THE PRODUCTION OF RADIUM IN COLORADO

SECRETARY of the Interior Lane authorizes the statement that the production of radium from Colorado carnotite ores by the Bureau of Mines, in connection with the National Radium Institute, has passed the experimental stage in its new process and is now on a successful manufacturing basis. He says:

The cost of one gram of radium metal produced in the form of bromide during March, April and May of the present year was $36,050, I am informed by Dr. Charles L. Parsons, in charge of the radium investigations of the bureau. This includes the cost of ore, insurance, repairs, amortization allowance for plant and equipment, cost of Bureau of Mines cooperation, and all expenses incident to the production of high-grade radium bromide. When you consider that radium has been selling for $120,000 and $160,000 a gram, you will see just what the Bureau of Mines has accomplished along these lines.

The cost of producing radium in the small experimental plant during the first few months of the bureau's activities was somewhat higher but not enough to seriously effect the final average.

The public, however, should not infer that this low cost of production necessarily means an immediate drop in the selling price of radium. The National Radium Institute was fortunate in securing through the Crucible Steel Company the right to mine ten claims of carnotite ores belonging to them and this was practically the only ore available at the time. Since then new deposits have been opened but these are closely held and according to the best judgment of the experts employed by the Bureau of Mines the Colorado and Utah fields, which are much richer in radium-bearing ores than any others known, will supply ore for a few years only at the rate of production that obtained when the European war closed down the mines. The demand for radium will also increase rapidly, for the two or three surgeons who have a sufficient amount of this element to entitle them to speak from experience are obtaining results in the cure of cancer that are increasingly encouraging as their knowledge of its application improves. A few more reports like that presented to the American Medical Association at its recent San Francisco meeting and the medical profession, as a whole, will be convinced of its efficacy. Under all the circumstances that have come to my knowledge it does seem to me that it behooves the government to make some arrangement whereby these deposits, so unique in their extent and their richness, may be conserved in the truest sense for our people, by extracting the radium from the ores where it now lies useless and putting it to work for the eradication of cancer in the hospitals of the Army and Navy and the Public Health Service.

The ten carnotite claims being operated at Long Park, Colorado, by the National Radium Institute have already produced over 796 tons of ore averaging above two per cent. uranium oxide. The cost of ore delivered at the radium plant in Denver has averaged $81.30 per ton. This included 15 per cent. royalty, salary of Bureau of Mines employees, amortization of camp and equipment and all expenses incident to the mining, transportation, grinding and sampling of the ore.

A concentrating plant for low-grade ores has been erected at the mines and is successfully recovering material formerly wasted. Grinding and sampling machinery has been installed at Denver and a radium extraction plant erected in the same city. The radium plant has now a capacity of three tons of ore per day, having been more than doubled in size since last February. Before that time that plant had been run more or less on an experimental scale although regularly producing radium since June, 1914. To July 1, slightly over three grams of radium metal had been obtained in the form of radium barium sulfate containing over one milligram of radium to the kilogram of sulfates. The conversion of the sulfates into chlorides and the purification of the radium therefrom is easily accomplished and with very small loss of material. Unfortunately, however, special acid-proof enamel ware, obtainable only in France, has not been delivered of sufficient capacity to handle the crystallization of the full plant production, so that a little less than half the output, or to be exact, 1,304 milligrams of radium element have been delivered to the two hospitals connected with the National Radium Institute. The radium remaining can be crystallized at any time from neutral solution in apparatus already installed, but the greater rapidity and efficiency of production of this very valuable material by the methods used have decided the Bureau of Mines to await the completion of apparatus now being built before pushing the chloride crystallization to full capacity.

The average radium extraction of all ore mined by the National Radium Institute has been over 85 per cent. of the amount present in the ore as

determined by actual measurement. The amount present in the ore has been found in fact to be essentially the same as the theoretical amount required by the uranium-radium ratio. The extraction figures for the last five carloads of carnotite treatment has shown a recovery of over 90 per cent. in each case.

A bulletin giving details of mining, concentration and methods of extraction is being prepared by the Bureau of Mines and will be issued early in the fall.

SCIENTIFIC NOTES AND NEWS

DR. DAVID STARR JORDAN has been elected a member of the Royal Swedish Academy of Science at Stockholm, in appreciation of his work in zoology.

IT is planned at Brown University to collect a fund to endow the library of the department of mathematics in honor of Professor Nathaniel F. Davis, who will retire from active service at the close of the present academic year, after having served Brown University for over forty years.

THE University of Edinburgh has conferred the degree of doctor of laws on Professor W. A. Herdman, who holds the chair of zoology in the University of Liverpool, and on Professor Arthur Thomson, who holds the chair of human anatomy in the University of Oxford.

THE Royal Scottish Geographical Society has awarded the Livingstone gold medal to Lord Kitchener in recognition of his work on the survey of Palestine and as director of the survey of Cyprus, as well as in recognition of his services to the state. The society's gold medal has been awarded to Dr. J. Scott Keltie, late secretary of the Royal Geographical Society, in consideration of his services to geographical science.

THE medal and grant for 1915 of the South African Association for the Advancement of Science have been awarded to Mr. C. P. Lounsbury, chief of the division of entomology, Union Department of Agriculture.

THE following is a list of recently elected honorary fellows of the Royal Society of Medicine: *British:* Sir R. Douglas Powell, Lord Moulton, Sir John McFadyean, Sir Francis Darwin, Robert Bridges, Lieutenant-Colonel Sir David Prain, T. Pridgin Teale, Sir John Williams, Professor E. G. Browne, Professor S. G. Shattock. *Foreign:* Professors J. Babinski, A. Chauffard, Jules Dejerine, M. T. Tuffier of Paris, and Dr. Paul Heger, of Belgium.

THE Hanbury medal has been awarded to Mr. E. M. Holmes, curator of the Pharmaceutical Society's Museum, for his original research in the natural history of drugs.

ON June 30, as we learn from *Nature,* Dr. Alexander Fischer de Waldheim, director of the Imperial Botanic Garden of Peter the Great at Petrograd, completed the fiftieth year of his scientific and administrative activities. The event was made the occasion of a ceremony with presentation of addresses in the hall of the herbarium at the garden. Dr. Fischer de Waldheim commenced his botanical career as docent at the University of Moscow, and later became professor of botany at the University of Warsaw. On the death of A. F. Batalin in 1897 he was appointed director of the gardens at Petrograd.

THE committee on awards for scientific exhibits at the San Francisco meeting granted gold medals to the pathological departments of Stanford University and of the University of Michigan; to the Indiana State Board of Health, for its exhibit on a public health campaign; to Drs. C. C. Bass and F. M. Johns, of Tulane University, for their exhibit on pyorrhea alveolaris and malaria; to Drs. Claud A. Smith and J. Witherspoon, on hookworm; to the pathological laboratory of the New York Lying-in Hospital, on the demonstration of the cultivation of human tissue *in vitro;* to Dr. Martin H. Fischer, of Cincinnati, on newer experiments in the physiology and pathology of kidney functions, and to Dr. J. T. Case, of Battle Creek, on lantern slides illustrating Roentgen-ray studies.

THE bronze thesis medal of the Science Club of the University of Wisconsin was awarded at commencement to Walter Pitz for a thesis on "The Effect of Elemental Sulphur and of Calcium Sulphate on Certain of the Higher