SCIENCE NEWS

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BERYLLIUM

AIRSHIP frames and light-weight pistons may soon be made from beryllium or its alloys, and this hitherto unknown metal may soon achieve the household familiarity that aluminum has won during the last two or three decades.

Beryllium is a metal about a third lighter than aluminum, but is very much harder, scratching glass easily like hard steel. According to H. S. Cooper, industrial chemist of Cleveland, who has been conducting extensive experiments, it is one of the most remarkable of all metals in its elasticity. It is over four times as elastic as aluminum, and 25 per cent. more elastic than steel. And while aluminum corrodes easily on contact with salt-water, beryllium shows very high resistance to this as well as to other metal-destroying liquids and fumes. It is light gray in color, and takes a polish like that of high grade steel.

It is chemically related to aluminum, and easily forms alloys with it. One of these, consisting of 70 per cent. beryllium and 30 per cent. aluminum, is one fifth lighter than aluminum, far more resistant to corrosion and in tensile strength far exceeds duralumin.

One quality which Dr. Cooper points out may render beryllium especially valuable to the automobile industry. It expands under the influence of heat at about the same rate as cast-iron. Thus when used for light pistons inside the iron cylinders of automobile engines it will present far less engineering difficulty than do the present types of light pistons, which expand at a rate different from that of iron.

Beryllium ores are found abundantly both in this country and abroad. At present they are hauled out of feldspar mines in New England by hundreds of tons, but are dumped away as waste. The commonest type of ore is known as beryl, polished crystals of which are sometimes worn as semi-precious stones.

Although so new industrially that it can not properly be said to have been born yet, scientifically beryllium is an old story. It has been known to chemists for 130 years; Vauquelin, a Frenchman, first indicated its existence in 1797. But until recently it has remained merely a museum curiosity and a laboratory material, because it is so refractory that the cost of getting it in anything like a pure state has been prohibitive. But now that the cost of manufacture promises to be materially reduced by a new electrolytic process, it is probable that it will appear on the market in quantity within a few years.

LIQUID FUEL FROM COAL

THE key to the conversion of water-gas made from coal into petroleum-like liquid fuels, jealously guarded by all the chemists who have discovered it, is being sought by chemists of the U. S. Bureau of Mines. And in its main principles at least it has been discovered. Three Bureau of Mines chemists, David W. Smith, J. D. Davis and D. A. Reynolds, reported their findings to the American Chemical Society meeting at Detroit, which will be published in detail in an early issue of *Industrial and Engineering Chemistry*.

The stimulus that started them to work was the secretiveness of the oil-making chemists, particularly the Germans, about the catalysts they used in their processes. A catalyst has been defined as a chemical go-between or matchmaker; it is something that promotes the combination of other elements or compounds, without itself becoming a part of the combination. Nobody knows much about the way catalysts do this, but the fact that they do is exploited in many industrial chemical processes, such as the synthetic production of ammonia from the nitrogen of the air.

The foreign chemists, in their publications and at scientific gatherings, would state frankly enough the proportions of hydrogen and carbon monoxid they used, the temperatures and pressures they employed, and all other details, but would merely say, "The gas was then passed over a catalyst," when it came to the crucial point. They never told what the catalyst was, or when they did reveal its constituents they still remained silent regarding their proportions or the important details of their preparation.

The three government chemists have tried six different catalysts, all of them being mixtures of metals in a very finely divided state, exposing a great deal of surface to the action of the gases. The most effective was one made up of metallic cobalt and manganese oxid, with a small amount of metallic copper. This produced from the water-gas a mixture of hydrocarbons, ranging from the simple gaseous forms to those forming a clear, oily liquid.

FISH HATCHERIES OF THE UNITED STATES

WE have become accustomed to billion-dollar Congresses and we are beginning to discuss billionaires. Difficult as it may seem of achievement, we are now stocking our waters annually with billions of fry, fingerling and adult fish. These are the output of Federal, State and private hatcheries. Nearly every state has at least one hatchery, and the Federal government has 70 stations and substations all the way from Afognak, Alaska, to Boothbay Harbor, Maine; from Duluth, Minn., to San Marcos, Texas.

In 1926 the output of the U. S. Bureau of Fisheries fish-cultural stations and of the rescue fields bordering the Mississippi aggregated 5,232,000,000 fish and eggs, according to a recent report by Glen C. Leach. The forty-four species propagated include nearly every important food and game fish in our waters. Because of the increased demand for fish of the fingerling sizes, the output was increased more than 100 per cent., total-

ing nearly 300,000,000. Another important phase of the Bureau's work included the salvaging of about 150,000,000 fishes which had become stranded in land-locked pools along the upper Mississippi.

