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EDWIN E. SLOSSON, Director
WATSON DAVIS, Managing Editor

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ATTEMPTS AT ARTIFICIAL GOLD

By Dr. Edwin E. Slosson

For some three thousand years, off and on, chemists have been trying to make gold out of the baser metals. Just now they are on the quest again with as high hopes as the medieval alchemists and with better reason. We now know that some atoms can be broken to pieces and that some elements can be transmuted into others. The metal radium decomposes spontaneously into the gas helium and the metal lead. Professor Rutherford has split up the nitrogen atom into helium and hydrogen. The helium atom weighs 4 and they hydrogen atom weighs 1. The helium is supposed to be made by the combination of 4 hydrogen atoms.

Now if you subtract weight of the gold atom (197) from the weight of the mercury atom (201) you get 4. So it would seem that if you could knock out from the mercury atom a helium atom, or its equivalent 4 hydrogen atoms, you would get gold.

But can you? That is the question. This may be, like many another chemical reaction, easy to write out on paper yet impossible to accomplish in the laboratory. But two chemists, a German and a Japanese, say that they have done it.

Prof. A. Miethe of the Photochemical Department of the Berlin Technical High School, who has been for years studying the discoloration of minerals and glass by ultra-violet light, found that the mercury vapor lamps used as a source for these rays ceased after a time to work, owing to the deposit of a sort of soot on the quartz glass wall. He tested this deposit and got indications of gold.

Now it is not surprising to find a trace of gold in commercial samples of mercury, for mercury is one of the few liquids that will dissolve gold and is used to extract the precious metal from sand or ores. But the mercury in the lamps had been twice distilled to free it from all impurities and on analysis showed notrace of gold until after it had been subjected to the prolonged action of the electric current in the lamp. The quartz, the iron and the carbons of the lamp were also analyzed and pronounced gold-free. Miethe sent samples of these and of the mercury, before and after using in the lamp, to Professor Haber, the inventor of the Haber process for fixing nitrogen, who has been interested in the extraction of gold from sea water and had developed a very delicate method of estimating gold in minute amount. He reported finding gold and in some cases silver in the samples that came from the lamps. The amount varied from one to fifty-two parts in a billion parts of mercury.

From these experiments, which Miethe has carried on with his assistant, Dr. H. Stammreich, since last April, he concludes that some of the atoms of the mercury have been crumbled away by the electric current passing through the vapor, leaving gold as a residue. In his lamps he used 170 volts between the electrodes and ran currents from 400 to 2000 watts for periods of 20 to 200 hours.

From the other side of the world comes the report of similar success in the manufacture of gold artificially. Professor Hantaro Nagaoka of the Tokyo Imperial University has published a phtograph of a deposit of gold which he obtained by running a mercury lamp for more than 200 hours under a voltage of 226. The gold obtained amounted to a milligram and a white metal that appears to be platinum was also produced.

In the United States Prof. H. H. Sheldon of New York University is engaged in repeating these experiments and doubtless many others are quietly carrying on the quest.

But there is as yet no apparent reason for the alarm that synthetic gold will upset the standard of the world's currency. The process, if possible, is too expensive to be profitable. Although gold is more than three hundred times as costly as mercury yet the electric current would cost more than the value of the gold produced. This is likely to remain true however much the efficiency of the apparatus is improved. Professor Miethe expressly warns the public that his discovery of the possibility of decompsing the mercury atom has no commercial importance and that speculation in this direction is rash and premature. There is no ground for the suspicion that the Germans are secretly manufacturing gold with intent to pay off all their war debts before the rest of the world learns how. If the aim is to produce wealth it would be much more profitable to find out how to get energy out of the atom than how to transform the elements by putting energy into the atom.

"A" STOOD FOR "BISON" IN OLD MESOPOTAMIA

The image on the American five-cent piece, the letter "A", and the great winged bulls of the palaces of Babylon, are all pictures of the same animal. This is the discovery of Prof. Max Hilzheimer, director of the natural history section of the Provincial Museum of Brandenburg in Berlin, who has made a special study of the ancient images and inscriptions in connection with the former distribution of the European bison.

