THE PICKING TABLE

FRANKLIN OGDENSBURG MINERALOGICAL SOCIETY, INC.

BOX 146

FRANKLIN, NEW JERSEY, 07416

VOLUME V AUGUST 1964 NUMBER 2

CALENDAR OF EVENTS - FALL 1964

Saturday, September 19th	Field Trip, 9:00 A.M. to Noon, B. Nichols (Cellate) Quarry, Franklin Meeting - 2:00 P.M., American Legion Hall Speaker - Mr. Burton Dezendorf, American Optical Company Topic - Mineralogy and the Microscope
Sunday September 27th	Special Field Trip, Noon to 4:00 P.M., Limecrest Quarry, Sparta, N.J.
Saturday, Sunday October 10th-11th	8th Annual Mineral Show - sponsored by the Franklin Kiwanis Club, Franklin Armory, Franklin, N. J.
Saturday October 17th	Field Trip, 9:00 to Noon Andover Iron Mine, Andover, N. J. Meeting - 2:00 P.M. Hardyston School. A panel discussion and recent information on Franklin minerals.
Sunday November 22nd	Field Trip, 9 A.M. to Noon. Munson Quarry, Franklin, N. J. Meeting - 2 P.M., American Legion Hall Speaker - Mr. Robert W. Metsger, New Jersey Zinc Company Topic - The Geology of Sussex County

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The Picking Table is issued twice a year; a February number to reach members about March 1st with news and the Club Spring program; and an August number to reach members about September 1st with news and the Club Fall program.

F.O.M.S. OFFICERS FOR THE YEAR 1964

President	Frederick A. Kraissl
Vice President	Dr. Harry E. Montero
Secretary	Henry M. Althoen
Treasurer	Julian M. Butler

Trustees

John L. Baum — Ferd DeP. HasBrouck
Paul Chorney — Alexander F. Knoll
Frank Z. Edwards — William D. Spencer
Richard Hauck (Alternate)

Committee Chairmen

Program	Frederick A. Kraissl
Field Trip	Henry M. Althoen
Membership	Dr. Harry E. Montero
Display	Ewald Gerstmann
Identification	Alexander F. Knoll
Nominating	Richard Hauck
Historical	Perry Armagnac and Mrs. E. Packard Cook
Safety	Julian M. Butler
Museum	William D. Spencer
Publicity	John L. Baum

Editor of the Picking Table - Frank Z. Edwards
Mimeo and Typing -Louise W. Borgstrom

Fall Program

Mr. Henry Althoen, our energetic and capable Secretary and Field Trip Chairman, has arranged for four attractive field trips this Fall. Please note that two of these have been scheduled for Sundays at the request of members who cannot attend our usual Saturday activities. Repeat trips will be made to three locations; the old Andover Iron Mine has not been visited by our Club before. Full details for each trip will be given in our monthly mailings.

Members who have attended our joint field trips with the New Jersey Audubon Society, have already met and heard Mr. Burton Dezendorf, our September speaker. Mr. Dezendorf is the President of the New York Microscope Society and is Sales Manager for Scientific Instruments of the American Optical Company. His talk on the use of the microscope in mineralogy should be valuable to every collector who owns or hopes to own a microscope.

Mr. Robert Metsger, Resident Geologist at the Sterling Hill mine of the New Jersey Zinc Company, after a lapse of several years, will return to our speaker's rostrum in November. This learned and lucid gentleman will talk on the Geology of Sussex County, a topic of interest to all Franklin collectors.

Many members have requested we again hold a panel discussion on Franklin minerals and mineralogy with emphasis on recent news and developments. Such a program has been scheduled for October with Mr. John L. Baum, Resident Geologist of the New Jersey Zinc Company, Franklin, heading a panel of qualified club members.

Also plan to attend the 8th Annual Mineral Show of the Franklin Kiwanis Club to be held on October 10th and 11th at the Franklin Armory, Routes #23 and #517, Franklin, New Jersey. Interesting mineral displays, a top quality dealer area, free entry to the Buckwheat Dump and the Mine Replica, give excellent value for a nominal admission fee. This event is always a must for the Franklin enthusiast.