The five distribution cars travelled nearly 85,000 miles, additional territory being covered by messenger with the familiar milk can of fish, travelling by the regular baggage cars. From 12,000 to 15,000 applications are received each year.

The number of applications received is increasing so rapidly that it is very difficult to fill all of them. In every case an effort is made to furnish a sufficient supply of young fish for the establishment of a brood stock.

Fish-culture is becoming more and more an exact science. The modern fish-culturist talks in terms of pond fertilization, the use of forage fish for food for the game fishes, use of foods rich in vitamins, and the free use of the thermometer to prevent his brood from being subjected to too sudden changes in temperature.—*Lewis Radcliffe.*

X-RAYS AND EVOLUTION

How X-rays in heavy doses have been used to speed up the process of evolution over one hundred and fifty times was told before the Fifth International Genetics Congress, meeting in Berlin, by Professor H. J. Muller, of the University of Texas. At the same time, Professor Muller suggested caution to physicians in the use of X-ray therapy, stating that the reproductive cells of human beings are probably just as susceptible to the influence of these rays as were those of his experimental insects, and that heavy rayings of the genital tract might have lamentable results in a later generation. Ordinary uses of the X-rays, it might be added, are not to be regarded as dangerous.

Earlier experiments by other workers in the same field had produced some results, but these were of an equivocal nature. Professor Muller, however, decided to try again, with heavier rayings. He used the familiar little fruit-fly, well known to both geneticists and housewives, because it breeds rapidly and costs little to keep.

Raying these in large numbers, he waited for results. The first generation were normal, like their parents, but among the second generation, the grandchildren, were numerous mutations or "sports," with abnormal wings, eyes and other organs. These were the same kind of things geneticists have been observing for many years in their studies of evolution, but they were produced over one hundred and fifty times as frequently as they are accustomed to occur naturally.

The theory of this remarkable effect of the X-rays on animal heredity is that their energy in some way affected the "genes," or hereditary units, that are bound to the chromosomes, which are special bits of living substance in the reproductive cells that always pass over in the same way from parent to offspring. "The X-rays hit these genes like a charge of shot hitting a pile of pebbles, and had much the same kind of effect on them," was the phrase of Professor Muller.

His warning against possible ill effects among the grandchildren of parents recklessly exposing themselves to heavy X-ray treatment without good cause is based on the fact that the chromosomes and genes in human cells are very much like those in the cells of the lowly fly; and what happened to the insect might easily happen to a man or woman.

CLADOCERA

An instance of evolution in a laboratory bottle, with a small aquatic animal producing offspring that can thrive only at abnormally high temperatures, was described before the congress by Dr. A. M. Banta and T. R. Wood, of the Carnegie Institution of Washington.

In conducting a series of experiments at the Station for Experimental Evolution at Cold Spring Harbor, N. Y., in which huge numbers of a minute water animal known as Cladocera had to be reared, they noticed that the brood of one of the animals were not doing very well, and they tried putting the bottle in which they were growing into a warmer place. At once the little creatures began to thrive and multiply. Further observations brought out the fact that the new race demanded for its best growth a water temperature considerably above that which its parent species found most suitable for its life processes, and this preference for being "always in hot water" was handed down from generation to generation.

Dr. Banta suggests that the peculiar animals and plants that live in hot springs, some of them at temperatures near the boiling-point, may have originted in this fashion. "Mutations such as the one we have observed in the laboratory must also occur once in a while in nature," he says. "But under ordinary circumstances, with no warm water handy for them to live in, the new strain will die out. However, if the mutation should happen to occur in the run-off stream from a geyser or hot spring, the warmth-loving animals could swim to a place where the temperature would suit them, and there survive and multiply."

LOCUST PODS FOR FODDER

Fodder for stock will be harvested from the farmer's fencerow and woodlot trees, as well as timber for posts and other uses, according to a plan now being promoted by *The Journal of Heredity.* Honey locust pods are eaten eagerly by hogs and cattle, which find them tasty and nutritious, and the editors of the magazine are offering $50 in prizes for the tree with the biggest and best yield of pods. They invite any one who owns an exceptional locust tree to write them for particulars of the competition.

Some of the elongated fruits of the honey locust tree are a foot or more from tip to tip, and the small, hard seeds are embedded in a matrix of sweet, gelatinous substance. The pods are somewhat similar to those of the carob of the eastern Mediterranean countries, which has been used for centuries as stock food in its native land and is planted to some extent in our own Southwest. The carob will even do, at a pinch, for human food. When the prodigal son found himself reduced to "the

husks that the swine did eat,'' it was these thick, sweetish carob pods he was eating; and under the name of ''St. John's bread'' they are regarded by some as having been the frugal diet of John the Baptist.

