

SCIENCE NEWS

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CHEMICAL ELEMENTS HEAVIER THAN URANIUM

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DISCOVERY of a whole new group of chemical elements heavier than number 92, uranium, which the text-books now list as the heaviest, has begun through the positive identification of element 93 and the probable discovery of element 94 at Berkeley, Calif.

The research, which was carried out by Dr. Edwin M. McMillan, of the University of California, and Dr. Philip Hauge Abelson, of the Carnegie Institution of Washington, confirms the discovery made several years ago by Professor Enrico Fermi, of Columbia University, of element 93.

When in January, 1939, the sensational splitting of uranium atoms with release of power was discovered, the existence of element 93 was called into question. Dramatically this happened at about the time that Professor Fermi received the Nobel prize for his researches. Now Professor Fermi's discovery is vindicated, and the discovery at Berkeley of still another super-heavy element is indicated. It is expected that the discovery of element 94 of atomic weight 239 will be reported in an early issue of the *Physical Review*.

Theoretically this new element 94 might be converted by self-destruction or radioactive emission of a helium nucleus into the uranium of atomic weight 235, which is sought as source of atomic power, but, surprisingly, this new element 93 is very stable. There is no likelihood that it can be used in the manufacture of the power-producing uranium.

Here is the train of events in the sub-microscopic world of the atom that gives rise to the new heavy-weight elements:

Starting with the common sort of uranium 92 of 238 atomic weight, this element is bombarded with relatively feeble neutrons of 25-volt energy. One of these is captured by resonance and the ordinary uranium becomes radioactive, with a half-life of 23 minutes. This produces element 93 of atomic weight 239. This is the element discovered by Professor Fermi.

The new element 93 is itself unstable and is radioactive, half of it disintegrating every 2.3 days. The existence of this reaction was first noted but not identified last year by Dr. E. Segre, a former colleague of Professor Fermi's at Rome, working at the University of California.

Now the McMillan-Abelson research indicates that with emission of electrons the element 93 changes to element 94 of the atomic weight 239.

Thus two elements heavier than uranium are added to the periodic table of the fundamental building blocks of the matter of the universe.

The discovery of other heavier elements may be expected as research progresses. For example, element 95 is being sought. The relative stability of element 94 among elements that are all radioactive brings hope that the others will be identified.

If the element 94 of 239 atomic weight gave off an alpha particle or helium atomic nucleus of weight 4, it would be converted into the power-emitting uranium 235. But preliminary explorations are understood to have indicated a very long life time for element 94, perhaps many thousands of years, making highly improbable any possible production of uranium 235 by this means.—WATSON DAVIS.

FREQUENCY MODULATION RADIO

WITH frequency modulation radio, known as FM, given the green light by the Federal Communications Commission, the stage is set for rapid changes in radio—provided war does not freeze the present art and prevent progress.

Within the next five years, radio engineers are freely predicting that almost every large broadcasting station now operating will be paralleled by an FM station, probably carrying the same program. There will be many local stations serving limited areas that will operate on FM alone.

Within a few months or a year all the larger radio sets will be built to receive both the more ordinary amplitude modulation signals and FM. FM broadcasts can not be received on conventional radio sets. Thousands and perhaps millions of sets in the next few years will be manufactured and purchased, as FM broadcasting grows. Elimination of static, extraordinary fidelity of tone, and lack of interference from distant stations are features of FM.

When the FCC cleared the radio spectrum from 42,000 to 50,000 kilocycles for FM it was a triumph for a kind of radio that many said could not be produced, the invention of Major Edwin H. Armstrong, of Columbia University, father of important radio circuits used in almost all ordinary radio sets in use to-day.

Dominant radio broadcasting interests did not take kindly to a new kind of radio, although there was much more interest on the part of manufacturers of radio sets who saw a chance to fill a demand for more sets.

Radio typewriters, in homes and business offices, pounding out news in the same way that it comes over teletypes in newspaper offices, may be a by-product of FM. Or a facsimile service can be broadcast. Either of these services can be multiplexed or carried on the same wave band as the sound FM without any interference. Whether they will be available will depend upon whether the public wants these services sufficiently to pay the price of the rather costly and complicated receivers.

FM quality will be only as good as the receiver that catches the radio signal and converts it into sound. While much conventional radio broadcasting does not run the whole gamut of the spread of sound frequencies, most receivers are much more woefully deficient in their frequency ranges. For instance, the broadcast frequencies of transmitters often range from 60 to 10,000 cycles per second, while many receivers range only from 150 to 5,000.

THE WORLD'S WHEAT SUPPLY

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Is the world being drawn toward famine?

This dark question haunts the food experts, who soberly admit they can not see far ahead in this continually surprising war. But reports from the world's food front, that mean bread, or none, for large masses of the world's two billion people, are not bright.

There is hunger now in parts of Europe, hunger in northern China. The United States, more fortunate, sees no menacing shadow of food shortages on its own horizon.

