

same time splitting off phosphorus. The starch aggregates into definite grains, just as it does under natural conditions in the food-making cells of green plants. The grains turn blue when treated with iodine, and show all other normal reactions to the usual tests for starch. Moreover, they can be broken down into glucose again, by appropriate chemical treatment.

Long ago, man learned to take starch and break it down into glucose by heating it with a dilute acid. This process is carried on in industrial plants, by thousands of tons. But not until now has

man succeeded in imitating the reverse process, glucose-into-starch, that in nature apparently always precedes the starch-into-glucose step by which stored starch becomes available for transport or use within the plant body.

Thus far, the work at the laboratory has been attended with extreme technical difficulties, so that very little of the new synthetic starch has been accumulated. The total stock on hand is only about 20 grams—two-thirds of an ounce. But it weighs myriad-fold more in terms of scientific conquest.

Science News Letter, March 23, 1940

PHYSIOLOGY—MEDICINE

Anemia in Children Blamed On Iron Deficiency in Soil

Nutrition, Cancer Control and Other Problems of Health Discussed as Two Leading Societies Meet at New Orleans

FARM children in Florida, and other regions as well, are in danger of severe nutritional anemia if they live on home-grown food from poor soil that is deficient in iron. Such anemia is not primarily due to hookworm disease as previously believed, Dr. Ouida Davis Abbott, of the Florida Agricultural Experiment Station at Gainesville, Fla., told members of the American Institute of Nutrition.

Hookworm infection affects the degree of anemia, but the prevalence of anemia among rural children in Florida is due primarily to diets low in iron, Dr. Abbott stated.

Anemia of children is so widespread, Dr. Abbott pointed out, that it has been called omnipresent, "the ubiquitous nutritional disease." From Nova Scotia, Massachusetts, North and South Carolina and Georgia as well as Florida have come reports of deficient soils and mineral deficiency diseases of cattle. Plants grown on such soils are lacking in iron and other blood-forming minerals. Both vegetables and meat from such regions, therefore, would be so low in iron that even children living on good diets would be anemic if the diets were composed of home-grown foods.

Anemia was discovered in from 52% to 96% of rural children in Florida living in regions where the soil was predominantly deficient as shown by prevalence of salt sick of cattle. This age-old disease of cattle is known to occur

when the animals are restricted to forages grown on certain white and gray sands and residual mucks known to be lacking in iron, copper, cobalt and perhaps other elements.

Even though hookworm was widespread among the children in Dr. Abbott's study, many children with no

hookworm were so anemic they had only from about one-fifth to one-half the normal amount of red coloring matter in their blood.

When iron was given to children with hookworm, most of the symptoms, such as pallor, marked weakness, excessive fatigue, loss of appetite and edema gradually disappeared, even when the hookworm infection remained. On the other hand, clearing up the hookworm infection did not improve the quality of the blood.

Science News Letter, March 23, 1940

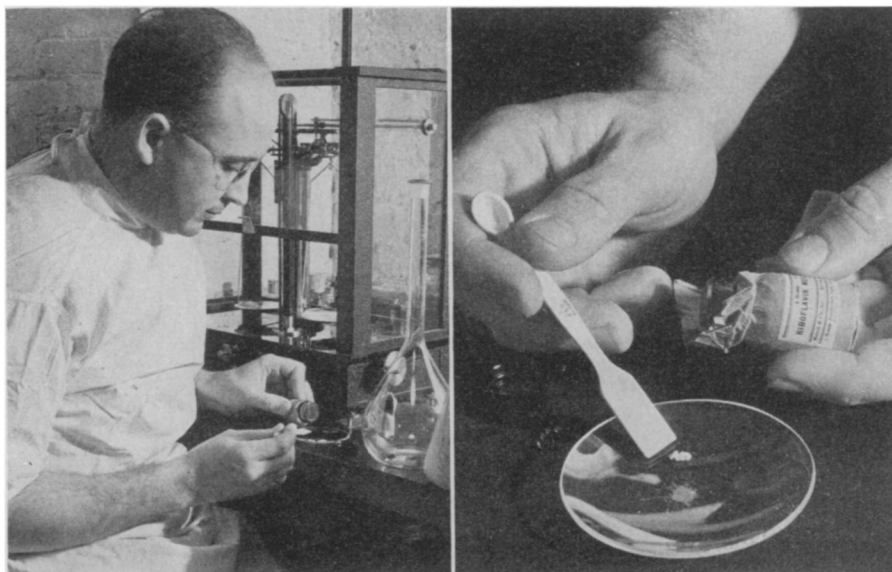
Insulin Changes Cancer Cell

STARVATION treatment of wildly growing cancer cells that caused them to turn toward normalcy, accomplished in test tube experiments, was announced by Drs. Richard H. Steckel and John R. Murlin, University of Rochester, at the meeting of the Federation of American Societies for Experimental Biology in New Orleans.