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Our Spring program was popular with the big day, May 16th, when a record number of 210 members were drawn by a field trip to Sterling Hill, and Dr. Frederick H. Pough, who spoke on the Carbonate Minerals of Franklin. The Third Annual Swap Session sponsored jointly by the North Jersey Mineralogical Society and the F.O.M.S. on May 23rd, also set a new record for participants from many states. Our other field trips and meetings were well attended and received.

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LAWSON H. BAUER AWARD

At our meeting of May 16th, the Lawson H. Bauer Award was presented to Stanley G. Schaub, posthumously. The presentation was made to Mrs. Arlita K. Schaub, his widow, by Jack Baum, for the Society. Mr. Baum's speech, quoted here, details Mr. Schaub's qualifications for the award.

"Stanley Schaub was a rare combination of artistic talent, technical skill, curiosity, independence and great affection for people. All who knew him felt this and, because they felt it, made many demands on his time and energy, knowing that these would be given without second thought, without stint and without favor. He was a man of great integrity, satisfied with only his own and others' best, a gentleman of the old style in the best sense.

He was born in Salt Lake City, Utah, into a gifted family. His father was a well known inventor. Stanley showed musical talent at an early age. He studied at the New England Conservatory of Music. He also attended Cornell University and the Virginia Conservatory. Many remember with pleasure the Emerson Male Quartet of the early days in radio of which Stanley was the director. He also developed music for the motion pictures and stage shows. In later years he was a teacher of piano in Westfield, New Jersey.

His interest in mineralogy took a direction typical of his character. His quest for his best efforts in this field required that he be as sure as he could of the identity of his specimens. Despite his lack of formal training in chemistry and crystallography he applied himself to learning microchemical analysis and the use of the polarizing microscope. He not only acquired more than the usual skill in these two difficult fields, but he devised his own equipment by adapting a common microscope to a polarizing type by making his own polarizing equipment, condenser, compensator and Bertrand lens. Those who saw him work were constantly amazed at the quality of the results obtained with his home-made equipment.

He had special interest in the mineralogy of the Franklin area. He had many calls on his skill in identification of Franklin unknowns. Of outstanding note was his recognition that an unusual isotropic manganese mineral from Franklin was probably a new Franklin species. His opinion was later confirmed by Professor Frondel of Harvard, who identified it as Manganberzeliite, found before only at Langban, Sweden.

Later his work with an unusual specimen brought to his attention by Dick Hauck indicated this to be related to Holdenite but not to be identified with any known Franklin species. The specimen has been turned over to the National Museum at Washington, D.C. for further work.

Those of us who knew him will feel a great loss. The rest of us should find in his efforts an inspiration to do likewise. The calibre of his work demonstrates that formal training in a highly skilled field is not necessary to exceptional accomplishment. All it takes is interest, determination and effort. This, Stanley has shown us. The Bauer Award of the Franklin Ogdensburg Mineralogical Society is, we trust, recognition of the meaning and value of his work in the field of Franklin mineralogy. We hope also that it will be a reminder to us who are still here.

Therefore, because of the outstanding work of this distinguished amateur, the Franklin Ogdensburg Mineralogical Society takes great pleasure in bestowing upon our late and great friend, Stanley Schaub, the Lawson H. Bauer Award for outstanding contributions to Franklin Mineralogy, and it is with both sadness and pride that I call upon Mrs. Schaub to accept this token of our appreciation and esteem for the mineralogical studies of her husband and our friend."

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Franklin Mineral Museum

The hopes of many people interested in Franklin and its minerals will be realized this Fall. Late last year the Franklin Kiwanis Club purchased the lot and building housing the Replica Mine exhibit, on Evans Street. The Borough of Franklin sold the parcel for a nominal figure with the understanding that a mineral museum be constructed on the site. In April 1964, a non profit corporation, the Franklin Mineral Museum, Inc. was organized as a community project under the

auspices of the Franklin Kiwanis. The Board of Directors is composed of interested local citizens except for Messrs. Baum, Kraissl, Althoen and Hauck, who are active in the F.O.M.S. Since April steady progress has been made and as of August 1st, final architect's plans have been approved and bids requested from local contractors. Actual construction should begin later in August. Every effort will be made to open the Museum on October 10th, the weekend of the Annual Mineral Show.