This little-known animal, known in Germany as the Wisent and in Russia as the Zubr, is now even nearer extinction than its American cousin, but once had a much wider range, roaming the plains of Mesopotamia when that country was the world's "Wild West". That it was important to the early inhabitants of western Asia is shown by its appearance on many cylinder seals and other inscriptions of the old Sumerian civilization, whence it was adopted by the later Babylonians and Assyrians, even though the animal itself had by then disappeared from the country.

These early peoples used a picture - writing built on somewhat the same principles as modern Chinese. The Assyrian character for "bull" was a triangle standing on its point, representing the broad face of the animal, with a pair of short horns projecting. Something very like this character can be obtained by turning a capital " A" upside down. The early Hebrew word for "bull" was "alphu", expressed with the old Assyrian word-sign. Later the same sign, inverted, became the Hebrew-Phenecian "aleph", the Greek "alpha", and the Latin-Modern " A".

Early Sumerian figures of this ancient bison show it standing erect and fighting with beasts of prey, with men, even with the gods. The broad noses of the animals, with their suggestion of a Semitic shape, together with their characteristic beards, must have made them seem very man-like to the old Mesopotamian peoples and their gradual conventionalization into the winged, humanfaced, bearded colossi of the ancient palaces and temples was a natural change.

NEW-FOUND DIET FACTOR PREVENTS PELLAGRA

Pellagra, a disease of serious importance in the South, may be prevented by the newly discovered "dietary factor P-P", present in brewers' yeast, fresh milk, and fresh beef. While it may be a vitamin, it is not identical with any of the vitamins hitherto discovered and described. Drs. Joseph Goldberger and W. F. Tanner, of the U. S. Public Health Service, discovered this new disease-preventing factor while they were at work at the Georgia State Sanitarium for colored women, where many of the immates were sufferers from pellagra.

Earlier investigators had made frequent statements that peas and beans were pellagra preventives, but Drs. Goldberger and Tanner found that even when the patients were given these foods daily in considerable amounts, pellagra still developed. Then they tried fresh milk casein in the form of cottage cheese, and got good results. Dried milk powder, however, failed to have the same preventive power. The best results were obtained with brewer's yeast. Patients receiving daily doses improved more rapidly than those on any other treatment tried.

By comparison of the diets of their patients with those used in treatments and experiments on other deficienty diseases, Drs. Goldberger and Tanner were led to the conclusion that none of the known vitamins or dietary factors could account in every case for their results, and that therefore there must be a hitherto unsuspected preventive factor at work.

PARATHYROID EXTRACT CURES SICKNESS CAUSED BY LACK

Successful treatment of parathyroid tetany, a deficienty disease caused by defects in the parathyroid gland, is announced as the result of researches by Dr. J. B. Collip of the University of Alberta.

The parathyroid gland is an obscure body associated with the thyroid gland in the throat, in the region of the "Adam's apple". It is one of the ductless glands, whose secretions pass directly into the blood, and are therefore very hard to isolate and study. Persons with parathyroid deficiency, and animals from which these glands have been removed surgically, develop a condition known as "tetany", marked by extreme nervousness, spasms and stiffening of the muscles, and other distressing symptoms.

Hitherto there has been no effective treatment for this condition, but Dr. Collip has succeeded in obtaining an extract from animal parathyroids, which he calls "parathyrin", and which seems to be the long-sought remedy. After a number of successful preliminary experiments with dogs, whose parathyoids had been operated upon, he tried the extract on a baby in a hospital, whose condition had become

desperate. The child's life was saved and at last reports she was well on the road to recovery.

The operation of parathyrin in normal persons and animals seems to be connected with the quantity of lime in the blood. Tetany is accompanied with disturbances of the calcium concentration, and when the extract is administered normal conditions are restored.

EXPEDITION TO PENETRATE HOMELAND OF PANAMA'S WHITE INDIANS

An expedition to further explore the area inhabited by the White Indians of Panama is about to penetrate into the interior of this country, hitherto practically unknown to all except the white and brown Indians.

Dr. and Mrs. Reginald G. Harris have joined Richard O. Marsh, who took three white Indian children and five brown Indians to the United States last summer, in this attempt to learn for science more details about the origin and cause of the unusual presence of many white-skinned Indians among the brown San Blas and mountain tribes. With Marsh also is Maj. Herry B. Johnson, naturalist, who accompanied him last year on his trip of exploration in this part of Darien.