This change from cell activity characteristic of cancer toward normal activity was made by starving the cancer of sugar through the use of insulin, the diabetes remedy.

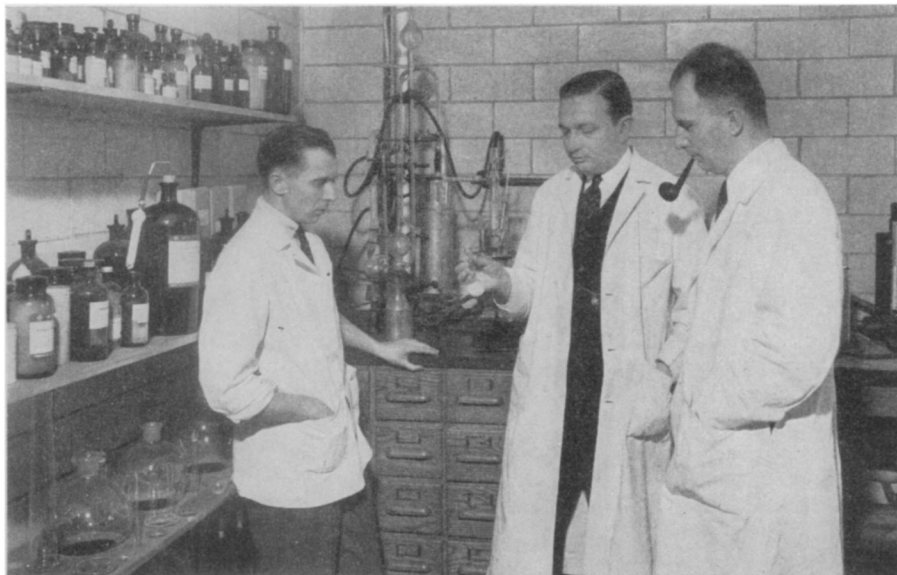
"The experiments offer no proof that insulin will cure or prevent human cancer," the Rochester scientists stated in response to inquiry.

The results, however, seem to be an



HONORED FOR RESEARCH

Dr. W. H. Sebrell, shown here in his laboratory at the National Institute of Health, shared with others the Mead, Johnson and Company's award for his discovery that riboflavin, part of vitamin B, is essential in human nutrition. At the right are Dr. Sebrell's hands and some riboflavin.



VITAMIN SYNTHESIZERS

Dr. E. T. Stiller (left) and Dr. J. C. Keresztesy (right), who with three other Merck and Co. researchers shared half the Mead Johnson-American Institute of Nutrition award for isolation and synthesis of vitamin B₆, are shown here with Dr. J. Finkelstein, also of Merck's, examining an intermediate product in their more recent vitamin synthesis, pantothenic acid.

important advance in the chemical attack on cancer by which scientists have long hoped to conquer this great killer of mankind. Changing the diet on which cancer thrives brought about this hopeful effect.

Slices of cancer from a rabbit were grown in blood from another rabbit that had been thrown into insulin shock by huge doses of the diabetes remedy, such as are being used in insulin shock treatment of mental disease. This blood, as a result of the insulin treatment, is deficient in sugar. Its effect in reversing the cancer toward normal was explained by the Rochester scientists in the following exclusive statement:

"Unlike normal cells, tumor cells get their energy principally from fermentation of glucose to lactic acid instead of complete oxidation of the sugar. This was shown by Prof. Otto Warburg, German Nobel laureate, and associates as early as 1923. Many attempts have been made to restore normal metabolism and thereby 'burn out' the tumor. Prof. Warburg himself and many others used insulin on tumor-bearing animals, but with no clear indication of success.

