

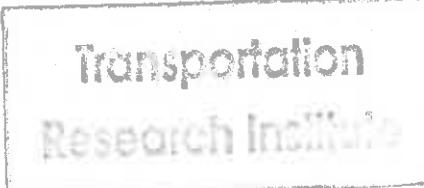
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BIBLIOGRAPHY ON THE
PHYSICAL PROPERTIES OF THE SKELETAL SYSTEM

Volume III of IV

Interim Report on Contract PH-43-67-1136

Appendix B



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BIBLIOGRAPHY
ON
THE PHYSICAL PROPERTIES OF THE SKELETAL SYSTEM

F. Gaynor Evans, Ph.D.

With the assistance of
Antoinette R. Catron, M.A.

Department of Anatomy
The University of Michigan
Ann Arbor, Michigan

PREFACE

This bibliography on the physical properties of the skeletal system is an outgrowth of one originally prepared in connection with my own research in this area and the writing of a book on the subject. The bibliography includes references to research on the physical properties of bone considered as a material, as well as to research on intact bones and parts of the skeleton. There are also a few references to the physical properties of intervertebral disks and of articular cartilage

Most of the references deal with properties at the gross rather than the molecular level. While these properties are usually considered as "mechanical" rather than "physical," the term "physical" properties was believed to be a better choice for our purpose because it is more generally understood by those who are not specialists in the field of materials testing.

No claim is made that the present bibliography is a complete one. However, we believe that it contains references to most of the important publications on the subject. Except in special cases, e.g., Russian and Japanese, each reference is cited in its original language. To the extent permitted by time and facilities, each reference has been carefully checked for accuracy. Many references not included in the present bibliography are filed and, it is hoped, will be reviewed and added at some future time.

We believe the bibliography will be useful to individuals working in many different areas. Some of these areas are orthopedic surgery, trauma surgery, neurosurgery; physical medicine and rehabilitation; the design and manufacturing of prosthetic and orthotic appliances; safety engineering in the automotive and airplane industries as well as in the space program; the manufacture of crash helmets and other safety gear; anatomy, physical anthropology, and other areas of investigation within the basic sciences.

We wish to express our gratitude and appreciation to various members of the staff of The University of Michigan Libraries who have been of great help in tracing references during the preparation of this bibliography. We also want to thank Dr. Verne L. Roberts, Coordinator, Biomechanics Research, of the Highway Safety Research Institute, The University of Michigan, and his staff for their cooperation in the publication of this bibliography.

F. Gaynor Evans

Department of Anatomy
The University of Michigan
Ann Arbor, Michigan

March 14, 1967

- Anderson, C. E., J. Ludowieg, H. A. Harper, and E. P. Engelman 1964
 The Composition of the organic component of human articular cartilage. Relationship to Age and Degenerative Joint Disease.
J. Bone Joint Surg., 46A: 1176-1183.
- Aoji, O., T. Motojima, and T. Bando 1959 On the effective sectional areas and maximum compressive loads of diaphysis of human long bones. *J. Kyoto Prefect. Med. Univ.*, 65: 979-984. (Japanese text with English summary).
- Aoji, O. and T. Motozima 1956 The research of the compressive strength of compact bone. *Acta Anat. Nippon.*, (abstract).
- 1959 On the Relation of the Compressive Strength between the Diaphysis and Compact Bone in Human Long Bones. *J. Kyoto Prefect. Med. Univ.*, 65(5): 989-993 (Japanese text with English summary).
- Aoji, O., T. Motojima, and Y. Sugiyama 1959 On the Age Changes of the Strength of Long Bones in Rat. *J. Kyoto Prefect. Med. Univ.*, 65(5): 985-988 (Japanese text with English summary).
- Arandes, A. R. and A. Viladot 1953 Biomechanics of the os calcis. *Med. Clin. (Barcelona)*, 21(1): 25-34.
- Ascenzi, A. 1948 Contributo allo studio delle proprietà ottiche dell'osso umano normale. I. Sull'indice di rifrazione. *Rendic. Accad. Naz. Lincei*, 4(6): 777-783.
- 1948 Contributo allo studio delle proprietà ottiche dell'osso umano normale. III. Sulla birifrangenza di forma e la birifrangenza propria. *Rendic. Accad. Naz. Lincei*, 5(3-4): 171-180.
- 1948 Contributo allo studio delle proprietà ottiche dell'osso umano normale. II. Sulla birifrangenza totale. *Rendic. Accad. Naz. Lincei*, 5(1-2): 100-107.
- 1949 Quantitative researches on the optical properties of human bone. *Nature*, 163: 604-605.
- 1961 A quantitative investigation of the birefringence of the osteon. *Acta Anat.*, 44: 236-262.
- Ascenzi, A. and E. Bonucci 1964 The Ultimate Tensile Strength of Single Osteons. *Acta Anat.*, 58: 160-183.
- 1966 The Osteon Calcification as Revealed by the Electron Microscope. Third European Symposium on Calcified Tissues. Ed. by H. Fleisch, H. J. J. Blackwood, and M. Owen. Springer-Verlag, Heidelberg. 142-146.
- Ascenzi, A. and A. Chiozzotto 1955 Applicazione della tecnica della pseudo-replica allo studio della fine struttura dell'osso al microscopio elettronico. *Rendic. Ist. Sup. Sanit.*, 18: 214-224.

- Ascenzi, A. and C. Fabry 1959 Technique for dissection and measurement of refractive index of osteones. *J. Biophys. Biochem. Cytol.*, 6: 139-142, 1959.
- Ascenzi, A. and V. Marozzi 1958 Some biophysical aspects of changes in bone in blood diseases. *Amer. J. Clin. Path.*, 30: 187-189.
- Ascenzi, A. and V. Marozzi 1961 Biophysical Study of von Recklinghausen's Disease of Bone. *Arch. Path.*, 72: 297-309.
- Ascenzi, A., E. Bonucci, and A. Checcucci 1966 The Tensile Properties of Single Osteons Studied Using a Microwave Extensimeter. Studies on the Anatomy and Function of Bone and Joints. Ed. by F. G. Evans Springer-Verlag, Heidelberg. 121-141.
- Ascenzi, A., V. Marozzi, and D. Steve-Bocciarelli 1958 Apparecchiatura e tecnica microradiografica per lo studio del tessuto osseo (con particolare riferimento al tessuto osseo spongioso). *Rendic. Ist. Sup. Sanit.*, 21: 842-849.
- Atkinson, P. J. 1962 Changes in density of the human femoral cortex with age. *J. Bone Joint Surg.*, 44-B: 496-502.
- 1965 Changes in Resorption Spaces in Femoral Cortical Bone with Age. *J. Path. Bact.*, 89(1): 173-178.
- Aufranc, O. E., W. N. Jones, and W. H. Harris 1964 Pathological Fracture of Proximal Humerus. *J. Amer. Med. Assoc.*, 188: 736-740.
- Bachman, C. H. and E. H. Ellis 1965 Fluorescence of Bone. *Nature*, 206(4991): 1328-1331.
- Backman, S. 1957 The proximal end of the femur. *Acta Radiol.*, Suppl. 146.
- Badoux, D. M. 1966 Statics of the Mandible. *Acta Morph. Neerl. Scand.*, 6(3): 251-256.
- Baker, P. T. and J. L. Angel 1965 Old Age Changes in Bone Density: Sex and Race Factors in the United States. *Hum. Biol.*, 37(2): 104-121.
- Baker, P. T. and M. A. Little 1965 Bone Density Changes with Age, Altitude, Sex and Race Factors in Peruvians. *Hum. Biol.*, 37(2): 122-136.
- Baker, P. T. and R. W. Newman 1957 The use of bone weight for human identification. *Amer. J. Phys. Anthropol.*, 15(4): 601-618.
- Baker, P. T. and H. Schraer 1958 The estimation of dry skeletal weight by photometry of roentgenograms. *Hum. Biol.*, 30: 171-184.
- Barbosa Sueiro, M. B. and R. Moisao 1957 The armillary architecture of the human skull; its application to the topography of the lines of fracture. *C. R. Ass. Anat.*, 43(94): 175-181.

- Barcelo, P. 1959 Anatomy, physiology and biomechanics of the lumbo-sacral region. *Rev. Esp. Reum.*, 8(4): 233-251.
- Bassett, C. A. L. and R. O. Becker 1962 Generation of electric potentials by bone in response to mechanical stress. *Science*, 137(3535): 1063-1064.
- Bassett, C. A. L. 1966 Electro-mechanical Factors Regulating Bone Architecture. Third European Symposium on Calcified Tissues. Ed. by H. Fleisch, H. J. J. Blackwood, and M. Owen. Springer-Verlag, Heidelberg. 78-89.
- Bassett, C. A. L., R. J. Pawluk, and R. O. Becker 1964 Effects of Electric Currents on Bone In Vivo. *Nature*, 204 (4959): 652-654.
- Baume, L. J. and H. Derichsweiler 1961 Response of condylar growth cartilage to induced stresses. *Science*, 134(3471): 53-54.
- Baumann, W. 1951 Die Bedeutung des Trochanter major für die Festigkeit des Oberschenkelknochens. Johann Wolfgang Goethe Universität, Frankfurt a. M. (Doctoral Dissertation).
- Byars, E. F. and J. H. McElhaney 1965 Dynamic Response of Biological Materials. *Amer. Soc. Mech. Eng.*, 65-WA/HUF-9: 1-8.
- Bechtol, C. O. 1952 Engineering Principles Applied to Orthopedic Surgery. *Amer. Acad. Orthop. Surg.*, Instructional Course Lectures, 9: 257-264.
- Bechtol, C. O. 1959 Bone as a structure. Metals and Engineering in Bone and Joint Surgery by C. O. Bechtol, A. B. Ferguson, and P. G. Laing. The Williams and Wilkins Co., Baltimore. Chap. 6, 127-142.
- Becker, R. O., C. A. L. Bassett, and C. H. Bachman 1964 Bioelectrical Factors Controlling Bone Structure. *Bone Biodynamics*. Ed. by H. M. Frost. Little, Brown and Co., Boston. Chap. 13, 209-232.
- Becker, R. O. and F. M. Brown 1965 Photoelectric effects in human bone. *Nature*, 206: 1325.
- Becker, R. B. and W. M. Neal 1930 Relation of feed to bone strength in cattle. *Proc. Amer. Soc. Anim. Prod.*, 81-88.
- Belenkii, V. E. 1961 Modern methods for the study on elastic properties of bone tissues. *Ortop. Travm. Protez.*, 22: 35-38.
- Bell, G. H. 1956 Bone as a Mechanical Engineering Problem. The Biochemistry and Physiology of Bone. Ed. by G. H. Bourne. Academic Press, Inc., Publishers, New York. Chap. 2, 27-52.
- 1965 Application of Engineering Techniques to the Physiology of Bone. Biomechanics and Related Bio-Engineering Topics. Ed. by R. M. Kenedi. Pergamon Press, London. Chap. 16, 177-179.

- 1966 Rheology of Bone. Lab. Pract., Jan.
- Bell, G. H. and D. P. Cuthbertson 1943 The effect of various hormones on the chemical and physical properties of bone. J. Endocr., 3: 302-309.
- Bell, G. H. and J. B. de V. Weir 1949 Physical properties of bone in fluorosis. Industrial Fluorosis. Med. Res. Council Memorandum, 22: 85-92.
- Bell, G. H., J. W. Chambers, and I. M. Dawson 1947 The mechanical and structural properties of bone in rats on a rachitogenic diet. J. Physiol., 106(3): 286-300.
- Bell, G. H., J. W. Chambers, and J. B. de V. Weir 1948 Elastic Properties of Normal and Rachitic Rat Femora. J. Physiol., 108: 19P (abstract).
- Bell, G. H., D. P. Cuthbertson, and J. Orr 1941 Strength and size of bone in relation to calcium intake. J. Physiol. 100: 299-317.
- Bell, G. H., O. Dunbar, J. A. Gillespie, J. Iball, and J. Oliver 1957 Effect of sweet-pea poisoning on strength of bone and skin. J. Physiol., 139(1): 17-18 (abstract).
- Bergman, E. 1959 Fatigue fractures of the lower extremities. Acta Orthop. Scand., 29(1): 43-48.
- Berkebile, R. D. 1964 Stress fracture of the tibia in children. Amer. J. Roentgen., 91: 588-596.
- Berliner, A. 1957 Observations in variation in x-ray density with bone loss in the human mandible. J. Dent. Res., 36(3): 451-457.
- Berry, C. A. and G. L. Hekuis 1960 X-ray survey for bone changes in low-pressure chamber operators. Aerospace Med., 31(9): 760-765.
- Bierman, H. R. and V. R. Larsen 1946 Reactions of the human to impact forces revealed by high speed motion picture technique. J. Aviat. Med., 17: 407-412.
- Bingold, A. C. 1959 Experimental work on femoral neck fractures. Proc. Roy. Soc. Med., 52: 906-910.
- Bismuth, V. 1959 The densimetry of bone by x-rays. Presse Med., 67: 1933-1936.
- Bittner, H. 1937 Insufficiency of bone due to unequal strain. Arch. Klin. Chir., 188: 175-206.
- Bobechko, W. P. and W. R. Harris 1960 The radiographic density of avascular bone. J. Bone Joint Surg., 42B(3): 626-632.
- Bonfield, W. and C. H. Li 1965 Deformation and Fracture of Ivory. J. Appl. Phys., 36(10): 3181-3184.

