

**MOST VALUABLE MINERAL**

**Method of Radium Production**

**SMALL QUANTITIES FOUND LOCALLY**

The attention of scientists, eminent medical men, and the public generally is centred at the present time on the study of radium, which is the rarest of all metals. In view of the marked success achieved by radium in arresting the growth of cancer, it has come to occupy foremost place in the minds of those whose energies are bent on the alleviation of the ills of humanity.

Radium was discovered in South Australia, but only in small quantities. It was found that the cost of extracting and treating the mineral was too costly to permit of the continuance of mining operations.

Prof. Kerr Grant (Professor Physics at Adelaide University) and Mr. C. T. Madigan, M.A., B.Sc. (Lecturer in Geology), have made a life study of the mineral, and their views, given in a special interview with "The Mail," are interesting.

Radium has a special interest to the people of Adelaide generally in view of the allocation to Adelaide Hospital of portion of the £100,000 supply purchased recently by the Federal Government.

Pro. Grant stated that a discovery by M. Henri Becqueret, a Parisian scientist, in the year 1896, began a new chapter in science. "Becqueret found," said Prof. Grant, "that compounds of the metal uranium had the inherent power of emitting radiations resembling light."

"Prof. Pierre Curie and his wife, who were the scientific associates of M. Becqueret, followed this discovery by an investigation of the radio-activity—as this new property of matter was called—of natural uranium ore. Their work established the fact that 'pitch blende' was far more powerful, weight for weight, than any pure uranium compound and resulted in the extraction from this ore of two new intensely radio active elements which they christened 'polonium' and 'radium' respectively. More than 40 radio-active elements are now known, but in this total are included many which exist only in infinitesimal amounts."

**MYSTERY FOR YEARS**

Continuing, Prof. Grant said that the nature of these new radiations remained for some years a mystery until Sir Ernest Rutherford, at that time a research student in the Cavendish Laboratory at Cambridge University (England), showed that there existed three different types, two of which, although distinct, were corpuscular in character, while the third was identical with X-rays, except in possessing a power of penetrating matter far exceeding that of any radiation which was produced artificially.

Later, said Prof. Grant, Rutherford and others succeeded in showing that one type of corpuscular radiation, the so called "alpha rays" was in reality electrically charged atoms of helium gas expelled from the radio active substance with a speed reaching at times 10,000 miles a second. The second type, termed beta rays, which attained a still higher speed and consequently had greater penetrating powers, was identical with the electrons or particles of negative electricity, which carry the electric current in the discharge of highly rarefied gas.

"Rutherford and Soddy also worked together in the McGill University, Montreal," said Prof. Grant, "and ascertained the true explanation of radio activity, namely, that atoms of elements possessing this property were more or less unstable in character, so that a certain percentage of them—fixed for any given type of atom—spontaneously exploded or disintegrated in every second of time, ejecting, in doing so, either an alpha or a beta corpuscle, with the simultaneous production of the X or 'gamma' radiation in the latter case."

**RATES OF DISINTEGRATION**

Prof. Grant said that the rates of disintegration could be expressed by stating the time taken for half the atoms of the elements to disappear. These times varied widely. For uranium the period was more than a thousand million years, and for radium about 1,600 years, while certain short-lived products of the disintegration of radium survived but a fraction of a second.

"The old controversy between physicists and geologists on the age of this planet—the calculations of Kelvin on the cooling

of the earth limited that age to 200,000,000 years, but the geologists required 1,000,000,000 years at least for the accumulation of the vast deposits of sedimentary rock—has been solved by taking into account the heat continually produced by the absorption of the radiations of radio-active substances in the rocks of the earth. Indeed, from accurate measurements of the ratio of the amount of lead to that of uranium in certain of the oldest igneous rocks, it is certain that not less than 1,500,000,000 years have elapsed since these rocks solidified from a molten state.

"The effects of the different types of radiation in promoting physical, chemical, and biological changes have been and are being studied exhaustively.

"While all types of radiation exert a destructive action upon living tissues the highly penetrating 'gamma' rays possess, like X-rays but in a higher degree, a selective action according to the nature of the living cell. Fortunately pathological types of cells are on the whole less resistant to their influence than normal healthy cells.

**TREATMENT OF DISEASE**

"On this fact is based the therapeutic application of radium in the treatment of lupus, rodent ulcer and malignant tumors. Twelve years ago Sir Ernest Rutherford made the highly important observation that 'alpha' rays of highest speed impinging upon certain types of atoms may occasionally bring about a transmutation of the atoms struck into a different species. This remains up to the present the only method of converting artificially one chemical element into another."