"Recently this laboratory has undertaken the use of insulin in a different way, on the hypothesis that it should discourage the tumor's growth by: First, starving it of sugar for glycolysis and, second, promoting oxidation of sugar.

The present experiments show merely that tumor slices placed in hypoglycemic (sugar deficient) serum have their oxidative metabolism markedly increased and the fermentation metabolism greatly diminished.

"Both are changes in the direction of the normal. The Brown-Pearce transplantable carcinoma of the rabbit was used and only young vigorously growing tumors chosen. Slices from the same tumor were studied simultaneously in serum from normal rabbit and from the same rabbit after being thrown into insulin shock. The effect on fermentation probably is due wholly to the lower blood (serum) sugar but the effect on oxidation may possibly be the result of a combination of factors. The experiments offer no proof that insulin will cure or prevent human cancer."

Science News Letter, March 23, 1940

Gallstones Due to Germs?

GERMS may play a part in the chemistry which causes formation of gallstones, experiments by Drs. K. K. Jones and Marie Lorenz, of Northwestern University Medical School, revealed. The material of which gallstones are made may be present normally in gallbladder bile, but it does not crystallize into stones unless chemical conditions are right, they found. (Turn to page 188)

NUTRITION

\$1000 Prize Awarded to Vitamin Researchers

DISCOVERY that humans need the part of vitamin B called riboflavin to keep them healthy and synthesis of another B vitamin, B₆, which has also been used successfully in treatment of humans, won the Mead, Johnson and Company \$1000 award for advances in knowledge of the vitamin B complex at the meeting of the American Institute of Nutrition.

Recipients of the award are: Dr. W. H. Sebrell, National Institute of Health, U. S. Public Health Service, for the riboflavin discovery which has since led to discovery of the cause and cure of the sometimes blinding eye disease, keratitis; and, for the synthesis of B₆, a five-man research team of Merck and Company's research laboratories, Drs. John C. Keresztesy, Joseph R. Stevens, Stanton A. Harris, Eric T. Stiller and Karl Folkers.

Science News Letter, March 23, 1940

MEDICINE

Thiamin Vitamin Relieves Pain of Varicose Ulcers

VITAMIN B₁ (thiamin chloride) is effective in relieving the pain of varicose ulcers, Drs. Alton Ochsner and Marvin C. Smith of New Orleans report. (*Journal, American Medical Association, March 16.*)

Ten women suffering with painful varicose ulcers were treated and all but one were definitely relieved and eight had complete subsidence of their symptoms, in an average of five days. The women varied in age from 27 to 75 years.

Science News Letter, March 23, 1940

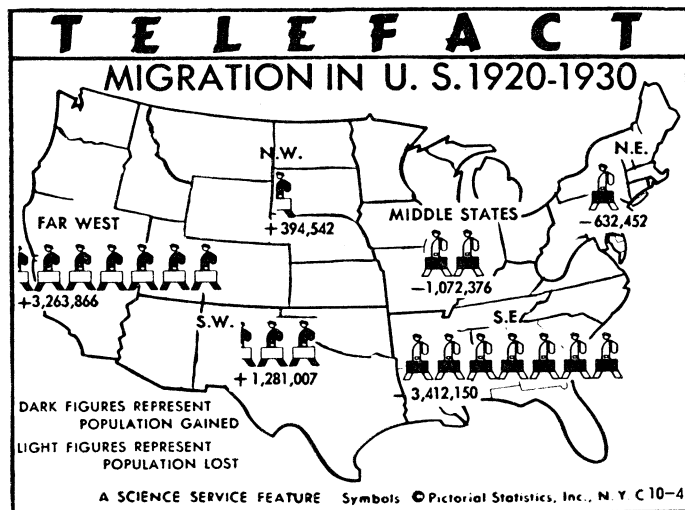
Rice is now being marketed in cooked, ready-to-serve form.

If an automobile resembling 1940 models had been designed in 1900, it would have weighed three times as much as today, made of materials then available.

● RADIO

Conway P. Coe, U. S. Commissioner of Patents, will announce plans for the celebration of the U. S. Patent Law Sesquicentennial, to be held in Washington, D. C., in April, as guest speaker on "Adventures in Science" with Watson Davis, director of Science Service, over the coast to coast network of the Columbia Broadcasting System, Thursday, March 28, 4:15 p.m., EST, 3:15 CST, 2:15 MST, 1:15 PST.