- 1966 Deformation and Fracture of Bone. J. Appl. Physiol., 37(2): 869-875.
- Bordier, P., H. Matrajt., L. Miravet, and D. Hioco 1964 Mesure Histologique de la Masse et de la Résorption des Travées Osseuses. Path. Biol. (Paris), 12(23-24): 1238-1243.
- Bornhaupt 1881 Sur le mécanisme des fractures des os longs en général, et sur le mécanisme des fractures des os longs par coups de feu en particulier. Rev. Mil de Méd. et Chir., 1:723-731 and 1: 481-496.
- Bourlière, F. and J. Dry 1961 Variations with age of bone density in the rat. Rev. Franc. Etud. Clin. Biol., 6: 475-479.
- Brailsford, J. F. 1945 Plasticity of bone. Brit. J. Surg., 32: 345-357.
- Brodetti, A. 1956 The weight bearing capacity of the femoral neck with solitary bone cyst. Acta Orthop. Scand., 24: 81-98.
- Brodin, H. 1953 Pro Laboratorio (A method to determine the solidity to the flexion, the module of elasticity and the specific pressure of the fracture in healing). Experientia, 9: 225-227.
- Broman, G. E., M. Trotter, and R. R. Peterson 1958 The density of selected bones of the human skeleton. Amer. J. Phys. Anthropol., 16(2): 197-211.
- Brown, T., R. J. Hansen, and A. J. Yorra 1957 Some mechanical tests on the lumbosacral spine with particular reference to the intervertebral discs. J. Bone Joint Surg., 39A(5): 1135-1164.
- Brown, W. N. and R. I. Brooks 1948 The reproducibility of the mack technique for bone density evaluation as applied to the os calcis of a living human subject. Sch. of Chem. and Phys., Penn. St. Col. (abstract).
- Bunak, V. V. 1960 The reaction of the growth zone of tubular bones to change in mechanical stress. Biull. Moskv. Obshch. Ispyt. Prirody. [Biol.], 65(2): 157.
- 1964 Split-lines in the cranial bones in comparison with lines of force and growth. Arch. Anat. (Strasb.), 46: 43-53.
- Bunak, V. V. and E. A. Klebanova 1957 Formirovaniye struktury trubčatych kostej u nekotorych grupp mlekopitajuščich v period ich rosta. Mat. po funkci. i vozr. morfol., 46-86 (Moskva).
- 1960 The influence of increased mechanical loading on the forming of bones in the limbs of growing animals. Arkh. Anat., 38(5): 43-50; Referat. Zhur., Biol., 1961, no. 121148. (Russian text with English summary).

- Burdzik, G. 1952 Die ermudungsfrakture als ausdruck mechanischen und biologischen kräfte (The fatigue fracture as an expression of mechanical and biological forces). Arch. Orthop. Unfallchir., 334-342.
- Caglioti, V., A. Ascenzi, and A. Santoro 1956 On the interpretation of the Low-Angle Scatter of X-Rays from Bone Tissues. Biochim. Biophys. Acta, 21: 425-432.
- Calabrisi, P. and F. C. Smith 1951 The effects of embalming on the compressive strength of a few specimens of compact human bone. MR-51-2, NH/R-NM 001 056.02, Nav. Med. Res. Inst., Nat. Nav. Med. Center, Bethesda, Md.
- Camosso, M. E. 1958 Analysis of mechanical strength of articular cartilage under load. Boll. Soc. Ital. Biol. Sper., 34(7): 331-333.
- Carlström, D. 1954 Micro-hardness measurements on single Haversian systems in bone. Experientia, 10: 171-172.
- Carothers, C. O., F. C. Smith, and P. Calabrisi 1949 The elasticity and strength of some long bones of the human body. Nav. Med. Res. Inst., Proj. NM 001 056.02.13 (Oct.).
- Carvalho, A. A. M. S. de 1957 Ensaio da técnica dos vernizes frágeis para o estudo da distribuição de esforços nos ossos. Folia Anat. Univ. Conimbrigensis, 32(11): 1-19 (Portuguese text with English summary).
- 1959 Nota prévia sobre a transmissão de esforços no crânio. Folia Anat. Univ. Conimbrigensis, 34(7): 1-13 (Portuguese text with English summary).
- 1960-1961 Estudo da distribuição de esforços nas costelas pela técnica dos vernizes frágeis. Folia Anat. Univ. Conimbrigensis, 35(7): 1-9 (Portuguese text with English summary).
- 1960-1961 A distribuição de esforços na epífise superior do fêmur estudada pela técnica dos vernizes frágeis. Folia Anat. Univ. Conimbrigensis, 35(12): 1-16 (Portuguese text with English summary).
- 1962 Estudo da distribuição de esforços no fêmur humano pela técnica dos vernizes frágeis. Folia Anat. Univ. Conimbrigensis, 36(1): 1-13 (Portuguese text with English summary).
- 1964 Introdução à osteologia; a arquitectura óssea e a transmissão de esforços. Rev. dos Estudos Gerais Univ. Mocambique, 1: 1-34 (Portuguese text).
- Casacci, A. 1952 The influence of pressure on the development of human articular cartilage. Arch. Ortop. (Bologna), 65(1): 8-15.
- Cavaye Hazen, E. and E. Rodríguez Valdés 1946 Contribución al estudio bioquímico del hueso en animales fracturados. An. Casa de salud Valdecilla, 9: 109-115.

- Ceci, C. O. 1949 Biomechanics of bone. *Arch. Argent. Kinesiologia*, 2(3): 35-39.
- Cenni, B. and T. L. Frateschi 1953 Comparative studies on the coefficient of flexion, the ash content, etc. of the principal metacarpal in horses. *Ann. Fac. Med. Veter. (Pisa)*, 6: 38-51.
- Chalmers, J. and J. K. Weaver 1966 Cancellous Bone: Its Strength and Changes with Aging and Evaluation of Some Methods for Measuring Its Mineral Content. II. An Evaluation of Some Methods for Measuring Osteoporosis. *J. Bone Joint Surg.*, 48-A(2): 299-308.
- Charnley, J. 1965 A Biomechanical Analysis of the Use of Cement to Anchor the Femoral Head Prosthesis. *J. Bone Joint Surg.*, 47-B(2): 354-363.
- 1965 Biomechanics in orthopaedic surgery. Biomechanics and Related Bio-Engineering Topics. Ed. by R. M. Kenedi. Pergamon Press, London. Chap. 8, 99-110.
- Charnley, J. and S. L. Baker 1952 Compression arthrodesis of the knee. A clinical and histological study. *J. Bone Joint Surg.*, 34B: 187-199.
- Compostella, A. 1964 Experimental research on phenomena due to overburdening of bone tissue. *Minerva Ortop.*, 15: 503-511.
- Cook, S. F., S. T. Brooks, and H. E. Ezra-Cohn 1962 Histological Studies on Fossil Bone. *J. Paleont.*, 36(3): 483-494.
- Coolbaugh, C. C. 1952 Effects of reduced blood supply on the physical properties of bone. *Anat. Rec.*, 112(2): 303-475.
- Coplans, C. W. 1951 Lumbar disc herniation, the effect of torque on its causation and conservative treatment. *S. Afr. Med. J.*, 25: 881-884.
- Craig, R. G. and F. A. Peyton 1958 The microhardness of enamel and dentin. *J. Dent. Res.*, 37(4): 661-668.
- 1958 Elastic and mechanical properties of human dentin. *J. Dent. Res.*, 37(4): 701-718.
- Craig, R. G. and C. A. Rautiola 1961 The microhardness of cementum and underlying dentin of normal teeth and teeth exposed to periodontal disease. *J. Periodont.*, 32: 113-123.
- Craig, R. G., P. E. Gehring, and F. A. Peyton 1959 Relation of Structure to the microhardness of human dentin. *J. Dent. Res.*, 38(3): 624-630.
- Craig, R. G., F. A. Peyton, and D. W. Johnson 1961 Compressive properties of enamel, dental cements, and gold. *J. Dent. Res.*, 40(5): 936-945.
- Crelin, E. S. and W. O. Southwick 1964 Changes induced by sustained pressure in the knee joint articular cartilage of adult rabbits. *Anat. Rec.*, 149(1): 113-134.

- Currey, J. D. 1959 Differences in the tensile strength of bone of different histological types. *J. Anat.*, 93(1): 87-95.
- 1962 Stress concentrations in bone. *Quart. J. Micr. Sci.*, 103(1): 111-133.
- 1962 Strength of bone. *Nature*, 195(4840): 13-514.
- 1964 Three analogies to explain the mechanical properties of bone. *Biorheology*, 2: 1-10.
- 1964 Mechanical aspects of the structure of bone. *J. Bone Joint Surg.*, 46B: 356. (abstract).
- 1965 Anelasticity in bone and echinoderm skeletons. *J. Exp. Biol.*, 43: 279-292.
- Dallemande, M. J. and L. J. Richelle 1965 Le Tissu Osseux: Structure et Métabolisme. *Presse Méd.*, 73(33): 1915-1920.
- Davis, A. G. 1938 Tensile strength of the anterior longitudinal ligament in relation to treatment of 132 crush fractures of the spine. *J. Bone Joint Surg.*, 20: 429-438.
- Davis, P. R. 1961 Human lower lumbar vertebrae: some mechanical and osteological considerations. *J. Anat.*, 95(3): 337-344.
- Dempster, W. T. 1961 Free-body Diagrams as an Approach to the Mechanics of Human Posture and Motion. Biomechanical Studies of the Musculo-Skeletal System. Ed. by F. G. Evans. Charles C Thomas, Springfield. Chap. 5, 81-135.
- 1967 Correlation of Types of Cortical Grain Structure with Architectural Features of the Human Skull. *Amer. J. Anat.*, 120(1): 7-31.
- Dempster, W. T., and R. F. Coleman 1961 Tensile strength of bone along and across the grain. *J. Appl. Physiol.*, 16(2): 355-360.
- Dempster, W. T. and R. T. Liddicoat 1952 Compact bone as a non-isotropic material. *Amer. J. Anat.*, 91(3): 331-362.
- Dempster, W. T., L. A. Sherr, and J. G. Priest 1964 Conversion scales for estimating humeral and femoral lengths and the lengths of functional segments in the limbs of American Caucasoid males. *Hum. Biol.*, 36(3): 246-262.
- Demy, N. G. 1960 Factors influencing bone density. *Seminar Int.*, 9(3): 2-10.
- Derian, P. S., W. H. Siegrist, S. J. Wilder, and W. F. Pontius 1962 Polarographic studies in bone. *Surg. Forum*, 13: 448-450.
- Devas, M. B. 1965 Stress Fractures of the Femoral Neck. *J. Bone Joint Surg.*, 47B(4): 728-738.

- Dirks, D. 1964 Bone-conduction measurements. Effects of vibrator, placement, and masking. *Arch. Otolaryng.* (Chicago) 79(6): 551-558.
- 1964 Factors related to bone conduction reliability. *Arch. Otolaryng.* (Chicago), 79(6): 594-599.
- Dreyer, C. J. 1961 Properties of stressed bone. *Nature*, 189(4764): 594-595.
- Eggers, G. W. N. 1949 Pressure studies of fractures and bone, preliminary report. *Texas Rep. Biol. Med.*, 7: 125-128.
- Eggers Lura, H. 1952 Biomechanical reactions of bone tissue to mechanical forces. *Tandlaegebladet*, 56: 49-56.
- Egglestan, A. A. 1963 An osteopathic appraisal of biomechanical stress in the cervical and upper thoracic areas. Physiologically centered differential diagnosis. *J. Osteopath.*, 70: 21-30.
- Elftman, H. 1944 Skeletal and muscular systems. Structure and Function in Medical Physics. Year Book Publishers, Chicago. 1420-1430.
- Elmore, S. M., L. Sokoloff, G. Norris, and P. Carmeci 1963 Nature of "imperfect" elasticity of articular cartilage. *J. Appl. Physiol.*, 18(2): 393-396.
- Endo, B. 1961 An experiment on the stresses in the facial skeleton produced by the occlusal action. *Proc. Joint Meet. Anthropol. Sci. Nippon and Jap. Soc. Ethn.*, 14th session: 160-162 (Japanese text).
- 1965 Distribution of Stress and Strain Produced in the Human Facial Skeleton by the Masticatory Force. *J. Anthropol. Soc. Nippon*, 73(747): 123-136.
- 1966 A Biomechanical Study of the Human Facial Skeleton by Means of Strain-Sensitive Lacquer. *Okajimas Fol. Anat. Jap.*, 42: 205-217.
- 1966 Experimental studies on the mechanical significance of the form of the human facial skeleton. *J. Fac. Sci. (Tokyo)*, 3: 1-106.
- Engfeldt, B. and A. Engström 1954 Biophysical studies on bone tissue. *Acta Orthop. Scand.*, 24: 85-100.
- Engfeldt, B. and S. O. Hjertquist 1955 Biophysical studies on bone tissue. XV. A histochemical and microradiographic study on normal bone tissue. *Acta Path. Microbiol. Scand.*, 36(5): 385-390.
- Engfeldt, B. and J. Strandh 1960 Microchemical and Biophysical Studies of Normal Human Compact Bone Tissue. *Clin. Orthop.*, 17: 63-68.
- Engström, A. and R. Amprino 1950 X-ray diffraction and x-ray absorption studies of immobilized bones. *Experientia*, 6(7): 267-269.