In conclusion Prof. Grant said that American geneticists were now conducting experiments of great interest. These had to do with the effect of 'gamma' rays, or 'gamma' rays in bringing about mutations or variations in the offspring of plants or animals, irradiated by these rays.

"New and permanent varieties of the fruit fly and of the tobacco plant," he said, "have, it is stated, been produced in this way. According to Prof. Gilbert Lewis and Dr. Asel Olson, of the University of California, it is possible that in the natural radio activity of the earth may be found the true source of the variations in species demanded by the theory of evolution. At the same time a weapon of great power may be placed in the hands of man for the deliberate creation of new forms of living organisms.

Mr. Madigan stated that the chief use for radium nowadays was in the attempted cure of cancer, but the treatment was in its experimental stage.

**SUPPLY FROM BELGIAN CONGO**

"Practically the whole of the world supply of radium," he said, "is obtained from the Belgian Congo in Africa. It is found only in minute quantities, and is never found alone. It has to be extracted from other ores, the chief of which is uranium.

"In the Flinders Ranges there are a number of uranium minerals, particularly the green mineral known as 'tabernite'—a scaly green in color, which contains copper uranium and phosphorus, and a similar mineral of a yellowish color known as 'audunite,' which contains calcium instead of copper."

Mr. Madigan said that much ore had been mined at Radium Hill, on the Broken Hill line, and at Mount Painter, near Lake Frome. The cost of operations had been heavy.

"Radio active minerals are so complex," he declared, "and the chemistry of them so little known that the extraction of even a minute quantity of radium is a difficult problem.

"We have obtained radium from South Australian deposits, but we have not yet devised a commercially successful way of extracting it. At Dry Creek one-tenth of a gram was produced, but the cost of operations was prohibitive.

"Radium is so valuable owing to its scarcity that the Austrians will not permit the radium obtained from the world-famous Joachimsthal mine to leave the country."

**ELDER CONSERVATORIUM.**

**Chamber Music Recital.**

The finished and beautiful work of the Conservatorium String Quartet has never reached a higher artistry than at the chamber music recital, at the Elder Hall, on Monday evening. Those prevented from attending by inclement weather, missed a particularly fine presentation of a well-balanced programme. There was beauty in the rendering of Beethoven's "String Quartet in F Major, Op. 59." The "Allegro" was given in a manner which brought out its distinctive character to the full.

The second movement, characteristic of Beethoven's most masterly writing, was interpreted with delightful sensitiveness, and the third, "Molto Adagio e Mestro," was rich in depth of tone and breadth of treatment. The finale with its recurring Russian theme, so full of song-like beauty, taken up by each instrument in turn, leading on to a fine climax was a real triumph. Mr. Charles Schilsky, Miss Kathleen Meegan, Miss Sylvia Whittington, and Mr. Harold Parsons have the qualities not only of soloists, but, from long association, have attained a responsiveness and effectiveness which makes the playing of this quartet a joy.

Miss Olive Bassett was the vocalist of the evening, and Mr. John H. Horner, the accompanist. A group of songs by Grieg, "Reminiscences, Descriptive of Mountain and Fiord," gave admirable scope for Miss Bassett's fine voice, and her crisp clear enunciation added much to the effect. The "Prologue," "I Wonder What Emotion" touched strikingly the impression of the great mountains, and the succeeding songs, "Ragnhild," tenderly plaintive, and "Ragna," beautiful in its contemplative tranquillity of mood, found a fitting close in "Epilogue," with its haunting refrain "on the hills, on the hills." Mr. Horner's accompaniment was restrained, but expressive.

The trio for violin, cello, and piano, "Trio in C Major Op. 87," by Brahms, was presented with admirable effect by Miss Whittington, Mr. Parsons, and Mr. George Pearce. The opening was telling, the slow movement, with its variations on a folk tune being gracefully given, and the fairy music in the "Scherzo," leading on to the robust and quaint concluding movement vividly handled. Mr. George Pearce's treatment of the piano part in each movement was admirable. Never allowing his instrument to preponderate, he still stressed the character of each phase of the music and his chord work, and especially his runs were an essential part of an effective presentation.

**Professor Woollard On The Unfit.**

Sir—It is both a duty and a pleasure for me to attempt to reply to Dr. Jethro Brown's comments on my lecture on the anatomy of the cell. When I used the word "persuasive eugenics," I had in mind particularly the very grave state of affairs in England usually referred to as the differential fertility of the various classes. It is contended, and I believe with fairness when all allowances are made, that the highest birth rate prevails among the improvident and unskilled members of the population, while the more efficient, for various reasons, have a low birth rate. Legislation, utterly at variance with our traditions, compelling some people to have more, and some to have fewer children, seems to me an impossible solution of this problem. Education and persuasion (perhaps indirect legislation, taxation for instance) are the only remedies that suggest themselves to me.

