Mt. Sinai School of Medicine
 Associate Attending Department of Orthopaedics
 Mt. Sinai Medical Center
 New York, New York

GEORGE T. RAB, M.D.
 Associate Professor of Orthopaedic Surgery
 University of California, Davis
 Chief, Section of Children's Orthopaedics
 University of California, Davis Medical Center
 Sacramento, California

RUDOLF RESCHAUER, M.D. PROF.
 Prof. Dr. med., University of Graz
 Chief, Section of Accident Surgery
 Allgemeines Krankenhaus
 Linz, Austria

RICHARD S. RIGGINS, M.D.
 Professor of Orthopaedics
 Emory University School of Medicine
 Atlanta, Georgia

LAWRENCE A. RINSKY, M.D.
 Associate Professor of Orthopedic Surgery
 Stanford University
 Chief of Pediatric Orthopedics
 Children's Hospital at Stanford
 Stanford, California

JOHN M. ROBERTS, M.D.
 Professor of Orthopaedics and Pediatrics
 Brown University Program in Medicine
 Surgeon-in-Charge
 Division of Pediatric Orthopaedic Surgery
 Rhode Island Hospital
 Providence, Rhode Island

JUAN J. RODRIGO, M.D.
 Associate Professor of Orthopaedics
 University of California, Davis
 Chief, Adult Reconstructive Service
 University of California, Davis Medical Center
 Sacramento, California

WILLIAM L. ROHR, JR., M.D. M.S.M.E.
 Chairman, Department of Orthopaedics
 Alvarado Hospital Medical Center
 Alvarado Orthopaedic Research
 San Diego, California

HOWARD ROSEN, M.D.
 Clinical Professor of Orthopaedic Surgery
 Mt. Sinai School of Medicine
 Chief of Fracture-Trauma Service
 Hospital for Joint Diseases Orthopaedic Institute
 New York, New York

THOMAS D. ROSENBERG, M.D.
 Assistant Clinical Professor of Orthopaedic Surgery
 University of Utah
 Salt Lake City, Utah

THOMAS P. RÜEDI, M.D.
 Professor of Surgery
 University of Basle
 Head, Department of Surgery
 Kantonsspital
 Chur, Switzerland

MICHAEL F. SCHAFER, M.D.
 Ryerson Professor and Chairman
 Department of Orthopaedic Surgery
 Northwestern University Medical School
 Chairman, Department of Orthopaedic Surgery
 Northwestern Memorial Hospital
 Chicago, Illinois

DOMENIC SCHARPLATZ, M.D.
 Head of the Surgical Department
 Hospital of Thusis
 Thusis, Switzerland

JOSEPH SCHATZKER, M.D., F.R.C.S.(C)
 Professor of Surgery
 University of Toronto
 Chief Division of Orthopaedic Surgery
 Sunnybrook Medical Center
 Toronto, Ontario
 Canada

DAVID J. SCHURMAN, M.D.
Associate Professor of Surgery/Orthopaedics
Stanford University
Chief of Arthritis Surgery
Stanford University Medical Center
Stanford, California

WOLFGANG SEGGL, M.D.
Dr. med., University of Graz
Chief, Department of Accident Surgery
University Clinic for Surgery
Landeskrankenhaus Graz
Graz, Austria

GOTTFRIED SEGMÜLLER, M.D.
Head of Hand Surgery Service
Department of Orthopaedic Surgery
Kantonsspital
St. Gallen, Switzerland

JULES S. SHAPIRO, M.D.
Associate Professor, Orthopedic Surgery
Associate Attending Surgeon
Rush Presbyterian St. Luke's Medical Center
Chicago, Illinois

THOMAS C. SHIVES, M.D.
Assistant Professor of Orthopedic Surgery
Mayo Graduate School of Medicine
Rochester, Minnesota

MARK A. SILVER, M.D.
Hand Fellow
Harvard Medical School
Massachusetts General Hospital
Boston, Massachusetts