- Engström, A. 1956 Structure of bone from the anatomical to the molecular level. Ciba Foundation Symposium on Bone Structure and Metabolism. 3-10.
- Epker, B. N. and H. M. Frost 1964 Aging and the Kinetics of Human Osteon Formation. J. Amer. Geront. Soc., 12(5): 401-409.
- 1965 Correlation of Bone Resorption and Formation with the Physical Behavior of Loaded Bone. J. Dent. Res., 44(1): 33-41.
- Epker, B. N., R. Hattner, and H. M. Frost 1964 Radial rate of osteon closure: Its application in the study of bone formation in metabolic bone disease. J. Lab. Clin. Med., 64(4): 643-653.
- Estel, L. and C. W. Asling 1948 An experimental approach to the mechanical significance of bone form. Amer. J. Phys. Anthropol., 6(4): 413-421.
- Evans, F. G. 1948 Studies of femoral deformation. Stanford Med. Bull., 6: 374-381.
- 1952 Stress and strain in the long bones of the lower extremity. Amer. Acad. Orthop. Surg., Instructional Course Lectures, 9: 264-271.
- Evans, F. G. 1953 Methods of studying the biomechanical significance of bone form. Amer. J. Phys. Anthropol., 11: 413-436.
- 1955 Studies in human biomechanics. Ann. N. Y. Acad. Sci., 63: 586-615.
- 1956 Bone: some physical characteristics. Handbook of Biological Data. Ed. by W. S. Spector. WADC Tech. Rept. 56-273, W. B. Saunders Co., Philadelphia. 170-171.
- 1957 Stress and Strain in Bones. Charles C Thomas, Springfield.
- 1957 Studies on the biomechanics and structure of bone. Comptes Rendus de l'Association des Anatomistes, 49: 272-276.
- 1958 Relations between the microscopic structure and tensile strength of human bone. Acta Anat., 35: 285-301.
- 1958 The mechanics of fracture. Wayne St. Univ. College of Med. and Detroit Receiving Hosp. Bull., 5(1): 23-28.
- 1960 Biomechanics: stress-strain phenomena in bones. Medical Physics. Ed. by O. Glasser. Year Book Publishers, Inc., Chicago. Vol. III, 89-93.
- 1960 Relations of some physical properties of human bone to its microscopic structure. Amer. J. Phys. Anthropol., 18: 356 (abstract).
- 1960 Studies on the relations between tensile strength of human bone and osteon number and size. Amer. J. Phys. Anthropol., 18: 336-337 (abstract).

- 1961 Relation of the physical properties of bone to fracture. The Amer. Acad. Orthop. Surg., Instructional Course Lectures. The C. V. Mosby Co., St. Louis, Vol. 18, 110-121.
- (Ed.) 1961 Biomechanics Studies of the Musculo-Skeletal System. Charles C Thomas, Springfield, Ill.
- 1962 Mechanics of bone fracture. The Fifth Stapp Automotive Crash and Field Demonstration Conference. Ed. by M. K. Cragun. Univ. of Minn., Minneapolis. Chap. 11, 145-157.
- 1962 Age and sexual differences in the ultimate tensile strength of human compact bone. Amer. J. Phys. Anthropol., 20: 63 (abstract).
- 1962 Stress and strain of posture, expressed in the construction of man's weight-bearing skeletal structures. Clin. Orthop., 25: 42-54.
- 1964 Significant differences in the tensile strength of adult human compact bone. Proceedings of the First European Bone and Tooth Symposium. Pergamon Press, Oxford. 319-331.
- Evans, F. G. 1965 A commentary on the significance of stresscoat and split-line patterns on bone. Amer. J. Phys. Anthropol., 23(2): 189-196.
- Evans, F. G. and S. Bang 1966 Physical and Histological Differences between Human Fibular and Femoral Compact Bone. Studies on the Anatomy and Function of Bone and Joints. Ed. by F. G. Evans. Springer-Verlag, Heidelberg. 142-155.
- 1967 Differences and Relationships between the Physical Properties and the Microscopic Structure of Human Femoral, Tibial and Fibular Cortical Bone. Amer. J. Anat., 120(1): 79-88.
- Evans, F. G. and C. W. Goff 1957 A comparative study of the primate femur by means of the stresscoat and the split-line techniques. Amer. J. Phys. Anthropol., 15(1): 59-89.
- Evans, F. G. and A. I. King 1961 Regional differences in some physical properties of human spongy bone. Biomechanical Studies of the Musculo-Skeletal System. Ed. by F. G. Evans. Charles C Thomas, Springfield. 49-67.
- 1961 Relation of some physical properties of spongy bone to trabecular orientation. Amer. J. Phys. Anthropol., 19:94. (abstract).
- Evans, F. G. and M. Lebow 1951 Regional differences in some of the physical properties of the human femur. J. Appl. Physiol., 3(9): 563-572.
- 1952 The strength of human compact bone as revealed by engineering technics. Amer. J. Surg., 83: 326-331.
- 1956 Some physical properties of the human tibia. Fed. Proc., 15: 59. (abstract).

- 1957 Strength of human compact bone under repetitive loading.
J. Appl. Physiol., 10: 127-130.
- Evans, F. G. and H. R. Lissner 1948 "Stresscoat" deformation studies of the femur under static vertical loading. Anat. Rec., 100: 159-190.
- 1953 Deformation studies of adult human pelvis under dynamic loading. Anat. Rec., 115: 382 (abstract).
- 1955 Studies on pelvic deformations and fractures. Anat. Rec., 121(2): 141-165.
- 1956 Engineering aspects of fracture. Clinical Orthopaedics. J. B. Lippincott Co., Philadelphia. No. 8, 310-322.
- 1957 Tensile and compressive strength of human parietal bone. J. Appl. Physiol., 10: 493-497.
- 1959 Biomechanical studies on the lumbar spine and pelvis. J. Bone Joint Surg., 41A: 278-290.
- Evans, F. G. and H. R. Lissner 1965 Studies on the energy absorbing capacity of human lumbar intervertebral discs. The Seventh Stapp Car Crash Conference Proceedings. Ed. by D. M. Severy. Charles C Thomas, Springfield. Chap. 27, 386-402.
- Evans, F. G., C. C. Coolbaugh, and M. Lebow 1951 An apparatus for determining bone density by means of radioactive strontium (Sr^{90}). Science, 114(2955): 182-185.
- Evans, F. G., J. G. Hayes, and J. E. Powers 1953 "Stresscoat" deformation studies of the human femur transverse loading. Anat. Rec., 116(2): 171-187.
- Evans, F. G., H. R. Lissner, and M. Lebow 1958 The relation of energy, velocity, and acceleration to skull deformation and fracture. Surg. Gynec. Obstet., 107: 593-601.
- 1960 Experimental studies on the relation between acceleration and intracranial pressure changes in man. Surg. Gynec. Obstet., 111: 329-338.
- Evans, F. G., H. R. Lissner, and L. M. Patrick 1962 Acceleration-induced strains in the intact vertebral column. J. Appl. Physiol., 17(3): 405-409.
- Evans, F. G., H. R. Lissner, and H. E. Pedersen 1948 Deformation studies of the femur under dynamic vertical loading. Anat. Rec., 101: 225-241.
- Evans, F. G., H. E. Pedersen, and H. R. Lissner 1951 The role of tensile stress in the mechanism of femoral fractures. J. Bone Joint Surg., 33A: 485-501.

- Falkenberg, J. 1961 An experimental study of the rate of fracture healing. As assessed from the tensile strength and Sr⁸⁵ activity of the callus with special reference to the effect of intramedullary nailing. *Acta Orthop. Scand.*, Suppl. 50.
- Felts, W. J. L. 1964 An apparatus for determination of breaking-strength of small rodent bones. *Anat. Rec.*, 148: 75-79.
- 1965 Structural Orientation and Density in Cetacean Humeri. *Amer. J. Anat.*, 116(1): 171-204.
- Felts, W. J. L. and J. W. Monson 1961 Transplantation studies of factors in skeletal organogenesis. II. The response of the immature mouse humerus to longitudinal compressive force. *Amer. J. Phys. Anthropol.*, 19: 63-78.
- Fessler, H. 1957 Load distribution in a model of a hip joint. *J. Bone Joint Surg.*, 39B: 145-153.
- Finean, J. B. and A. Engström 1954 Low Angle Reflection in X-Ray Diffraction Patterns of Bone Tissue. *Experientia*, 10(2): 63-66.
- Ford, L. T., J. C. Lottes, and J. A. Key 1951 Experimental study of the effect of pressure on the healing of bone grafts. *Arch. Surg.*, 62: 475-485.
- Forssblad, P. 1958 Determination of elasticity modulus of bone. *Acta Orthop. Scand.*, 28(4): 262-268.
- Frankel, V. H. 1959 Mechanical factors for internal fixation of the femoral neck. *Acta Orthop. Scand.*, 29: 21-42.
- 1961 The femoral neck. An experimental study of function, fracture mechanism, and internal fixation. Almqvist and Wiksell's, Uppsala, Sweden.
- Frankel, V. H. and A. H. Burstein 1965 Load capacity of tubular bone. Biomechanics and Related Bio-Engineering Topics. Ed. by R. M. Kenedi. Pergamon Press, London. Chap. 32, 381-396.
- Frankel, V. H. and C. Hirsch 1960 Analysis of Forces Producing Fractures of the Proximal End of the Femur. *J. Bone Joint Surg.*, 42-B(3): 633-640.
- Friedenberg, Z. B. and C. T. Brighton 1966 Bioelectric Potentials in Bone. *J. Bone Joint Surg.*, 48-A(5): 915-923.
- Friedenberg, Z. B. and G. French 1952 The effects of known compression forces on fracture healing. *Surg. Gynec. Obstet.*, 94: 743-748.
- Frost, H. M. 1961 Physical characteristics of bone. Henry Ford Hosp. Med. Bull., 9(1, part 2): 148.

- 1961 Known quantitative variables in human bone. Henry Ford Hosp. Med. Bull., 9(1, part 2): 180-182.
- 1962 Physical characteristics of bone: shrinkage and hydration. Henry Ford Hosp. Med. Bull., 10(1-part 2): 237-239.
- 1964 The Laws of Bone Structure. Ed. by C. R. Lam. Charles C Thomas, Springfield, Ill.
- 1966 An Introduction to Biomechanics. Charles C Thomas, Springfield, Ill.
- 1966 Bone Dynamics in Metabolic Bone Disease. J. Bone Joint Surg., 48-A(6): 1192-1203.
- Frost, H. M. and A. R. Villanueva 1962 Human osteoclastic activity: qualitative histological measurement. Henry Ford Hosp. Med. Bull., 10(1-part 2): 229-236.
- Frost, H. M., H. Roth, and A. R. Villanueva 1961 Physical characteristics of bone. III. A semimicro measurement of unit shear stress. Henry Ford Hosp. Med. Bull., 9(1, part 2): 157-162.
- Frost, H. M., A. R. Villanueva, and H. Roth 1962 Qualitative method for measuring osteoclastic activity. Henry Ford Hosp. Med. Bull., 10(1, part 2): 217-228.
- Fukada, E. and R. Goto 1959 The piezo-electric effect in collagen. Reports on Progress in Polymer Physics in Japan, 2: 101.
- Fukada, E. and I. Yasuda 1957 On the piezo-electric effect of bone. J. Phys. Soc. Japan, 12: 1158.
- Furst, W. 1940 Force required to crush vertebrae. Psychiat. Quart., 14: 397-402.
- Fyfe, F. W. 1960 Histological effects of intermittent pressure on the rabbit's upper tibial epiphysis. Anat. Rec., 136(2): 195 (abstract).
- Galabov, G. 1965 Studies on the Biomechanics of the Lumbar Vertebral Column. Izv. Inst. Morfol. (Sofiya), 11: 79-103 (Russian text with English summary).
- Gardner, W. W. 1940 Breaking strength in mice receiving estrogen. Proc. Soc. Exp. Biol. Med., 45: 230-232.
- Garn, S. M. 1962 An annotated bibliography on bone densitometry. Amer. J. Clin. Nutr., 10: 59-67.
- Garn, S. M., C. G. Rohmann and P. Nolan, Jr. 1964 The developmental nature of bone changes during aging. Relations of Development and Aging. Ed. by J. E. Birren. Charles C Thomas, Springfield, Ill., 41-61.

Garn, S. M., C. G. Rohmann, M. Behár, F. Viteri, and M. A. Guzmán 1964 Compact bone deficiency in protein-calorie malnutrition. *Science*, 145(3639): 1444-1445.

Gedalia, I., A. Frumkin, and H. Zukerman 1964 Effects of estrogen on bone composition in rats at low and high fluoride intake. *Endocrinology*, 75(2): 201-205.

Gelbke, H. 1950 Tierexperimentelle Untersuchungen zur Frage des enchondralen Knochenwachstums Unter Zug. *Langenbecks Arch. u. Dtsch. Z. Chir.*, 266: 271-284.

1951 The influence of pressure and tension on growing bone in experiments with animals. *J. Bone Joint Surg.*, 33A: 947-954.

Gerber, A. 1951 The form of the maxillary joints as a manifestation of active forces. *Schweiz. Mschr. Zahnheilk.*, 61(7): 679-681.

Gershon-Cohen, J., M. Boehnke, and N. H. Cherry 1957 Gamma gauge determinations of bone density. *J. Albert Einstein Med. Center*, 5(3): 226.

Gershon-Cohen, J., N. H. Cherry, and M. Boehnke 1958 Bone density studies with a gamma gage. *Radiat. Res.*, 8(6): 509-515.

Gershon-Cohen, J., H. Schraer and N. Blumberg 1955 Bone density measurements of osteoporosis in the aged. *Radiology*, 65: 416-419.

Girdlestone, G. R. 1932 Response of bone to stress; president's address. *Proc. Roy. Soc. Med.*, 26: 55-70.

Glegg, R. E. 1953 Role of pressure and tension in explaining the instability of bone and tooth material. *Anat. Rec.*, 115: 2. (abstract).

