THE SCIENCE NEWS-LETTER

A Weekly Summary of Current Science

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TEST TELLS SUSCEPTIBILITY TO SCARLET FEVER

Scarlet fever is about to be subdued. The development of a test to determine human susceptibility to this disease was announced lately to the American Medical Association by Drs. George F. Dick and Gladys Henry Dick of the John McCormick Institute for Infectious Diseases at Chicago. It is expected to do for scarlet fever what the Shick test does for diphtheria.

The responsibility for scarlet fever has apparently been fastened firmly on a suspected germ, a streptococcus that destroys blood corpuscles.

And, more important, the two medical experimenters have taken the first steps toward a method of immunizing against the disease by use of products obtained from the apparently specific scarlet fever streptococcus.

Drs. Dick and Dick recently were able to produce scarlet fever experimentally, using human volunteers as subjects. The disease developed in the volunteers after cultures of hemolytic streptococci were swabbed on their tonsils and pharynx.

Using the filtrate from cultures of this streptococcus they have now been able to devise a skin sensitization test that tells whether the person tested is susceptible to scarlet fever.

All convalescent scarlet fever patients showed a negative or only slightly positive reaction to the new skin test.

But 41.6 per cent. of persons tested who had not had scarlet fever showed positive skin tests.

If this ratio holds generally, it means that less than half of the population is susceptible to scarlet fever.

The filtrate used in the skin sensitization test will not react properly when it is mixed with serum from convalescent scarlet fever patients and this may lead to a means of prevention of scarlet fever, similar to the anti-toxins used in treatment of diphtheria and other diseases.

Progress in the use of a serum for the treatment of scarlet fever has also been reported by Dr. A. R. Dochez of Columbia University and Dr. Francis G. Blake of Yale. Serum from horses inoculated with the hemolytic streptococcus

was used in the treatment of scarlet fever patients with promising results.

From two to five people in every 100,000 die each year from scarlet fever and young people are more likely to be attacked than those who have reached maturity.

SERUM FROM MEASLES SUCCESSFULLY USED

The successful use of a preventive serum for measles has been announced by Drs. George H. Weaver and T. T. Crooks in a report to the American Medical Association on the results of the use of the serum in the Durand Hospital of the John McCormick Institute for Infectious Diseases.

The study was made on 57 children, all susceptible to measles, who were known to have been exposed to the disease. Of these 48 were injected with the serum. All of the remaining nine came down with the disease. Of those given the serum treatment, 44 failed to develop the disease, while of the remaining four the measles rash appeared in three in from one to six days after the serum injection.

The main use of the serum seems to be limited to the prevention of the disease when given during the first week of exposure. The Chicago investigators also conclude that babies are naturally immune during the first few months of life, and confirm earlier beliefs that one attack gives relative immunity. A Berlin physician has collected the results of 2,000 cases where serum from the blood of patients convalescing from measles had been injected into the veins of persons exposed to the disease, and has found that it has protected in more than 97 per cent. of all exposures.

BIG POWER PLANT WORKS IN SOLITUDE

A great hydroelectric plant which needs no man about the place while it furnishes power to the industries of New England is located at Searsburg, Vt., on the upper waters of the Deerfield river. Excepting for the occasional visit of an engineer, it operates in complete solitude, attending to its duties unassisted, even to meeting whatever emergency may arise.

It is wholly automatic in its control. If serious trouble arises in its mechanism, it shuts down and stays shut down until experts have made things right again. But if the trouble is trifling and of a sort to correct itself, the big waterwheel and generator rest for a time until conditions are again normal, and then start up again turning out their thousands of horse power.

Other automatic stations are in operation elsewhere; the idea has been tried out in small units. But the plant at Searsburg is the largest of its kind in the world.

The plant is the uppermost of the seven stations of the New England Power Co., on the Deerfield river. Its turbine, rotating at 360 revolutions per minute, drives a generator having a capacity of 6,500 horse power. The only

help from human beings that is required is an occasional looking over and attention to the lubricating system, and remedying of any trouble, or to set the governor mechanism to produce a given amount of power, or to start up the turbine at some predetermined moment.

If the company's dispatcher down in Millbury, 100 miles away in central Massachusetts, decides to tie in the Searsburg power, say at 6 o'clock the next morning, a man visits the station and sets an alarm clock for that hour. When the alarm goes off, the control circuit is closed, the gate of the huge penstock is opened, the water pours through the wheel and the generator begins to convert its power into electric current and deliver it to the high tension wires which stretch along the right of way to the distant distributing station at Millbury.

Or the dispatcher, knowing the flow of water which is to be let down from the company's Somerset reservoir, which impounds the flow of the upper watershed, may decide that the automatic plant shall generate 2,000 or 3,000 or 4,000 horse power, whatever may seem desirable under given conditions. In such a case a dial on the governor is set for that power, which is all that the station will generate until the setting of the dial has been changed.

