

SCIENCE NEWS

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BEYOND URANIUM

THE possibility of a group of elements resembling the rare earths beyond uranium or element No. 92, once considered the uttermost outpost of the atomic system, has been demonstrated mathematically by Dr. M. Goeppert Mayer, of Columbia University, and is reported in the forthcoming issue of the *Physical Review*.

The uranium outpost was passed some years ago by Professor Enrico Fermi, Nobelist now working at Columbia University, but then in Italy, with his discovery of the radioactive element No. 93, now called neptunium. Since then several other radioactive "transuranic" elements have been discovered by experimental research.

The chemical behavior of element No. 93 was determined in 1939 and 1940 by Dr. E. McMillan and Dr. P. H. Abelson at the University of California, who came to the conclusion that it was a rare earth and suggested that a second rare earth group might start at uranium. This is precisely what Dr. Mayer has proved to be mathematically possible. The problem had been previously discussed by Dr. H. C. Urey, of Columbia University, and Dr. Y. Sugiura, Danish chemist, on the basis of the old quantum theory. Dr. Mayer, using the newest quantum theory, has come to more definite results.

The group of rare earths occupies a quite anomalous position in the chemist's "periodic table" of the elements. This table classifies the elements into families having similar chemical properties, but also individual differences from the type, *i.e.*, family resemblances and differences. Each element, except those belonging to the rare earth group, occupies a separate box to which belongs a certain group of chemical properties.

The rare earths consist of fifteen elements belonging to the aluminum family. Their chemical properties are so similar that it is extremely difficult and sometimes impossible to separate them by chemical means. It is as though in a family, after a number of single births, suddenly a litter of fifteen almost identical sons appeared. In the periodic table there is only one box reserved for the particular set of chemical properties shared by these fifteen elements. So, all of them had to be crowded into this one box.

This curious situation is fully accounted for by Dr. Mayer's formulas. Her researches also show that the same conditions that cause it recur in the neighborhood of the uranium atom. Hence it is quite possible that a similar series of elements, almost identical in their chemical properties, exists in the transuranic region.

DETERIORATION OF PHOTOGRAPHIC FILMS

THAT the deterioration of photographic films and plates with time, which requires an early development after exposure, is not due to cosmic rays, is shown by experiments of Wayne T. Sproull, of the General Motors Research Laboratories in Detroit.

If the deterioration is principally due to cosmic ray

action, then it should be shown more markedly by film manufactured expressly for use with x-rays, and therefore more sensitive also to cosmic rays, than by ordinary film. The effect shows itself principally as a general fogging of the film. The cosmic rays, which pour down continuously upon the earth and penetrate whatever wrappings or coverings protect the film, would be capable of such an effect.

In 1939 Mr. Sproull purchased some Eastman "Verichrome" film and some Agfa x-ray film. One half of each type of film was stored in a mine shaft 2,057 feet below the surface of the ground where measurements by V. C. Wilson had previously shown that the cosmic ray intensity was about one twenty-thousandth of that on top of the ground. The remaining films were stored in an ordinary place in Detroit.

Two years later (1941) some of the mine-stored x-ray films were developed along with some of the x-ray films stored in Detroit, and a piece of new Agfa film. The films were developed and fixed together. The new film of course showed no fogging, but the other two were about equally fogged, showing that the cosmic rays were not a major factor in this deterioration. Similar tests with the Verichrome film gave similar results.

If the cosmic rays were a major factor in film deterioration, the author states, there would be little prospect that a way could ever be found to prevent such deterioration. But since it appears to be due to temperature and humidity effect, there is still hope that a remedy will eventually be found.

MAGNESIUM

MAGNESIUM, the white metal important in defense and warfare because of the lightness of its alloys, as well as its use in incendiary bombs, may be made easily from many common ores with a new process. This is claimed in the specifications accompanying U. S. Patent 2,251,968, which has been granted for the method to the inventor, Carlo Adamoli, of Milan, Italy. Rights on the American patent are assigned to the Perosa Corporation of Wilmington, Delaware.

Present methods of preparing the metal use electrical means in separating it from its compounds, but these are not used in the Adamoli process. From common magnesium-containing ores, such as talc, magnesite, dolomite, etc., is obtained metal which, quoting the patent, "is free from any impurity having its origin either in the ores or in the reagents which have been used, the process being performed in the course of a single direct operation and avoiding the losses of metal which are ordinarily incurred when it is necessary to melt the metal because it is not compact enough."

The process is a cyclic one, in which the material goes through again and again. The ores are mixed with hydrofluoric acid to form magnesium fluoride, a reducing agent is mixed with them, and the magnesium metal goes off in a vapor, to be condensed to the solid form. Then the

hydrofluoric acid is regenerated and mixed with more of the ores.—JAMES STOKLEY.

AMERICAN DRUG PLANTS

AMERICAN drug plants are being studied as possible replacements for similar drugs that used to be imported but are now cut off, or at least threatened, by the war, according to papers read before the American Pharmaceutical Association. In some instances, satisfactory replacement plants are already in sight.

