

PHYSICAL CHEMISTRY

Discover New Kind of Plutonium, Element 94

➤ A NEW KIND of plutonium, the atomic fission bomb element, has been discovered by a team of University of California scientists.

The new isotope is plutonium 233. It is the 13th known chemical twin of plutonium, element 94. Isotopes are varieties of the same element, having the same chemical properties but different structure inside the nucleus.

Plutonium 239 is the most important isotope, being fissionable by slow neutrons and capable of sustaining a fission chain reaction. The A-bomb dropped on Nagasaki in World War II was a plutonium bomb.

Plutonium was first produced artificially in 1940 by a team of scientists that included Dr. Glenn T. Seaborg of the University of California. Now Drs. Seaborg, T. Darrah Thomas, Robert Vandenbosch and Richard A. Glass report their experiments identifying the plutonium isotope in *The Physical Review* (June 15).

Their studies of plutonium 233 were made at the University of California's Radiation Laboratory, Berkeley.

Science News Letter, August 17, 1957

BIOLOGY

Report Treatment For Sickle Cell Disease

➤ A NEW DRUG treatment for sickle cell disease, a strange and incurable blood malady, has so far been successful in the one patient receiving it, Dr. G. Hilkovitz, Hospital for Tropical Diseases, London, reports in the *British Medical Journal* (Aug. 3).

The drug is acetazolamide, a compound used as a diuretic for removing excess water from body tissues. Laboratory tests showed that it inhibited the sickling of red blood cells outside the body so it was tested on an eight-month-old Negro infant with proved sickle cell disease.

Sickle cell disease is an inherited blood disorder that affects the Negro race almost exclusively. Several cases among white individuals have been reported, however.

Victims of the disorder are almost constantly anemic and have recurrent "crises" in which they develop fever and attacks of pain in the limbs and abdomen. Many die before the age of ten and almost all have succumbed by 40 years of age.

The disease gets its name from the odd shape which the red blood cells take on. Normally spherical in shape, they are twisted out of proportion and into a curved or sickle shape by a changing molecular arrangement in the hemoglobin they contain.

Hemoglobin is the chemical substance that gives the red cell its color and allows it to carry oxygen throughout the body. Sickle cell victims have an abnormal type of hemoglobin which forms long slender rods inside the red cells after giving up its oxygen.

The only treatment has been massive trans-

fusions of healthy blood. Anticoagulant drugs have not been able to stop the deadly clumping of the sickled cells which finally block off blood in the veins and arteries.

The acetazolamide treatment reduced the sickling and brought about a steady rise in the hemoglobin level in the blood. The baby has continued to gain weight and to become more alert and active than before.

The drug's effects must be watched over a long period of time, however, since the natural remissions common in the disease may have accounted for the child's improvement, Dr. Hilkovitz cautions.

Science News Letter, August 17, 1957

AGRICULTURE

Whey Made Into Feed For Dairy Cows

➤ COWS may soon be getting back some of the milk they give the farmer.

Preliminary trials at Pennsylvania State University of a feed supplement derived from whey, a waste milk product formed in cheese-making, indicate that the product helped growth and milk production.

Since microorganisms in the cow's first stomach, or rumen, can convert simple forms of nitrogen to protein, scientists at the University's agricultural experiment station worked out a method for turning the milk-sugar, or lactose, in whey into an ammonium product. Concentrates of this product ranging in solids content from 30% to 72.75% were then combined with grain or other feeds and given to the cows.

D. R. Arnott, S. Patton and E. M. Kesler developed the process for manufacturing the feed supplement.

Some 10 billion pounds of whey are produced each year.

Science News Letter, August 17, 1957

BIOLOGY

Horse Holds Record For Sweating

➤ WHATEVER perspiring man first exclaimed that he was "sweating like a horse" probably did not realize how good the comparison was.

Dr. Francis N. Marzulli and John F. Callahan of the Army Chemical Center, Maryland, measured the capacity of ten common laboratory animals to sweat and found that the horse wins on two counts: He has the greatest output and the fastest "sweating response" of the animals tested.

The horse and burro, the scientists believe, may have a greater output of sweat in addition to a larger number of active sweat glands for a particular body area than man does. Man, however, is better supplied with sweat glands than either the monkey or dog.

The animals, which included, in addition to those mentioned, goats, swine, cats, guinea pigs, rabbits and rats, were exposed to a "hot room," 100 degrees Fahrenheit, 70% relative humidity. Neither the rabbits nor the guinea pigs sweated.