The new building will cost about $20,000.00; the Franklin Kiwanis Club has donated $5,000.00. Additional funds are greatly needed. Franklin mineral collectors will benefit directly from the Museum The Executive Board strongly urges that F.O.M.S. members support this project by sending personal contributions to the

Franklin Mineral Museum, Inc.,
c/o Mr. Alfred B. Littell,
Box 76,
Franklin, N. J. 07416.

In addition to cash, the Museum would appreciate gifts or loans of Franklin minerals, literature, photographs, mining relics and other material for display. One of our F.O.M.S. founders, Mrs. E. Packard Cook, has already donated her beautiful collection and a check for $100.00. All contributions of money or material, regardless of size, will be greatly appreciated. Please send your donation today.

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Our Fifth Birthday

In October, the F.O.M.S. will be five years old. The Society was formed during the 3rd Annual Mineral Show of the Franklin Kiwanis Club when John Hendricks, Dick Hauck and Sunny Cook addressed a group of Franklin collectors in the old Nabe house - announced plans and accepted charter members. From the start the F.O.M.S. has operated in an individual manner. We have always believed that details of club operation can be entrusted to the Executive Committee; that club members only attend meetings to hear a good speaker; that members want field trips to promising locations; that the only qualification for membership is an interest in Franklin minerals.

These general principles have been followed to date and we believe they still represent the wishes of the great majority of our membership. However, our fifth birthday provides an appropriate time to ask our members for their opinion of our Society, our policies and operations. We would like your suggestions or criticisms on all subjects but specifically on the following questions:

As a member, would you desire and attend trips to areas out of Sussex County? If so, what locations would you suggest and what geographical limits would you impose? What speakers would you like our Program Committee to schedule? What subjects would you like discussed? Have you any suggestions for the Picking Table?

Your letters will help us shape Club policy, programs and direction for our mutual benefit. Please address your correspondence to Mr. Frederick A. Kraissl, President, F.O.M.S., Box 146, Franklin, N. J. 07416.

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The New Jersey Geological Survey

Earlier this year, the New Jersey Geological Survey celebrated its 100th Birthday. The present Survey is actually the third for the State. The first Survey operated from 1836-1840 under Professor Henry D. Rogers; the second from 1854-56 under Dr. William Kitchell. On March 30th, 1864, George H. Cook was appointed director of the third and current Survey, which is the second oldest state survey in continuous operation.

When saluting the Survey, State Conservation Commissioner Robert A. Roe pointed out that it was one of the state's best investments and cited the following accomplishments.

"Discovery of ilmenite deposits in Ocean County which have led to valuable titanium mining operations. Titanium is used in making white paint and has possibilities as a metal for proposed 2,000 mile per hour airplanes.

Locations of ground water supplies for a fifteen million dollar pharmaceutical plant to be located in Warren County and for a cement plant in northern New Jersey.

Accurate maps and survey monuments that have made precise land surveys possible, saving land buyers money and trouble.

Development of a geodetic monument system that helped in recomputing the shape of the earth and was useful in planning the inter-continental ballistics missile tracking program.

Made New Jersey one of the best mapped areas in the world."

The work of the Survey is performed by a topographic engineer, a geodetic field crew, mapmakers, seven geologists and administrative personnel all under the direction of Mr. Kemble Widmer.

Mr. Widmer and members of his staff have addressed and worked with many New Jersey mineral groups, including our own. The F.O.M.S. extends its congratulations and good wishes to this important and useful organization.

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Miscellaneous News Notes

It has been announced that the Patricia O'Brian Memorial Fund, totaling nearly $1500.00, has been used to purchase minerals for the new New Jersey State Museum at Trenton. The new Director of the State Museum, Dr. Kenneth Prescott and his Exhibits Curator, favor the idea of displaying the minerals in a mine replica. Emphasis will be placed on Franklin fluorescent, and zeolite minerals.

