SCIENCE NEWS

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HORMONES FROM THE PITUITARY GLAND

OUT of the research that won the $1,000 prize of the New York meeting of the American Association for the Advancement of Science just closed, there may come new treatments for severely burned fire victims, water-logged fat people, and sufferers from diabetes insipidus.

Dr. Oliver Kamm, the research director of the Detroit drug manufacturers, Parke, Davis and Company, who was honored for his paper on "Hormones from the Pituitary Gland," has studied for the past few years one of the smallest and most important organs of the human body.

About the size of a green pea, the pituitary gland is located near the brain, carefully protected and inaccessible. The front or anterior portion of the gland is responsible, when it is overactive, for some giants of the circus and other ungainly, unfortunate individuals whose skeletons have grown abnormally.

Dr. Kamm investigated the back or posterior lobe of the gland, and found two hormones, called alpha and beta, produced by it.

If you could buy these hormones they would cost you millions of dollars a pound. As it is, Dr. Kamm has been able to produce only a very few fractions of an ounce. So limited is the quantity that the chemical analysis must be performed under the microscope and the pituitary glands of 50,000 cattle must be used to obtain enough hormones for a single laboratory experiment.

The alpha hormone promises the women of the world some relief from the pains of childbirth as it aids that process. At present its cost price, at the rate of $3,000,000 a pound, prevents practical use.

The beta hormone has the important function of controlling the utilization of water in the tissues of the body. Dr. Kamm has been able to classify individuals as "physiologically wet" or "physiologically dry."

"Some individuals, the physiological wets, are extremely sensitive to the action of the beta hormone," Dr. Kamm said in explaining his work. "Others readily return to normal after administration of the hormone and they are the physiological drys.

"The fleshy type of individual is almost invariably the wet type, whereas the slender, scrawny individual is usually a dry. The suggestion is therefore made that we have here possibly one of the important explanations why the former is fleshy and why the latter fails to put on weight readily in spite of an excessive intake of food and water.

"It is apparent that the portly person who is desirous of reducing must cut down on his liquid intake, as well as his intake of solid food. As for the scrawny person, gland therapy may possibly be indicated, but here the work is still in the investigative stage and conclusions can not be drawn."

Since the beta member of the "pituitary twins" affects the body's water content, it may prove useful in the treatment of severe burns which produce their damage by dehydrating the tissues of the body. Diabetes insipidus, characterized by disturbed water conditions of the body, may be better understood and treated through the use of the beta hormone when its cost is reduced to a price much less than its present value of a million dollars a pound.

The post-pituitary hormones are very similar in chemical behavior in spite of their different physiological action. One of the effects that are produced with equal facility by either of them is the increasing of the sugar content of the blood to counteract, for example, an overdose of the hormone, insulin, which science gave the world only a few years ago as a treatment for diabetes mellitus.

AN ARTIFICIAL PLANET

MARS, red planet of controversy that is now reappearing in the eastern evening sky, may have more water and life-giving oxygen in its atmosphere than astronomers have previously supposed from a study of its spectrum. This is indicated by experiments made here with an "artificial planet" by Professor John Q. Stewart and Serge A. Korff. It is nothing more than a glass bulb which can be filled with a gas, and illuminated by a diffuse light. Another reflecting material, such as a cylinder of asbestos or a silvered glass rod, can be placed in the globe as well.

This imitates the planet, which consists of a solid body surrounded by a shell of gas, its atmosphere. Just as the planet's atmosphere may be studied by the spectrum of the sunlight that passes through it to the planet's solid mass, then out again and to the terrestrial observer, the gas in the globe may be studied by the spectrum of the light that is reflected from the solid rod inside.

The vapor of iodine was tried inside the bulb, and its spectrum was found to be the same as when light passed directly through the bulb. But with the vapor of sodium, one of the two elements in common salt, the spectrum with the artificial planet was different from the spectrum of the light which passed directly through. This is because certain colors, or wave-lengths, are not just absorbed by the gas as with iodine, and changed to an entirely different kind of energy, but scattered in a different direction. When the light goes directly through, certain colors would be absorbed, and dark lines would show in the spectrum, but when reflected from the planet, the effect would not be nearly as marked.

Dr. Stewart suggested that if a planet were made of some such substance as asbestos, and had an atmosphere of iodine, the spectrum of its light would reveal the presence of iodine, but that sodium atmosphere would not make itself manifest. He suggests that something similar may be true for oxygen and water vapor, and says that until such tests are made with these gases, it is unsafe to make any conclusions about the scarcity of these substances, so necessary to life, in the atmosphere of Mars.