A complete report on the experiment appears in the *Journal of the American Veterinary Medical Association* (July 15).

Science News Letter, August 17, 1957



TECHNOLOGY

Mechanical Search Of Patents Successful

➤ ONE MAN can do the work of five in examining patents in the same period of time and with a higher degree of accuracy, using a newly developed punch card system.

In its first application to a practical problem, the mechanical search method cut examination time 80%, the Patent Office, Department of Commerce, has announced.

It was used to help examiners determine if a patent could be granted to 64 patent applications involving steroids, an important class of complex drug compounds including the familiar cortisone, the hormones and cholesterol. This required inspection of more than 2,000 existing patents to uncover any subject matter related to the pending applications.

Results were believed to be a "significant advance" for the drug manufacturing industry.

Science News Letter, August 17, 1957

PSYCHOLOGY

Talking to One's Self May Indicate Intelligence

➤ A MEASURE of human intelligence may be how broadly a person can converse with himself.

This is the belief of Dr. Albert Goss, visiting professor of psychology at the University of California at Los Angeles. Dr. Goss is studying the role of verbal cues in the general learning process.

Most of our learning is based upon talking to ourselves, he points out. Almost everything we learn to do is based upon verbal instructions we give ourselves describing the necessary steps to be followed in order to achieve a particular goal.

For example, when you pick out a tomato at the market, you generally follow instructions you have given yourself. The color, you have told yourself, should be a certain shade of red. Size may be important. There should be—if you're the kind that pinches tomatoes—a certain degree of firmness.

In time, things you do repeatedly become automatic. After you have driven to work over the same route several times, you do not have to tell yourself to turn left at the green house and right at the gasoline station. Driving along such a route becomes automatic.

Dr. Goss has been studying differences in learning processes between those people who do not employ verbal cues and those who do. He says the ability to talk to one's self, that is to make use of verbal cues, seems to facilitate learning. Children seem to learn faster once they are able to grasp verbal cues.

Science News Letter, August 17, 1957

CE FIELDS

MEDICINE

Fraternity Hazing Causes Illness

➤ **FRATERNITY HAZING** of college students at Ohio State University brought on an illness characterized by tense muscles and coffee-colored urine, Dr. William C. Stahl, Columbus, Ohio, reports in the *Journal of the American Medical Association* (July 27).

The illness is caused by over strenuous exercise and has been named "exercise myohemoglobinuria." The probable cause is a breakdown of muscle fibers due to extreme exercise, with the result that hemoglobin is released into the blood stream and then through the kidneys.

The first recognized case was a student who had been compelled by his active fraternity brothers to get out of bed three times during the night and each time for 30 to 45 minutes to do push-ups, knee-bends and other exercises. He was hospitalized as soon as he reported to the University health service about 60 hours later, because his symptoms resembled that of a serious kidney disease.

The condition also occurred in two students who developed it after doing more than 150 knee-bends "for fun to see who could do the most."

Another student developed it after doing about 200 push-ups in an hour to "get into condition."

The illness resembles "march hemoglobinuria" which occurs after marching or strenuous walking or running. This was first known in 1881 but was always associated with exercising in an erect posture. Only 75 cases of it have ever been reported. The Ohio State students, however, were doing non-erect exercises, Dr. Stahl reports.

Recovery was spontaneous and the treatment included bed rest if the student wanted it, aspirin for the muscular pains, and the prohibition of additional exercises.

Science News Letter, August 17, 1957

SOCIOLOGY

Find Eight Basic Causes Of Marriage Failures

➤ **EIGHT BASIC FACTORS**, indicating incompatibility with marriage in general, are at the root of most marital failures.

This has been discovered in research at the University of California at Los Angeles by Ahmed El Senoussi, Dr. Andrew L. Comrey, D. Richard Coleman and Dr. Jacob S. Druckman.

The factors are 1. low self-opinion; 2. adolescence "hangover;" 3. early conditioning against marriage; 4. cumulative ego strain; 5. homosexual tendency or male passivity; 6. sex dissatisfaction and projection; 7. revolt against femininity; 8. flight into rejection.

Such factors might come into being re-

gardless of race, religion or social status, one of the researchers said.

