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AMERICAN GEOLOGY, 1850-1900¹

By Dr. BAILEY WILLIS

STANFORD UNIVERSITY

IN 1850 the knowledge of geology was in an early exploratory stage, especially in America. In England and Europe sufficient progress had been made in the study of the stratified rocks and their contained fossils to contrast markedly with American lack of observations. It could not have been otherwise. The first task of a geologist, entering upon a new field, is to discover and locate the various rock formations. He must have a map, upon which to delineate their distribution. But in 1850 the mapping of America was very crude. Even the eastern country was known only in broad outline and the west was imperfectly explored. Nevertheless, by 1850, material progress

¹ Abstract of address before the American Philosophical Society, February, 1942.

had been made in determining the ages and distribution of the sedimentary rocks of the United States east of the Mississippi and of Canada. Logan of Canada, Hall of New York, the Rogers brothers of Pennsylvania and Virginia, Safford of Tennessee, and many others who felt the urge to read the record in the rocks, had identified the strata of certain great periods of geological time, had classified them in order of relative age, and had mapped them with such accuracy as the conditions permitted.

That they had been able to accomplish so much was in part due to the fact that the great leaders in English geology, Sedgewick and Murchison, had established for that country a succession of strata and fossils, which is the same as that of eastern North America.

was considered to have an effect upon the longevity of viruses, experiments were designed to determine whether the absence of oxygen would prevent inactivation of certain viruses.

Two potato viruses, Y-virus and Canada streak virus, were used in these studies. These viruses when extracted in air have a longevity at 15° C. of about 72 hours and 120 hours, respectively.

In order to extract the plant juices in CO₂ a special metal box was constructed, in the front of which were two round holes to which rubber sleeves were attached, permitting the operator free movement with hands inside the box. Above these openings a pane of glass was inserted in such a manner that it could be easily removed, thus leaving an opening through which plant material and equipment could be placed inside the box. Solid carbon dioxide (dry ice) was placed in this container. After the CO₂ gas had replaced the air, the box was closed and it was ready for operation. Potato leaves infected with a virus were placed inside this chamber and crushed in a mortar. A few cc of extracted juice were then put into each of several glass tubes. After these tubes were covered with clamped rubber tubing, they were removed from the chamber and attached to a modified lyophile apparatus, which can be easily constructed.

This lyophile apparatus consists of a manifold made of an inverted 2-liter round-bottom flask (Fig. 1, A) from the sides of the bulb of which extend two

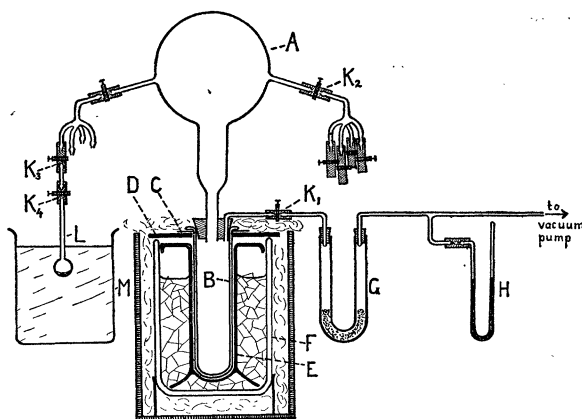


FIG. 1.

pieces of glass tubing. Each of these terminates in four outlets, to which tubes containing virus can be attached by means of rubber vacuum tubing. The sections of tubing K₃ and K₄, with screw clamps, allow removal of the tubes without releasing the vacuum. Four tubes L can be suspended in the air or be kept at a required temperature by submersion in a container M. The mouth of the flask A is fastened by means of a rubber stopper to a wide glass tube B used as a condensing chamber, which dips into a

2-gallon insulated vacuum jar F filled with a mixture of di-ethylene glycol and solid CO₂. The wire basket E permits easy removal of this chamber. The condensing chamber has a flared-out mouth which rests on a hard rubber ring D, which in its turn rests on the vacuum jar. The soft rubber washer C is used as a cushion. In the rubber stopper used to connect the manifold and condensing chamber, a glass tube (8 m.m.o.d.) is inserted which leads to a U-tube G filled with dryerite, to a manometer H, and finally to a vacuum pump. In order to facilitate cleaning, to prevent breakage and to aid in the detection of leaks, tubing and clamps K₁ and K₂ are used.

Dehydration of the virus was effected by a combination of evacuation, condensation and chemical drying, and resulted in formation of a thin film of solid particles inside the tubes L. The tubes were then clamped, removed from the lyophile apparatus, sealed and stored at room temperature. At monthly intervals a few tubes were broken and the contents of each used to inoculate 10 potato plants. Preparations of both the Y-virus and the Canada streak virus continued to produce 100 per cent. infection as long as 4 months after extraction and dehydration. Some of the tubes were improperly sealed and permitted air leakage; in all such cases the virus was invariably inactivated, indicating that oxidation had a direct or indirect effect on the destruction of the virus. Experiments are now in progress to secure additional information on this problem.