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The Borough of Ogdensburg will celebrate its 50th Birthday in October 1964. Recently residents were asked to search trunks and attics for old pictures and articles about the early days of the community. The items are needed for a souvenir journal to be published as part of the program. Mr. Joseph Masar, chairman of the publication committee, has asked for historical items, especially those pertaining to the local mining enterprise of Thomas A. Edison, the early days of railroading in the community, Indian artifacts and other items of historical interest.

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Members who attend the October field trip to the old Andover Iron Mine should see some new markers in the Borough of Andover. The Tercentenary Committee has announced that they will place markers to locate sites important to the old iron works in Andover Borough, which were thriving even before the county seat, Newton, was settled. These markers will indicate the locations of the old forge, the furnace and the iron master's house.

The history of the iron mines in the borough, according to a publication by Edward A. Webb in 1872, goes back to 1714, when William Penn, having acquired land in Sussex County by a warrant from the Council of Proprietors, became owner of what was to become the Andover Mine.

Soon after this, the history goes on, the mine, with the lands adjoining, passed into the hands of an English company from Sussexshire in England. This company worked the mine until the second year of the Revolutionary War.

At this time, Congress having been informed that iron and steel of the best quality were manufactured here and used for purposes of war by the enemy, directed the Government of New Jersey to secure the mine and work it for the benefit of the United States. For the next five years the mine furnished iron and steel for the Continental Army.

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In April, the Alan Wood Steel Company announced the permanent closure of their mines at Oxford, N. J. This leaves only one iron mine still operating in the entire state. The lone survivor of a one time major industry in New Jersey is the Scrub Oaks Mine, Mine Hill, N. J., also owned by Alan Wood.

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Zinc consumption reached a record 1,100,000 tons during 1963, an increase of 4% over 1962. The greatest amount, 435,000 tons, was used for zinc-base alloys. Galvanizing used 424,000 tons, an increase of 9% over the previous year. Zinc-brass and rolled zinc showed slight declines.

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The New Jersey Zinc Company has established the R. L. McCann Endowed Professorship in Chemical Engineering at Lehigh University with a gift of $100,000 to the University's Centennial Development Fund. The gift was presented to the University by New Jersey Zinc Company to honor the long and distinguished career of its president, Mr. McCann, to both his company and his alma mater, Lehigh.

McCann, an American leader in the mineral industry as an engineer and corporate executive, was graduated from Lehigh in 1917 with a degree in mining engineering. He has been associated with New Jersey Zinc ever since his graduation. He started with the company as a surveyor in Franklin, N.J. where he still resides, and successively rose through various managerial positions until he was elected President of the New Jersey Zinc Company in 1951. He is a native of Harrisburg, Pa.

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The August 1964 issue of The Mineralogist (Mentone, Cal.) contains an interesting article by John S. Albanese on the "Origin of the Zinc Ore Bodies at Franklin and Sterling Hill, N. J." John discusses the genesis of this ore body as revealed by new evidence from the New Jersey Zinc Company and mineral specimens from the Trofimuk Collection. To complement his information, the following extract should be interesting. It was contained in Jack Baum's keynote speech to the New Jersey Audubon Society on their Rock and Mineral Field Trip to Franklin on April 20, 1963.

"Franklin's recorded history began 1160 million years ago. We know something of the prior history, but we have no dates to go with it. For a long time there had been a great sea, and perhaps 9000 feet of sediments were deposited upon a sinking ocean floor. Interlayered with sandstones and shales were limestone beds, one of them many hundred feet in thickness and forming a great layer many miles in extent, the Franklin marble. Other rocks, now gone, formed above the Franklin sequence, burying them beneath a mile or two of cover. Mountain building followed and the folding layers were squeezed and cooked. Toward the end of this epoch of folding, recrystallization of the rock components took place in a process geologists call metamorphism. It is this moment in history that has been dated at 1160 million years ago through the potassium-argon ratios in the rocks. Everything older than that has been recrystallized and the earlier record has been lost.

Franklin ore minerals were rebuilt at this time. We do not know what they were before. The great mass of franklinite, willemite, and zincite in its marble matrix was injected and soaked with nearly molten rock from nearby and from rock inclusions within the ore, and the resulting reactions started the formation of the many additional minerals for which Franklin is famous.