FRANKLIN H. SIM, M.D.
Professor of Orthopedic Surgery
Mayo Medical School
Consultant, Department of Orthopedics
Mayo Clinic and Mayo Foundation
Rochester, Minnesota

EDWARD H. SIMMONS, M.D., F.R.C.S. (Tor)
Professor of Orthopaedic Surgery
State University of New York at Buffalo
Head of the Department of Orthopaedic Surgery
Buffalo General Hospital
Buffalo, New York

MICHAEL A. SIMON, M.D.
Professor of Surgery, Section of Orthopaedic Surgery
and Rehabilitation Medicine
Professor of Pathology
University of Chicago Medical Center
Chicago, Illinois

T. DAVID SISK, M.D.
Clinical Associate Professor
Campbell Clinic
University of Tennessee
Department of Orthopedics
Memphis, Tennessee

TAYLOR KING SMITH, M.D.
Clinical Professor
Department of Orthopedic Surgery
University of California, San Francisco
Director of Rehabilitation
Davies Medical Center
San Francisco, California

WAYNE O. SOUTHWICK, M.D.
Professor of Orthopaedics and Rehabilitation
Yale University School of Medicine
New Haven, Connecticut

DAVID L. SPENCER, M.D.
Associate Professor of Orthopaedic Surgery
University of Illinois
Chief of Spine Surgery
University of Illinois and
Lutheran General Hospital
Glenview, Illinois

DAN M. SPENGLER, M.D.
Professor and Chairman
Department of Orthopaedics and Rehabilitation
Vanderbilt University Medical Center
Chief of Orthopaedics
Vanderbilt University Hospital
Nashville, Tennessee

JAMES D. SPIEGEL, M.D.
Chief Resident, Department of Orthopaedic Surgery
University of California, Davis
Davis, California

LYNN T. STAHeli, M.D.
Professor of Orthopaedic Surgery
University of Washington
Director of Orthopedics
Children's Hospital and Medical Center
Seattle, Washington

PETER J. STERN, M.D.
Clinical Professor of Orthopaedic Surgery
University of Cincinnati
College of Medicine
Cincinnati, Ohio

PETER M. STEVENS, M.D.
Clinical Associate Professor
University of Utah Medical Center
Assistant Chief Surgeon
Shriners Hospital for Crippled Children
Salt Lake City, Utah

JAMES W. STRICKLAND, M.D.
Clinical Professor of Orthopaedic Surgery
Indiana University School of Medicine
Chief, Section of Hand Surgery
St. Vincent Hospital and Health Care Center
Indianapolis, Indiana

MARC F. SWIONTKOWSKI, M.D.
Assistant Professor of Orthopaedics and Rehabilitation
Vanderbilt University School of Medicine
Staff Orthopaedist
Vanderbilt University Medical Center
Nashville, Tennessee

ROBERT M. SZABO, M.D.
Assistant Professor of Orthopaedics
University of California, Davis
Chief, Hand & Microvascular Service
University of California, Davis Medical Center
Sacramento, California

RUDOLF SZYSZKOWITZ, M.D.
Professor and Head
Department of Trauma Surgery
School of Medicine
University of Graz
Graz, Austria

JULIO TALEISNIK, M.D.
Clinical Professor
Department of Surgery (Orthopaedics)
University of California, Irvine
Irvine, California

DAVID C. TEMPLEMAN, M.D.
Assistant Professor of Orthopaedics
Department of Orthopaedics
University of Minnesota
Minneapolis, Minnesota

JAMES S. THOMPSON, M.D.
Assistant Professor of Orthopaedic Surgery
Johns Hopkins University School of Medicine
Assistant Professor
Johns Hopkins Hospital
Baltimore, Maryland

JACK W. TUPPER, M.D.
Clinical Professor of Orthopaedic Surgery
University of California, San Francisco
Chief, Hand Division
Orthopaedic Surgery
Samuel Merritt Hospital
Oakland, California