Dr. Harris is director of the laboratory of the Long Island Biological Association at Cold Spring Harbor, N.Y. and he has already studied many of the White Indians along the coast with a view to solving the biological puzzle of their origin. Mrs. Harris is a daughter of Dr. C. B. Davenport, director of the department of genetics of the Carnegie Institution of Washington.

Marsh left the United States January 2 and brought back to their native land all but one of the Indians whom he took north last summer. The smaller White Indian boy, a youngster of eleven, named Chepu, has been adopted by the Marsh family at Brockport, N. Y.

Reports reaching the coast indicate that there is much unrest among the mountain tribes who threaten an uprising against the negro rubber hunters who are penetrating the country and raiding the Indian plantations. All of the Indians are very friendly to the Marsh party, however. Among the brown San Blas Indians taken to the United States by Marsh was Iqua Negappi, "crown price" of the San Blas who will one day rule the whole coast.

WOMEN SCIENTIST SHOWS HOW LICHENS PULVERIZE ROCKS

The activity of lichens, the gray or brown crusts of plant growth that splotch rock surfaces in "weathering" stone has been studied in Aberystwyth, Wales, by Miss E. J. Fry who has demonstrated the simple but efficient means by which these lowly plants literally pull the rocks to pieces. It is a well known fact that if gelatin or agar-agar jelly is allowed to dry in glass vessels thin flakes of glass are split off from the surface of the vessel in contact with the gelatin. The phenomenon may be described as due to the gelatin first sticking very tightly to the glass surface and then contracting when it dries. In contrating the outer edges of the gelatin tares flakes of glass with them.

Lichens in wet weather are surrounded by a gelatinous layer which sticks tighly to the rock on which they grow. In hot dry weather this gelatinous layer contracts, its edges curling away from the rock face. If these edges be examined they are seen to be covered with a thin layer of rock which has been peeled off.

Miss Fry in her paper recalls the great damage often done by organisms to the glass in church windows. Work done by a French investigator suggests that in this case chemical action is important in the early stages, but it seems highly probable that in this case, too, the alternate spreading of gelatinous lichens and their shrinkage in hot weather play their part.

AUSTRIA BUILDS FIRST AVALANCHE OBSERVATORY

An observatory for avalanches, believed to be the first of its kind, has been erected in Tamischbachturm, in the ppovince of Steiermark, Austria, by the state railway. Its object is both scientific and practical. It has been fitted with instruments for the recording of exact data, and it will also send out warnings to stations below when avalanches threaten. It is also planned to "set off" incipient avalanches, and so prevent them from launching themselves later spontaneously and without warning.

FERNS MAY BE ERADICATED FOR CARRYING BALSAM DISEASE

Some of our most beautiful ferns may fall under the ban which the government is placing on gooseberries and barberries, according to S. A. Weatherby, noted fern specialist. Her reports that species of rust attacking balsam firs with destructive force are found to have ferns for their alternate hosts. Both eastern and western balsams are infected, and ferns guilty of transmitting their disease are found on both coasts. Among them are the beech fern, the sensitive fern, the marsh fern, the western ladyferns, brackens and polypodies.

RADIO DISTRESS SIGNALS SENT OUT AUTOMATICALLY FROM SHIP

A device which sends out distress signals from ships automatically has been invented by M. Passaquin, a young engineer. The instrument consists of wheels with projections around the edges corresponding to the signal, SOS, certain numbers which will give the latitude and longitude of the vessel, and the radio call of the ship.

An ordinary electric motor operates the machine which is mounted on a table. Each wheel is set at the proper angle and the motor started. The signal flashes three times and then stops. After a short pause the signal is flashed again and again until the motor is forced to stop running.

Ships or lifeboats equipped with this new invention do not have to have radio operators in order to send out messages of distress. A special dial on the transmitter may be set every day with the exact location of the ship and the motor turned on to operate the set whenever an emergency arises.

LOS ANGELES ECLIPSE PHOTOGRAPH SHOWS NEW CORONA SPECTRUM

What is believed to be the first photographs of the spectrum of the sun's corona in the deep red region was obtained as a result of the U. S. Naval Observatory eclipse expedtion on board the U. S. Navy dirigible LosAngeles.