The next geological event to take place consisted of weathering, 500 million years of it. In this time, the mountains were worn away to a flat pavement, caves a thousand feet deep existed in the Franklin marble, and the Franklin ore was exposed for the first time. More weathering and we would have lost it. On this surface were deposited over 6,000 feet of ocean bottom sediments in Paleozoic time, and these too were folded and compressed, but not enough to destroy completely the earlier story expressed in the underlying Precambrian rocks.

Again weathering for millions of years removed the rocks overlying the Franklin ore, stopping at just the right moment to preserve the deposit for us. One more geologic event threatened the ore as the Pleistocene glaciation bulldozed across the surface and, melting, left the rubble of its passage covering the ore. In the scant seven or eight thousand years since that time, enough of the hillside cover washed away to reveal the Franklin ore body for the third and last time."

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Computer Techniques in Mining Operations

Automation and computers, which are usually thought of as techniques for factories and offices, are going underground to help solve the problems of mining.

A statement to this effect was made by Anthony J. Barry of the United States Bureau of Mines in summarizing developments at the Fourth International Conference on Strata Control and Rock Mechanics.

"By 1970," he said, "a miner is likely to be a combination scientist-craftsman who will use the latest equipment and methods to obtain the earth's mineral wealth safely and efficiently."

He said that the conference made considerable progress as "the first practical step towards effecting a universal modernization of mining practices."

Mr. Barry said developments such as hydraulically-operated steel props, automatic controls, computers, sonar devices and resin-based chemicals were being put to work on an experimental basis in mines throughout the world.

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Rockbursts

When a deep mine collapses, it is often caused by an explosion within the rock - in some cases, with the energy of 500 tons of dynamite. This explosion, or rockburst, occurs when internal forces exceed the actual rock strength.

Rockbursts can be avoided if the stresses in the rock are known. But until recently, this has been expensive to determine, and results have been somewhat inaccurate. However, following research at Sheffield University, England, a civil engineering firm, Rock Mechanics, Ltd., have devised a simple piece of apparatus which measures rock strain to within 1 percent. The principle is based on the photo-elastic effort - when strained, many transparent materials will rotate their plane of polarization of light.

The device consists of a metal cylinder about three inches in diameter which contains a cylinder of suitable glass. Behind the glass is a light and a polarizing filter. A hole is bored sufficiently deep in the rock to prevent spurious reading entering from the tunnel. Further, the hole is made large enough to take not only the metal cylinder, but also two small, remotely controlled jacks. These squeeze the cylinder across a diameter and the strain in the glass is measured in the usual way. Next, this particular strain is relieved by trepanning a nine inch hole around the rock - this is done with the instrument in situ. Another strain determination is made, this giving the strain due to the jacks alone. From the two measurements, the strain in the rock can be obtained and the stress calculated.

The techniquie will also find uses in dams and tunnels and the device is soon to be used in the construction of the underground power station which is part of the Batang Padang hydro-electric scheme in Malaya. (From - Discovery, February 6, 1964, Page #13-15)

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Earthquake Prediction

Changes in the earth's magnetic field might be used to predict earthquakes. In a letter to Nature (December 14) Dr. F. D. Stacey of the Meterological Office research unit in Cambridge explains that, although in the past correlations of magnetic effects and earthquakes were often caused by physical vibration of the magnetometers, new evidence - particularly from Japan - justifies a renewed examination of the problem.

An earthquake is preceded by a building of stress in the earth's crust, probably over a period of months. These stress changes would be expected to produce changes in the magnetization of the rocks concerned. In the past, however, it was thought that this piezomagnetic effect would be too small to be observable. Dr. Stacey denies this and claims that studies of magnetic changes would give forewarning of many earthquakes, although this would require at least weekly surveys with magnetometers. However, instruments of the required accuracy are cheap, simple and reliable, and Dr. Stacey considers that earthquake forecasting on this basis merits urgent attention. (From - Discovery, February 6, 1964, Page 5-6).

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Prospecting by Satellite

An orbiting spacecraft may well prove the best way of identifying valuable mineral deposits that still await discovery, particularly in remote areas.