Glegg, R. E. and C. P. Leblond 1953 Pressure as a possible cause of dissolution and redeposition of bone and tooth crystals. *Canadian J. Med. Sci.*, 31(3): 202-206.

Glücksmann, A. 1938 Studies on bone mechanics in vitro. I. Influence of pressure on orientation of structure. *Anat. Rec.*, 72: 97-115.

1939 Studies of bone mechanics in vitro: role of tension and pressure in chondrogenesis. *Anat. Rec.*, 73: 39-55.

1942 The role of mechanical stresses in bone formation in vitro. *J. Anat.*, 76: 231-239.

Göcke, C. 1928 Beiträge zur Druckfestigkeit des spongiösen Knochens. *Brunns Beitr.*, 143: 539-566.

Goldhaber, P. 1962 Some current concepts of bone physiology. *New Eng. J. Med.*, 266: 870-877, 924-931.

Goldman, D. E. 1946 Mechanical forces acting on aviation personnel. *J. Aviat. Med.*, 17: 426-430.

- Gong, J. K. 1964 Density of organic and volatile and non-volatile inorganic components of bone. *Anat. Rec.*, 149: 319-324.
- Gong, J. K., J. S. Arnold, and S. H. Cohn 1964 Composition of trabecular and cortical bone. *Anat. Rec.*, 149(3): 325-332.
- Gould, D. M. 1952 Generalized Decreased Bone Density. *Amer. J. Med. Sci.*, 223: 569-580.
- Gray, J. T. 1934 Influence of pressure. *Intern. J. Orthod.*, 20: 318-323.
- Graziati, G. 1963 Apparato meccanico per la determinazione di alcune proprietà fisiche del tessuto osseo. *Atti Soc. Med.-Chir. Padova*, 3-10.
- Grünwald, J. 1920 Die Beanspruchung der langen Röhrenknochen des Menschen. *Z. Orthop. Chir.*, 39: 27-49; 129-147; 257-286.
- Gurdjian, E. S. and H. R. Lissner 1944 Mechanism of head injury as studied by the cathode ray oscilloscope. Preliminary report. *J. Neurosurg.*, 1(6): 393-399.
- 1945 Deformation of the skull in head injury. *Surg. Gynec. Obstet.*, 81: 679-687.
- 1946 Deformations of the skull in head injury studied by the "stresscoat" technique, quantitative determinations. *Surg. Gynec. Obstet.*, 83: 219-233.
- 1946 Study of deformations of the skull by the "stresscoat" technique. *Anat. Rec.*, 94(3): 21-22 (abstract).
- 1947 Deformations of the skull in head injury as studied by the "stresscoat" technique. *Amer. J. Surg.*, 73(2): 269-281.
- Gurdjian, E. S. and J. E. Webster 1947 The mechanism and management of injuries of the head. *J. Amer. Med. Ass.*, 134: 1072-1076.
- Gurdjian, E. S., H. R. Lissner, and J. E. Webster 1947 The mechanism of production of linear skull fracture. *Surg., Gynec., Obstet.*, 85: 195-210.
- Gurdjian, E. S., J. E. Webster, and H. R. Lissner 1949 Studies on skull fracture with particular reference to engineering factors. *Amer. J. Surg.*, 78(5): 736-742.
- 1950 The mechanism of skull fracture. *J. Neurosurg.*, 7: 106-114.
- 1950 The mechanism of skull fracture. *Radiology*, 54: 313-339.
- 1950 Biomechanics: fractures, skull. *Medical Physics*. Ed. by O. Glasser. Year Book Publishers, Inc., Chicago, Vol. II, 98-104.

- 1953 Observations on prediction of fracture site in head injury.
Radiology, 60(2): 226-235.
- Gurdjian, E. S., H. R. Lissner, F. G. Evans, L. M. Patrick, and W. G. Hardy
1961 Intracranial pressure and acceleration accompanying head impacts
in human cadavers. Surg. Gynec. Obstet., 113: 185-190.
- Gustafson, G. and O. Kling 1948 Microhardness measurements in the
human dental enamel. Odontol. Tidskrift, 56(1): 23-46.
- Haas, S. L. 1948 Mechanical retardation of bone growth. J. Bone Joint
Surg., 30A(2): 506-512.
- Haase, W. 1936 Technical physical studies (of fractures). Beitr. Klin.
Chir., 164: 243-263.
- Haboush, E. J. 1952 Photoelastic stress and strain analysis in cervical
fractures of the femur. Bull. Hosp. Joint Dis., 13: 252-258.
- 1953 A new operation for arthroplasty of the hip based on
biomechanics, photoelasticity, fast-setting dental acrylic, and
other considerations. Bull. Hosp. Joint Dis., 14: 242-277.
- 1954 A Universal nail. Instruments for the treatment of
fractures of the femur and biomechanical considerations. Bull.
Hosp. Joint Dis., 15: 223-242.
- Hagan, E. H. and D. F. Huelke 1961 An analysis of 319 case reports of
mandibular fractures. J. Oral Surg., 19: 93-104.
- Hagymasi, S. 1957 The functional alteration of the acetabular ligament
with age and stress. Acta Morphol. Acad. Sci. Hung., 7(3): 249-256.
- Hall, Michael C. 1961 The trabecular patterns of the neck of the femur
with particular reference to changes in osteoporosis. Canad. Med.
Ass. J., 85(21): 1141-1144.
- Hallermann, H. 1935 Die Beziehungen der Werkstoffmechanik und
Werkstoffforschung zur allgemeinen Knochen-Mechanik. Verh. Deutsch.
Orthop. Ges., 62: 347-360.
- Hamel, A. L. and J. H. Moe 1964 The collapsing spine. Surgery, 56(2):
364-373.
- Hardinge, M. G. 1949 Determination of the strength of the cancellous
bone in the head and neck of the femur. Surg. Gynec. Obstet.,
89(4): 439-441.
- Hardy, W. G., H. R. Lissner, J. E. Webster, and E. S. Gurdjian 1959
repeated loading tests of the lumbar spine, a preliminary report.
Surg. Forum, 9: 690-695.
- Hartingsnelt, H. van 1950 Structural modifications of bone due to effect
of mechanical stress. T. Tandheelk., 57: 439-471.

- Hartl, F. and L. Burkhardt 1952 Changes in the structure of the skeleton, especially in the calvarium and the clavicle, in adults and their relationships to the hypophysis, on the basis of specific gravity and histological aspects. *Virchow. Arch. Path. Anat.*, 322(5): 503-528.
- Hattner, R. and H. Frost 1963 Mean skeletal age: its calculation and theoretical effects on skeletal tracer physiology and on physical characteristics of bone. *Henry Ford Hosp. Med. Bull.*, 11: 201-216.
- Hayes, J. F. 1949 Dynamic cross-bending studies on the femur. *Anat. Rec.*, 103(3): 467. (abstract).
- Haynes, A. L. and H. R. Lissner 1962 Experimental head impact studies Fifth Stapp Automotive Crash and Field Demonstration Conference. Ed. by M. K. Cragun. Univ. of Minn., Minneapolis. Chap. 12, 158-170.
- Hazama, H. 1956 Study on the torsional strength of the compact substance of human beings. *J. Kyoto Prefect. Med. Univ.*, 60: 167-184. (Japanese text with English summary).
- Hert, J., P. Kucera, M. Vávra, and V. Voleník 1965 Comparison of the Mechanical Properties of Both the Primary and Haversian Bone Tissue. *Acta Anat.*, 61: 412-423.
- Hert, J., M. Liskova 1964 Growth of bone after experimental overloading and unloading of the epiphyseal cartilages. *Cesk Morf.*, 12: 104-105.
- Hirsch, C. 1951 Studies on the mechanism of low back pain. *Acta Orthop. Scand.*, 20(4): 261-274.
- 1955 The reaction of intervertebral discs to compression forces. *J. Bone Joint Surg.*, 37A(6): 1188-1196.
- 1955 The Use of Some Electric Measurements on Biomechanical Phenomena. *Acta Orthop. Scand.*, 24(3): 184-194.
- 1960 Analysis of Mechanical Forces Acting on the Proximal End of the Femur. *Anat. Rec.*, 136(2): 211. (abstract).
- 1962 Orthopaedic Problems Viewed in the Light of Biomechanics. *Acta Orthop. Scand.*, 32(3-4): 228-236.
- 1965 Forces in the Hip-Joint. Part I. General Considerations. Biomechanics and Related Bio-Engineering Topics. Ed. by R. M. Kenedi. Pergamon Press, London. Chap. 28, 341-350.
- Hirsch, C. and A. Brodetti 1956 Methods of studying some mechanical properties of bone tissue. *Acta Orthop. Scand.*, 26: 1-14.
- 1956 The weight-bearing capacity of structural elements in femoral necks. *Acta Orthop. Scand.*, 26: 15-24.

- Hirsch, C., A. Cavadias, and A. Nachemson 1954 An attempt to explain fracture types - experimental studies on rabbit bones. *Acta Orthop. Scand.*, 24(1): 8-29.
- Hirsch, C. and F. G. Evans 1965 Studies on some physical properties of infant compact bone. *Acta Orthop. Scand.*, 35: 300-313.
- Hirsch, C. and V. H. Frankel 1960 Analysis of forces producing fractures of the proximal end of the femur. *J. Bone Joint Surg.*, 42B: 633-640.
- Hirsch, C. and V. H. Frankel 1961 The Reaction of the Proximal End of the Femur to Mechanical Forces. *Biomechanical Studies of the Musculo-Skeletal System*. Ed. by F. G. Evans. Charles C Thomas, Publisher, Springfield, Ill. Chap. 4, 68-80.
- Hirsch, C. and A. Nachemson 1954 New observations on the mechanical behavior of lumbar discs. *Acta Orthop. Scand.*, 23(4): 254-283.
- 1961 Clinical observations on the spine in ejected pilots. *Acta Orthop. Scand.*, 31(2): 135-145.
- Hjertquist, S. O. 1961 Biophysical studies of epiphyseal growth zones and adjacent compact bone tissue in normal and rachitic dogs and rats. *Acta Soc. Med. Upsal.*, 66: 202-216.
- Holbourn, A. H. S. 1943 Mechanics of head injury. *Lancet*, 245: 432-441.
- Hollingshaus, H. 1959 "Spontaneous fracture" of bones. *Mech. Eng.*, 81: 85-89.
- Hollister, N. R., W. P. Jolley, R. G. Horne, and R. Friede 1958 Biophysics of concussion. ASTIA No. AD 203 385 (Sept.).
- Homma, H. 1960 On the mechanics of vertebral lesions caused by an attack of tetanus. *Wiener Klin. Wochenschr.*, 72(41/42): 745-749.
- Hopsu, V. K., P. Kajanoja, A. Telkka, and P. Virtama 1961 The density of some small bones of human extremities with special reference to the reliability of volume measurement methods. *Anat. Anz.*, 109: 247-254.
- Horton, W. G. 1958 Further observations on the elastic mechanism of the intervertebral disc. *J. Bone Joint Surg.*, 40B(3): 552-557.
- Hosokawa, S. 1956 Study on the changes of the splitting lines of human mandible caused by dental prosthesis. *Acta Anat. Nippon.*, 31(5): 472-482.
- Huelke, D. F. 1961 Mechanics in the production of mandibular fractures: a study with the "stresscoat" technique. I. Symphyseal impacts. *J. Dent. Res.*, 40: 1042-1056.
- 1963 Biomechanical Studies on the Bones of the Face. Impact Acceleration Stress. National Academy of Sciences - National Research Council Publication, 977: 131-133.

- 1962 The Biomechanical Response of the Mandible due to Chin Impacts. *Anat. Rec.*, 142: 242 (abstract).
- Huelke, D. F. and D. H. Enlow 1963 Fractures of Long Bones Produced by High Velocity Impacts. *Anat. Rec.*, 145(2): 243-244 (abstract).
- Huelke, D. F. and L. M. Patrick 1964 Mechanics in the production of mandibular fractures: strain-gauge measurements of impacts to the chin. *J. Dent. Res.*, 43(3): 437-446.
- Huelke, D. F., L. J. Buege, and J. H. Harger 1967 Bone Fractures Produced by High Velocity Impacts. *Amer. J. Anat.*, 120(1): 123-131.
- Hülsen, K. K. 1896 Specific gravity resilience and strength of bone. *Bull. Biol. Lab. St. Petersburg*, 1: 7-37. (Russian text with German summary).
- Humphry, G. M. 1858 A treatise on the human skeleton. MacMillan and Co., Cambridge.
- Ingalls, N. W. 1931 Observations on bone weights. *Amer. J. Anat.*, 48(1): 45-98.
- 1932 Observations on bone weights. II. The bones of the foot. *Amer. J. Anat.*, 50(3): 435-450.
- Jaffe, H. L. 1929 Structure of bone with particular reference to its fibrillar nature and relation of function to internal architecture. *Arch. Surg.*, 19: 24-52.
- Janecek, M. 1959 Histological and mechanical findings concerning intervertebral disks and their relation to the protrusion of the disks. *Acta Fac. Med. Univ. Brunensis*, 2: 145-167.
- Jansen, M. 1920 On Bone Formation: Its Relation to Tension and Pressure. Longmans, Green and Co., London.
- Jones, R. L. 1945 The functional significance of the declination of the axis of the subtalar joint. *Anat. Rec.*, 93(2): 151-159.
- Jores, L. 1920 Experimentelle Untersuchungen über die Einwirkung mechanischen Druckes auf den Knochen. *Beitr. Path. Anat.*, 66: 433-469.
- Jowsey, J. 1960 Age Changes in Human Bone. *Clin. Orthop.*, 17: 210-217.
- Jowsey, J., P. J. Kelly, B. L. Riggs, A. J. Bianco, Jr., D. A. Scholz, and J. Gershon-Cohen 1965 Quantitative microradiographic studies of normal and osteoporotic bone. *J. Bone Joint Surg.*, 47A(4): 785-807.
- Kalén, R. 1961 Strains and stresses in the upper femur studied by the stresscoat method. *Acta Orthop. Scand.*, 31: 103-113.
- Katsura, M. and K. Shono 1959 Comparison of the mechanical properties of compact bone between proximal and distal bones. *J. Kyoto Pref. Med. Univ.*, 66: 235-243 (Japanese text with English summary).