C. C. Keiss, physicist of the U. S. Bureau of Standards, who operated a spectroscopic camera fitted with special plates sensitive to red, found upon development of his plates that he had obtained a spectrum that extends out into the deep red, a region of the coronal spectrum but meagerly known heretofore. Owing to a slight motion of the camera, the images are somewhat blurred, but it is expected that important qualitative results will be obtained after the photographs are measured and more carefully examined.

Mr. Keiss carried on his observations with the hope of getting more information about the unidentified element, called coronium, which is believed to cause in the coronal spectrum a brilliant green line and several other lines unclaimed by the known chemical elements! Further examination of Mr. Keiss's plates may reveal similar limes in the red end of the coronalspectrum.

RADIO BROADCASTING SUCCESSFUL FROM DIRIGIBLE ON ECLIPSE FLIGHT

The experimental broadcasing by radiophone of an account of the U. S.Naval Observatory Eclipse expedtion on board the Navy dirigible LosAngeles was a success according to reports from forty-six listeners received at the U. S. Naval Air Station at Lakehurst, N. J.

Lieut. T. G. W. Settle, communications officer of the Los Angeles, reports that radio fans in Massachusetts, Connecticut, New York, Rhode Island and News Jersey are among those who received successfully the brief three minute radio talk given by Watson Davis, manging editor, Science Service, who was the press representative on the eclipse flight. The broadcasting which was unannounced and purely experimental took place on 500 meters and occurred about 12:20 Saturday (Jan. 24) while the Los Angeles was some sixty milesout at sea and a half mile in the air. The dirigible was then speeding homeward to her hangar at Lakehurst after having been a mile high observatory for the Naval Observatory astronomers and their photographic telescopes.

ECLIPSE FAILS TO ALTER SWING OF OCEAN TIDES

The eclipse of the sun had no direct effect on the heights of tides, according to officials of the U. S. Coast and Geodetic Survey. Variations in the height of tides are greatest and least at new and full moon, when the sun and moon are practically in the same line with the earth. At the time of the eclipse, the earth, moon and sun were lined up and the combined pull of the two heavenly bodies was being exerted on the earth and its waters; but this pull was not appreciably greater than at the usual periods of full moon.

In checking up one of the several reports of unusual tidal conditions attributed to the eclipse, experts of the Coast Survey discovered that the supposed effect occurred four hours after the eclipse and was no greater than that recorded for the day before the eclipse.

GERMAN SCIENTIST SAYS FISH SMELL

The popular idea that the sense of smell consists of detecting minute traces of gaseous substances in the air, that taste consists of detecting substances dissolved in water, and that therefore fish cannot be said to have a real sense of smell has been attacked by a prominent German physiologist, Prof.Karl von Frisch, of Breslau.

Prof. von Frisch states that the nerves of the taste-organs of fish, which are located not only in their mouths but also on other widely scattered spots on their bodies, are connected with quite different nerve trunks, leading to a different part of the brain, than those of the fishes' nostrils. He claims also that the two groups of organs work differently.

Normal fish were able to detect very faint traces of food flavors which he put into their tanks, and began to hunt about for their dinners; while if he put their nose-nerves out of commission by a slight operation they were totally indifferent to the "odors", even though their taste nerves were still in order. In another experiment he learned that the amphibian newts and salamanders used the same organs on land for detecting the presence of worms underground that they used in the water to find worms that he had tied up in a bag and dropped into their aquarium.

Prof. von Frisch therefore concludes that "smelling" serves to detect very minute stimulations and thus makes it possible for a fish or other aquatic creature to discover food, even at a considerable distance; while "tasing" examines stimulants which are generally more concentrated, at close quarters.

STORAGE BATTERY SOLUTIONS INFERIOR TO PLAIN ACID

A new electric charge cannot be poured into a storage battery in the form of a patented solution, despite all claims of dealers to the contrary. This is the official conclusion of the National Bureau of Standards after tests of many such substitutes for sulphuric acid. And, says the Bureau: "Although the materials and coloring matter considered individually may be harmless, the disadvantages in using such solutions more than offset any temporary gain."

