



The Geochemical News

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SOCIETY AFFAIRS

The Secretary of the Geochemical Society, Konrad B. Krauskopf, announces the following list of nominations for officers of the Society for next year:

President: T. F. W. Barth
Vice-Pres.: Harold C. Urey
Treasurer: George T. Faust
Secretary: Konrad B. Krauskopf
Councilors: Th. G. Sahama
Ralph Cannon

Biographical sketches for each candidate, in accordance with the Council's recommendation of last November, will be prepared to accompany the ballots during the summer, and it is hoped that these biographies can also be included in a forthcoming issue of the Geochemical News.

SYMPOSIUM ON GEOCHEMISTRY

A symposium on geochemistry organized by the Commission on Geochemistry of the International Union of Pure and Applied Chemistry will be held in Göttingen, Germany, on August 21st and 22nd, 1959, to be followed by two days of field excursions. The topics for discussion at the Symposium are:

- 1) Stable nuclides in geochemistry
- 2) Long lived radionuclides in natural systems
- 3) Geochemistry of the halogens
- 4) Geochemical aspects of life on earth

Introductory lectures will be held by: 1) Rankama, 2) Harrison Brown, 3) Correns, 4) Oparin and Urey. They will extend invitations for further contributions.

The excursions will comprise a day's visit to the Harz and one to the Zechstein salt deposits along the Werra.

The local chairman of the Symposium is Professor C. W. Correns, Sedimentpetrographisches Institut, Lotzestrasse 13, Göttingen, Germany.

GEOCHEMICAL APPLICATIONS OF PAPER CHROMATOGRAPHY

by

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Filter paper chromatography, a relatively new technique of analytical chemistry, is now finding application to a variety of geochemical problems. The method offers a simple and inexpensive means of isolating dissolved substances in complex organic or inorganic solutions and is readily adapted to use in the field. Separations are accomplished by passing selected solvents through filter paper and across spots where drops of the unknown solution were previously applied and dried. Materials in the unknown tend to redissolve and migrate at different rates in the direction of solvent flow. The finished chromatogram is dried and later sprayed with reagents chosen to yield specific color reactions with suspected ingredients of the unknown. The color and location of spots obtained thus are used in identification of the resolved substances.

Variations in equipment and procedures are as diverse as its many applications. Tests may be carried out on strips, sheets, or circles of paper of different size and texture. Solvents may be fed to the paper by gravity (descending chromatography), capillary attraction (ascending and horizontal chromatography), or, more rarely, by spinning the paper and feeding the solvent near the center of rotation (centrifugal chromatography). The indicating reagents are usually sprayed, but may also be applied with brushes or by dipping techniques. Resolution of multi-spots on the chromatogram may require use of a second solvent which is fed at right angles to the first, thereby giving a second component of differential movement to substances in the unknown (two-dimensional or two-way chromatography).

Semi-quantitative analyses may be based on comparison of unknown chromatograms with standards. Individual spots may also be cut from the paper and eluted or ashed; more conventional techniques are then used for the final determination. Another quantitative approach is to measure the width and intensity of spots with a photo-cell or with a counter if the materials are radioactive.

Paleobiochemistry

Paper chromatography has been applied by different investigators to analysis of organic constituents of a wide age-range of geologic materials from recent sediments to acid extracts of early Precambrian rocks. Abelson (Carnegie Institute, 1953-1954) has utilized two-way ascending chromatography for separation of organic compounds synthetically produced by electrical discharges in artificial "primitive" atmospheres. In experiments similar to those of Miller but using atmospheres other than methane-ammonia, he has synthesized and isolated a number of amino acids.

In a survey of the organic composition of fossils, Abelson (1955-1956) has also used a combination of ion exchange and paper chromatography for separation of organic substances in a variety of ancient and modern bone, teeth, and shells. He has detected amino acids in all materials tested including the oldest, a Devonian fish plate. Reliable identifications were made by addition of radioactive tracers to the unknown.

Swain, Blumenthals, and Prokopovich (Univ. of Minnesota, 1958) have utilized one-way ascending chromatography in their search for organic materials in the Precambrian of Minnesota. Substances related to amino acids and aldehydes were isolated in their chromatograms of acid extracts and hydrolyzates from the Rove argillite and Thomson slate. In earlier work (Blumenthals and Swain, 1956) this group employed chromatography for study of amino acids in recent lake sediments and peat and their relation to existing environmental conditions. Quantitative estimates of the resolved compounds were made by photo-cell measurements of the paper strips.