Some experiments already in progress indicate that the native honey locust may be a fair competitor for the carob as a fodder producer. The present governor of Georgia, Lamartine Hardman, likes to experiment with new stunts in scientific farming, and he reports that locust pods have proved very satisfactory, both when raked up and fed in the barn and when left to lie for the animals to pick up for themselves.

ASIATIC CHOLERA

ASIATIC cholera, which is reported to be decimating the troops of the Northern army in the Nanking district of China, is an example of a highly fatal disease that has spread through the world by the increasing facility of modern travel. It has existed since very early times around the mouth of the Ganges but up to the time of the British occupation was not known outside India.

The first recorded excursion of this dangerous infection beyond its native haunts took place in 1816. It traveled slowly in those days of sailing vessels but managed to extend its range to the rest of Asia and to Africa. In 1826 it broke loose again, reaching as far as Europe and America. Twenty years later it spread to the uttermost parts of the earth. It followed the forty-niners across the American continent during the gold rush. In France alone it killed 150,000 people. It has flared up in world-wide epidemics three times since. The last, which occurred in 1902, had its start from the gathering of some 400,000 pilgrims at Mecca.

The cholera bacillus is carried in drinking water from regions where the disease is prevalent. Infection only takes place by swallowing the bacillus, much as typhoid fever infection is transmitted. This means that Asiatic cholera can be brought under control by sanitary measures and for this reason has never gained a serious foothold in advanced countries during recent years.

Vaccination is an important adjunct to sanitation in the prevention of this disease, particularly when epidemics break out in time of war. When, however, medical and sanitary measures are not available, as in many sections of China at the present time, fatalities inevitably run exceedingly high.

TUBERCULOSIS VACCINE FOR CATTLE

THE preventive tuberculosis vaccine that has been developed by Dr. Albert Calmette, director of the Pasteur Institute at Paris, is about to be tried out on herds of dairy cattle through the cooperation of the British veterinary ministry of health.

The vaccine is known as BCG, from the names of its discoverers, Dr. Calmette and Dr. M. Guerin, of the Pasteur Institute at Lille. It consists of an attenuated strain of bovine tubercle bacilli that have, after years of cultivation on beef bile medium, somewhere in the succeeding generations lost their virulence, though they still apparently retain their power to confer immunity.

The vaccine will be used in selected herds in which tuberculosis is known to be present. All calves will be vaccinated within two weeks after they are born. The operation will be repeated every twelve months, over a period of five years. By that time most of the older and tuberculous cows will have been worked out of the herds. At the end of this period the herds will, it is expected, consist largely of adults that have been kept free from infection by vaccination.

Members of the staff of the health ministry will supervise the vaccinations to check up on the efficacy of this new method of attacking tuberculosis in cattle.

ITEMS

THE members of one of the French athletic teams are regularly using ultra-violet ray baths during training, having been convinced of their value in toning up the system. England as well as France is following the example of America and Germany in the use of ultra-violet rays for preventive and curative medical purposes. In the British Parliament a bill is under consideration making it obligatory for light baths as well as water baths to be installed in mines, freely available for every miner who has been deprived of sunlight for six hours a day. An enterprising municipality is fitting out ordinary public bath-houses with ''artificial sunlight.''

THE old adage, ''What is one man's meat is another's poison,'' has been well illustrated by the effects of ultra-violet rays on the sugar solutions in which yeast cultures are grown. Experiments performed by Drs. J. W. Woodrow, A. C. Bailey and E. I. Fulmer, of the Iowa State College, show that if the flasks of nutrient liquid in which the minute plants are subsequently to be grown are exposed for a number of hours to the invisible radiations, they become definitely poisonous to the yeast cells, markedly decreasing their rate of growth. This is completely contrary to the results obtained by irradiating the food of animals, which have been shown to generate beneficial vitamins under such treatment.

COD-LIVER oil and yeast, popular medicines for human beings, are proving to be almost as beneficial when fed to fish. Such is the statement of Dr. Lewis Radcliffe, of the Fisheries Bureau of the Commerce Department. So firm is the faith of the Fisheries Bureau in the efficacy of the two human medicines that an entire bureau hatchery at Holden, Vermont, has been turned over to the fish doctor, H. S. Davis, for experimentation. Healthy fish as well as sick ones are responding favorably to the unusual vitamin treatment. Trout, in particular, show remarkable development when fed cod-liver oil. The usual procedure is to subject two broods of trout to a 30- to 50-day period of experimentation. Other conditions being equal, one brood is fed yeast or cod-liver oil, and the other given its usual feed. Results are carefully tabulated. Experiments already made have shown decided improvement as to increased growth, general vigor and loss by mortality. The cod-liver oil or yeast is added to the feed in powdered form.