Ergot, a powerful drug used in checking bleeding after childbirth, can be produced in as high quality from American-grown material as it can from the Spanish imports, it is indicated in tests reported by H. W. Youngken, Jr., E. B. Fischer and Dr. C. H. Rogers, of the University of Minnesota.

Ergot is a parasitic fungus that preys upon grain. The part used in medicine is the hard, purple fruiting body, shaped like an exaggerated wheat or rye grain, that protrudes from the heads of diseased plants. These fruiting bodies are harvested by hand, and the active principle, an alkaloid known as ergotoxine, is extracted from them. The studies indicate that American rye ergot yields more of the essential alkaloid than Spanish rye ergot, but that ergot from American wheat is less rich in ergotoxine than the Spanish rye material.

Imported capsicum, source of an exceedingly hot drug used externally in liniments and plasters and internally as a medicine in digestive disturbances, can be replaced by domestic tabasco peppers, was reported by Miss Carmel R. Olden and Professor E. V. Lynn, of the Massachusetts College of Pharmacy. In preparing the familiar condiment, tabasco sauce, the seeds and hulls of the peppers are commonly discarded, yet these wastes are as rich in the essential principle, capsaicine, as any other part of the plant. It is proposed that tabasco peppers replace imported capsicum as the official source of the drug, because the latter is now difficult to obtain and apparently offers no advantage in medicine.

Strychnine from American-grown sources is a possibility suggested to the meeting by Dale L. Kinsely, of North Dakota Agricultural College. Strychnine is extracted from shrubby plants of the genus *Strychnos*, one species of which, *Strychnos spinosa*, has been grown successfully in Florida since 1903. Mr. Kinsely's researches have been directed to both the botany and the chemistry of this plant.

INFANTILE PARALYSIS AND ENCEPHALITIS

INFANTILE paralysis is still on the increase, but, except in the South, the situation is not any more alarming than it has been in recent weeks, according to reports received by the U. S. Public Health Service.

Southern states, which have been having large numbers of cases in previous weeks, are still having them. Alabama, hardest hit by the disease, reports a jump from 49 cases, for the week ending August 2, up to 80 for August 9. In Georgia, the number of new cases remains the same, 71. Four other southern states report increases: Tennessee, from 13 to 31; Kentucky, from 7 to 13; North Caro-

lina, from 0 to 10, and South Carolina, from 5 to 16. In Florida, the number went down from 27 to 13.

Minnesota is suffering the double trouble of a sleeping sickness (encephalitis) outbreak and infantile paralysis. The infantile paralysis cases jumped in the week ending August 9 from 3 cases to 12. Many more victims were claimed in Minnesota by sleeping sickness, which has crossed the river from neighboring North Dakota. These cases nearly doubled in number in the week ending August 9. The jump was from 35 to 65. Colorado also reports an increase in sleeping sickness from 3 cases to 9.

In states in the east central part of the country, infantile paralysis cases are increasing, but the situation there is not as bad as it is in the South. New York reports an increase from 12 to 30 cases; New Jersey, from 5 to 13; Pennsylvania, from 15 to 17; Ohio, 16 to 27; Indiana, 5 to 12, and Michigan, 8 to 10.

In New England, where slight increases during the week ending August 2 led health officials to fear the outbreak might be spreading, reports were reassuring. A total of only 7 cases were reported for this whole region for the week of August 9, as compared with 16 for the previous week.

CONTROL OF THE RED SCALE

RED SCALE, an insect rated as number one pest of citrus groves, has seriously threatened our chief source of vitamin C, yet no control methods have been successful against the pest.

To-day, however, the University of California Citrus Experiment Station announced a sure death for red scale: an insect imported from South China that hunts and devours the citrus pest. J. Linsley Gressitt, graduate of the university, now at Lingnan University, went to China at the request of the Citrus Experiment Station and collected the pest killers.

The insects rode a clipper plane from Hong Kong to San Francisco, then were sent directly to the United States Department of Agriculture insectary at Hoboken, New Jersey, to be tested as "carriers" of tree disease. When no evidence of citrus canker was found in the shipment, the insects were sent to California for trial as red scale predators.

The Chinese insects successfully cleared laboratory test trees of the scale. Orchard tests of from two to four years will be necessary to check the laboratory experiments, and large numbers of the insects have been raised for release in southern California citrus groves. If normal orchard conditions do not limit their effectiveness, one of the greatest problems of Western citrus growers will be solved.

Sprays and fumigation, costly and sometimes harmful to trees, have been of little help in the war against red scale in recent years. If the Chinese immigrant predator is as effective in orchards as in the laboratory, hundreds of thousands of dollars now spent on other controls will be saved by the living, self-propagating insect control, and bigger and better crops of citrus fruits will be harvested.

Harold Compere, Dr. Stanley Flanders and Dr. H. S. Smith, of the Station Staff, have conducted the experiments.