- Kelly, P. J., J. Jowsey, and B. L. Riggs 1965 A Comparison of Different Morphologic Methods of Determining Bone Formation. *Clin. Orthop.*, 40: 7-11.
- Kenedi, R. M. (Ed.) 1965 Biomechanics and Related Bio-Engineering Topics. Pergamon Press, London.
- Kerley, E. R. 1965 The Microscopic Determination of Age in Human Bone. *Amer. J. Phys. Anthrop.*, 23(2): 149-164.
- Kick, C. H., R. M. Bethke, and B. Edgington 1933 Effect of fluorine on the nutrition of swine, with special reference to bone and tooth composition. *J. Agric. Rec.*, 46: 1023-1037.
- Kimura, T. 1966 An Experimental Study of the Form of the Human Tibia from the Biomechanical Point of View. *Zinruigaku Zassi*, 74(752): 219-227.
- Kivilaakso, E. and E. Palolampi 1965 On the Density of the Ulna and on the Relationship between Density and Cortex Thickness. *Acta Anat.*, 60: 325-329.
- Klausen, K. 1965 The Form and Function of the Loaded Human Spine. *Acta Physiol. Scand.*, 65(1-2): 176-190.
- Klevanova, E. A. 1954 Changes in bone system in growing animals under effect of physical stress. Collection: *Trans. First Sci. Conf. on Age Morphol. and Physiol. Pub. Hse. of Acad. Pedagog. Sci., RSFSR*, Moscow, 185-190.
- Knese, K. -H. 1955 Statik des Kniegelenkes. *Z. Anat. Entwgesch.*, 118: 471-512.
- 1955 Allgemeine Bemerkungen über Belastungsuntersuchungen des knochens sowie spezielle Untersuchungen am Oberschenkel unter der Annahme einer Krankonstruktion. *Anat. Anz.*, 101(13-15): 186-203.
- 1956 Belastungsuntersuchungen des Oberschenkels unter der Annahme des knochens. *Morphol. Jahrb.*, 97: 405-452.
- 1956 Statik der Oberen Extremität. *Acta Anat.*, 26(1): 20-61.
- Knese, K. -H., O. H. Hahne, and H. Biermann 1955 Festigkeitsuntersuchungen an menschlichen Extremitätenknochen. *Morphol. Jahrb.*, 96: 141-209.
- Knese, K.-H., I. Ritschl, and D. Voges 1954 Quantitative Untersuchung der Osteonverteilung im Extremitätsknochen eines 43jährigen Mannes. *Z. Zellforsch.*, 40: 519-570.
- Kō, R. 1953 The fundamental study on the compression test of a tubular bone. *J. Kyoto Prefect. Med. Univ.*, 52(5): 730-732 (Japanese text with English summary).
- 1953 The compression test upon the tubular bone of several kinds of small animals. *J. Kyoto Prefect. Med. Univ.*, 52(5): 736-744 (Japanese text with English summary).

- 1953 The tension test upon the compact substance of the long bones of human extremities. J. Kyoto Prefect. Med. Univ., 53: 503-525 (Japanese text with English summary).
- Kō, R. and M. Takigawa 1953 The tension test upon the costal cartilage of a human body. J. Kyoto Prefect. Med. Univ., 53: 93-96 (Japanese text with English summary).
- Kō, R. and Y. Sugiyama 1953 The fundamental study on the scratch hardness upon the bone. J. Kyoto Prefect. Med. Univ., 52(6): 861-864 (Japanese text with English summary).
- Koch, J. C. 1917 The laws of bone architecture. Amer. J. Anat., 21: 177-298.
- Koch, W. and D. Kaplan 1961 New standards for estimating bone density. Lancet, 1: 377.
- Koyama, K. 1964 Study of measurement of solidity of living bone. J. Jap. Orthop. Ass., 38: 686-688.
- Krahil, V. E. 1947 The torsion of humerus: its localization, cause and duration in man. Amer. J. Anat., 80: 275-319.
- Krylova, N. V. 1954 The influence of physical stress on the skeleton of the foot. Vestn. Rentgen. Radiol., 9: 52-57.
- Kučera, P. 1965 Microhardness and Mineralization of the Primary Bone. Folia Morph., 13(4): 362-371.
- Kummer, B. 1956 Eine vereinfachte Methode zur Darstellung von Spannungstrajektorien, gleichzeitig ein Modellversuch für die Ausrichtung und Dichteverteilung der Spongiosa in den Gelenkenden der Röhrenknochen. Z. Anat. Entwicklungsgesch., 119: 223-234.
- 1959 Bauprinzipien des Säugerskeletes. Georg Thieme Verlag, Stuttgart.
- 1965 Die Biomechanik der aufrechten Haltung. Naturforsch. Gesell., 22: 237-259.
- 1965 Development and variations of forms of long bones in connection with mechanical effect. Arkh. Anat. Gistol. Embriol., 49(7): 21-29 (Russian text with English summary).
- 1966 Photoelastic Studies on the functional structure of bone. Folia Biotheoretica, 6: 31-40.
- Küntscher, G. 1934 Die Darstellung des Kraftflusses im Knochen. Zbl. Chir., 61: 2130-2136.
- 1935 Die Bedeutung der Darstellung des Kraftflusses im Knochen für die Chirurgie. Arch. Klin. Chir., 182: 489-551.

- Küntscher, G. 1935 Über Nachweis von Spannungspitzen am menschlichen knochengerüst. *Morphol. Jahrb.*, 74: 427-444.
- 1936 Die Spannungsverteilung am Schenkelhals. *Arch. Klin. Chir.*, 185: 308-321.
- 1938 Nature of diseases of [bone] mechanical origin. *Arch. Klin. Chir.*, 193: 665-668.
- 1938 Experimental fractures due to overstrain. *Zbl. Chir.*, 65: 964-974.
- Lacroix, P. 1951 The Organization of Bones. J and A. Churchill, Ltd., London.
- Lamare, J. P. 1937 Mechanics and physiology of bone. *Rev. Gén. Clin. Thérap.*, 51: 229-232.
- Latimer, H. B. 1965 Bilateral Asymmetry in Weight and in Length of Human Bones. *Anat. Rec.*, 152(2): 217-224.
- Laurence, M., M. A. R. Freeman, and S. A. V. Swanson 1966 The Internal Fixation of Long Bone Shaft Fractures: Engineering Considerations. *Proc. Roy. Soc. Med.*, 59(10): 943.
- Lease, G., O'D. and F. G. Evans 1959 Strength of human metatarsal bones under repetitive loading. *J. Appl. Physiol.*, 14(1): 49-51.
- Lefebvre, J., V. Bismuth, and P. Chaumone 1964 La densimétrie de l'os chez l'enfant. *J. Radiol. Electr. (Paris)*, 45: 11-15.
- Lexer, E. 1929 Untersuchungen über die Knochenhärte des Humerus. *Zeitschr. Konstitutionslehre*, 14: 227-243, 1929.
- Lindgren, S. O. 1964 Studies in Head Injuries: Intracranial Pressure Pattern during Impact. Preliminary Communication. *Lancet*: 1251-1253.
- 1966 Experimental studies of mechanical effects in head injury. *Acta Chir. Scand.*, Suppl. 360: 1-100.
- Lindsay, M. K. and E. L. Howes 1931 Breaking strength of healing fractures. *J. Bone Joint Surg.*, 13A: 491-501.
- Lips, E. M. H. and J. Sack 1936 A Hardness Tester for Microscopical Objects. *Nature*, 138: 328-329.
- Lissner, H. R. 1965 The response of the human body to impact. Biomechanics and Related Bio-Engineering Topics. Ed. by R. M. Kenedi. Pergamon Press, London. Chap. 11, 135-139.

Lissner, H. R. and E. S. Gurdjian 1946 A Study of the Mechanical Behavior of the Skull and its Contents When Subjected to Injuring Blows. *Exp. Stress Anal.*, 3: 40-46.

Lissner, H. R. and V. L. Roberts 1966 Evaluation of skeletal impacts of human cadavers. Studies on the Anatomy and Function of Bone and Joints. Ed. by F. G. Evans. Springer-Verlag, Heidelberg. 113-120.

Lissner, H. R., E. S. Gurdjian, and J. E. Webster 1949 Mechanics of Skull Fracture. *Exp. Stress Anal.*, 7: 61-70.

Loeschke, H. and H. Weinoldt 1922 Über den Einfluss von Druck und Entspannung auf das Knochenwachstum des Hirnschadels. *Beitr. Path. Anat.*, 70: 406-439.

Lombard, C. F. 1949 How much force can body withstand? *Aviat. Wk.*, Jan. 17.

Lorentz, K. 1958 Studies on the density of the ultrastructure of the ground substance of bone by means of staining and microdensometric methods. *Virchow. Arch. Path. Anat.*, 331(1): 72-86.

Lowrance, E. W. and H. B. Latimer 1957 Weights and linear measurements of 105 human skeletons from Asia. *Amer. J. Anat.*, 101: 445-459.

1958 Coefficients of correlation for the weights and linear dimensions of the bones of 105 skeletons from Asia. *Amer. J. Anat.*, 102: 455-467.

Lutwak, L. 1964 Osteoporosis--A mineral deficiency disease? *J. Amer. Diet. Ass.*, 44(3): 173-175.

MacConaill, M. A. 1951 The movements of bones and joints. IV. The mechanical structure of articulating cartilage. *J. Bone Joint Surg.*, 33B: 251-257.

1956 Studies in the mechanics of synovial joints. IV. The transarticular force: Its magnitude and consequences. *Irish J. Med. Sci.*, 6(365): 193-203.

1956 Studies in the mechanics of synovial joints. V. The statics of single joints. *Irish J. Med. Sci.*, 6(368): 353-364.

1961 Staining properties of stressed bone. *Nature*, 192(4800): 368-369.

Mack, R. W. 1964 Bone-A Natural Two-Phase Material. A Study of the Relative Strength and Elasticity of the Organic and Mineral Components of Bone. Technical Memorandum. Biomechanics Laboratory, Univ. of California, San Francisco-Berkeley.

Mack, P. B., W. N. Brown, and H. D. Trapp 1949 The quantitative evaluation of bone density. *Amer. J. Roent. Rad. Ther.*, 61(6): 808-825.

- Mainland, D. 1956 Measurement of bone density. Ann. Rheum. Dis., 15: 115-118.
- Mainland, D. 1957 A study of age differences in the x-ray density of five bones in the adult human wrist and hand. J. Geront., 12: 284-291.
- Mainland, D. 1957 A study of age differences in the X-ray density of the adult human calcaneus-variation and sources of bias. J. Geront., 12: 53-61.
- Mainland, D. 1963 X-ray bone density of infants in a prenatal nutrition study with a discussion of bone densitometry in general. Milbank Mem. Fund Quart., 41: Suppl. I, 1-106.
- Maj, G. 1938 Resistenza meccanica del tessuto osseo a diversi livelli di uno stesso osso. Boll. Soc. Ital. Biol. Sper., 13(6): 413-415.
- 1938 Osservazioni sulle differenze topografiche della resistenza meccanica del tessuto osseo di uno stesso segmento scheletrico. Monit. Zool. Ital., 49: 139-149.
- 1940 Effetto delle irradiazioni röntgen sulle proprietà fisiche e chimiche del tessuto osseo compatto. Scritti Ital. Radiobiol., 7: 1-14.
- 1940 Variazioni individuali e topografiche della resistenza meccanica del tessuto osseo umano. Boll. Soc. Ital. Biol. Sper., 15(11): 1151-1152.
- 1942 Studio sulle variazioni individuali e topografiche della resistenza meccanica del tessuto osseo diafisario umano in diverse età. Arch. Ital. Anat. Embriol., 47: 612-633.
- Maj, G. and E. Toajari 1937 Osservazioni sperimentali sul meccanismo di resistenza del tessuto osseo lamellare compatto alle azioni meccaniche. Chir. Organi Mov., 22: 541-557.
- Manter, J. T. 1946 Distribution of compression forces in the joints of the human foot. Anat. Rec., 96: 313-321.
- 1949 Biomechanics of the foot. Anat. Rec., 103: 486.(abstract).
- Mantyla, M. 1964 Teeth as indicators of bone density. Acta Odont. Scand., 22: 365-371.
- Marique, P. 1945 Etudes sur le fémur. Anatomie: Axes et angles; Déformations; Resistance. Librairie des Sci., Bruxelles.
- Martz, C. D. 1951 Stress factors in bone and metal. Bull. Ind. Univ. Med. Cent., 13: 108-109.
- 1956 Stress tolerance of bone and metal. J. Bone Joint Surg., 38A: 827-834.
- 1959 Bones-Metals-Surgeons. J. Indiana State Med. Assoc., 52(1): 60-64.