Listen in on your local station. Listen in each Thursday.



Censuses have served wars, from the days when Moses counted "all that are able to go forth to war in Israel." Peaceful though the United States is, and wants to be, it is conscious of defense these days, and wants to know its man power. The census of 1940 will provide army and navy with information regarding men in different age groups; also the regions where specialized workers

are grouped. The army would have liked specific information from the population census—names and addresses of types of workers and specialists valuable in military service. But the Census Bureau clings to its policy of assuring anonymity to the public. Your census return is confidential, and even the War Department may not consult it. Only statistics are released.

Science News Letter, March 23, 1940

PUBLIC HEALTH

More Sickness Among Children Than Most Other Age Groups

THE COMPLACENCY Americans are apt to feel over the health of the nation's children, based on low child mortality rates, is dealt a severe blow by figures on child sickness which the U. S. Public Health Service has just released. (*Public Health Reports*, Jan. 26.)

Children under 10 years of age get sick oftener than any other group in the population than the aged, it is shown

by these figures, compiled by Miss Dorothy F. Holland, one of the federal health service statisticians.

The figures refer to frequency of illness lasting for one week or more as found in a survey of 500,000 children in 83 cities of varying sizes in 18 states during one year. The very highest frequency rate for disabling sickness among white children was found at the ages five to nine years. This rate was 305 per 1,000. For Negro children the highest disabling illness rate occurs in the ages under five years.

Acute communicable diseases of childhood and the respiratory diseases caused eight out of ten disabling illnesses among children under 15 years of age. Among these eight cases, five were acute communicable diseases of childhood and three were cases of acute respiratory diseases. Measles showed a higher frequency than any of the other childhood diseases, though the marked excess of measles shown in the survey reflects the unusually high incidence of measles during the

survey year (1935). Mumps, whooping cough and chicken pox also were frequent causes of disabling illness. Among the respiratory diseases, tonsillitis, influenza, colds, pneumonia and bronchitis led in frequency.

Infantile paralysis caused 56% of all orthopedic impairments due to disease among children under 15 years.

Science News Letter, March 23, 1940

From Page 181

Specifically, fatty acids with long side-chains must be converted by oxygen to acids with short side-chains. If the flow of bile is stopped ferments from bacteria or from white blood cells may provide the oxygen for changing the long fatty acids into short ones with consequent formation of the stones.

Science News Letter, March 23, 1940

Danger in Benzedrine

FOR reviving those who have passed out after imbibing moderate amounts of alcohol, benzedrine is effective and relatively safe. But this wake-up drug may be dangerous when more than moderate amounts of alcohol have been taken.

This is the conclusion that may be drawn from experiments on rabbits reported in New Orleans to the Federation of American Societies for Experimental Biology by Dr. E. C. Reifenstein, Jr., of Syracuse (N. Y.) University.

Benzedrine (technically, amphetamine sulphate) has been known previously to be useful for sobering-up. It is used also in preparations for relieving stuffy noses. And recently it was reported useful for treating nervous patients and even problem children.

Dr. Reifenstein's rabbit experiments show that the drug has no restorative effect after lethal amounts of alcohol and even increases the toxicity of near lethal quantities of alcohol.

Alcohol, in rabbits at least, counteracts the effects of amphetamine, protect-

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ing the animal against lethal doses of the drug. This finding may prove valuable in cases of nervous and emotional disturbances, such as the sleep disorder, narcolepsy, for which amphetamine is proving a valuable remedy. If patients under this treatment should get an overdose of amphetamine, the antidote, apparently, would be a cocktail.

Science News Letter, March 23, 1940

Young Girl "Guinea Pigs"

FOUR physically healthy American young women were given the first stages of the Oriental deficiency disease, beriberi, in diet experiments reported by Drs. R. D. Williams, H. L. Mason and R. M. Wilder, of the Mayo Foundation, at the meeting of the American Institute of Nutrition in New Orleans.

They were given the disease by a diet almost completely lacking in vitamin B₁, or thiamin. Polished rice, sugar, tapioca, white bread, cornstarch, white raisins, egg white, cottage cheese and American cream cheese, butter, black tea and cocoa were the foods they ate for 21 weeks.