At the start of Europe's war, the world's granaries overflowed with largest wheat supplies known in history. The 1939 crop, plus record-breaking reserves, totaled the tremendous amount of 5,459,000,000 bushels, not counting the wheat in Soviet Russia and China, for which available figures are never complete. Now, the wheat situation is less favorable. Wheat, which means bread to a third of the world, has been attacked by severe winter in northern Europe and by a late spring, shortage of field labor, devastation in embattled countries. The crop is forecast as less than needed for consumption.

Meanwhile, ironically, the reserve that was record-breaking in 1939 is apt to be about 250,000,000 bushels larger than in July, 1939, when it stood at 1,189,000,000 bushels. A large part of this reserve is in the hands of the Big Four wheat-exporting countries—Australia, Canada, the United States, Argentina. Shipping and financing limit the amount that can be exported now. By another July, in 1941, the carry-over will be on the down grade, it is believed. Oddly enough, the Wheat Advisory Committee, back in 1938, forecast the carry-over of the world's wheat to be expected in the summer of 1940 at 1,369,000,000 bushels, which is close to the reality, though that forecast was based on an assumption of "normal conditions."

The saying of World War days, "wheat will win the war" may be heard again if strife spreads and lengthens. Germany's recent invasions have damaged crop prospects of lands that never produced enough grain for themselves at best. The United States in an ordinary year would expect to send 80,000,000 bushels of wheat to Belgium, the Netherlands, Denmark and Norway. Feeding 20,000,000 Belgians, Dutch and Danes next winter is a problem that Germany faces. And Germany's conquests have not yet brought her major grain resources to meet her own needs.

Reports of the world's wheat future include these:

Japan's wheat crop is now expected to be 24 per cent. less than the official estimate, due to adverse weather and not enough fertilizer supplies.

Finland lost quantities of grain in the ceded area, and found its imports of grain from Scandinavia cut off, when war broke out there. Finland expects a shortage of grain next winter.

France has the burden of 5,000,000 refugees, with the Red Cross as the only stop-gap aid in meeting the problem.

North China has been faced with hunger, and latest reports of the wheat crop there are conflicting, some encouraging, others not.

A bread-basket land like Hungary is rationing its flour.

The United States' wheat crop is forecast a little smaller than last year, amounting to 489,000,000 bushels of winter wheat, 215,000,000 bushels of spring wheat and a carry-over in July, 1940, of about 288,000,000 bushels.

Spain, which spent a grim winter, with some towns going two days at a time without bread, has another scant cupboard to look forward to. The wheat yield is forecast at 20 per cent. below normal, due to scarcity of fertilizers, poor agricultural machinery and low acreage. Spain offers a preview of what other lands enduring war can expect.—EMILY C. DAVIS.

SOME PAPERS READ BEFORE THE AMERICAN MEDICAL ASSOCIATION

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The layman's divided interest to-day between national defense measures and measures for giving him better medical care was reflected in the report to the American Medical Association, which opened in New York City on June 10, under the presidency of Dr. Nathan B. Van Etten, of New York.

Patriotism and a desire to uphold organized medicine in its squabbles with the government and unofficial reformers were blended in his address.

Dr. Van Etten believes that America's doctors are threatened by "pagan" invasion not only with guns but with ideas which would force foreign systems of medical practise on them. He said: "Love of country is a noble passion, but loss of the strong position of organized medicine in the United States would be deplorable and in the midst of this excited moment we must not lose sight of our patriotic ideals for the health and happiness of our people. We must not lose sight of the dangers to medical practise through concentrations of federal authority."

He approved the President's plan for medical service through small hospitals, but said they should be "workshops for ordinary physicians sufficiently educated to take care of average patients who will make up the average tenantry of these institutions." For patients needing more expert care, he suggested ambulance service to carry them to larger hospitals in larger towns.

Members of the house of delegates to whom he was speaking will bring discredit to the group which make the policies of the association, he stated, if they do not know exactly the medical needs of their own communities.

A POWDER extracted from human body fluid which gave encouraging results in treatment of sixty stomach ulcer patients was shown. The remedy was developed by Dr. David J. Sandweiss, Dr. M. H. F. Friedman, Dr. H. C. Saltzstein and Dr. A. A. Farbman, of Wayne University College of Medicine and Harper Hospital, Detroit. The substance, still unidentified, not only cured experimental ulcers in dogs but actually prevented their development. The patients who have been treated with this new substance have not been followed long enough, nor have there been enough of them to be sure that a cure has been found.

THE only hope for saving the lives of a third of the older patients having massive bleeding from stomach ulcers is prompt operation, Dr. John H. Blackford and

Dr. Robert H. Williams, Seattle, concluded from a study of the records in the city bureau of vital statistics of patients who died of stomach ulcer. Among 23,965 deaths they found 116 which could be attributed to hemorrhage from ulcer. More than 97 per cent. of the group were over 45 years old and 78 per cent. of them died from the first hemorrhage.