Every State must and does deal with the feeble-minded as it deems expedient. The calculation I quoted merely serves to bring out the fact that the ideal of abolition of the feeble-minded is not likely to be obtained quickly by sterilization of those actually suffering from feeble-mindedness. It is only fair to point out that this calculation is based on several assumptions, none of which may be wholly true. It is therefore at best only an approximation. It assumes that feeble-mindedness behaves as a recessive character, and therefore in accordance with the Mendelian theory both parents must carry the gene. The difficulty of fitting feeble-mindedness into the theory arises from the fact that feeble-mindedness varies enormously in degree, and again, in some cases at any rate, depends on environmental causes such as faulty implantation of the embryo, birth injuries, &c. It assumes that marriage is a random choice, which I suppose is only partly true. It assumes that the gene is uniformly distributed through the population. It is unlikely that this is wholly true. There is probably a tendency for feeble-mindedness to congregate in a particular stratum of the population.

The main issue from my review of the scientific work on this problem was to show the enormous importance of inheri-

tance and to diminish the part played by environment. In this result I judge from Dr. Brown's letter we are in agreement. The translation of such a result into social practice is a matter I would gladly leave to our eminent jurists.—I am, Sir, &c., The University. H. H. WOOLLARD.

**Organ Recitals**

"E. I." Adelaide:—A large audience gathers each Thursday during the lunch hour to listen to the masterly performances of Mr. J. Horner on the organ at the Conservatorium.

I desire to express appreciation of the excellent work of Mr. Horner. It is a great relaxation for business people to listen to such playing.

Few recitals of this kind have been given in Adelaide in the past, but it is hoped that there will be more to come. Some trust that pianoforte recitals will be conducted.

**Musical Standards.**

Sir—It is gratifying to note that at last the public are realizing that in the musical world we are fast qualifying for the Gilbertian state, "when every one is somebody, then no one's anybody." Soon little kindergarten tots will gleefully learn to write the magical letters which their "musical" ability entitles them to add to their laboriously spelled names. The examination fever has so attacked the everyday person, that if a music teacher refuses to send pupils for examinations, it is quite possible that he or she will be regarded as incapable of "getting them through," and the pupils will be sent to another teacher. Therefore, we have to prepare our pupils for exams whether we like it or not, if the pecuniary side of the question is of any importance to us, and to most of us it unfortunately is, however much we may love real music for its own sake.

Therefore, since examinations seem to be a necessary evil, can we not do more to support those conducted by the Australian Music Examinations Board? It is true that at least seven examinations (more than that, if one counts theory examinations separately) require to be passed before one can hope to "write letters after his or her name," and one would be eighteen (or more) rather than a precocious infant of eight, before there would be much likelihood of achieving the honour, but, once obtained it would be an honour worth having. Since exams must be, teachers should support those of their own country.—I am, Sir, &c.,

"AN AUSTRALIAN TEACHER."

**UNIVERSITY GRADUATES' ASSOCIATION.**

**THE ANNUAL MEETING.**

The annual meeting of the Graduates' Association of the University of Adelaide was held on Wednesday evening, Mr. E. W. Holden presiding over a representative attendance.

The annual report stated that the association held a successful luncheon on Commemoration Day for the new graduates, and the gathering was gaining in popularity. Mr. D. H. Hollidge, who had been secretary of the association since its foundation in 1920, resigned during the year, and the committee expressed its appreciation of his services. Mr. M. C. Kriewaldt was appointed to the position. Dr. Helen Mayo resigned from the committee, her place being filled by Miss Whittam. The Lady Syman building and part of cloisters of the Union building were nearing completion. The drive for funds to complete the men's portion was in abeyance temporarily, but would be resumed in the near future. The association had been in close touch with the University authorities in all matters relating to the Union building. The association was not doing all it could for the University. They were too apt to regard their association with the Alma Mater as finished when they ceased attendance at lectures. Actually there remained an obligation to maintain interest in her affairs and to render her such service as was in their power. The University had a right to expect from her alumni an intelligent interest in her problems and generous help towards their solution.

A satisfactory balance-sheet was presented by the treasurer.

The officers elected were:—Patron, Sir George Murray; president, Mr. E. W. Holden; vice-president, Professor A. L. Campbell; treasurer, Mr. A. G. Price; secretary, Mr. M. C. Kriewaldt; committee, Miss Whittam, Mrs. J. C. McKail, Professors E. H. Davies and J. McKellar Stewart, Messrs. F. W. Eardley, G. K. Fuller, and S. Talbot Smith.