- Mason, R. L. 1965 Bone density measurements in vivo: improvement of x-ray densitometry. *Science*, 150: 221-222.
- Mather, B. S. Correlations between breaking load and other properties of long bones. In Press.
- A Method of Studying the Mechanical Properties of Long Bones. In Press.
- A Study of the Symmetry of the Mechanical Properties of the Human Femur. In Press.
- Mathur, P. D., R. McDonald, and R. K. Ghormley 1949 A study of tensile strength of the menisci of the knee. *J. Bone Joint Surg.*, 31A: 650-654.
- Matsunaga, S. 1961 Experimental study of absorption mechanism in the knee of rabbits. *Shikoku Acta Med.*, 17(1): 64-74.
- McCance, R. A., J. W. T. Dickerson, G. H. Bell and O. Dunbar 1962 Severe undernutrition in growing and adult animals. The effect of undernutrition and its relief on the mechanical properties of bone. *Brit. J. Nutr.*, 16: 1-12.
- McElhaney, J. H. and E. F. Byars 1965 Dynamic response of biological materials. *Amer. Soc. Mech. Engineers Pub.*, 65-WA/HUF-9.
- McElhaney, J. H., J. Fogle, E. Byars, and G. Weaver 1964 Effect of embalming on the mechanical properties of beef bone. *J. Appl. Physiol.*, 19(6): 1234-1236.
- McKeown, R. M., M. K. Lindsay, S. C. Harvey, and E. L. Howes 1932 The breaking strength of healing fractured fibulae of rats. *Arch. Surg.*, 24: 458; 25: 467, 722, 1011.
- McLean, F. C. 1958 The ultrastructure and function of bone. *Science*, 127(3296): 451-456.
- McLean, F. C. and M. R. Urist 1955 Bone: An Introduction to the Physiology of Skeletal Tissue. Univ. Chicago Press, Chicago.
- Melick, R. A. and D. R. Miller 1966 Variations of tensile strength of human cortical bone with age. *Clin. Sci.*, 30: 243-248.
- Messerer, O. 1880 Über Elasticität und Festigkeit der Menschlichen Knochen. Verlag der J. G. Cotta'schen Buchhandlung, Stuttgart.
- Meyer, G. H. 1867 Die Architectur des Spongiosa. *Arch. Anat. Physiol.*, 34: 615-628.
- 1873 Die Statik und Mechanik des menschlichen Knochengerüstes. Wilhelm Engelmann, Leipzig.
- Meyer, K. H. 1936 Elasticity of elastic and collagenic fibers and their molecular significance. *Arch. Ges. Psychol.*, 238: 78-80.

- Milch, H. 1940 Photo-elastic studies of bone form. *J. Bone Joint Surg.*, 22A(3): 621-626.
- Morton, D. J. 1944 Foot biomechanics: functional disorders and deformities. *M. Physics*, 1: 457.
- Motoshima, T. 1960 Studies on the strength for bending of human long extremity bones. *J. Kyoto Prefect. Med. Univ.*, 68: 1377-1398. (Japanese text with English summary).
- Müller, W. 1922 Experimental research on mechanical influences which alter composition of bone. *Beitr. Klin. Chir.*, 127: 251-290.
- _____. 1923 Mechanical strains and bone growth. *Beitr. Klin. Chir.*, 130: 459-472.
- Munizaga, J. R. 1962 Device for Measuring Bone Thickness over the Top of the Cranial Vault. *Amer. J. Phys. Anthrop.*, 20(3): 391-393.
- Murray, P. D. F. 1936 Bones. A study in the development and structure of the vertebrate skeleton. Cambridge Univ. Press, Cambridge.
- Murray, P. D. F. and D. Selby 1930 Intrinsic and extrinsic factors in the primary development of the skeleton. *Roux. Arch.*, 122: 629-662.
- Muto, T. 1951 Basic Study on the Compressive Test of Compact Bone. *J. Kyoto Prefect. Med. Univ.*, 49(6): 567-590 (Japanese text with English summary).
- Muto, T. and R. Kuruma 1951 The Comparison of the Compression Test of a Cylinder with that of a Square-prism. *J. Kyoto Prefect. Med. Univ.*, 50(2): 163-166 (Japanese text with English summary).
- Muto, T. and Y. Sugiyama 1951 A Regional Examination on Compressive Strength of the Compact Substance of the Femur. *J. Kyoto Prefect. Med. Univ.*, 50(2): 167-168 (Japanese text with English summary).
- Nachemson, A. 1959 Measurement of Intradiscal Pressure. *Acta Orthop. Scand.*, 18(4): 269-289.
- Nachemson, A. 1960 Lumbar intradiscal pressure. *Acta Orthop Scand.*, Suppl. 43.
- _____. 1961 Strength of bones. *Nord. Med.*, 65: 360-364.
- _____. 1962 Some Mechanical Properties of the Lumbar Intervertebral Discs. *Bull. Hosp. Joint Dis.*, 23(2): 130-143.
- National Bureau of Standards 1948 Mechanical properties of human bones. Tech. Rep. 1258, U. S. Dept. of Commerce, Tech. News Bull. (Oct.), 118-120.

- Nigst, H., H. H. Wagener, J. Bircher, and P. Zuppinger 1960 Industrial araldite in bone surgery. Bending strength and flexion of fractures of the rabbit tibia united with araldite. *Deutsch. Med. Wschr.*, 85: 658-660.
- Nordin, B. E. C., E. Barnett, J. MacGregor, and J. Nisbet 1962 Lumbar Spine Densitometry. *Brit. Med. J.*, 1: 1793-1796.
- Nutrition Review 1959 Influence of stable strontium on bone growth and strength. *Nutr. Rev.*, 17: 312-313.
- Oda, M. 1955 The Strength of the buried Human Bones. *J. Kyoto Prefect. Med. Univ.*, 57(1): 25-27 (Japanese text with English summary).
- Odland, L. M., K. P. Warnick, and N. C. Esselbaugh 1958 Bone Density. Cooperative Nutritional Status Studies in the Western Region. Bulletin 534. Ed. by A. F. Morgan, Montana Agricultural Experiment Station, Montana State College, Bozeman, Montana.
- Okada, K. 1956 Dynamic studies on bone fractures. *J. Jap. Orthop. Surg. Soc.*, 30: 105-134.
- Okamoto, T. 1955 Mechanical Significance of Components of Bone-tissue. *J. Kyoto Prefect. Med. Univ.*, 58(6): 1003-1006 (Japanese text with English summary).
- Olivo, O. M. 1937 Rispondenza della funzione meccanica varia degli osteoni con la loro diversa minuta architettura. *Boll. Soc. Ital. Biol. Sper.*, 12(8): 400-401.
- 1937 Rapport entre la structure et la fonction dans les ostéons. *C. R. Ass. Anat.*, 32: 334-346.
- Olivo, O. M., G. Maj, and E. Toajari 1937 Sul significato della minuta struttura del tessuto osseo compatto. *Boll. Sci. Med. (Bologna)*, 109: 369-394.
- Orloff, J. A. 1950 Some problems of cranial biomechanics. *Zool. J. Moscow*, 29(4): 350-353.
- Patrick, L. M. 1962 Caudo-cephalad static and dynamic injuries. The Fifth Stapp Automotive Crash and Field Demonstration Conference. Ed. by M. K. Cragun. Univ. of Minn., Minneapolis. Chap. 13, 171-181.
- Patrick, L. M., H. R. Lissner, and F. G. Evans 1961 Effects of controlled acceleration on stress-strain phenomena in the intact vertebral column. *Huitième Congrès International de Chirurgie Orthopédique*. Presented at Société Internationale de Chirurgie Orthopédique et de Traumatologie, N. Y., Sept. 4-9, 1962 Imprimerie des Sciences, Brussels. 781-786.
- Pauwels, F. 1948 Bedeutung und kausale Erklärung der Spongiosa-Architektur in neurer Auffassung. *Klin. Wschr. (Berlin)*, 26(7-8): 123-124.

- 1949 Über die Bedeutung der Bänder und Muskeln für die mechanische Beanspruchung der Röhrenknochen. Schweiz. Med. Wschr. (Basel), 79(20): 461.
- 1965 Gesammelte Abhandlungen zur Funktionellen Anatomie des Bewegungsapparates. Springer-Verlag, Berlin.
- Pauwels, F. 1966 Über die Bedeutung einer Zuggurtung für die Beanspruchung des Röhrenknochens und ihre Verwendung zur Druckosteosynthese. Verh. Deutsch. Orthop. Ges. (52nd Kongress), Stuttgart, Sept., 1965, 231-257.
- Pauwels, F., G. Geller, and B. Kummer 1965 Biomechanica Orthopaedica and Traumatologica. IX^eme Congrès de la Société Internationale de Chirurgie Orthopédique et de Traumatologie, Tom II. Verlag der Wiener Medizinischen Academie, Vienna. (also English translation).
- Pearson, H. M. 1961 Properties of stressed bone. Nature, 190(4782): 1217.
- Pedersen, H. E., F. G. Evans, and H. R. Lissner 1949 Deformation studies of the femur under various loadings and orientations. Anat. Rec., 103(2): 159-185.
- Perey, O. 1952 Depression fractures of the lateral tibial condyle. Acta Chir. Scand., 103: 154-157.
- 1957 Fracture of the vertebral end-plate in the lumbar spine. Acta Orthop. Scand., Suppl. 25.
- Perkins, G. 1956 The value of knowing the direction and nature of the force causing a fracture. J. Bone Joint Surg., 38B: 227-236.
- Philipson, B. 1965 Composition of cement lines in bone. J. Histochem. Cytochem., 13(4): 270-281.
- Policard, A. 1927 Les Méchanismes physiologiques fondamentaux de la substance osseuse. J. Méd. Franc., 16: 387-395.
- Popa, G. T. 1931 Mechanical structures of pathology of bone. Soc. Biol. C. R., 107: 390-392.
- Popov, S. N. 1963 On transformation of bone structure related to functional stress. Vestn. Rentgen. Radiol., 38: 15-17.
- Pradhan, L. B. and P. N. Kapadia 1953 The relation between the length of fish, and weight and density of otolith and bone, and the rate of ossification. J. Univ. Bombay, 22(3): 32-40.
- Provins, K. A. 1955 Effect of limb position on the forces exerted about the elbow and shoulder joints on the two sides simultaneously. J. Appl. Physiol., 7(4): 387-389.
- 1955 Maximum forces exerted about the elbow and shoulder joints on each side separately and simultaneously. J. Appl. Physiol., 7(4): 390-392.

- Provins, K. A. and N. Salter 1955 Maximum torque exerted about the elbow joint. *J. Appl. Physiol.*, 7: 393-398.
- Rabischong, P., G. Konirsch, and J. Avril 1965 Etude Biomécanique du Tissu Osseux Compact des Os Longs en Fonction de Leur Structure. *Comptes Rendus de l'Association des Anat.*, 1359-1387.
- Randaccio, M. 1965 The Trabecular Architecture of the Tarsal and Metatarsal Bones in Man. Anatomical and Radiological Investigation. *Radiol. Med. (Torino)*, 51(7): 689-714.
- Rauber, A. 1876 Elasticität und Festigkeit der Knochen. Engelmann, Leipzig.
- Ravelli, A. 1955 Über die Torsion und die Frontalkrümmung des Schlüsselbeines. *Anat. Anz.*, 101(20/24): 306-310.
- Rawling, L. B. 1904 Fractures of the skull. The Hunterian Lectures. *Lancet*, 1: 973-979; 1034-1039; 1097-1102.
- Razemon, J. P. 1959 Fractures of the upper end of the humerus. *Lille Med.*, 4: 739-742.
- Reischauer, F. 1938 Bone fatigue and overexertion phenomena. *Fortschr. Roentgenstr.*, 58: 343-365.
- Reiss, O. 1936 Strength of bones under normal conditions and during fracture healing. *Deutsch. Z. Chir.*, 246: 486-493.
- Reynolds, C. F. and J. A. Key 1954 Fracture healing after fixation with standard plates, contact splints, and medullary nails. *J. Bone Joint Surg.*, 36A: 577-587.
- Richardson, L. R. 1948 Density of the blackfish petrosal. *Nature*, 162(4108): 150.
- Riniker, P. 1960 Das mechanische Bauprinzip der Knochenstruktur. *Path. Microbiol.*, 23: 234-238, 1960.
- Rixford, E. 1913 On the mechanics of production of certain fractures; greenstick fractures, buckling fractures, flexion and torsion fractures. *J. Amer. Med. Ass.*, 61: 916-920.
- 1925 Spiral fractures, theory and treatment. *Ann. Surg.*, 81: 368-373.
- Robertson, W. D. 1956 Stress corrosion cracking and embrittlement John Wiley and Sons, Inc., N. Y.
- Robinson, R. A. and S. R. Elliott 1957 The water content of bone. I. The mass of water, inorganic crystals, organic matrix, and CO₂ space components in a unit volume of dog bone. *J. Bone Joint Surg.*, 39A(1): 167-188.