Color photographs taken by astronaut Cooper from a height of 100 miles last May underline this possibility. They show large-scale geological features which could not be easily and quickly spotted in other ways and which, in inacessible areas, might pass unnoticed. A geological expert of NASA, Mr. Paul Lowman, commenting recently on the color pictures of the ground taken on Mercury flights, points out that colour provides clues to rock types that would not be visible in black and white. Geological structures that show up in these pictures resemble those that have been successfully prospected for gold, silver, uranium and other minerals. Particularly promising and unexpected is a 15,000 square mile area of the Himalayan plateau in the northern part of Central Tibet which the Cooper photographs indicate as typical of rich mineral-bearing deposits. The areas between Lake Montcalm and the Kojo Shili mountains is at a considerable altitude and is, of course, controlled by the Communist Chinese. Mr. Lowman also considers that it might be worth while to make colour photo-surveys from space of intensely prospected areas such as the American West, since this could show whether a rich mineral area had been adequately exploited.

An entirely different approach to space prospecting is put forward in a paper from the Stanford Research Institute. This discusses the use of infra red emission characteristics of different rocks observed at satellite altitudes for the geological mapping of the moon. Instrumentation of sufficient sensitivity to distinguish between the reflectivity of closely related minerals such as gypsum and quartz is now available and could be readily adapted for satellite use. Work is in progress to establish the modifications introduced by different particle size on the characteristic emissions. And then not only the material but the structure of lunar features could be observed by this means. (From Discovery, February 6, 1964, Page 5).

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Flipped Magnetic Poles

A study of "frozen" magnetism in rocks has shown that the direction of the earth's magnetic field was reversed at least twice in the course of geologic time. In the period between 980,000 and 1.9 million years ago and prior to 3.4 million years ago, magnetic north lay deep in the Southern Hemisphere. The present orientation of the field has prevailed for the past 980,000 years and existed once before between 1.9 million and 3.4 million years ago.

These conclusions were drawn from a study of old lava flows in many parts of the world, particularly those in Hawaii and those from Mount Etna in Sicily. The remnant magnetism in the volcanic rocks faithfully records the direction of the earth's magnetic field at the time the lava

flows took place. The rocks were dated by measuring the amount of non-radioactive isotope argon 40 that has accumulated in them from the decay of the radioactive isotope potassium 40. The study was reported by Allen Cox, Richard R. Doell and Brent Dalrymple of the U.S. Geological Survey. They are continuing their investigation to see if any magnetic reversals took place earlier than 4 million years ago. They offer no hypothesis for the cause of the reversals. (From the Scientific American, October 1963, page 62)

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Quick data on the crystalline structure of nearly any material is possible with a new analyzer developed by Rigaku-Denki, Co., Ltd., Japan and marketed in the United States by Perkin-Elmer Corp., Main Avenue, Norwalk, Conn. The combination x-ray diffractometer and vacuum x-ray spectrometer peeks into crystals by first exciting the various elements in the specimen with x-rays and then analyzes the diffraction angles and intensities of the emitted fluorescent x-ray wave lengths. This means of analysis is claimed to be the only method which permits repeated study of the same specimen. The analyzer is capable of both qualitative and quantitative analyses at great speed.

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Willemite

In a paper by K. C. G. Heath - Mining and Metallurgical Operations at Rhodesia, Broken Hill - Past, Present and Future (Transactions Inst. Mining & Metall, London, 1961, volume 70, pages 681-736) the geology of Broken Hill, Northern Rhodesia is briefly outlined. The ore minerals are mainly galena and sphalerite, associated with cerussite, willemite, hemimorphite, descloizite, and vanadinite; they occur replacing dolomite country rock. At the outcrop the ore bodies were more or less completely oxidized. In depth, they contain a core of massive sulphides, locally oxidized; this core is surrounded by a shell of silicate ore, chiefly willemite, mixed with some sulphides.

Willemite is rarely found in sufficient quantities to be mined as an ore except at Franklin and Sterling Hill.

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Manganpyrosmalite

Manganpyrosmalite occurs abundantly as an ore forming mineral at the Shinsanjin ore body of the Kyurazawa mine, Tochigi Prefecture, Japan. The first occurrence of pyrosmalite in Japan was reported from another ore body of the same mine. The associated minerals are rhodonite, manganese amphibole, garnet, manganocalcite, quartz and small amounts of sulphide minerals.