Adolescence "hangover" refers to those who bring adolescent instability into their marriages. Sex dissatisfaction and projection were indicated in those who blamed their own sexual failures on their mate. "Flight into rejection" seems to be the problem of people who reject their husbands or wives before "they themselves are rejected."

The eight factors were derived from answers to a questionnaire based on typical problems of marital conflict and submitted to a group of 50 persons, most of whom were receiving marriage counseling. The group represented a wide range of social, economic, educational and intellectual backgrounds.

Science News Letter, August 17, 1957

MEDICINE

Enzyme Drug Dissolves Fatal Blood Clots

➤ **A DRUG THAT** may stop heart attacks by dissolving dangerous blood clots after they form in the body is now being tested in humans, Yale University scientists have reported.

The drug is an enzyme known as plasmin. It will be injected into the blood stream as soon as a blood clot is detected. If it works as well in humans as it has in experimental animals, the clot will dissolve and the blood will return to normal within a few hours.

Although anticoagulant drugs to help prevent the formation of clots are already in use for heart patients, there is nothing now available that can be used to dissolve the clots once they are formed. These clots travel throughout the blood stream and cut off vitally needed blood flow in arteries and veins.

The plasmin enzyme is obtained from the reaction between two other enzymes, plasminogen and streptokinase. Plasminogen is an inactive enzyme extracted from human blood which was provided by the American Red Cross, while the streptokinase is obtained from streptococcal bacteria and contains poisonous materials which lower blood pressure, restrict blood supply to the heart and has been found to cause chills and fever.

The big problem in the past has been to get plasmin pure enough so that it was nontoxic to humans.

Although it has not yet been completely purified, Drs. Daniel L. Kline and Jacob B. Fishman, Yale School of Medicine, believe they have removed enough of the toxins to try it in humans.

Other scientists are working on ways to inject the streptokinase directly into the blood stream so that it can react with the plasminogen normally in the blood, thus releasing plasmin inside the body.

This method would not work in all cases because some people may be deficient in plasminogen, Dr. Kline said.

Also, about one out of three persons has developed antibodies against streptokinase because of previous streptococcus infections, he added.

Science News Letter, August 17, 1957

ANIMAL NUTRITION

Selenium Cures Chicks' Nutritional Deficiency

➤ **Selenium**, a mineral used in photoelectric cells and other electronic devices, produces the same nutritional effects as does vitamin E when given in very small amounts to young chicks.

Selenium has been considered a highly poisonous substance.

E. L. R. Stokstad, E. L. Patterson and R. Miltrey of the nutrition and physiology section of the American Cyanamid Company's laboratories in Pearl River, N. Y., reported to the Poultry Science Association at its annual meeting in Columbia, Mo., that as little as one part of selenium in 10,000,000 parts of feed is important to chick nutrition.

A nutritional disease found in baby chicks when they were fed a diet lacking vitamin E and selenium was completely prevented by adding either the vitamin or pork kidney to the original diet. The effect of pork kidney was not due to vitamin E but to an "unknown substance" later proved to be selenium.

Fluorine is another example of a toxic mineral which is beneficial in extremely low concentrations.

Science News Letter, August 17, 1957

TECHNOLOGY

Paint Spray Process Uses Static Electricity

➤ **A PROCESS** for painting steel parts better than by hand or ordinary paint-spray methods makes use of the same force that sometimes makes your hair "stand on end" when brushed on a dry day.

The principle used in the process is "electrostatic attraction," the electric force that makes oppositely charged particles attract, and similarly charged particles repel one another.

Republic Steel Corporation's Berger Division, Canton, Ohio, is using this principle to paint steel school lockers. As the lockers go by on a conveyor, electric-eye-operated paint-spray guns start shooting through a hoop-shaped electrode charged with up to 100,000 volts. As the paint particles fly through the charged electrode, they pick up a negative charge and are irresistibly drawn to the steel lockers, which have been grounded to induce an opposite positive charge.

The electrostatic paint-spray process has three advantages:

1. Electrostatically sprayed paint gives a good, smooth, uniform surface finish, free from irregularities.

2. Time is saved since the paint particles "wrap around" all steel parts of the lockers, where formerly the parts had to be mechanically rotated.

3. Electrostatic painting uses less paint, since almost all the charged paint particles land on the oppositely charged locker. Less than 10% of the sprayed paint is wasted, and as a result, less "painter's house-cleaning" is needed around the painting booths.

Science News Letter, August 17, 1957