

# Scientific Meetings

## Fatigue of Metals

A colloquium on the fatigue of metals was held at the Royal Technological Institute, Stockholm, 25–27 May, under the sponsorship of the International Union of Theoretical and Applied Mechanics and with financial assistance from UNESCO via the International Council of Scientific Unions, the Swedish Government, and Swedish industrial firms.

Papers were presented by 37 authors from Denmark, Finland, France, Germany, Holland, Italy, Norway, the Saar, Sweden, Switzerland, the United Kingdom, the United States and the U.S.S.R.

W. Weibull (Sweden) began the colloquium by proposing to consider the fatigue process in two stages—first, the initiation of a crack; and second, the propagation of the crack. Weibull showed some data for which the velocity of crack propagation was independent of crack length in a given notched specimen and increased in direct proportion to the specimen width. Thus the time of propagation is independent of the specimen dimensions. The scatter in these results was very small. On the other hand, the number of cycles to the appearance of the first crack of a given small length exhibits great scatter and a size effect.

The subject of crack propagation appeared in other papers and the data were not wholly consistent with those of Weibull. R. B. Heywood (United Kingdom) presented some data in a much larger specimen which showed an increase in velocity of propagation. In both sets of data the load was continually readjusted to give constant stress on the undamaged section. C. E. Phillips (United Kingdom) described the appearance of fatigue cracks in notched specimens at a small number of cycles which do not propagate further at the same stress. His explanation was that the crack propagated in the stress field until the stress fell to the level of the fatigue limit.

Other participants thought the cracks relieved initial stresses in the specimen. Some evidence was presented to show that a fatigue crack is not as effective as a stress raiser as is a notch of considerably greater radius at the apex or root. Phillips believes that the maximum stress in the stress cycle is the predominant factor in crack propagation, and that posi-

tive values of mean stress have a large effect. Cracks appear to propagate under maximum principal shear stress when microscopically examined, even in those cases where microscopically they appear to propagate under maximum principal tension.

C. Schaub (Sweden) advanced the hypothesis that fatigue failure requires the simultaneous action of imposed alternating stresses and a reaction-kinetic process of the surface material that has been activated by slip with the surrounding medium. His paper stimulated extensive discussions.

Several papers dealt with cumulative damage, but the discussion was somewhat confusing, in that the term *damage* was used in various meanings, often without clear quantitative definition. There was general agreement that the Miner hypothesis was not generally applicable.

E. Gassner (Germany) described some fatigue experiments with randomly varying loads reproducing the magnitudes and frequencies to be expected in service. Attempts were made to determine the influence of small stress amplitudes far below the endurance limit.

I. A. Oding (U.S.S.R.) discussed the mechanism of fatigue failure in terms of dislocation theory. He quoted experimental results on the torsional endurance limit  $\sigma_a$  with zero mean stress and the torsional endurance limit  $\sigma_w$  when a steady stress  $\sigma_0$  was present. The results supported the relation  $\sigma_w^2 = \sigma_a^2 + \sigma_0^2$ .

Heywood described a substantial improvement in the fatigue strength of aircraft structural elements through the application of a very high static load prior to the fatigue test.

A. S. Petrusevich (U.S.S.R.) called attention to the puzzling fact that in contact fatigue between cylinders, cracks begin at the surface rather than at points below the surface where the stresses are higher. In the discussion, the large influence of lubricants was described, as well as experiments in which attempts were made to inspect for cracks below the surface by ultrasonic techniques.

A paper by G. V. Uchik (U.S.S.R.) presented a theory of fatigue based on considerations of the effect of repeated microplastic flow in the vicinity of stress concentrations, stress redistributions, and similar considerations.

■ A World Conference of Scientists will be held in London, 3–5 Aug., under the sponsorship of the World Association of Parliamentarians for World Government. The purpose of the conference is to enable world scientists to discuss the nature and extent of the danger to mankind involved in experiments with nuclear weapons and their possible use in warfare. Officers of the association are Boyd Orr, honorary pres.; Clement Davies, pres.; and Gilbert McAllister, sec.-general. Headquarters are maintained at 21 Hampstead Lane, Highgate Village, London.

■ The 4th annual symposium on Industrial Applications of X-ray Analyses will be held 11–12 Aug. at the Albany Hotel, Denver, Colo. The symposium is sponsored by the Denver Research Institute, University of Denver.

■ The 10th International Congress of Entomology will be held in Montreal, 17–25 Aug. Following the congress, a number of excursions to places of entomological interest will be arranged. For further information, those planning to attend the congress should communicate as soon as possible with the secretary, Mr. J. A. Downes, Division of Entomology, Science Service Building, Ottawa, Ontario, Canada.

