

Contents

I. Historical Background

Julius Wolff and the Law of Bone Remodelling	
H. Zippel	1

A Noteworthy Meeting of the Society for Nature Research in Zurich	
Two Important Precursors of Julius Wolff:	
Carl Culmann and Hermann von Meyer	
B. Rüttimann	13

Julius Wolff and Friedrich Pauwels	
Wolff's Concept of a Causal Therapy of Orthopaedic Diseases Using	
Biological Adaptation Phenomena and Its Realization by Friedrich Pauwels	
F. Lör, R. Weigmann	23

Wolff's Law	
Paul Maquet	31

II. Theory of Biological Sciences

Biological Explanation and Principle of Causality	
R. Löther	35

Adaptation and Compensation as Biological Principles of Medical Thinking	
and Action	
A. Hecht	39

Feedback Control Processes in Medicine and Technology - a Comparison	
F. Thomas	45

III. Biomechanical Considerations

Computer Aided Simulation of the Functional Bone Adaptation -	
a Method to Check a Theory	
B. Kummer	65

The Bone as a Compression Member in a Cable Tensioning Device: The Example of the Hip	
M. Möser, W. Hein	81
Stress-Shape Relationship during Treatment of a Congenital Dislocation of the Hip	
P. Maquet	93
Computer Simulation of Bone Remodelling in Dentistry and Orthopaedics	
S. Tsutsumi, Y. Inoue, T. Yamamuro	103
Computerized Reconstruction for the Study of the Three-dimensional Architecture of Trabecular Bone	
A. Merolli, P. Tranquilli Leali, C. Gabbi, G. Fineshi	113
 IV. Electrophysiological Aspects	
Wolff's Law and Its Biophysical Implications	
C. A. L. Bassett	119
How Do Cells Respond to the Mechanical Environment?	
D. B. Jones	135
Control of Embryonic Chick Bone Growth by Resonant Electromagnetic Fields	
S. D. Smith, B. R. McLeod, A. R. Liboff.....	147
Electrostimulation in Biology, Utilities and Side Effects	
H. Berg, E. Bauer	161
An integrative Concept for an Electrophysiological Signal System in the Connective Tissue Matrix. The Native Collagen Fibrils as Biosensor and Signal-Conducting Structure Between Nerve and Cell as Well as in the Intercellular Matrix, and a Discussion of the Underlying Mechanism	
G. Regling, H.-I. Rückmann	171
 V. Blood Supply and Metabolism	
Intraosseous Pressure of the Human Patella	
J. Graf, R. Christophers, F. U. Niethard	193

The Mechanoreceptor Hypothesis for Remodeling of Bone and the Influence of Fluorid Therapy for Osteoporosis on It K. Abendroth	199
Metaphyseal Stress Shielding and Transarticular Load Transfer - a Biomechanical Concept of Osteopenia R. Schleberger, K. Bernsmann, E. M. Schneider	203
Bone Remodelling in Disuse Osteoporosis H.-G. Willert, A. Enderle	217
Selenite, Nitrate, and Mercury and their Influence on Regulation Principles in Connective Tissue G. Wilsdorf	223
The Biological Role of Oxygen Radicals, Lipid Peroxidation, and Antioxidative Therapy in Connective Tissue Regulation G. Regling, A. Hager, G. Wilsdorf	231
 VI. Special Clinical Problems	
Model Investigations on the Loading of Bone in the Area of Hip-Joint Prostheses, and New Prosthesis Designs in Consideration of Wolff's Law A. Schreiber, H. A. C. Jacob, A. H. Huggler	243
Modes of Adaptation in Noncemented Total Hip Endoprosthesis K. Rossak	253
Cementless Implantation of the Stem of Different Types of Standard Hip Endoprosthesis G. E. Krakovits	261
Bone Adaptation to Dynamic Osteosynthetic Implants R. Labitzke	269
Complex Biophysical-Chemical Therapies for Squamous Cell Carcinoma U. G. Randoll, R. M. Pangan, R. Dehmlow	273

VII. Soft Tissue Regulation, Arthrosis, and Arthritis

Superficial Zone of Articular Cartilage after Immobilization and Running Training: Is Proteoglycan Depletion the Clue to the Pathogenesis of Osteoarthritis? H. J. Helminen, I. Kiviranta, A.-M. Säämänen, J. Jurvelin, K. Paukkonen, J. Parkkinen, M. Lammi, J. Arokoski, T. Lapveteläinen, M. Hyttinen, M. Tammi	279
Feedback Mechanism in the Synovial System N. Dettmer	283
Oxygen-Multistep Therapy in Degenerative Diseases of The Locomotor System M. von Ardenne	289
Intra-articular Measurement of Resting Synovial pO_2 (Oxygen Partial Pressure of Synovial Fluid) - a New Point of Intersection for Clinical Research in the Areas of Arthrosis and Pain G. Regling, N. Jessen, S. Meister, R. Berg	299
Immunologic and Immunogenic Background in the Understanding of the Pathogenesis of Lyme Disease C. Dostál	321
A Biological Examination of Inflammatory Rheumatic Diseases: The Example of Spondylitis Ankylopoietica (Bekhterev's Disease) G. Regling, P.-U. Tunn	329