These special solutions which are often of too great strength may seem to give the battery a fine "kick" to start the car on a cold morning. But the owner will probably pay heavily for this in damaged separators or plates. Such solutions often contain sodium and magnesium salts, but have only the usual acid concentration. That "such material is without beneficial effect" is confirmed by the Bureau because the voltage, total charge, and the efficiency are in no wise improved.

Adding anything except pure sulphuric acid of proper strength may cause damage to the battery plates. This happens especially when added material makes the battery solution too strong, for then the plates may be softened or may lose their electric charge very rapidly, even when standing idle. One case like this showed six times the rate of loss that should occur, almost a half the charge escaping in four weeks.

Rice beads, used as embroidery on the new dresses, attract mice.

SAND INSECTS LIVE IN MINIATURE SAHARA

Just as cities have their hustling daytime populations and their night life denizens made up of quite separate classes of people, so the little Saharas on American sand dunes have entirely different day and night populations of insects, Prof. Royal N. Chapman of the University of Minnesota and some of his graduate students have discovered through a study of small dunes in Minnesota.

They found a night population consisting almost entirely of one species of beetle, which burrowed deeply into the ground at the first streaks of day, and remained there until dark came again. The daytime population was more varied. Both night and day groups were largely governed in their movements by temperature.

Heat conditions on the dunes are almost as severe as they are in the Sahara desert. Temperatures as high as 120 degrees Fahrenheit are not uncommon at the surface of the sand, though they are several degrees cooler a few inches above it; and below, where the beetles burrow, the temperature falls off as much as twenty degrees in three or four inches. Temperatures fluctuate violently; there may be as much as forty degrees difference between day and night.

ORPHANS' DREAMS EXPRESS WISH FOR HOME AND MOTHER

Are dreams really one way to enjoy things we want but cannot have in reality? So the psychoanalysts contend - and the dreams of orphans support this contention. For orphans, like other people, dream when they sleep, but their dreams have a striking similarity. Visions of mother, father, home, and in particular that the parents have come to take them home constitute orphan dreams.

That the dreams of orphans in institutions center about their one common experience, the loss of parents and home, is the result of an investigation by Dr. Kate Gordon of the University of Southern California. Of one hundred and five children questioned, eighty admitted dreaming and the dreams of fully half of these may be expressed in the typical statements "about mother" or "father came to get me". The dreams of another sixteen per cent. suggests fears of various sorts, as of tonsil operations. These fears may be regarded as "negative wishes". About eight children, or nine per cent. dreamed of toys, candy, money, etc., while a lesser number dreamed of religion.

Dr. Gordon's research seems to support the psychoanalytic view that dreams are one way people live out wishes which are unfulfilled in reality. And from a practical standpoint, it indicates that institutional life does not appeal to the child as a substitute for the intimate care of parents.

GERMAN INVENTS TALKING POSTCARDS

A postcard device that tells its message not to the eye but to the ear is the invention of Charles Rammelsberg, formerly of the German patent office. With a phonographic apparatus small enough to be carried in a pocket, the inventor states that anyone is able to make faithful voice records on gelatin films the size of postcards. Each record has a capacity of 600 to 800 syllables. To receive daily love-letters in the veritable voice of the sweetheart would greatly facilitate long-range courtship.

FLYING MOUNTAINS OF GRASSHOPPERS

By Dr. Edwin E. Slosson

Twenty-five trillion grasshoppers. Forty-four million tons of them. Covering an area of 2,280 square miles. All day long passing a given point. These are the figures given for a swarm making its migration from Africa to Arabia across the Red Sea on November 25, 1889, and the British naturalist, Dr. G. Caruthers, who observed the flight adds that it was not one of the largest swarms. He fails to furnish the figures on a real big one, perhaps because of inadequate facilities for taking a census of such a flighty population.

But the swarm that passed over Pretoria on May 25, 1891, is more generously and more accurately, or at least more definitely, estimated as composed of 130,842,144,000,000 individual insects. This swarm is said to have filled 12 cubic miles of space in the air.

The swarm that invaded Algeria in "the grasshopper year" of 1866 is estimated to have totaled 50,000 tons live weight on the wing. Apparently the insects were not counted in this case, but a count of the natives who died of starvation in consequence of their devastations is reported as 200,000.