ANTHONY S. UNGER, M.D.
Clinical Instructor of Orthopaedics
George Washington University School of Medicine
Attending Orthopaedic Surgeon
George Washington University Medical Center
Washington, DC
Orthopaedic Consultant
National Institutes of Health
Bethesda, Maryland

JAMES R. URBANIAK, M.D.
Professor, Division of Orthopaedic Surgery
Duke University School of Medicine
Chief, Division of Orthopaedic Surgery
Duke University Medical Center
Durham, North Carolina

MICHAEL I. VENDER, M.D.
Attending Hand and Orthopaedic Surgeon
Department of Orthopaedic Surgery
Edward Hospital
Naperville, Illinois

F. WILLIAM WAGNER, JR., M.D.
Clinical Professor of Orthopaedic Surgery
University of Southern California
School of Medicine
Chief Consultant, Ortho-Diabetes Service
Rancho Los Amigos Medical Center
Downey, California

ROBERT WATERS, M.D.
Clinical Professor of Orthopedic Surgery
University of Southern California
School of Medicine
Chairman, Department of Surgery
Rancho Los Amigos Medical Center
Downey, California

ROBERT G. WATKINS, M.D.
Clinical Associate Professor of Orthopedics
University of Southern California
School of Medicine
Orthopedic Staff
Centinela Hospital Medical Center
Los Angeles, California

H. KIRK WATSON, M.D.
Associate Clinical Professor of Orthopaedics
University of Connecticut Medical School
Farmington, Connecticut
Associate Professor of Orthopaedics and Surgery
University of Massachusetts Medical Center
Worcester, Massachusetts
Assistant Clinical Professor of Plastic Surgery
and Orthopaedics
Yale New Haven Medical School
New Haven, Connecticut
Chief, Connecticut Combined Hand Service
Hartford, Connecticut

BERNHARD GEORG WEBER, M.D.
FMH Orthopaedic and General Surgery
Honorary Professor for Orthopaedic Surgery
University of Berne
Klinik am Rosenberg
Heiden, Switzerland

MICHAEL J. WEBER, M.D.
Orthopaedic Surgeon
McCain Orthopaedic Clinic
North Little Rock, Arkansas

STEPHEN C. WEBER, M.D.
Assistant Clinical Professor of Orthopaedics
University of California, Davis Medical Center
Sacramento, California

ANDREW J. WEILAND, M.D.
Professor, Department of Orthopaedic Surgery
Division of Plastic Surgery and
Department of Emergency Medicine
Chief, Division of Upper Extremity Surgery
Johns Hopkins University School of Medicine
Baltimore, Maryland

TERRY L. WHIPPLE, M.D.
Department of Orthopaedics
Medical College of Virginia
University of Virginia
Chief of Orthopaedics
Humana St. Luke's Hospital
Richmond, Virginia

ROBERT LEE WILSON, M.D.
Chief, Hand Surgery Service
Maricopa Medical Center
Phoenix, Arizona
Associate in Surgery
University of Arizona
Tucson, Arizona

LESTER E. WOLD, M.D.
Assistant Professor of Orthopaedic Surgery
Mayo School of Medicine
Mayo Clinic
Rochester, Minnesota

SAVIO L-Y. WOO, PH.D.
Professor of Surgery and Bioengineering
University of California, San Diego
La Jolla, California

MICHAEL B. WOOD, M.D.
Consultant
Department of Orthopedic Surgery
Section of Hand Surgery
Mayo Clinic
Associate Professor of Orthopedic Surgery
Mayo Medical School
Consultant, Orthopedic Surgery
Saint Mary's Hospital
Rochester, Minnesota

ROBERT E. ZICKEL, M.D.
Clinical Professor, Orthopedic Surgery
Columbia University
Attending Orthopedic Surgeon
St. Lukes-Roosevelt Hospital Center
New York, New York