The Anthropology Department, The University of Michigan, is applying two-dimensional chromatography in their attempts to extend present dating techniques for bone samples. They are seeking some property of proteins that changes consistently with time and will permit closer estimates of the age of anthropological specimens. At present, research is focused on bone samples

from Indian Knoll, Kentucky (3900-5500 years), but the group has had previous success in isolating amino acids from higher vertebrate bone as old as one million years (Australopithecus). They have found remarkable qualitative similarities between the amino acid chromatograms of some of these older materials and those of recent bone from related forms.

Mineralogy

The simplicity of required equipment, the possibility of simultaneous detection of cations or anions, the very small quantity of unknown solution initially needed, and the adaptability of the method to either field or laboratory work are some of the features that should render paper chromatography a valuable supplement to present techniques of mineral analysis. Against these advantages is weighed the fact that chromatography is slow (diffusion of solvents may require up to 24 hours). Even this disadvantage is offset to some extent by the facts that a large number of unknowns may be run simultaneously and the analyst's time is only a small fraction of that required for the whole operation.

Weiss, Fallab, and Erlenmeyer (1952) were among the first to apply paper chromatography to mineral analysis. They developed semi-quantitative tests for small amounts of uranium, copper, and iron in minerals using one-way ascending techniques. Their method for uranium has a sensitivity of 0.5% uranium and an accuracy of 20%.

H. Agrinier (1957) has stressed the advantages of filter paper chromatography over more conventional techniques. He has used circular and one-way ascending techniques to illustrate the ready separation of boron, beryllium, and lithium from interfering elements. He also presents semi-quantitative procedures for silver, nickel, cobalt, copper, tantalum and titanium in minerals based on comparison with standard chromatograms.

At The University of Michigan, one-way and two-way ascending techniques have been used to establish spot tests for the sulfo-salt minerals. At present, centrifugal chromatography is being used in analysis of the opaque ore minerals to determine whether this method will cancel out the time disadvantage of the slower diffusion techniques. The hope is to develop a rapid scheme for qualitative analysis of very small samples of any sulfide or sulfo-salt.

Geochemical Prospecting

Among its geological uses, paper chromatography has perhaps found greatest application in geochemical prospecting. Hunt, North, and Wells (1955-1956) of the National Chemical Laboratory at Teddington, Middlesex, England, have established simple and rapid means for determination of uranium, lead, tantalum, copper, cobalt, nickel, and niobium in soil samples. Separations are accomplished by upward diffusion of solvents on special slotted sheets of paper which, after spraying, are visually compared with standards. They have also developed a provisional chromatographic method for the estimation of bismuth in soils. The U. S. Geological Survey (Thompson and Lakin, 1957; Ward and Marranzino, 1957) has modified the technique of Hunt et al. and, using the same slotted sheets of filter paper, standardized procedures for analysis of uranium in soils, rocks, and natural waters. The group at Denver is now preparing a report on determination of uranium in plants using the same method. Following the same procedures for separations, Coulomb and Goldstein (1956) cut the uranium-bearing spots from the chromatogram and perform the final determination fluorimetrically. This method has been used extensively in the uranium exploration of France.

These techniques have been applied by mining and exploration companies in Africa and have been used by the U. S. Geological Survey for determination of uranium in many samples from the Colorado Plateau. The Survey has also employed the copper-nickel-cobalt test of Hunt et al. in some Alaskan work and the tantalum method for evaluation of possible tantalum ores.

(A. A. North of the National Chemical Laboratory and H. W. Lakin of the U. S. Geological Survey were kind enough to brief the writer on research activities of their respective groups.)

Selected References

Of the many excellent articles available on the subject of chromatography, only a few of more geochemical interest can be cited here. A selective bibliography was recently sent to the writer by Schaar and Company which lists over 1000 references on paper chromatography alone. This covers the chemical literature in 25 major periodicals for the period 1944-1953. Excellent bibliographies are also contained in the texts by Lederer (1953), Smith (1953), and Pollard and McOmie (1953) listed below:

- Abelson, P. H., Organic constituents of fossils: Annual Rept., Geophysical Lab., Carnegie Inst. of Wash., pp. 171-174 (1955-1956).
- , Inorganic synthesis of amino acids: Annual Rept., Geophysical Lab., Carnegie Inst. of Wash., pp. 97-101 (1953-1954).
- Agrinier, H., Applications de la chromatographie ascendante de partage sur papier à la détermination de certains éléments dans les minéraux: Bull. Soc. Franc. Miner. et Crist., Vol. LXXX, pp. 181-193, 275-292 (1957).
- Blumenthals, A., and F. M. Swain, Comparison of amino acids obtained by acid hydrolysis of lake sediments, central Minnesota: Geol. Soc. Amer. Bull. 67, p. 1673 (1956).
- Coulomb, R., and M. Goldstein, Prospection et recherche de l'uranium, Deuxième Partie Les Techniques Annexes: Chapter II, Prospection Géochimique, Extrait de la Revue de L'Industrie Minière, Numéro Spécial 1R (1956).
- Hunt, E. C., A. A. North, and R. A. Wells, Application of paper chromatographic methods of analysis to geochemical prospecting: Analyst, 80, pp. 172-194 (1955).
- Lederer, E., and M. Lederer, Chromatography; a review of principles and applications. Amsterdam, Houston, Elsevier Pub. Co. (1953).
- North, A. A., and R. A. Wells, Analytical methods for geochemical prospecting: XX Int. Geol. Cong., Mexico, Resúmenes, pp. 372-373 (1956).
- Pollard, F. H., and J. F. W. McOmie, Chromatographic Methods of Inorganic Analysis. Butterworth, London (1953).
- Smith, O. C., Inorganic Chromatography. Van Nostrand, New York (1953).
- Solow, H., Geochemistry: the Prospectors new tool: Fortune Magazine, p. 126 (1959).
- Stanton, R. E., and M. A. Gilbert, Copper, cobalt, and nickel in soils, sediments, and rocks by chromatography: Tech. Com. No. 4, Geochemical Prospecting Research Centre, Imperial College of Science and Technology, London, England (1956).
- Swain, F. M., A. Blumenthals, and N. Prokopovich, Bituminous and other organic substances in the Precambrian of Minnesota: Bull. Amer. Assoc. Petr. Geol. 42, pp. 173-189 (1958).
- Thompson, C. E., and H. W. Lakin, A field chromatographic method for determination of uranium in soils and rocks: U. S. Geol. Surv. Bull. 1036-L (1957).
- Van Wambeke, L., Les méthodes de prospection de l'uranium et du thorium: Centre d'Etude de L'Energie Nucléaire C.E.N., Bruxelles (1957).
- Ward, F. M., and A. P. Marranzino, Field determinations of uranium in natural waters: U. S. Geol. Survey Bull. 1036-J (1957).
- Weiss, A., S. Fallab, and H. Erlenmeyer, Semi-quantitative Bestimmung von kleinen Mengen Uran, Kupfer, und Eisen in Gesteinen: Helv. Chim. Acta. 35, p. 1588 (1952).

MEMORIAL OF SAMUEL ZERFOSS
November 1, 1912 - December 19, 1958
by
A. Van Valkenburg

Dr. Samuel Zerfoss, Chief of the National Bureau of Standards Refractories Section, died on December 19, 1958, from injuries received in a tragic pre-holiday automobile accident in Washington, D. C. He and two other Bureau scientists were en route to Baltimore on official business when the accident occurred. Dr. Zerfoss joined the staff at NBS in April 1955 as an expert in the field of ceramic sciences, and four months later was named head of the Refractories Section where he directed a program of fundamental research on the properties of materials at high temperatures. Before joining the NBS staff, he worked for eight years at the Naval Research Laboratory where he was in charge of the Crystal Growth and Preparation Section of the Crystal Branch Laboratory. From 1942 to 1947 he was an Assistant Professor of Ceramics at Pennsylvania State University, teaching both graduate and undergraduate courses in the field of high-temperature chemistry. In addition to his own research and responsibilities as head of the Refractories Section, he served as planning coordinator for the Bureau's Scientific Staff Meetings and was a member of the Educational Committee. Dr. Zerfoss is survived by a sister, Martha Zerfoss of Philadelphia, and two brothers, George Zerfoss, a Nevada mining engineer, and Commander Allen Zerfoss, USN, San Pedro, California.

BOOK REVIEWS

AGRICOLA ON METALS, by Bern Dibner. Burndy Library, Norwalk Connecticut, 1958. Paper bound, 8 1/4 x 10 3/4, 128 pages, 72 figures.