T. P. DYKSTRA

BUREAU OF PLANT INDUSTRY,
U. S. DEPARTMENT OF AGRICULTURE

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BOOKS RECEIVED

- BALDWIN, HENRY IVES. *Forest Tree Seed of the North American Temperate Regions*. Illustrated. Pp. xvi + 240. Chronica Botanica, Waltham, Mass. \$4.75.
- BOURNE, GEOFFREY. *Nutrition and the War*. Pp. xii + 148. University Press, Cambridge, England; Macmillan, New York. \$1.50.
- CONRAD, V. *Fundamentals of Physical Climatology*. Pp. vii + 121. Harvard University Blue Hill Meteorological Observatory.
- Eclipse Meteorology*. Harvard Meteorological Studies, No. 5. Pp. 109. Harvard University Blue Hill Meteorological Observatory.
- ELSASSER, WALTER M. *Heat Transfer by Infrared Radiation in the Atmosphere*. Harvard Meteorological Studies, No. 6. Pp. 107. Harvard University Blue Hill Meteorological Observatory.
- KELLER, ERNEST G. *Mathematics of Modern Engineering*. Pp. xii + 309. John Wiley and Sons, Inc. \$4.00.
- MCGEOCH, JOHN L. *The Psychology of Human Learning*. Illustrated. Pp. xvii + 633. Longmans, Green and Co., Inc. \$4.00.
- SARGENT, PORTER. *Education in Wartime*. Pp. 224. Porter Sargent, Boston, Mass. \$1.50.
- Studies of the Institutum Divi Thomae*. Vol. III. No. 1. Illustrated. Pp. vii + 222. Institutum Divi Thomae, The Athenaeum of Ohio, Cincinnati.

IMPORTANT TEXTS FOR FALL CLASSES

Refractories. *New second edition*

By F. H. NORTON, Massachusetts Institute of Technology. 798 pages, 6 x 9. \$7.50

The new edition of this book is a thoroughly up-to-date treatise on refractories. As before, the author deals mainly with the fundamental processes involved in the manufacture and use of refractories, and confines the descriptions of the manufacturing processes to American practice. Every chapter in the book, with the exception of the history, has been completely revised, and about half of the chapters have been wholly rewritten to bring the material in line with the latest advances in the field.

Quantitative Analysis. A Theoretical Approach.

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By WILLIAM RIEMAN, III, Rutgers University, JACOB D. NEUSS, Merck and Company, and BARNET NAIMAN, College of the City of New York. *International Chemical Series*. 480 pages, 6 x 9. \$3.50

Like the well-known first edition, the present revision emphasizes theoretical aspects and close relationships between theory and laboratory practice, and approaches the subject from the physical chemistry point of view. The book has been completely revised and largely rewritten and is now virtually a new book. Problems of acidimetry, alkalimetry, and pH are treated exclusively by the Bronsted concept. Redox potentials have been made easier to understand. Many new determinations have been added.

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By the late ROBERT B. LEIGHOU; revised by J. C. WARNER and associates, Carnegie Institute of Technology. *International Chemical Series*. 631 pages, 6 x 9. \$4.50

Gives the engineering student practical, up-to-date information on the chemistry of materials. The book has been fully revised and most of the material has been rewritten. New chapters have been added on Metallic and Inorganic Protective Coatings, the Technology of Shaping Metals and Alloys, Abrasives, Glass, and Organic Plastics. There is a discussion of the newer alloys and a section on the interpretation of phase diagrams.

The Chemical Technology of Petroleum. *New second edition*

By WILLIAM A. GRUSE and DONALD R. STEVENS, Mellon Institute of Industrial Research. 712 pages, 6 x 9. \$7.50

This book represents a revision of Gruse's *Petroleum and Its Products*, and is essentially a completely new book. The authors present a chemical discussion of the properties, refining, and utilization of petroleum, covering the making of hydrocarbons; applications of chemistry and physical chemistry in oil production; distillation; motor fuels; lubricants; cracking; etc. A new chapter has been added on thermodynamics as applied to hydrocarbon chemistry and there is a new chapter on production chemistry. The chapter on physical properties has been recast entirely.

Heat Transmission. *New second edition*

By WILLIAM H. MCADAMS, Massachusetts Institute of Technology. 455 pages, 6 x 9. \$4.50

In the new edition of this standard text approximately 85 per cent of the old material has been entirely rewritten and the rest has been revised. The purpose of the new edition is threefold: (1) to analyze the data on heat made available by the research of the last decade in the light of the basic mechanisms by which heat is transferred; (2) to present the recommended relations in the form of equations or graphs; and (3) to illustrate the method of attack on new problems.

Optical Methods of Chemical Analysis.

By THOMAS R. P. GIBB, JR., Massachusetts Institute of Technology. *International Chemical Series*. 385 pages, 6 x 9. \$5.00

Covers the fundamental theory, the design, and the practical application of the ten optical instruments which are most widely used in organic and inorganic chemical analysis. Emphasis is placed on the design and technique of modern rapid methods of micro and macro analysis by means of the spectrograph, spectrophotometer, colorimeter and allied instruments, refractometer, microscope, and polariscope.

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