■ The 18th meeting of the Meteoritical Society will be held 12–13 Sept. at the Institute of Meteoritics of the University of New Mexico, Albuquerque. All scientific sessions of the meeting will be open to the public. The chairman of the program committee is Lincoln LaPaz, director of the institute.

■ The 10th annual Ohio State Fire School will be held 12–16 Sept. at Ohio State University and will be conducted simultaneously with a separate school, also on the campus, for arson investigators. Seven state-wide organizations interested in firefighting and fire prevention join with the university in sponsoring the annual school. Inquiries about enrollment should be sent to Charles L. Scott, State Fire Marshal Wyandotte Bldg., Columbus, Ohio.

■ In conjunction with the Atomic Industrial Forum's fall meeting, a trade fair will be held in Washington, D.C., 26–30 Sept., to demonstrate the extent to which peaceful uses of atomic energy and its associate products and services have advanced as an important sector of our industrial economy. The fair will be attended by officials of organizations engaged or considering participation in atomic energy development and use, members of the Congress, the staffs of interested government agencies, and the

commercial and scientific attachés of various embassies and legations.

Exhibits will be displayed in such fields as design engineering, package power, medical and research reactors, control systems, reactor materials, instrumentation, construction and fabrication techniques, isotope sources and applications, shielding materials and devices, and reactor components and auxiliaries.

■ Arrangements for the Nuclear Engineering and Science Congress to be held in Cleveland, 12-16 Dec., are being coordinated by the Engineers Joint Council under the leadership of Thorndike Saville, dean of the College of Engineering, New York University, and president of EJC. Nearly 300 papers covering practically every phase of the peacetime uses of atomic energy and its by-products are scheduled for presentation by U.S. and foreign participants from 24 business and technical societies, 16 universities, 13 government bureaus and AEC contractors, and 34 major U.S. industrial corporations.

Representatives of the 29 participating societies, whose membership totals more than 400,000, have approved plans for 50 technical sessions, with as many as five separate sessions being held simultaneously. A special committee headed by John R. Dunning, chairman of the General Committee on Nuclear Engineering and Science and dean of engineering at Columbia University, is making arrangements for an all-congress session.

Under the chairmanship of Donald L. Katz, head of the chemical and metallurgical engineering department at the University of Michigan, the program committee has grouped the papers to be presented into 50 general topic headings. They include the "where and how" of atomic power plants, with emphasis on safety and selection of site; radiation hazards and their controls; pros and cons of the varied proposed power-plant types; atomic reactors for research purposes and radiation laboratories; radioisotopes and tracer techniques for industry, medicine and agriculture; disposal of radioactive waste; what to do about radioactive fallout; and uranium geology.

While the technical sessions are underway at the Cleveland Public Auditorium, leading U.S. and foreign industrial firms that are working on developing atomic energy for industry, medicine, and agriculture will display in the auditorium's five exhibit halls special equipment developed for peacetime uses of the atom. Sponsored by the American Institute of Chemical Engineers and headed by Barnett F. Dodge of Yale University, this first International Atomic Exposition will feature reactor models of the latest design; specially designed "mechanical hands" and their controls, which can be

operated with great accuracy to handle the "hot" materials encountered in atomic installations; closed-circuit television, a vital accessory to many of these installations; and newly developed alloys and materials that have properties essential for use in radioactive installations. The exposition will be open to the general public on 10-11 Dec. and in the evenings from 12-16 Dec. Representatives of industry, medicine, and agriculture may attend from 12-16 Dec. during the day. Registrants to the congress may visit the exposition at any time.

■ "Endocrinology and metabolism" will be the subject for the 7th annual Postgraduate Assembly of the Endocrine Society, to be held 26 Sept.-1 Oct. at Indianapolis with the cooperation of the Indiana University School of Medicine. Continuation study facilities of the Indiana University Medical Center will be utilized for the sessions, at which 21 leading clinicians and investigators will be heard. Information regarding the program and registration may be obtained from the Postgraduate Office, Indiana University School of Medicine, 1100 W. Michigan, Indianapolis 7, Ind.

■ The 3rd annual meeting of the Inter-Society Cytology Council will be held at the Statler Hotel, Cleveland, Ohio, 11-12 Nov. Morning and afternoon sessions will be devoted to the scientific program, which will include 16 formal papers and 9 round-table discussions of cytological problems. The scientific program will comprise four sections: (i) new advancements in cytology; (ii) applied cytology; (iii) round table discussions; (iv) a symposium on the problems of early endometrial cancer. Additional information may be obtained from Dr. Paul F. Fletcher, 634 N. Grand Ave., St. Louis 3, Mo.