Chemical analyses of this Japanese manganpyrosmalite and pyrosmalite and the correlation between refractive indices and FeO contents of the friedelite-manganpyrosmalite-pyrosmalite series is given in an article by Takeo Watanabe, Akiro Kato and Jun Ito; Mining Journal (Japan), 1961, volume 3, pages 130-138.

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Bementite

The thermal transformation of bementite in air has been studied in a temperature range up to 1200°C. using d.t.a. thermogravimetric, chemical and x-ray analysis. It was found that the chemical reactions produced by heat treatment are - first, dehydration then oxidation of a part of Mn^{2+} to Mn^{4+}, followed by reduction of Mn^{4+} formed at the former stage to Mn^{2+} as temperature increases, and that bementite in general transforms into braunite at the lower temperature oxidation stage, and into two phases, rhodonite and hausmannite, at the higher temperature reduction stage. The braunite thus formed contains a greater amount of SiO than natural mineral. At the high temperature reduction stage, when quartz is present, quartz combines with hausmannite released from braunite and forms rhodonite. This reaction promotes the decomposition of braunite. (Kenzo Ito - Thermal transformation of bementite - Journal Japanese Assoc. Min. Petr. & Econ. Geol., 1961, volume 45, pages 209-218)

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Woodruffite

Woodruffite occurs in the Sandur manganese ore deposits, Mysore State, India, associated with pyrolusite and cryptomelane. It is dark brownish grey and has a brown streak; sp. gr. 4.01. In reflected light it is light grey to yellowish grey with clear anisotropism, reflecting power about 26% in green light in air. Chemical analysis gave MnO_2 68.29, MnO 8.46, ZnO 9.42, BaO 0.62, MgO 0.48, CaO nil, K_2O 0.08, Na_2O 0.04, Fe_2O_3 0.89, Al_2O_3 0.96, SiO_2 1.28, H_2O+ 8.48, H_2O- 0.83 = 99.84. Indexed x-ray powder data are tabulated. Woodruffite is probably tetragonal with a 8.42Å c 9.28Å. (C. Naganna and V. Boucka - Mining Magazine, 1963, volume 33, pages 506-507)

Woodruffite had previously been reported only from Franklin-Sterling Hill.

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First Description of Zincite

One of the first mineralogical papers in American scientific literature was the "Description, and Chemical Examination of an Ore of Zinc, from New Jersey by the Editor" published in the American Mineralogical Journal, conducted by Archibald Bruce, M.D., volume 1, 1814, pages 96-100.

(see page 14)

This paper is still interesting reading and provides a vivid contrast to our current scientific papers, particularly in the scope of the subject. We quote:

Red Oxide of Zinc

External Characters

Colour, light and dark red, approaching to blood red, ruby and aurora red. Opaque, though generally translucent on the edges. Fracture foliated - cross fracture slightly conchoidal. Lustre on fresh surface, shining; after long exposure to the atmosphere, dull; the surface in time becoming covered with a pearl white crust. Brittle - being easily pulverized, the powder, brownish yellow, approaching to orange. Readily scratched by steel. Specific gravity 6.22.

Chemical Characters

Soluble in the mineral acids. Infusible before the blow pipe per se. With Sub-borate of soda, melts into a transparent yellow bead. When exposed to the united flames of oxygene and hydrogene, it sublimes, attended with a brilliant white light. When powdered, and with potash exposed to heat, it fuses into an emerald green mass, which on solution, affords to water the same color. On the addition of a few drops of nitric sulphuric or muriatic acids, the green coloured fluid is immediately changed to a rose red. (For the application of hydrogene and oxygene gasses, to the purpose of the blowpipe, we are indebted to Robert Hare, Jr., Esq., Professor of Natural Philosophy in the University of Pennsylvania. For a description of his hydrostatic blow pipe, we refer the reader to a pamphlet published in 1802, by order of the Chemical Society of Philadelphia; and also to a paper of his, read before the American Philosophical Society, in June 1803, and published in the sixth volume of their transactions.)