This exceedingly interesting book contains synopses on the twelve books on mines and metals as presented by Agricola in his monumental work DE RE METALLICA. It is not a translation but describes each of the books of the monograph in concise and complete form. Many of the original woodcuts from De Re Metallica have been produced to accompany the descriptions and the discussion of Agricola's ideas. In addition to these summaries there are also short chapters dealing with the following subjects: Mining and metals before Agricola; Bronze and steel; the Renaissance; Geology in Agricola's time; Metallurgy before Agricola; Georgius Agricola himself; and one on De Re Metallica as a whole. The book concludes with a section on the influence of Agricola and his works. To those readers who are familiar with the Hoover translation of Agricola's work, this book will come as a valuable addition, for it is in a sense a commentary on De Re Metallica and a supplement which enables the reader to place the monograph in its proper historical perspective. The book is highly recommended to all students of geology.

E. W. H.

GROWTH AND PERFECTION OF CRYSTALS, edited by Doremus, Roberts, and Turnbull. 609 pp., illustrated. John Wiley and Sons, Inc., New York, 1958. \$12.50.

The Growth and Perfection of Crystals, edited by R. H. Doremus, B. W. Roberts, and David Turnbull, all of the General Electric Research Laboratory, contains 44 papers by 63 authors of international repute. The book is a photo-offset printing of the proceedings of the International Conference on Crystal Growth held at Cooperstown, New York, on August 27-29, 1958. The conference was sponsored by the Air Force Office of Scientific Research and the General Electric Research Laboratory.

The book is divided into six parts. Part I, which covers in 8 pages the pertinent history of the study of crystal growth and morphology, is the introductory lecture by F. C. Frank. The follow-

ing parts are The Growth of Crystal Whiskers, Properties of Crystals and Crystal Imperfections, Growth of Crystals in the Solvent Phase, Growth of Crystals in the Solute Phase, and finally, The Crystallization of Polymers. The papers are well illustrated by photographs and diagrams. The Author and Subject indexes occupy the last 16 pages. Discussions by participants of the meeting follow many of the papers.

In addition to being a compilation of current research on crystal morphology, growth, and properties, the book is a valuable bibliographic compilation, by virtue of the references and the author index. This is particularly true since the literature of this aspect of crystallography is voluminous and widely scattered. It is commendable that the publishers were able to produce the book in so short a time. The resultant lack of homogeneity is not objectionable.

The Growth and Perfection of Crystals should be a valuable reference for all students and research workers in the field of crystal properties and growth mechanism of substances ranging from metals to long chain polymers.

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THE ATOM AND THE ENERGY REVOLUTION, by Norman Lansdell. Philosophical Library, 15 E. 40th St., New York 16, 1958. 200 pp., illustrated. \$6.00.

The Atom and the Energy Revolution is a timely summary of the present world situation involving atomic energy and power requirements. The work is designed for the general reader who wishes to obtain an understanding of the social and political implications of new developments in atomic energy, as well as for the businessman who will have to adjust himself to new economic concepts, and also for specialists in the various related fields. The main subjects that are covered include: 1) summary of world energy resources and world energy requirements. 2) A discussion of possible new sources of energy: wind power, water power, traditional fuels, solar energy and others. 3) An account of the structure of the atom and of the processes of fission and fusion. 4) Various techniques for releasing atomic energy, with more detailed descriptions of the fission process and its materials and of fusion reactors as well. 5) A discussion of the sources of natural materials required for atomic energy developments, not only fissionable materials, uranium and thorium, but allied elements including those of low neutron capture cross sections and high neutron capture cross sections. 6) The Exploitation of Atomic Energy deals with those applications in general and with specific developments in a great many countries. 7) International organizations are discussed, not only agreements between states but such formal associations as Euratom and national organizations for atomic development. 8) Radiation risks are described and insurance against them. The final chapter is entitled "The World Impact of Atomic Energy", and attempts to assess the influence of atomic energy on industry, world trade, and politics. The book concludes with a glossary of technical terms employed.

This is a much needed and very welcome summary of the relationships between the development in atomic energy and consequent economic, social, and political changes. Geologists and geochemists as well as general readers will benefit from studying its theses.

E. W. H.

COLORIMETRIC DETERMINATION OF NONMETALS. Edited by David F. Boltz. Interscience Publishers, 250 Fifth Avenue, New York 1, N. Y., 1958. 372 pp. \$8.50.

This is the eighth volume in the Chemical Analysis series of monographs on analytical chemistry and its applications. It is an excellent book and should be included in the reference library of all analytical laboratories.