THE ITALIAN HYDRO-ELECTRIC PROJECT

THE first of the year will see the opening of the famous Monte Oro Tunnel of the Adige-Garda hydro-electric project at Lake Garda, Italy, according to Romolo Angelone, the Italian Commercial Attaché here. This three and one half mile shaft, one of the most difficult engineering feats in the history of hydro-electric engineering, will convey the waters of Lake Ledro through the solid rocks of the Alps to provide electric power for a large part of the rich industrial district of northern Italy.

Lake Ledro, at an altitude of 2,150 feet, lies behind the first range of the Alps, while Lake Garda, less than four miles away, is but 215 feet above sea-level. To connect the two and bring the water of Lake Ledro through to its drop of slightly less than two thousand feet—about three times the height of the Woolworth Building in New York City—it was necessary to blast a way through the intervening Monte Oro. After the solid stone was cleared away, the tunnel was lined with steel and concrete for its entire distance. If the uneven surface of the bare mountain rock had been permitted to come in contact with the rushing waters, blockading cave-ins might have occurred.

The Adige-Garda water tunnel project is the third of its kind in the world. Another, slightly longer, exists in the Italian Alps and a shorter one on the western slope of the Sierra Nevadas in the United States.

After being led through the tunnel, the Ledro waters drop at an angle of forty-five degrees for a perpendicular distance of 1,968 feet. In recent years it has been found most efficient to place hydro-electric generators in a vertical position. But so great is the force of the waters dropping from this tremendous height that it was necessary to break their force by turning them upward at the end of the plunge, and revolving them around water wheels attached to horizontal generators.

Despite the difficulties of the entire undertaking, the work has been completed in the one year which has elapsed since Gabriele D'Annunzio pronounced his blessing at its inception. As a result, the cities of Mantua, Verona, Bologna and Riva will be furnished with low-priced electric current. The building cost for the enterprise will be about $55 per horsepower as against costs of from $150 to $200 per horsepower for hydro-electric enterprises in the United States.

The present installation of the plant on the shores of Lake Garda comprises two units, each consisting of a 24,000 horsepower turbine driving a 16,500 kilowatt alternator with its switch gear and transformer, so that the total initial capacity amounts to 48,000 horsepower or 36,000 kilowatts. Two additional units, each with a 35,000 horsepower turbine and 24,000 kilowatt alternator are expected to be installed. With all four units in operation the total plant capacity will represent 118,000 horsepower or 88,000 kilowatts.

Even without the Adige-Garda unit, Italy led the world in increased use of electric power in 1928, exceeding its 1927 record by twenty per cent. This gain in current generated has been attained without adding to Italy's cost of coal, importation of which is second in point of value and has amounted, during the year, to about 11,000,000 tons—little more than the figure for 1913. If it was necessary for Italy to generate electricity by steam it would more than double her coal demands. Her power production to-day is about 81 per cent. hydro and the balance steam. Total kilowatt hours generated in 1928 is placed at about 8,000,000,000, or approximately one tenth that of the United States.

AMERICA'S LONGEST RAILROAD TUNNEL

AMERICA'S longest railroad tunnel, eight miles from end to end, and only exceeded in length by four tunnels in the Alps, opens to traffic on January 12, three years after work was begun, thus setting a new speed record for such construction. The new tunnel is on the line of the Great Northern Railway, in the Cascade range, about a hundred miles east of Seattle, Wash., and was built at a cost of $14,000,000. At the same time, the railroad's entire line through the Cascade range, 75 miles in length, will commence electrical operation.

Until now, the longest tunnel in America has been the Moffatt tunnel, in Colorado, 6.11 miles long, which was opened last February. The Cascade tunnel is exceeded in length by the Simplon, St. Gothard, Loetschberg and Mt. Cenis tunnels in the Alps, in Switzerland, France and Italy.

The electric locomotives that will operate through the tunnel and the Cascade line are the largest and most powerful of their type. They are unique in that they will utilize the advantages of both alternating and direct current. The overhead trolley wires carry 11,000 volts of alternating current. The locomotive picks this up, and a travelling substation, within the cab of the locomotive itself, changes it to low voltage, direct current, for operating the driving motors. When on down grades, where braking is necessary, the motors act as generators, and feed current back into the trolley lines, providing about a third of the total power needed to move them on the up-grade, and so helping pull trains up other sections of the road.

The new tunnel replaces one about two and two thirds miles long, at a higher elevation, completed in 1900. It was necessitated by the heavy snows that previously hampered operation at certain times of the year. There is snow almost every month in these mountains, and sometimes the fall is as fast as a foot an hour. Delay from this cause will be eliminated now, while the normal operation of the trains will be speeded an hour for passengers, and three hours for freight.