- Roberts, V. L. 1966 Strain-gage Techniques in Biomechanics. *Exp. Mech.*, March: 1-4.
- Rolander, S. D. 1966 Motion of the Lumbar Spine with Special Reference to the Stabilizing Effect of Posterior Fusion. An experimental Study on autopsy specimens. *Acta Orthop. Scand.*, Suppl. 90.
- Rosate, A. 1959 Distribuzione della microdurezza del tessuto osseo nella compatta di ossa lunghe in accrescimento. *Monit. Zool. Ital.*, Suppl. 67: 428-435.
- Ross, D. 1932 A method for the production of increased compression strength of bones. *Brit. J. Surg.*, 22: 337.
- Rössle, R. 1927 Untersuchungen über Knochenhärte. *Beitr. Path. Anat.*, 77: 174-208.
- Roth, H., H. M. Frost, and A. R. Villanueva 1961 Physical characteristics of bone. I. The existence of plastic flow in vitro. *Henry Ford Hosp. Med. Bull.*, 9: 149-152.
- 1961 The physical characteristics of bone. II. Biphasic elastic behavior of fresh human bone. *Henry Ford Hosp. Med. Bull.*, 9: 153-156.
- Rouiller, C., L. Huber, E. Kellenberger, and E. Rutishauser. 1952 La Structure Lamellaire de L'Osteone. *Acta Anat.*, 14(1/2): 9-22.
- Rouviere, H. 1938 De la résistance de os et du siège de certaines fractures des os longs per cause indirecte. *Presse Med.*, 46: 849-950.
- Roux, W. 1885 Beiträge zur Morphologie der funktionellen Anpassung. 3. Beschreibung und Erläuterung einer Knöchernen Kniegelenksankylose. *Arch. Anat., Physiol., Anat. Abt.*, 121-158.
- Rowland, R. E., J. Jowsey, and J. H. Marshall 1959 Microscopic Metabolism of Calcium in Bone. III. Microradiographic Measurements of Mineral Density. *Radiat. Res.*, 10: 234-242.
- Ruban, Y. D. 1961 Kostnays tkan' kak odno iz zlagaemykh v otsenke konstitutsii zhivotnykh (Osseous tissue as one of the components in evaluating the constitution of animals). *Izv. Akad. Nauk. SSSR. (Biol.)*, 5: 598-804 (Russian text with English summary).
- Rutishauser, E. and G. Majno 1949 Les Lésions Osseuses par Surcharge dans le Squelette Normal. *Schweiz. Med. Wschr.*, 79(13): 281-288.
- Rydell, N. 1965 Forces in the Hip-Joint. Part II. Intravital Measurements. Biomechanics and Related Bio-Engineering Topics. Ed. by R. M. Kenedi. Pergamon Press, London. Chap. 29, 351-357.
- 1966 Intravital measurements of forces acting on hip-joint. Studies on the Anatomy and Function of Bones and Joints. Ed. by F. G. Evans. Springer-Verlag, Heidelberg. 52-68.

- Saville, P. D. and R. Smith 1966 Bone Density, Breaking Force and Leg Muscle Mass as Functions of Weight in Bipedal Rats. Amer. J. Phys. Anthropol., 25(1): 35-40.
- Scales, J. T., I. Duff-Barclay, and H. J. Burrows 1965 Some engineering and medical problems associated with massive bone replacement. Biomechanics and Related Bio-Engineering Topics. Ed. by R. M. Kenedi. Pergamon Press, London. Chap. 19, 205-239.
- Schikawa, M. 1960 Some properties observed in the compression test of senile intervertebral discs. Acta Geront. Jap., 32: 99-119. (abstract).
- Schraer, H. 1958 Variation in the roentgenographic density of the os calcis and phalanx with sex and age. J. Pediat., 52(4): 416-423.
- Schraer, H., R. Schraer, H. G. Trostle, and A. D'Alfonso 1959 The validity of measuring bone density from roentgenograms by means of a bone density computing apparatus. Arch. Biochem., 83: 486-500.
- Schraer, H., W. J. Siar, and R. Schraer 1963 Changes in bone mass and density in living rats during the manipulation of calcium intake. Arch. Biochem., 100: 393-398.
- Schranz, D. 1959 Age Determination from the Internal Structure of the Humerus. Amer. J. Phys. Anthropol., 17(4): 273-277.
- Scott, J. H. 1957 The Mechanical Basis of Bone Formation. J. Bone Joint Surg., 39B(1): 134-144.
- Seale, R. U. 1959 The Weight of the Dry Fat-free Skeleton of American Whites and Negroes. Amer. J. Phys. Anthropol., 17(1): 37-48.
- Sedlin, E. D. 1965 A Rheologic Model for Cortical Bone. A Study of the physical properties of human femoral samples. Acta Orthop. Scand., Suppl. 83.
- Sedlin, E. D. and H. Frost 1962 The half-size of the osteon: method of determination. J. Surg. Res., 3: 82-84.
- 1963 Variations in rate of human osteon formation. Canad. J. Biochem. Physiol., 41: 19-22.
- Sedlin, E. D. and C. Hirsch 1966 Factors affecting the determination of the physical properties of femoral cortical bone. Acta. Orthop. Scand., 37(1): 29-48.
- Sedlin, E. D., H. M. Frost, and A. R. Villanueva 1963 Variations in Cross-Section Area of Rib Cortex with Age. J. Gerontol., 18: 9-13.
- Sedlin, E. D., A. R. Villanueva, and H. M. Frost 1963 Age variations in the specific surface of Howship's lacunae as an index of human bone resorption. Anat. Rec., 146: 201-207.
- Seipel, C. M. 1948 Trajectories of the jaws. Acta. Odont. Scand., 8: 81-191.

- Semb, H. 1966 The Breaking Strength of Normal and Immobilized Cortical Bone from Dogs. *Acta Orthop. Scand.*, 37(2): 131-140.
- Shamos, M. H. 1963 Piezoelectric effect in bone. *Nature*, 197: 4862.
- Shono, K. and I. Asami 1960 Strength for compression of human costal cartilage. *J. Kyoto Prefect. Med.*, 68: 1181-1184. (Japanese text with English summary).
- Shuvalov, B. V. 1959 On the problem of the degree of sensitivity of bone tissue to prolonged intensive pressure of a foreign body. *Orthop. Travm. Protez.*, 20: 41-44.
- Singer, F. L. and H. Milch 1960 Distribution of strain in mated cadaver femora: an experimental study on the relation of bone form to function Amer. Ass. Anat., 3rd Ann. Meeting and VIIth Intern Cong. Anat., N. Y. (abstract).
- Singer, F. L., H. Milch, and R. A. Milch 1964 Distribution of surface strain in paired human femora. *Nature*, 202: 206-208.
- Sissons, H. A. 1962 Age Changes in the Structure and Mineralization of Bone Tissue in Man. *Radioisotopes and Bone*. Ed. by F. C. McLean, P. Lacroix, and A. M. Budy. Blackwell Scientific Publications, Oxford. 443-465.
- Smith, J. W. 1956 Observations on the postural mechanism of the human knee joint. *J. Anat.*, 90(2): 236-260.
- 1957 The forces operating at the human ankle joint during standing. *J. Anat.*, 91(4): 545-564.
- 1962 The relationship of epiphyseal plates to stress in some bones of the lower limb. *J. Anat.*, 96: 58-80.
- 1962 The structure and stress relations of fibrous epiphyseal plates. *J. Anat.*, 96: 209-225.
- Smith, J. W. and R. Walmsley 1957 Elastic after-effect, plasticity and fatigue in bone. *Proc. Anat. Soc. Gr. Brit. and Ireland. J. Anat.*, 91: 603-604 (abstract).
- 1959 Factors affecting the elasticity of bone. *J. Anat.*, 93(4): 503-522.
- Smith, L. D. 1953 Hip fractures - the role of muscle contraction or intrinsic forces in the causation of fractures of the femoral neck. *J. Bone Joint Surg.*, 35A: 367-383.
- Smith, R. E. and P. D. Saville Bone Breaking Stress as a function of Weight Bearing in Bipedal Rats. In press.
- Smith, R. W., Jr. and D. A. Keiper 1965 Dynamic Measurement of Viscoelastic Properties of Bone. *Amer. J. Med. Electronics*, October-December: 156-160.

- Smithgall, E. B., F. E. Johnston, R. M. Malina, and M. A. Galbraith 1966 Developmental Changes in Compact Bone Relationships in the Second Metacarpal. *Hum. Biol.*, 38(2): 141-151.
- Smolyannikov, A. V. 1955 Atrophy of the bones of the skull with increase of pressure within the skull. *Arkh. Pat.*, 2: 56-58.
- Soeur, R. 1960 Biomechanical study of diaphysial fractures. *Lyon Chir.*, 56: 359-379.
- 1963 Malleolar fractures by shearing. *Acta Orthop. Belg.*, 29: 92-99.
- Sognnaes, R. F. 1960 The Ivory Core of Tusks and Teeth. *Clin. Orthop.*, 17: 43-62.
- Solomons, C. C. 1965 Biochemical effects of mechanical stress. *Aerospace Med.*, 36: 33-34.
- Somerville-Large, C. 1950 Strains of the ankle joint. *Irish J. Med. Sci.*, 6(293): 225-228.
- Sonoda, T. 1962 Studies on the strength for compression, tension, and torsion of the human vertebral column. *J. Kyoto Prefect. Med. Univ.*, 71: 659-702 (Japanese text with English summary).
- Sonoda, T., T. Zeniya, and S. Ibuki 1962 A Study on the Strength for Torsion of Human Extremity Long Bones. *J. Kyoto Prefect. Med. Univ.*, 71: 710-714 (Japanese text with English summary).
- Speed, K. 1915 The physics of bone. *Railway Surg. J.*, 22(4): 134-138.
- Stanford, J. W., G. C. Paffenbarger, J. W. Kumpula, and W. T. Sweeney 1958 Determination of some compressive properties of human enamel and dentin. *J. Amer. Dent. Ass.*, 57: 487-495.
- Stanford, J. W., K. V. Weigel, G. C. Paffenbarger, and W. T. Sweeney 1960 Compressive properties of hard tooth tissues and some restorative materials. *J. Amer. Dent. Ass.*, 60: 66-76.
- Staub, W. 1950 The functional structure of elastic cartilage. *Acta Anat. (Basel)*, 9(4): 309-329.
- Stein, A. H. 1957 Variations in normal bone-marrow pressures. *J. Bone Joint Surg.*, 39A: 1129-1134.
- Stein, I. 1937 Evaluation of bone density in Roentgenogram by ivory wedges. *Amer. J. Roentgen.*, 37: 678-682.
- Steindler, A. 1936 Physical properties of bone. *Arch. Phys. Ther.*, 17: 336-345.
- Storey, E. 1958 The influence of cortisone and ACTH on bone subjected to mechanical stress (tooth movement). *J. Bone Joint Surg.*, 40B(3): 558-573.
- Strandh, J. 1961 Chemical and biophysical studies of microscopic structures in compact bone. *Acta Univ. Upsaliensis*.

- Strobiño, L. J., G. O. French, and P. C. Colonna 1952 The effect of increasing tensions on the growth of epiphysial bone. *Surg. Gynec. Obstet.*, 95(6): 694-700.
- Stucke, K. 1950 The elasticity of the Achilles tendon in loading experiments. *Langenbeck. Arch. Klin. Chir.*, 265(5): 579-599.
- Studitsky, A. N. 1936 The strength of bone. *J.A.M.A.*, 107: 132.
- Sugiyama, Y. 1960 A study on the hardness of human bones. *J. Kyoto Prefect. Med. Univ.*, 68: 557-569 (Japanese text with English summary).
- Sugiyama, Y., T. Motojima, and S. Narumiya 1960 On the Strength for Compression of the Compact Bone of Long Bones of Extremities in Cattle. *J. Kyoto Prefect. Univ. Med.*, 68(3): 570-574 (Japanese text with English summary).
- Symposium on Biomechanics 1959 Pub. by the Institutional of Mechanical Engineers, London.
- Taber, S. A. and A. Ayer 1960 Weight-bearing line of the acetabulum and its evolutionary significance. *Anat. Rec.*, 136(2): 287-288 (abstract).
- Takahashi, H. and H. M. Frost 1965 A Tetracycline-Based Evaluation of the Relative Prevalence and Incidence of Formation of Secondary Osteons in Human Cortical Bone. *Canad. J. Physiol. Pharmacol.*, 43: 783-791.
- Takezono, K. 1964 The Torsion Strength of the Limb Long Bones in Several Animals. *J. Kyoto Pref. Med. Univ.*, 73(4): 275-308 (Japanese text with English summary).
- Taleisnik, J. and R. L. Linscheid 1965 Biomechanics of synovial joints: A review. *Arch. Phys. Med. Rehabil.*, 46(8): 553-561.
- Tappen, N. C. 1953 A functional analysis of the facial skeleton with split-line technique. *Amer. J. Phys. Anthrop.*, 11: 503-532.
- Tassi, D. and B. Franceschi 1951 The lumbar intervertebral disc in normal conditions and under compression after injection of a radio-opaque contrast medium into the disc space. *Riv. Infort. Mal. Prof.*, 38(6): 981-992.
- Taysum, D. H., F. G. Evans, W. M. Hammer, W. S. S. Jee, C. E. Rehfelk, and L. W. Blake 1962 Radionuclides and bone strength. Some Aspects of Internal Irradiation. Ed. by T. F. Dougherty, W. S. S. Jee, C. W. Mays, and B. J. Stover. Pergamon Press, N. Y., 145-162.
- Telkkä, A. H. Kauppinen, and P. Virtama 1962 Correlation of Dry Weight of Human Carpal, Metacarpal and Finger Bones to Their Actual Mineral Contents. *Amer. J. Phys. Anthrop.*, 20(1): 17-19.
- Toajari, E. 1938 Resistenza meccanica ed elasticita del tessuto osseo studiata in rapporto alla minuta struttura. *Monit. Zool. Ital.*, Suppl. to 48: 148-154.