The introductory chapter is theoretical and consists of a very lucid discussion of Beer's Law, the principles of visual and photoelectric colorimetry, spectrophotometry, turbidimetry and nephelometry, methodology in colorimetric analysis, and the various types of separation methods. Each of the chapters following the theoretical section is concerned with the analysis of an individual element.

Each is written by an expert in the field and each gives a comprehensive evaluation and discussion of the different methods of analysis available and their application to the determination of the element in different types of materials. A bibliography is given at the end of each chapter. The elements discussed are: phosphorus, silicon, nitrogen, chlorine, bromine, iodine, fluorine, sulfur, tellurium and selenium, and boron.

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THE EXPLORATION OF TIME, by R. N. C. Bowen. Philosophical Library, 15 E. 40th St., New York 16, N. Y., 1958. 143 pages, 40 illustrations. \$6.00.

This book gives a clear, concise, and accurate account of all methods that have been used in the various sciences for measuring time. Included also are chapters that give the general geological evolution of the earth and one on the science of dating. These are followed by a discussion of the nature of time. The individual sections deal with physical and chemical methods - fluorine content, radioactive methods of determination; astrophysical and astronomical methods; botanical methods; zoological methods; geological methods (varves), loess, sea-level fluctuations, weathering rates etc.; archaeological methods; anthropological methods; and meteorological methods. The book concludes with a summary of the impact of geochronological methods upon science, the author pointing out that geochronological methods have been in use for about three-quarters of a century and have resulted in a fundamental re-orientation of the attitude of the scientific world to the age of the earth and of man. For those of us who are primarily concerned with geological techniques and particularly those dealing with radioactivity, this book is a most welcome addition to our fund of general knowledge on all other age determination methods.

E. W. H.

PUBLICATIONS RECEIVED

Photostat copies of any of the publications listed below, with the exception of the trade journals which are not kept on file, may be received by any reader who wishes to pay for the cost of their reproduction plus postage. Please specify if negative is sufficient (cheaper) or positive is required.

21st List of New Mineral Names, by L. J. Spencer. Mineral. Mag. 31, pp. 951-977, 1958.

Bull. Comm. Geol. Finlande, No. 180, 1958. 145 pp. Contains articles on serpentinites of Sierra Leone, prospecting for molybdenum through its dispersion in till, examples of granitization of plutonic rocks, quartz lamellae in Finnish quartzites, the late glacial period and its correlation with ice-retreat stages in Finland, Esker stone counts in south Finland, chloritoid schists in Sierra Leone, the Outokumpu boulder terrain and Baltic Sea sedimentation.

Bull. Comm. Geol. Finlande, No. 181, 1958. 137 pp. "On the charnokites in the light of a highly metamorphic rock complex in southwestern Finland," by Kauko Parras. A detailed account of these charnokites is accompanied by a general summary of charnokites everywhere in the world.

Bull. Comm. Geol. Finlande, No. 182, 1958. 70 pp. "Radioactive age of some Finnish Pre-Cambrian minerals." By Olavi Kouvo.

Zur Methodik der geologischen Erkundung in Abhängigkeit von den Lagerstättentypen. By Oscar