Completion of such a long tunnel in so short a time was accomplished by drilling from a number of different points. By the older engineering methods, boring was commenced from each end and finally met in the middle. Over one part of the tunnel, there is a deep valley, only 622 feet above, so a shaft was sunk at this point, to what was to be the line of the tunnel. Through this two additional boring faces were obtained. Then a temporary tunnel was begun, from the west portal eastward, and from this shaft, westward. This Pioneer Tunnel, as it was called, was 8 feet high and 9 feet wide, about 52½

feet south of the main tunnel and at the same level. Being smaller, this tunnel was kept well ahead of the main tunnel, and permitted cross cuts over to the route of the main tunnel, thus providing a number of additional boring faces. The auxiliary tunnel also permitted the trains carrying workmen and supplies, and those removing rock to travel back and forth without interfering with the work in the main tunnel. At one time 1,793 men were working on the tunnel at different points. Also, the air conduits to supply the workings, the compressed air pipes for the drills and shovels, and the electric lines for power and light, were run through the Pioneer Tunnel.

The tunnel is lined with massive concrete walls, in which 264,000 cubic yards of concrete were used, while 875,000 cubic yards of rock were removed.

NEW SUGARS

Two new sugar industries made large strides in the United States during the past year, according to Dr. George K. Burgess, director of the U. S. Bureau of Standards.

Testifying before the House Appropriations Committee regarding the $75,000 needed to carry on the sugar work in 1929–30 he said that between 100,000 and 200,000 tons of crystallized dextrose, or corn sugar, were made and marketed in the United States during the past year.

Two factories in the United States are now devoting themselves to the making of sugar from corn, he said. One of them was built during the past few months at Kansas City at a cost of $1,500,000.

Commercial production of levulose, a sugar sweeter than cane or beet sugar, is, in Dr. Burgess' opinion, one of the most profound economic developments of the past 50 years.

While crystallized levulose has been made from artichokes chiefly at the Bureau of Standards to date, the discovery of the fact that diabetics could use this sugar to better advantage than sucrose has caused considerable scientific experimentation.

The result has been that the Jerusalem artichoke, from which levulose is made, has grown in popularity as a diabetic food, and within the past month an American company has been developed for manufacturing Jerusalem artichoke food products on a large scale.

This growing market for Jerusalem artichokes has been most gratifying to the farmers who last year grew considerable crops of the tuber, and who have found that they were able to realize several hundred dollars per acre on their investment.

CORN BORER WAR IN 1929

RENEWED war was planned against a European invader of both countries by a staff of Canadians and Americans who met at the Department of Agriculture a few days ago. The invader is the European corn borer, whose depredations have aroused much apprehension since its first appearance in New England, New York and Ontario a few years ago.

Modifications in strategy were suggested as a result of last year's campaign, and new drives proposed. The continuation of quarantine regulations in some sections was considered of doubtful value, inasmuch as the borer was breaking the lines. The effectiveness of direct attack, with thorough clean-up of infested fields after harvest, was held proven beyond doubt, by experiments on sample acres in Ohio, where plantings of corn were caged under tight screens after the ground had been swept clean of all stalks and stumps harboring over-wintering larvae. In these sample plots the borer infestation was reduced to a fraction of its incidence in neighboring unscreened areas.

Information regarding the borer's life and the usefulness of its natural enemies in the insect world is being sought in Europe and Asia by workers of the Department of Agriculture. One man has discovered several hitherto unknown parasites of the borer in Japan, and now intends to continue his researches in China, Korea, Siberia and possibly India. At least one new parasite was reported from Europe, and more favorable locations for obtaining large numbers of already known parasites were discovered. On this side of the ocean a number of insects have been found that serve as allies in man's struggle with this flying enemy. The most promising of them is an almost microscopic little fly named *Trichogramma.*

Poison sprays and dusts, though not at present very promising, have not yet been given up. The possibility of cultivating diseases of the borer is being investigated by one worker in New England. Even the Bureau of Public Roads has cooperated, in devising improved machinery for clearing the fields of stalks, and in producing burners to kill the borer larvae in their winter lurking-places.

ITEMS

PHOSPHATE cargoes bulking over a quarter of a million tons a year are now being shipped from Nauru, a small island only 26 miles south of the equator, whose resources are being exploited by Australians. The phosphate is marketed in Australia, New Zealand and Japan. Some thousands of Kanaka and Chinese laborers are employed in the workings, their labor supervised by a force of 100 to 120 Europeans. The latter are recruited mainly in Australia. They "take on" for a two-year "hitch," which takes them into a virtual exile, relieved by such comforts as a bachelors' club in the tropics may have to offer.

"LACTO-ACIDOPHILUS" is a new frozen delicacy manufactured by the Dairy Industry Department at Iowa State College. "Lacto-acidophilus" is the name applied to acidophilus or "medicinal" milk after fruit juices have been added and the resultant mixture frozen. People who dislike to drink acidophilus milk in its raw state, may now eat the new product which has a flavor similar to sherbet. Acidophilus milk contains beneficial bacteria which tend to replace the harmful putrefactive bacteria which inhabit the intestines of adults.