Distinguishing Characteristics

Its infusibility distinguishes it from the red antimoniated sulphuret of silver, which is fusible before the blowpipe, giving out white fumes, and a yellow tinge to the charcoal, leaving a globule of reduced silver. From the ruby red oxide of copper it differs in weight, being nearly twice as heavy, its specific gravity being only 3.9. It is also distinguished by its solution in acids, being colourless; whereas that of the red oxide of copper is of a bright green. Its solubility in the mineral acids is sufficient to distinguish it from the red oxide of titanium, which is insoluble. The red chromate of lead, before the blowpipe, melts into a blackened slag. The red sulphuret of arsenic is volatilized, giving a blue flame, and a strong smell of garlic.

Locality

This mineral occurs in several of the iron mines in Sussex County, New Jersey; as at the Franklin, Sterling, and Rutgers mines, and near Sparta. In some instances it is imbedded in a sparry limestone;

while in others, it serves as the matrix of several varieties of octahedral oxide of iron, which sometimes occurs crystallized, though more generally in various sized irregular grains. At Franklin, it also assumes a micaceous form, and is imbedded in a whitish oxide of zinc, which is often , in the same specimen, found adhering to the black oxide of iron.

Having ascertained by previous experiments, that this mineral was principally composed of oxide of zinc, iron and manganese, it was submitted to the following

Chemical Examination

A - Twenty five grains of the ore, in fine powder, were dissolved in diluted nitric acid; the solution was colourless. B - To the solution A, was added oxalic acid, while any precipitation took place. The precipitate (oxalate of zinc) being separated by the filter and dried, weighed 42 grains. C - The filtered fluid being evaporated to dryness, a dark brown coloured mass remained, which after being ignited, weighed two grains. D - The brown coloured mass C, being dissolved in diluted muriatic acid, into the solution was dropped a solution of super-tartrate of potash. After standing a few minutes, the solution became turbid, and a precipitation of minute crystalline grains (tartrate of manganese) took place. To the remaining fluid was added Prussiate of potash, which produced a dark blue colour; and after a few minutes a blue powder (Prussiate of iron) was precipitated. E - The oxalate of zinc, B, (consisting of 23 grains oxide of zinc, and 19 of oxalic acid) was exposed to a low red heat (in a platina crucible) for ten minutes, when the powder was changed to a light yellow colour. On further ignition, for half an hour, the colour became darker, and the powder on being weighed was found to have lost 20 grains, the remaining 22 grains being a sub oxide of zinc, which according to the experiments of Desormes and Clements, contains in the hundred parts 88 of zinc and 12 of oxygene. According to this examination, one hundred parts of the ore contains

Zinc	76
Oxygene	16
Oxides of Manganese and Iron	8
	100

Note:

The recently discovered property of the malleability of zinc, at a temperature of 300° of Fahrenheit, has greatly enhanced its value, and raised it to a high rank among the useful metals. The inconvenience arising from its brittleness, being removed, this metal is now applied to many of the purposes for which copper has hitherto been used. As the demand for metallic zinc must necessarily increase as its application to the arts becomes more general, the mineral just described will prove a source from which this metal may be procured in abundance and a series of experiments sufficiently shew the ease with which it may be separated from the ore.

In the manufacture of Brass, this ore possesses advantages over those generally used; as without previous preparation of ustulation, etc., it affords with copper a compound possessing a high degree of malleability, a fine colour, and every requisite of the best kind of brass, such as is used in the finest and most delicate workmanship, equal in every respect to that made from the reduced metal or (as it is more generally termed) Spelter, which being imported, bears an exorbitant price.

The mineral may also be advantageously employed in the manufacture of the sulphate of zinc, or white vitriol of commerce. Experiments also prove that the oxide or flowers of zinc may, without much difficulty, be obtained from this ore. The oxide of zinc has of late been recommended as a substitute for white lead as a pigment, over which it possesses some advantages, as it is not liable to change, and in its preparation is not subject to those deleterious consequences so frequently attendant on all the preparations of lead.

This red oxide of zinc from its abundance, and the many uses to which it may be applied, promises to be a valuable acquisition to the manufacturing interest of the United States."

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