- 1938 Resistenza del tessuto osseo in animali di razza diversa (bos taurus). *Boll. Soc. Ital. Biol. Sper.*, 13(3): 140-142.
- 1939 Differenze nella struttura e resistenza meccanica del tessuto osseo in due razze di bos taurus. *Arch. Sci. Biol. (Bologna)*, 25(6): 544-557.
- 1941 Osservazioni sulle proprietà meccaniche dei tavolati delle ossa della volta cranica. *Boll. Soc. Ital. Biol. Sper.*, 16(3): 165-167.
- Tobin, W. J. 1955 The internal architecture of the femur and its clinical significance. *The upper end. J. Bone Joint Surg.*, 37A(1): 57-71.
- Toni, G. 1948 The ligamenta flava. II. Caliber of the elastic fibers of the l.f. at various levels of the vertebral column. III. The density of the elastic fibers in various segments of the vertebral column. IV. The configuration of the l.f. V. Observations on the collagenous fibers of the ligamenta flava. *Boll. Soc. Ital. Biol. Sper.*, 24(6): 662-668.
- Tonna, E. A. 1964 The connective tissue framework on the femur in mice of different ages. *Anat. Rec.*, 149(4): 559-576.
- Tortosa, A. R. 1944 Slow fractures of fractures due to overloading. *Cir. d. ap. locom.*, 1: 362-369.
- Towey, J. P. 1952 Influence of some nutritional factors on the ash content, breaking stress, and elasticity of rat bones. Dissertation (Publ. 3963), Univ. Minn.
- Townsley, W. 1948 The Influence of Mechanical Factors on the Development and Structure of Bone. *Amer. J. Phys. Anthrop.*, 1: 25-45.
- Triepel, H. 1903 Über mekanische Strukturen. *Anat. Anz.*, 23: 480-486.
- Triepel, H. 1922 Die Architektur der Knochenspongiosa in neuer Auffassung. *Z. Ges. Anat.*, 2. Abt., München u. Berl., 8: 197-213.
- 1922 Die Architekturen der menschlichen Knochenspongiosa (Atlas and text). Bergmann, München.
- Trotter, M., G. E. Broman, and R. R. Peterson. 1958 The density of humeri of American Whites and Negroes. *Leech*, 28(3-4-5): 139-143.
- 1959 Density of cervical vertebrae and comparison with densities of other bones. *Amer. J. Phys. Anthrop.*, 17: 19-25.
- 1960 Densities of bones of White and Negro skeletons. *J. Bone Joint Surg.*, 42A(1): 50-58.
- Trotter, M. and R. R. Peterson 1955 Ash weight of human skeletons in per cent of their dry, fat-free weight. *Anat. Rec.*, 123: 341-358.

- Tsuda, K. 1957 Studies on the bending test and the impulsive bending test on human compact bone. J. Kyoto Prefect. Med. Univ., 61: 1001-1026 (Japanese text with English summary).
- Uehira, T. 1960 On the Relation between the Chemical Components and the Strength of the Compact Bone. J. Kyoto Prefect. Med. Univ., 68(4): 923-940 (Japanese text with English summary).
- Uehira, T. and Y. Taksukawa 1960 On the Relation between the Lamellar Systems and the Compressive Strength in the Compact Bone. J. Kyoto Prefect. Med. Univ., 68(4): 835-838 (Japanese text with English summary).
- Ulutas, I. 1952 Architectural lines of bones. Tip Fak. Mec., 15: 197-210.
- Velloso, G. D. 1960 Force and pressure in osseous regeneration. Rev. Brasil. Cir., 39: 370-371.
- Vigliani, F. 1950 Sulla struttura di ossa sottratte sperimentalmente alle normali sollecitazioni. Boll. Soc. Ital. Biol. Sper., 26(2): 153-155.
- _____. 1952 Accrescimento in Lunghezza di Ossa Tubulari in Arti Sottratti Sperimentalmente al Carico Meccanico. Arch. Putti (Firenze), 2: 207-221.
- _____. 1955 Accrescimento e Rinnovamento Strutturale della Compatta in Ossa Sottratte alle Sollecitazioni Meccaniche. 1. Ricerche sperimentali nel cane. Z. Zellforsch., 42: 59-76.
- _____. 1955 Accrescimento e Rinnovamento Strutturale della Compatta in Ossa Sottratte alle Sollecitazioni Meccaniche. 2. Ricerche sperimentali nel cane. Z. Zellforsch., 43: 17-47.
- Vignolo, W. H., M. C. Camano, and J. C. Barsantini 1957 Effect of stress on bone growth in rats. Ann. Endocr., 18(5): 677-680.
- Viidik, A. 1966 Biomechanics and functional adaption of tendons and joint ligaments. Studies on the Anatomy and Function of Bone and Joints. Ed. by F. G. Evans. Springer-Verlag, Heidelberg. 17-39.
- Virgin, W. J. 1951 Experimental investigations into the physical properties of the intervertebral disc. J. Bone Joint Surg., 33B(4): 607-611.
- Virtama, P., P. Kajanoja, V. K. Hopau, and A. Telkkä 1960 Density of human carpal, metacarpal, and digital bones. Ann. Med. Exp. Fenn., 38: 467-471.
- Virtama, P. and H. Mahonen 1960 Thickness of the cortical layer as an estimate of mineral content of human fingers bones. Brit. J. Radiol., 33: 60-62.
- Virtama, P. and A. Talkkä 1961 Trabecular Pattern of Cancellous Bone as an Estimate of Mineral Content of Human Finger Bones. Acta Anat., 46: 47-50.
- _____. 1962 Cortical thickness as an estimate of mineral content of human humerus and femur. Brit. J. Radiol., 35: 632-633.

- Vose, G. P. 1958 X-ray transmission factor in estimating bone density. Radiology, 71(1): 96-101.
- 1962 Relation of microscopic mineralization of intrinsic bone strength. Anat. Rec., 144(1): 31-36.
- 1963 Fine structure of bone as seen on fracture and cleavage planes by electron microscopy. Anat. Rec., 145(2): 183-191.
- Vose, G. P. and A. L. Kubala 1959 Bone strength--its relationship to x-ray determined ash content. Hum. Biol., 31(3): 261-270.
- Vose, G. P. and P. B. Mack 1963 Roentgenologic Assessment of Femoral Neck Density as Related to Fracturing. Amer. J. Roentgen., 89(6): 1296-1301.
- Vose, G. P., S. A. Hoerster, Jr., and P. B. Mack 1964 New technic for the radiographic assessment of vertebral density. Amer. J. Med. Electronics, 3(3): 181-188.
- Vose, G. P., B. J. Stover, and P. B. Mack 1961 Quantitative bone strength measurements in senile osteoporosis. J. Geront., 16(2): 120-124.
- Vose, G. P., P. B. Mack, B. J. Stover, H. Allen, J. Barton, T. Driskill, and M. Hutcheson 1962 A study of X-ray determined bone mineral in vitro and in vivo with relation to fracturing. Prog. Rept. (Jan. 20). Texas Woman's Univ., The Nelda Childers Stark Laboratory for Human Nutrition Research. Contract A-2641. 40 pp.
- Wagner, W. 1941 Fractures due to traction and indirect strain. Med. Klin., 37: 453-456.
- Wagstaffe, W. W. 1874 On the mechanical structure of the cancellous tissue of bone. St. Thomas Hosp. Rep. London, 5: 193-214.
- Watts, D. T., E. S. Mendelson, H. N. Hunter, A. T. Kornfield, and V. R. Pappen 1947 Tolerance to vertical acceleration required for seat ejection. J. Aviat. Med., 18: 554-564.
- Weaver, J. K. 1966 The Microscopic Hardness of Bone. J. Bone Joint Surg., 48-A(2): 273-288.
- Weaver, J. K. and J. Chalmers 1966 Cancellous Bone: Its Strength and Changes with Aging and an Evaluation of Some Methods for Measuring Its Mineral Content. I. Age Changes in Cancellous Bone. J. Bone Joint Surg., 48-A(2): 289-298.
- Weinmann, J. P. and H. Sicher 1955 Bone and Bones. C. V. Mosby Co., St. Louis.
- Weir, J. B. de V., G. H. Bell, and J. W. Chambers 1949 The strength and elasticity of bone in rats on a rachitogenic diet. J. Bone Joint Surg., 31B(3): 444-451.
- Weiss, L. 1965 Static loading of the mandible. Oral Surg., 19(2): 253-262.

- Wermel, J. 1935 Untersuchungen über die Kinetogenese und ihre Bedeutung in der onto-und phylogenetischen Entwicklung. II. Veränderungen der Dicke und der Masse der Knochen. *Morph. Jahrb.*, 75: 92-127.
- 1935 Untersuchungen über die Kinetogenese und ihre Bedeutung in der onto-und phylogenetischen Entwicklung. III. Veränderungen der Widerstandsfähigkeit der Knochen. *Morph. Jahrb.*, 75: 128-149.
- Wertheim, M. G. 1847 Mémoire sur l'elasticité et la cohésion des principaux tissus du corps humain. *Ann. Chim. Phys.*, 21: 385-414.
- Williams, D. E. and R. L. Mason 1962 Bone density measurements in vivo. *Science*, 138: 39-40.
- Williams, D. E. and A. Samson 1960 Bone density of East Indian and American students. *J. Amer. Diet. Ass.*, 36: 462-466.
- Williams, D. E., R. L. Mason, and B. B. McDonald 1964 Bone density measurements throughout the life cycle of the rat. *J. Nutr. (Philadelphia)*, 84(4): 373-382.
- Williams, D. E., B.B. McDonald, E. Morrell, F. A. Schofield , and F. L. MacLeod 1957 Influence of mineral intake on bone density in humans and in rats. *J. Nutr. (Philadelphia)*, 61(4): 489-505.
- Williams, D. E., B. B. McDonald, and S. I. Pyle 1964 Bone density and skeletal maturation as indexes of mineral status in children. *Amer. J. Clin. Nutr.*, 14: 91-97.
- Wolff, J. 1870 Über die innere Architectur der Knochen und ihre Bedeutung für die Frage vom Knochenwachstum. *Virchow. Arch. Path. Anat.*, 50: 389-453.
- 1892 Das Gesetz der Transformation der Knochen. A. Hirschwald, Berlin.
- Wyman, J. 1857 On cancellate structure of some of the bones of the human body. *Boston J. Nat. Hist.*, 6: 125-140.
- Yamada, H. and O. Aoji 1959 On the Law of Compressive Strength of Bone. *J. Kyoto Prefect. Med. Univ.*, 65(5): 971-978 (Japanese text with English summary).
- Yamada, H. and H. Hazama 1956 On the Correlation of Mechanical Strength among the Compact Substance of the Long Bones of the Extremities. *J. Kyoto Prefect. Med. Univ.*, 60(2): 329-335 (Japanese text with English summary).
- Yamada, H. and T. Motoshima 1960 The directional difference in the strength for compression of the shaft of human extremity bones. *J. Kyoto Prefect. Med. Univ.*, 68: 1398-1404. (Japanese text with English summary).
- Yamagishi, M. and Y. Yoshimura 1955 The biomechanics of fracture healing. *J. Bone Jt. Surg.*, 37A(5): 1035-1068.

Yamaguchi, T. and K. Katake 1960 Study on strength of auricular cartilages of men and animals. J. Kyoto Prefect. Med. Univ., 67: 420-424 (Japanese text with English summary).

Yasuda, I., K. Okada, T. Kato, O. Hara, K. Noguchi, and K. Kageyama 1953 The dynamic investigation of fractures. J. Jap. Orthop. Surg. Soc., 27: 220-221 (abstract).

Yokoo, S. 1952 The compression test of the costal cartilage of a human body. J. Kyoto Prefect. Med. Univ., 51: 266-272.

1952 Compression test of the cancellated bone, J. Kyoto Prefect. Med. Univ., 51: 273-276. (Japanese text with English summary).

1952 The compression test upon the diaphysis and the compact substance of the long bone of human extremities. J. Kyoto Prefect. Med. Univ., 51: 291-314 (Japanese text with English summary).

Yokoo, S. and Y. Sugiyama 1952 Compression Tests of the Femur and the Humerus of a Human Fetus. J. Kyoto Prefect. Med. Univ., 51(2): 197-200 (Japanese text with English summary).

Yoshikawa, K. 1964 Cleavage Test of Human and Animal Compact Bones. J. Kyoto Prefect. Med. Univ., 73(2): 121-134 (Japanese text with English summary).

Yoshikawa, K., M. Maeda, and H. Nawa 1964 The bending strength of compact bone in horses. J. Kyoto Prefect. Med. Univ., 73: 47-50.

Zarek, J. M. 1958 Biomechanics - its application to surgery. Modern Trends in Surgical Materials. Ed. by L. Gillis. Butterworth and Co. Ltd., London. Chap. 6, 106-123.

1966 Dynamic considerations in load bearing bones with special reference to osteosynthesis and articular cartilage. Studies on the Anatomy and Function of Bone and Joints. Ed. by F. G. Evans. Springer-Verlag, Heidelberg. 40-51.

Zarek, J. M. and J. Edwards 1963 The stress-structure relationship in articular cartilage. Med. Electron. Biol. Engng., 1: 497-507.

1965 Dynamic considerations of the human skeletal system Biomechanics and Related Bio-Engineering Topics. Ed. by R. M. Kenedi. Pergamon Press, London. Chap. 18, 187-203.

Zeniya, T. 1965 The Vickers hardness of human and animal compact bones. J. Kyoto Prefect. Med. Univ., 74: 553-567 (Japanese text with English summary).

Zeniya, T., T. Sonoda, and K. Takezono 1964 Study on the Vickers hardness of the horn of deer. J. Kyoto Prefect. Med. Univ., 73: 44-46 (Japanese text with English summary).

- Zeniya, T., K. Takazono, and S. Ibuki 1964 On the Vickers hardness of human temporal bone. J. Kyoto Prefect. Med. Univ., 73: 309-310 (Japanese text with English summary).
- Zettler, F. 1952 The statistics of the bony pelvis. Bruns Beitr. Klin. Chir., 184(3): 257-270.
- Zitzlsperger, S. 1960 The mechanics of the foot based on the concept of the skeleton as a statically indetermined space framework. Clin. Orthop., 16: 47-63.