POISON FOR SILVERFISH

SILVERFISH, the long, grayish insects that scamper through stored books, papers and linens, have had their private lives examined and their death warrant written. The likes and dislikes of these elusive pests that destroy valuable papers, books and heirlooms have been discovered by Arnold Mallis, entomologist of the University of California at Los Angeles.

The species used by Mr. Mallis in his studies, called *Ctenolepisma urbani* by entomologists, is unable to survive a spray of pyrethrum. When the silverfish is confined in a pyrethrum dust it shows great signs of irritation, often within thirty seconds. The pyrethrum dust adheres to the hairs on the body and around the mouth parts as well as upon all appendages. The insect becomes paralyzed within from three to ten minutes.

Sodium fluoride and sodium fluosilicate have been used in the past to control silverfish but were only partially effective. If these poisons are combined with pyrethrum, the lethal result to the pests is greatly enhanced. Treated "cards" sold commercially for silverfish control have little effect on the pests.

The diet preference of silverfish was also studied, and it was found that animal fibers such as silk and wool are not as popular with the pests as vegetable fibers, linen, rayon, cotton and lisle. As all paper and fine old linens are made from vegetable fiber sources, this explains their choice of libraries and linen closets for habitation. The insects are very fond of Cellophane, Kleenex and onion-skin paper, preferring these materials to newsprint and cardboard.

MAHOGANY A TIMBER CROP FOR FLORIDA

MAHOGANY may some day be a money-making timber crop in southern Florida, according to Professor Frank E. Egler, of the New York State College of Forestry.

The southern part of the peninsula, he points out, is similar in climate and other ecological conditions to the West Indian Islands where one species of mahogany flourishes. Mahogany trees are planted along the streets in some Florida cities and they are also found growing wild in the "hammocks" or hardwood groves that dot the flat Florida landscape. West Indian mahogany trees grow fairly rapidly under Florida conditions. Two-year-old saplings planted at Coral Gables in 1935 were 25 feet high in 1940. They are also more resistant to cold than might be expected of tropical trees, for they came through the severe freeze of the winter of 1940 that killed many other tropical plants in southern Florida. Mahogany trees will grow in a wide variety of habitats, from dry and exposed to semi-shaded and wet. They do, however, need protection from fire, a too-common and tolerated woodland evil in Florida.

Professor Egler, in a communication published in the August issue of the *Journal of Forestry*, indicates an increasing need to take thought for future mahogany supplies. The United States, with an annual utilization of about 24 million board feet, imports four fifths to nine tenths of the world's total cut. And since mahogany

cutters in tropical lands naturally take the trees nearest available transportation routes (usually rivers) it is becoming increasingly difficult and expensive to bring mahogany logs to market.

ITEMS

WHEN the great fur seal herd of the Pribilof Islands next puts to sea, at the end of its breeding season, it will be accompanied by a group of investigators of the U. S. Fish and Wildlife Service, in a specially equipped vessel now being outfitted. The object of the expedition will be to obtain further data on the life habits of these highly valuable animals for use in their protection. By international treaty in 1911, the United States undertook the supervision of the Pribilof herd, largest group of fur seals in the world, then threatened with extinction through reckless hunting at sea. Last October, Japan gave notice of intention to abrogate the treaty, which she had a legal right to do, but stated at the same time that she was prepared to conclude a new agreement.

MORE than a million dollars—\$1,192,000, to be exact—will be spent during the coming twelve months on anti-mosquito defense in and around the fifty-three major military areas where U. S. troops are quartered, according to the *Journal* of the American Medical Association. A little over a third of this sum will be used by the medical department, the remainder by the quartermaster department. The work will be done by civilian specialists and laborers, under the direction of eighty-seven sanitary engineers, all of them mosquito eradication experts.

IN preparation for whatever action the United States may take in the current Latin American and Far Eastern disturbances, the War Department announced that a special course of instruction in tropical diseases has been organized at the Army Medical School in Washington. Physicians taking the course will learn how to fight cholera and leprosy that are wide-spread in such countries as China; bejel, a non-venereal form of syphilis occurring among the Arabs of the middle Euphrates Valley; pinta, the spotted sickness of Mexico and other tropical countries; Oroya fever, an infectious disease found in Peru; and "Q" fever, a new disease found first in Australia.

IN experiments conducted at the Rockefeller Institute for Medical Research in Princeton by Dr. Folke Johnson, dodder, the pale yellow, leafless, parasitic vine that preys on the stems of other plants by sinking root-like growths into them, has been proved guilty of carrying virus diseases from one plant to another. Dodder shares with other non-parasitic vines the habit of twining around one stem for a distance, then reaching over to a neighboring stem. The living bridge thus formed sufficed to carry the viruses from infected to uninfected plants, under controlled laboratory conditions. Among the virus diseases thus transmitted by dodder were aster yellows, bushy-stunt of tomatoes, tobacco mosaic, curly-top of sugar beets and cucumber mosaic. Dr. Johnson reports his discovery in the current issue of *Phytopathology*.