On the island of Cyprus in 1883, the lady locusts laid five billion cases of eggs. I don't know how many eggs constitute a case, in this case, but the total weight of the lay is estimated at 4,000 tons.

No statistics are given as to the number of those who constituted the eighth plague of Egypt, but the Bible tells us that:-

> " They covered the face of the whole earth, so that the land was darkened; and they did eat every herb of the land, and all the fruit of the trees which the hail had left; and there remained not any green thing in the trees, or in the herbs of the field, through all the land of Egypt."

I believe all these stories, and I would believe bigger ones if I could find them in any book at hand, for I can remember the grasshopper years of 1876 in Kansas. I cannot give the number of these Colorado tourists because I was then too young to count over a billion, but I know that they darkened the land like a storm cloud and did eat every herb of the land and sent back to live with wife's folks thousands of hopeful young settlers in the western commonwealth. We called them "grasshoppers", not " locusts", and I ought to know what they are since I have seen and swallowed them , and I am pleased to notethat the Encyclopedia Britannica confirms our Western term.

I can add a detail of the grasshopper plague not mentioned by the author of Exodus, that they were so numerous as to stop the trains by greasing the track. Nowadays grasshopper grease is being used for lubricating airplane engines, a use we never thought of in 1876. It was recently reported that eighteen tons of dried locusts were shipped from South Africa to Holland for the extraction of the oil, which is said to retain its liquidity at very high altitudes.

It is nothing unusual to find great quantities of insects, especially grasshoppers, buried in snow fields and glaciers in the mountains. A very notable example of this is Grasshopper Glacier, in the Absaroka mountains, a few miles

north of Yellowstone National Park. The face of this glacier is marked with stratum after stratum of grasshoppers, and there are places on its surface where one can dig down a few inches with his fingers, and literally bring up solid handfuls of legs, heads, and other parts of grasshopper shells. Presumably great swarms of insects attempting to cross the glacier have been chilled and trapped, and subsequent falls of snow have incorporated their bodies into the ice.

The most amazing thing to a chemist is the gigantic scale and swiftness of this production of grasshopper meat. The estimate given for the weight of the Red Sea swarm is some seventy times the weight of all the copper mined in America in a year. That is to say, it would take us seventy years to produce copper enough to balance the grasshoppers produced in seven weeks in this locality alone. Biology is still far ahead of metallurgy as a large scale industry. A green crop converts the carbon, nitrogen, hydrogen, and oxygen of the air and water into plant protoplasm, and then comes a flying cloud and in a few seconds all this is gone into grasshoppers and the ground is bare.

It is not a simple process for producing a single element, like the smelting of copper from its ore, but more like the operation of an automobile factory. A grasshopper is a more complicated machine than an automobile and even Ford cannot catch up with the grasshopper in quantity production.

NORSE SCIENTIST SHOWS FINGER PRINTS INHERITED

Finger prints, the most certain of identification marks, are hereditary. One 's distinctive pattern is like that of one's parents, and will be passed on to future generations with relatively litile change. These results are announced by Mlle. Kristine Bonnevie, of the Royal Frederik University after exhaustive statistical study of the finger print records of the Oslo Court of Justice, which were put at her disposal.

Carrying her researches into the wider relationships of the human family, Mlle. Bonnevie has discovered that there is a resemblance between the finger print typesof related races; the nearer the relationship the closer the resemblance. Finally, the similarity between the finger prints of apes follows the same rule of kinship.

WIRES MADE FLAMEPROOF BY SELENIUM TREATMENT

Fireproof insulation for telephone switchboard wires is made possible by a new use recently discovered of selenium, an element whose chief use hitherto has been in apparatus involving the control of electric current by light. The flameproofing of switchboard wires is highly important, for even a small fire can undo many hours of work and throw a whole exchange out of commission. Fireproofing substances now in use are only partially successful.

The peculiar thing about the use of selenium for this purpose is that the element itself can be burned. Only when it is used on the cotton covering of the wires does it take on fireproof qualities. But then the wire resists all ordinary flames, and even when ignited by the intense heat of a blowtorch goes out immediately when the outside flame is removed.