PATIENTS with acute appendicitis should be given the benefit of immediate operation rather than be given the so-called delayed or expectant treatment, according to Dr. Edward S. Stafford, Baltimore. An analysis by himself and Dr. David H. Sprong, Jr., of the mortality among 1,317 patients operated on for acute appendicitis at the Johns Hopkins Hospital between September 1, 1931, and September 1, 1939, has convinced these surgeons that the patient has a better chance of surviving when operated on immediately. Dr. Stafford pointed out that surgeons know that death "seldom follows the competent removal of an acutely inflamed, but unperforated appendix." Arguments presented against the delayed treatment are: (1) The most experienced surgeon can not always tell accurately whether an appendix has ruptured; (2) even if the patient recovers from the attack, he still has his appendix and is in danger of another attack.

THAT a pill or tablet can be swallowed to give protection against scarlet fever was announced by Dr. George F. Dick and Dr. Gladys Henry Dick, Chicago. The tablet contains purified scarlet fever toxin such as is now used to give immunity by injections under the skin. The tablet is designed for use in patients who can not be given the injections. Such patients include those suffering from hemophilia, for which a hypodermic needle injection may mean dangerous bleeding; patients with severe heart injury, and persons in institutions under quarantine for scarlet fever when speed in immunization is a prime consideration.

SUCCESS of a new drug, thio-bismol, in helping the fight against brain syphilis, or paresis, was reported by Dr. Harold N. Cole, of Cleveland. The new drug controls the fever of malaria which is now being widely used in treatment of this form of syphilis. By means of this bismuth compound, the chills and fever can be kept from becoming too severe without stopping the malaria treatment altogether. For terminating the malaria quinine must still be used. Collaborating with Dr. Cole in the trial of the new drug were Dr. Gerard A. DeOreo, Dr. James A. Driver, Dr. Herbert H. Johnson, of Cleveland, and Dr. Walter F. Schwartz, now of Pasadena, Calif.

SULFANILAMIDE is an efficient remedy for one type of the distressing skin disease, impetigo, but not for the other, Dr. Stephan Epstein, Marshfield, Wis., said in announcing that there are two types of this malady. One type is caused by streptococcus germs, and for this sulfanilamide is an efficient remedy. The other type is caused by another germ, the staphylococcus, against which sulfanilamide is less, if at all, effective. The staphylococcus type predominates in the Middle West, Dr. Epstein finds, while the streptococcus type is more common in the East and in Western Europe.

AIR conditioning may be the future treatment for patients with mental and nervous disorders, it appears from a report by Dr. William F. Petersen, of the University of Illinois, and Dr. Hans H. Reese, of the University of Wisconsin. Without advocating such treatment, these investigators found that changes in weather have such influence over the mental state of patients as well as the moods of normal persons that vague difficulties or emotional disability may be augmented into full-fledged mental illnesses.

ITEMS

SHOOTING stars, or meteors, seem all to be permanent members of the solar system, according to Dr. Fletcher Watson, of the Harvard College Observatory. He finds that previous measures of their speeds, which would have brought some in from outer space, were too great.

INVESTIGATIONS of cosmic rays provide a way to study the conditions of the upper atmosphere of the earth at extreme heights, it has been demonstrated at the Institute of Physical and Chemical Research and the Central Meteorological Observatory in Tokyo. It has been found that cosmic ray intensities fluctuate with different air mass conditions over Japan. Warm air masses high in the stratosphere tend to decrease the intensity of the cosmic rays.

TUBERCULOSIS will be wiped out by the year 2000, Dr. Henry D. Chadwick, of Waltham, Mass., president of the National Tuberculosis Association, predicted at the first general session of the convention of the association in Cleveland on June 3. His prediction was based on the way the tuberculosis death rate has been dropping during the twentieth century. Assuming that the average decline of approximately one third every ten years can be maintained, Dr. Chadwick said: "In that event, the tuberculosis death rate would be 32 in 1950, 21 in 1960, 14 in 1970, and 40 years from now in 1980 a rate of 9 or 10 may be anticipated. The bells that ring in the year 2000 may sound the death knell of the tubercle bacillus. The ultimate surrender of the tubercle bacillus" may come sooner than in two generations, as a result of discoveries in chemical remedies and nutrition.

THE miracle of making little children walk again when wasted, useless muscles had apparently doomed them to life in a wheel chair has been accomplished in five cases by treatment with vitamins E and B. Details of the cases are reported by Dr. Simon Stone, Manchester, N. H., in the *Journal* of the American Medical Association. One of these children was a victim of infantile paralysis. Wasted muscles and pain in both legs made it impossible for her to stand alone or to rise from a lying to a sitting position. After she was helped to her feet she could walk, but with unsteady painful gait. Vitamin B—all members of the group—banished the pain and enabled her to walk without support. But her muscles remained wasted. When vitamin E, in the form of wheat germ oil, was added to the vitamin B treatment, her muscles were restored to nearly normal usefulness within one month, her limp greatly improved, and no sign of muscle wasting could be detected.