- Oelsner. Zeits. Angew. Geol., 4(7), 322-332, 1958.
- Freiberger Forschungshefte, Mineralogie-Lagerstättenkunde C 46. Tektonik und Genesis der Erzlagerstätte von Freiberg (Zentralteil). By Ludwig Baumann. 1958. 208 pp.
- Freiberger Forschungshefte, Mineralogie-Lagerstättenkunde C 52. Die Erzlagerstätten des Neudorfer Gangzuges. By O. Oelsner, M. Kraft, H. Schützel. 1958. 114 pp.
- Die erzgebirgischen Granite, ihre Vererzung und die Stellung der Bi-Co-Ni-Formation innerhalb dieser Vererzung. By Oscar Oelsner. Geologie, 7(3-6), 682-701, 1958.
- Zur Entdeckungsgeschichte des Urans. By Helmut Kirsch. Chemiker-Zeitung, Chemische Apparatur, 82(2), 33-36, 1959.
- Geochemische Untersuchungen an den ultrabasischen und basischen Gesteinen der Münchberger Gneismasse (Fichtelgebirge). By Paula Hahn-Weinheimer. Neues Jahrb. Mineral. Abh., 92(3), 203-278, 1959.
- African charnokites and related rocks. By R. A. Howie. Congo Belge Serv. Geol. Bull. 8, fasc. 2, 1-14, 1958.
- A system of ore mineral identification. By S. H. U. Bowie and K. Taylor. Mining Mag., Nov-Dec. 1958, 3-23.
- Data on the mineralogy and petrology of the dolomite-bearing northern contact zone of the Querigut granite, French Pyrenees. By H. Struwe. Doctoral dissertation, Univ. Leiden, 1958. Leidse Geol. Mededel. 22, 235-349.
- Plagioclase twinning in Ryoke metamorphic rocks from the Mitsue-Mura area, Kii Peninsula, central Japan. By Kanenori Suwa. Jour. Earth Sci., Nagoya Univ., 4(2), 91-122, 1956.
- Differential thermal analysis studies on the high-low inversion of vein quartz in Japan. By Keinosuke Nagasawa. Jour. Earth Sci., 1(2), 156-176, 1953.
- Tanganyika. Published by the Department of Public Relations, Dar-es-Salam. An interesting, informative and lavishly illustrated booklet of 28 pages on Tanganyika, its geography, history, races, cultures, resources, and industry.
- Notas à margem de "O Paladio e a platina no Brasil". By E. Hussak. Bol. Soc. Bras. Geol., 7(2), 15-26, 1958.
- Meteorito encontrado a margem do Corrego Areado, Municipio de Patos, Minas Gerais. By Djalma Guimaraes. Bol. Soc. Bras. Geol., 7(2), 33-35, 1958.
- Geology of the Montgary pegmatite. By R. W. Hutchinson. Preprint No. 59 H 46, Ann. Meeting AIME, San Francisco. 1959. 19 pp.
- Ontario and New Horizons in 1958. Report of the Ontario Department of Mines, 1959. 141 pp.
- Freshwater environment of deposition of Precambrian banded iron formations. By J. L. Hough. Jour. Sed. Pet., Dec. 1958, 414-430.
- Application of nuclear explosions to oil-shale utilization. U. S. Bur. Mines, Laramie (Wyoming) Petroleum Research Center. 1959. 22 pp.

- Geological map of California, Death Valley Sheet 1:250,000, 1958. California Divis. Mines, \$1.50.
A long-awaited map which is the companion to the text "Death Valley" published in Calif. Divis. Mines, Mineral Info. Serv., 11(10), Oct. 1958.
- The groundwater situation in Montana. By S. L. Groff. Montana Bur. Mines and Geol., Inf. Circ. 26, 1958. 45 pp.
- Geology and water resources of the Bitterroot Valley, Montana. By R. G. McMurtrey, R. L. Konizeski, and F. Stermitz. Mont. Bur. Mines and Geol. Bull. 9, 1959. 40 pp.
- Norelco Reporter. Vol. 5, No. 2, March-Apr. 1958. Contains an article by M. C. Haber in evaluation of Diesel fuel oils with the electron microscope.
- Museum News. Vol. 77, No. 1, Mar. 1959. Of particular interest is the article by Leonard Carmichael, The Compleat Museum, a description of the manifold ramifications of our largest museum complex, the Smithsonian Institution.
- Tin and its Uses. Quart. Jour., Tin Research Institute, No. 45, Winter 1958. A noteworthy article is that which describes the oldest can of food, opened after 134 years and found to contain still edible meat.
- Engenharia, Mineracao e Metalurgia. Vol. 28, No. 166, Oct. 1958 (Brazil). An article by Djalma Guimaraes entitled Granitizacao e metalogenese (in Portuguese).

CALENDAR

June

May 30-

June 6 5th World Petroleum Congress, Permanent Council, New York. Write C. E. Davis, Gen. Sec'y., 527 Madison Ave., New York 22.

1-4 Am. Assn. of Spectrographers, Ann. Symposium. Chicago.

1-5 World Petroleum Congress and Exposition. New York City.

11-12 IUCr. Commission on Crystallographic Apparatus, two conferences at Karolinska Institutet, Stockholm, Sweden. Inquire: Dr. Wm. Parrish, Philips Laboratories, Irvington-on-Hudson, New York.

15-17 Second Symposium on X-ray Microscopy and X-ray Microanalysis, Stockholm. Inquire: Dr. G. Hoglund, Inst. f. Medicinsk Fysik, Karolinska Inst., Stockholm 60, Sweden.

15-19 Molecular Structure and Spectroscopy, Symposium. Columbus, Ohio.

Aug.

24-30 5th Congress of the International Commission of Optics. Stockholm, Sweden.