Mental depression, lack of appetite, digestive disturbances, disturbed heart action, and occasional tenderness of the muscles of the calves of the legs were the symptoms they suffered on this diet. All the symptoms disappeared promptly when the young women were given thiamin or vitamin B₁. Within a few hours they felt better and were hungry for food that had previously been nauseating.

The severe neuritis and swelling characteristic of beriberi did not afflict these young women. This led one doctor to comment that if the young women while on the diet had gone to a doctor who did not know about the diet, their symptoms would have been diagnosed as neurasthenia or chronic nervous exhaustion. Many patients, it was suggested, may be suffering from lack of this vitamin.

A patient suffering from what used to be called alcoholic insanity was also put on the diet the young women ate. His mental symptoms were all made worse, but, like the young women, he improved when vitamin B₁ was given to him. This condition, it is now known, is due to lack of the vitamin rather than to the alcohol.

Science News Letter, March 23, 1940

New Vitamin B

A NEW vitamin, member of the large family of B vitamins but one whose existence has never before been suspected, was presented to the Institute

by Drs. A. G. Hogan, L. R. Richardson and Homer Patrick, of the University of Missouri.

This vitamin, which has not yet been identified, is provisionally labeled vitamin Bp. It is concerned with the development and shape of bones. Without this vitamin in their diet, the bones of chicks are shorter and thicker than normal, and the chicks develop the disease known as slipped tendon or perosis.

Existence of the vitamin has been so recently discovered that its exact significance, other than for prevention of perosis in chicks, is still a matter of speculation, the Missouri scientists stated.

"Our first thought is," they said, "since it is concerned with the bone development and conformation of the chick, it may also be concerned with the structural development of other animals, and of man himself."

Science News Letter, March 23, 1940

Pantothenic Acid

DISEASES of poor diet for which no vitamin cure has yet been discovered may be conquered by pantothenic acid, the vitamin believed essential for all life throughout the universe and the latest of the vitamins to be synthesized in the chemical laboratory.

This vitamin may even have a role in speeding recovery of patients whose vitamin stores have been depleted by serious germ diseases.

This speculative picture of the future usefulness of this vitamin, was presented by its discoverer, Prof. R. J. Williams, of the University of Texas, to the American Institute of Nutrition at New Orleans. Human beings very probably require this vitamin and its importance for nutrition of chicks and rats has already been demonstrated.

"People who are on a diet deficient in other B vitamins are liable to be deficient in pantothenic acid also," declared Prof. Williams. "While nicotinic acid is effective in pellagra, there are other conditions associated with pellagra which nicotinic acid will not cure but which are greatly benefited, for example, by vitamin B₁. It may be that pantothenic acid will be effective in similar cases.

"Individual human beings, unlike inbred strains of rats, probably do not all have the same requirements and it is probable that a given bacterial disease may alter one's requirement afterward."

No one can tell what a vitamin may be good for, Prof. Williams continued, pointing to the recent discovery that the anti-sterility vitamin E is effective in treating diseases of muscular weakness.

"The future of pantothenic acid in human nutrition and therapy is largely conjecture," he said.

Such conjectures are rife since announcement of the synthesis of the vitamin, which means a plentiful supply will be available for clinical and other experiments.

"Foods which are rich in other B vitamins, such as yeast, liver, eggs and milk, are relatively rich in pantothenic acid also," Prof. Williams said.

Science News Letter, March 23, 1940

Swimmer's Death

OCCASIONAL sudden death of a good swimmer upon plunging into cold water apparently is due to the effect of the cold water on the body's production of a chemical substance whose action resembles that of histamine. Tests made on five healthy swimmers by Dr. Grace M. Roth, section on clinical physiology of the Mayo Clinic, and Milton A. Gabrielson, M.S., Special Research Fellow of the Mayo Foundation, furnished this explanation of such deaths.

Swimming in cold water between 65 and 85 degrees Fahrenheit increases stomach acidity, these investigators discovered. This finding would doubtless be enough warning to keep many persons out of cold water. The finding, however, fits with previous Mayo Clinic discoveries about persons who are allergic or hypersensitive to cold. Such persons might die from the sudden plunge into

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the chilly waters of a mountain lake. The latest findings, made on normal persons, indicate the dangers even when there is no allergy or hypersensitiveness to cold, and explain the mechanism of the sudden deaths, linking it with the chemical, histamine.