## Forthcoming Events

### August

29-31. Symposium on Metabolic Aspects of Transport across Cell Membranes, Madison, Wis. (H. Lardy, Inst. for Enzyme Research, 1702 University Ave., Madison 5.)

29-2. Infrared Spectroscopy Inst., 6th annual Nashville, Tenn. (N. Fuson, ISI, Fisk Univ., Nashville 8.)

29-3. Mathematical Assoc. of America, Ann Arbor, Mich. (H. M. Gehman, Univ. of Buffalo, Buffalo 14, N.Y.)

29-5. International Astronomical Union, Dublin, Ireland. (P. T. Oosterhoff, IAU, Leiden Observatory, Leiden, Netherlands.)

29-6. International Horticultural Cong., 14th, The Hague, Netherlands. (G. de Bakker, International Comm. for Horticulture, Bezuidenhoutseweg 30, The Hague.)

30-31. Soc. for Industrial and Applied Mathematics, 2nd general, Ann Arbor, Mich. (G. W. Preston, Research Div., Philco Corp., Philadelphia 34, Pa.)

30-2. American Mathematical Soc., 60th summer, Ann Arbor, Mich. (AMS, 80 Waterman St., Providence 6, R.I.)

30-2. Biological Photographic Assoc., 25th annual, Milwaukee, Wis. (L. C. Massopust, Sr., Marquette Univ. School of Medicine, Milwaukee 3.)

31-1. Conf. on Low Temperature Physics, Paris, France. (L. Weil, Institut Fourier, Place du Doyen Gosse, Grenoble, Isère, France.)

31-2. American Sociological Soc., Washington, D.C. (W. J. Warner, ASS, New York Univ., Washington Sq., New York 3.)

31-3. United Chapters of Phi Beta Kappa, 24th triennial, Minneapolis, Minn. (C. Billman, 1811 Q St., NW, Washington 9.)

31-6. International Assoc. for Hydraulic Research, 6th plenary, The Hague, Netherlands. (L. G. Straub, St. Anthony Falls Hydraulic Lab., Minneapolis 14, Minn.)

31-7. British Assoc. for the Advancement of Science, annual, Bristol, Eng. (BAAS, Burlington House, London, W.1.)

31-8. International Cong. of Refrigeration, Paris, France. (L. Weil, Institut Fourier, Place du Doyen Gosse, Grenoble, Isère, France.)

### September

1. Assoc. for Symbolic Logic, Ann Arbor, Mich. (J. Barlaz, Rutgers Univ., New Brunswick, N.J.)

2-7. American Psychological Assoc., San Francisco, Calif. (F. H. Sanford, APA, 1333 16 St., NW, Washington 6.)

2-7. Psychometric Soc., San Francisco, Calif. (J. B. Carroll, Harvard Univ., 13 Kirkland St., Cambridge 38, Mass.)

2-9. International Cong. of Anthropological and Ethnological Sciences, 5th, Philadelphia, Pa. (A. Kidder, Univ. of Pennsylvania, Philadelphia 4.)

3-7. International Council of Women Psychologists, San Francisco, Calif. (M. G. Reiman, Milwaukee County Guidance Clinic, Milwaukee 3, Wis.)

4-7. International Cong. of Vitamin E, 3rd, Venice, Italy. (K. E. Mason, Dept. of Anatomy, Univ. of Rochester School of Medicine and Dentistry, 260 Crittenden Blvd., Rochester 20, N.Y.)

4-11. International Cong. of Historical Sciences, 10th, Rome, Italy. (F. Chabod, X<sup>e</sup> Congres International des Sciences Historiques, Université, Rome.)

5-8. American Soc. for Pharmacology and Experimental Therapeutics, Iowa City, Iowa. (C. C. Pfeiffer, Dept. of Pharmacology, Emory Univ., Emory University, Ga.)

5-9. American Inst. of Biological Sciences, Michigan State Univ., East Lansing, Mich. (H. T. Cox, AIBS, 2000 P St., NW, Washington 6.)

The following 24 societies will hold their meetings along with the AIBS during the same week at East Lansing, Mich.

American Bryological Soc. (L. J. Gier, Dept. of Biology, Wm. Jewell College, Liberty, Mo.)



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American Soc. of Human Genetics. (D. C. Rife, Ohio State Univ., Columbus.)

American Soc. of Limnology and Oceanography. (B. H. Ketchum, Woods Hole Oceanographic Inst., Woods Hole, Mass.)