30-

Sept. 12 International Oceanographic Congress, AAAS, UNESCO and ICSU special committee on oceanic research cooperating; United Nations Bldg., New York. Inquire: Dr. Mary Sears, Woods Hole Oceanographic Institution, Woods Hole, Mass.

Sept.

14-17 American Mining Congress, Metal Mining and Industrial Minerals Convention, Denver.

24-26 SME Industrial Minerals and Coal Divisions, joint meeting, Bedford Springs, Pennsylvania.

ION EXCHANGE COLUMN

Your editor attended the joint meetings of the 27th Annual Convention of the Prospectors and Developers Association of Canada, in conjunction with the 12th Annual Meeting of the Geological Association of Canada and the 4th Annual Meeting of the Mineralogical Association of Canada in Toronto, from March 1-4. As usual, both the technical and social programs were first class. The Canadian hosts are to be congratulated upon all aspects of their program, and particular thanks are due to Dr. Walter M. Towell, who was chairman of the program committee for the technical sessions.

Among the papers presented in the various sessions of the three organizations that are of particular interest to geochemists are the following:

- AMSTUTZ, G. C. Syngenetic zoning in ore deposits.
 BANNERMAN, H. M. Research in mineral resources.
 BOONE, G. Feldspar-quartz phase relations in a granite porphyry intrusion, Gaspe.
 BYERS, A. R. Base metal mineralization associated with pegmatite in Saskatchewan.
 DUFFELL, S. Geology and iron deposits of Mt. Wright area, Quebec.
 FERGUSON, R. B. The origin of orthoclase and microcline.
 HEINRICH, E. W. Occurrence and significance of exotic accessory minerals in igneous rocks.
 HOLMAN, R. H. C. A geochemical study of a copper-bearing swamp near Sackville, New Brunswick.
 JOLLIFFE, A. W. Geochemical patterns in certain ore deposits.
 KEYS, D. A. Canada's role in the peaceful uses of atomic energy.
 MORRIS, P. An application of x-ray fluorescence and flame photometry to the study of minerals.
 MOYD, L. Titanium sand deposits in Australia and West Africa.
 PATCHETT, J. Some contributions to the mineralogy of the Blind River ore conglomerates.
 PERRAULT, G. Determination of the chemical composition of pyrochlore from Oka, Quebec, by x-ray fluorescence.
 REMICK, J. H. Geology of the Opawica River anorthosite, northeastern Abitibi, Quebec.

Unfortunately abstracts generally were not available of most of these papers. However, it is understood that summaries of many of the more important papers are to be published in the April number of the Canadian Mining Journal.

The Geochemical Society had a display at the joint meeting, consisting of an exhibit of issues of the Geochemical News and of the three translated issues of the Geokhimiya. At the accompanying table the Society disposed of a considerable number of applications for membership and also applications for subscriptions to the translation.

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The Fifth Nuclear Congress met April 5-10. This year's Congress dealt primarily with nuclear engineering, instrumentation, physics, chemical processing, metallurgy and allied subjects. There were no sessions on raw materials or geological problems. Copies of the program may be obtained from Engineers Joint Council, 29 W. 39th St., New York 18, N. Y., and preprints of most of the papers are reportedly available from the same source.

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New Publications

The Geochemical Society extends to the American Geological Institute its congratulations on the appearance of GeoScience Abstracts No. 1, which carries 291 abstracts and replaces the Geological Abstracts formerly published by the Geological Society of America. It has been announced that the second issue, with about 260 abstracts, was already at the printers late in March. The Institute invites all organizations to submit volunteer abstracts for all papers, maps, and guidebooks

which are not published with author abstracts. All volunteer abstracts should carry the name of the abstractor, so that he may receive proper credit. This applies also to any of the shorter notes or discussions that appear in the various earth science journals, most of which never carry author abstracts. Many colleges and government surveys publish news letters which carry informative material, and abstracts of significant articles that appear in these publications are also solicited for GeoScience Abstracts.

The American Geophysical Union announces the publication of Geophysical Monograph No. 3 of the American Geophysical Union (Publ. No. 652 of the National Academy of Sciences-National Research Council), "The Atmospheric Chemistry of Chlorine and Sulfur Compounds Based on a Conference held in Cincinnati, Ohio, November 1957." The chairman of the conference was Dr. James P. Lodge, Jr., and it is expected that the volume will appear in the late spring or early summer of this year. It contains 23 articles on the chemistry and geochemistry of atmospheric chlorine and sulfur.