When an enzyme that inactivates histamine is taken into the digestive system half an hour before immersion in cold water, the increase in stomach acidity is prevented. This shows that the sudden increase of histamine-like substances due to immersion in cold water is what causes the trouble. Histamine dilates the small blood vessels and lowers the blood pressure dangerously. The shock of this sudden lowering of blood pressure may prove fatal.

Science News Letter, March 23, 1940

Arthritis Problem

ATTACK on the arthritis problem by experiments with mice and a new, unusual type of germ which gives the mice symptoms typical of human arthritis has progressed to the development of a vaccine that protects the mice against this experimental arthritis. Results of the vaccination experiments were reported by Drs. Albert B. Sabin, now of the University of Cincinnati College of Medicine and formerly of the Rockefeller Institute, and Dr. Isabel M. Morgan, of the Rockefeller Institute.

"I can see no present or future application of these experiments to human arthritis," Dr. Sabin replied to a question on this point.

Because the germ, a pleuropneumonia organism, belongs neither to the bacteria group nor the virus group of disease-causing microorganisms, Dr. Sabin's studies of it are interesting to scientists who want to know all about the strange new germ which, even if it may never affect humans, causes disease in the laboratory mice used for many studies.

Science News Letter, March 23, 1940

Noises Hurt

HIGH-PITCHED noises have a greater depressing effect than lower-pitched ones of the same degree of loudness, Drs. Edward J. Van Liere, Paul E. Vaughan and Davis W. Northup, West Virginia University School of Medicine, announced.

At a high pitch, a noise about as loud as a riveter slows down secretion of digestive juices and acid in the stomach more than the same noise at a low pitch, it was learned from studying the effects of noise on dogs' digestion. The same studies showed that variation between individuals is important, some being able to stand noise better.

Science News Letter, March 23, 1940



Multiple Cropping

MULTIPLE cropping, or the growing of two or more kinds of vegetables or flowers in the same tank of water containing nutrient chemicals, is the newest development in hydroponics, or "dirtless farming" as it has been nicknamed. Possibilities of multiple cropping are explained by the originator of hydroponics, Dr. William F. Gericke, of Berkeley, Calif., in his new book, *Soilless Gardening*.

Dr. Gericke states that he has successfully grown such combinations as corn and potatoes; potatoes, tomatoes and celery; and daffodils, godetias, gladioli and chrysanthemums simultaneously in the same hydroponic basins. The different plants kept out of each other's way through differences in height, sequence in harvesting times, etc. Sometimes a little human aid was called in, as in pruning the tomato vines so that they would bear their fruit above the level of the potato leaves.

In one experimental planting of potatoes and corn, in a basin with a surface area of 1/220 of an acre, the harvest was 6.8 bushels of potatoes and 1.11 bushels of corn, which is equivalent to 1496 bushels of potatoes and 244.2 bushels of corn from the same acre.

The hydroponic technique, as developed by Dr. Gericke, is an adaptation to large-scale, commercial production of the solution-culture method used for a century or more in plant physiology laboratories for purely experimental purposes. In it, plants are held suspended in sawdust, excelsior or other non-soil material on wire netting, with their roots dangling in tanks or basins filled with water. In the water are dissolved the same mineral nutrients that plants get from common soil fertilizers, though the combi-

ENGINEERING

New Fluorescent Lamps Must Have "Aging" Test

See Front Cover

RACKS upon racks of luscious-colored fluorescent lamps are being constantly filled, tested and emptied at the General Electric Fluorescent Lamp Works at Nela Park. Twelve thousand lamps a day pass through this "aging" test, which is pictured on the front cover of this week's SCIENCE NEWS LETTER.

Girls run an induction coil, and sometimes their hands, up and down the lamps to light them as if by magic.

Foreign gasses in the lamps are thus cleaned up and the lamps leveled off so that when sold they will start normally.

Science News Letter, March 23, 1940

If an ostrich should bury its head in the sand, it would *suffocate*.

Teaching handicapped *shut-in* children via a telephone hookup from classroom to homes is being tried in Waterloo, Iowa.

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