American Soc. of Naturalists. (W. P. Spencer, Dept. of Genetics, Univ. of Texas, Austin 12.)

American Soc. of Plant Physiologists. (J. F. Stanfield, Dept. of Botany, Miami Univ., Oxford, Ohio.)

American Soc. of Plant Taxonomists. (R. C. Rollins, Gray Herbarium, Harvard Univ., Cambridge 38, Mass.)

American Soc. of Zoologists. (R. C. Kempton, Dept. of Zoology, Vassar College, Poughkeepsie, N.Y.)

Beta Beta Beta. (B. R. Weimer, Bethany College, Bethany, W.Va.)

Biometric Soc. (C. I. Bliss, Box 1106, New Haven 4, Conn.)

Botanical Soc. of America. (H. C. Bold, Dept. of Biology, Vanderbilt Univ., Nashville, Tenn.)

Ecological Soc. of America. (J. F. Reed, Dept. of Botany, Univ. of Wyoming, Laramie.)

Genetics Soc. of America. (C. P. Oliver, Dept. of Zoology, Univ. of Texas, Austin.)

Mycological Soc. of America. (E. S.

Beneke, Botany and Plant Pathology Dept., Michigan State Univ., East Lansing.)

National Assoc. of Biology Teachers. (P. V. Webster, Bryan City Schools, Bryan, Ohio.)

Nature Conservancy. (G. B. Fell, 4200 22 St., NE, Washington 18.)

Phycological Soc. (P. C. Silva, Dept. of Botany, Univ. of Illinois, Urbana.)

Potato Assoc. of America. (R. W. Hougas, Dept. of Genetics, Univ. of Wisconsin, Madison 6.)

Soc. for Industrial Microbiology. (C. L. Porter, Dept. of Biological Sciences, Purdue Univ., West Lafayette, Ind.)

Soc. of Protozoologists. (N. D. Levine, College of Veterinary Medicine, Univ. of Illinois, Urbana.)

Soc. for the Study of Evolution. (H. Lewis, Dept. of Botany, Univ. of California, Los Angeles 24.)

Soc. of Systematic Zoologists. (R. E. Blackwelder, 3728 Second St. South, Arlington 4, Va.)

5-9. Econometric Soc., Ann Arbor, Mich. (R. Ruggles, Box 1264, Yale Station, New Haven, Conn.)

5-10. World Cong. of Anaesthesiologists, Scheveningen, Netherlands. (W. A. Fentener van Vlissingen, WCA, Bilthoven, Netherlands.)

6-11. American Physiological Soc., Boston, Mass. (M. O. Lee, APS, 9650 Wisconsin Ave., Washington 14.)

6-16. Chicago Inst. for Hospital Administrators, 23rd, Chicago, Ill. (American College of Hospital Administrators, 620 N. Michigan Ave., Chicago 11.)

7-9. American Political Science Assoc., Boulder, Colo. (E. M. Kirkpatrick, 1785 Massachusetts Ave., NW, Washington 6.)

7-9. American Soc. of Photogrammetry, Los Angeles, Calif. (C. E. Palmer, 1000 11 St., NW, Washington 1.)

9-10. Soc. of General Physiologists, Woods Hole, Mass. (J. B. Buck, NIH, Bethesda 14, Md.)

9-10. Symposium on Electroluminescence and Photoconduction in Inorganic Phosphors, Brooklyn, N.Y. (J. J. Dropkin, Polytechnic Inst. of Brooklyn, Brooklyn 1.)

9-12. Sigma Delta Epsilon, Minneapolis, Minn. (Mary Gojdics, Barat College, Lake Forest, Ill.)

10. International Conf. of Medical and Reference Librarians, Brussels, Belgium. (Miss C. de Looze, Oeuvre Nationale Belge de Defense contre la Tuberculose, 56, rue de la Concorde, Bruxelles.)

10-11. Soc. for Social Responsibility in Science, annual, Swarthmore, Pa. (J. Engelberg, 4715 Baltimore Ave., Philadelphia 43, Pa.)

10-15. International Cong. on Cosmic Radiation, Mexico, D.F., Mexico. (H. A. Barton, IUPAP, 57 E. 55 St., New York 22.)

11-16. American Chemical Soc., Minneapolis, Minn. (A. H. Emery, 1155 16 St., NW, Washington 6.)

11-16. Laurentian Hormone Conf. AAAS, annual, Estes Park, Colo. (Committee on Arrangements, 222 Maple Ave., Shrewsbury, Mass.)

(See 15 July issue for comprehensive list)