The Pergamon Press announces the publication of Clays and Clay Minerals; Proceedings of the Sixth National Conference on Clays and Clay Minerals, Berkeley, California, August 1957. Edited by Ada Swineford. The cost of the volume is \$8.50. Pergamon Press, Inc., 122 E. 55th St., New York 22, N. Y.

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The Journal Club of the Departments of Geology and Mineralogy of the University of Michigan were fortunate to have as its guest speaker early in March Dr. Charles Milton of the U. S. Geological Survey, who delivered an extremely interesting account of the bazaar mineralogy of the Green River, Wyoming, Utah and Colorado evaporite deposits. An abstract of his lecture follows:

Green River Mineralogy
by Charles Milton, U. S. Geological Survey

The Eocene Green River formation in Utah, Wyoming, and Colorado contains the worlds largest known hydrocarbon reserves ("oil shale") and in Wyoming, vast deposits of trona, sodium carbonate-bicarbonate. These lacustrine beds are characterized by an extraordinary mineralogy, such as complex silicates of sodium, calcium, barium, boron, titanium, and niobium, and many complex carbonates. These include remarkable minerals, some unique to the Green River; such as shortite $\text{Na}_2\text{CO}_3 \cdot 2\text{CaCO}_3$, eitelite $\text{Na}_2\text{CO}_3 \cdot \text{MgCO}_3$, bradleyite $\text{Na}_3\text{PO}_4 \cdot \text{MgCO}_3$, garrelsite $(\text{Ba}, \text{Ca}, \text{Mg})\text{B}_3\text{SiO}_6(\text{OH})_3$, loughlinite $(\text{Na}_2\text{Mg})_2\text{Si}_3\text{O}_6(\text{OH})_4$, and reedmergerite NaBSi_3O_8 (boron-albite), NaMgF_3 (n. sp.) and others, found elsewhere only in pegmatite or igneous environment, such as dawsonite $\text{Na}_3\text{Al}(\text{CO}_3)_3 \cdot 2\text{Al}(\text{OH})_3$, burbankite $\text{Na}_2(\text{Ca}, \text{Sr}, \text{Ba}, \text{Ce})_4(\text{CO}_3)_5$, labuntsovite $(\text{K}, \text{Ba}, \text{Na}, \text{Ca}, \text{Mn})(\text{Ti}, \text{Nb})(\text{Si}, \text{Al})_2(\text{O}, \text{OH})_7 \cdot \text{H}_2\text{O}$, elpidite $\text{Na}_2\text{ZrSi}_6\text{O}_{15} \cdot 3\text{H}_2\text{O}$, leucosphenite $\text{CaBaNa}_3\text{BTiSi}_9\text{O}_{29}$, magnesioriebeckite $\text{Na}_2(\text{Mg}, \text{Fe}^{II})_3(\text{Fe}^{III}, \text{Al})_2\text{Si}_8\text{O}_{22}(\text{OH})_2$ and acmite, $\text{NaFeSi}_2\text{O}_6$; and besides these are many more extremely rare or otherwise noteworthy species. All of these minerals have formed under conditions of lacustrine sedimentation or diagenesis, with no igneous, hydrothermal, or metamorphic activity whatsoever.

A complete discussion and description of these unusual mineral occurrences is presented in Researches in Geochemistry published by John Wiley and Sons, Inc., which will be reviewed in a forthcoming issue of Geochemical News. Royalties from the sale of this volume have generously been donated to the Geochemical Society to bolster its publications fund.

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Sand-in-the-Gears-of-Learning Department

A cross cutting intrusive of ophitic gabbro -- dikeabase.

With the advent of spring, a young lady would-be geologist wondered why the singular of specimen isn't speciman.

Excerpts from first-year geological examinations (foreign imports section):

"Garnet, formed of rhombic dodecahedral crystals."

Jasper -- "Used for making stone age tools."

Chlorite -- "Use. Good for First year exam specimens."

Garnet -- "One of the few naturally occurring synthetic gemstones."

Talc -- "Used in some lethal and constipative medicines and for babies."

Plagioclase -- "Used for refectory purposes."

Topaz -- "A Ca. Mg silicate, H6, used as a gemstone but has disadvantages as other things are known to scratch at it."

Culled from the description of the geology of a pegmatite: "The pegmatite contains a number of potential valuable miners... (and) is still-like in attitude."

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Editor

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