These are by no means all of the human characteristics of the automatic station. If left to itself to run as it wants to, the turbine will start up when water arrives in sufficient volume, and will shut down when the water falls below the efficient limit. Should a bearing become heated the penstock gate closes, in which case the wheel will stay idle until experts come and remedy the trouble. But when generator windings become too warm, the unit shuts down only so long as the temperature remains abnormal. When the windings cool off, turbine and generator run along merrily again.

In times of high water, when the river flow itself is ample and storage water is not a factor, the Searsburg plant runs right along all by itself, day and night, a constant, dependable source of power. It is here that another automatic function is important, the regulation of power generated to the load imposed. When the load falls off the action of the governor causes the supply of water to decrease proportionately, which means the production of a smaller amount of power.

GEOLOGISTS INVADE ARCTIC TO SURVEY HUGE NAVY OIL FIELD

The first reconnaisance survey of the Navy's largest petroleum reserve, located in northern Alaska on the slopes of the Arctic Ocean, is about to be begun by the U. S. Geological Survey. It will involve a trip across central Alaska in midwinter, the expedition expecting to "jump off" from Tanana into the unexplored and desolate wilderness to the northwards about March 1. The final objective will be Pt. Barrow on the Arctic coast which will be reached after a journey of about 1,000 miles by dog sled and canoe.

The area to be examined, in which the oil reserve is located, is bigger than the state of Maine, comprising 35,000 sq.mi.of practically uncharted wilderness that includes lofty mountain chains and vast silent stretches of tundra. The reserve which was created by Executive order last February is an irregular tract that extends for nearly 300 miles along the coast of the

Arctic Ocean, with Pt. Barrow as its most northern point, and runs inland in places for more than 200 miles. It is thought that all this area may contain valuable minerals besides the oil.

A midwinter start has been chosen because travelling in the north is easier when the snow is still on the ground and streams are frozen. The early start will also give sufficient time to carry through the work. The expedition must be entirely self-sustaining for about six months, requiring the freighting of supplies by dog sled for 400 miles even before the reserve is reached. Supplies weighing more than four tons, and including food, instruments, and even canoes, will be carried.

The route from Tanana will be over the mail trail to the Kovukuk river, a northern tributary of the Yukon, up the Koyukuk to the Alatna, one of its own tributaries, and then 150 miles up that stream to the northern limit of timber where headquarters camp will be established, well within the Arctic circle. From this point the advance party will explore the neighboring mountainsf for a pass while waiting for the freight sleds to catch up with them.

The whole expedition will then cross the mountains, which form the southern boundary of the oil reserve, and will explore their northern slopes. Spring will then be well under way, the streams will be opening, and the party will divide into two sections, each taking a separate route to the Arctic Ocean, hundreds of miles to the north. This part of the journey will be made by canoe, one party expecting to descend the Meade river, the lower 120 miles of which was ascended and mapped by a Geological Survey party last summer.

During the last 700 miles of the journey, the expedition will be in a country where there is not a stick of wood as big as a pencil, and it must carry all its fuel which will be kerosene oil. It is hoped to help out the commissariat with game such as moose, mountain sheep, ptarmigan, and caribou. Fish and little black bears may furnish additional delicacies, especially for the hungry dogs which are expected to consume at least a ton and a half of food.

The party will be in command of Dr. Phillip S. Smith, geologist, who is familiar with the region just south of the oil reserve, and who is already on his way. The other technical members of the expedition are J. B. Mertie and William T. Foran, geologists; Gerald Fitzgerald, and R. K. Lynt, topographic engineers, and several assistants.

READING REFERENCE: Spurr, J. E. Political and Commercial Geology and the World's Mineral Resources. New York, McGraw-Hill Book Co., 1920.

In cold weather the birds' greatest enemy is the length of the night which means a long fast for the day-feeding kinds.

The rare earth thorium forms the chief chemical constituent of the mantles used for incandescent gas burners.

BLOOD CELLS HURT BY RAYS OF RADIUM

Exposure to radium radiation for a few hours daily over a long period has apparently been shown to be dangerous to health, says a report of the U. S. Public Health Service. The blood seems to be especially affected, showing a reduction in the number of both the red and the white corpuscles. Blood pressure becomes abnormally low.

These conclusions follow a study made of workers at the U.S. Bureau of Standards who handle radium daily and are exposed to its effects. Practically all the radium sold for medical or scientific purposes in the United States is sent to the Bureau of Standards for measurement. Twelve of the employees of this radium section, five men and seven women, were studied over a period of months. All but two had handled radium for at least six months previous to the beginning of the test. One had been out of the radium section for a year and a half, but before that had been in it for more than six years.

The fact that the employees were exposed to radiation in spite of precautions taken to prevent the rays striking their bodies was demonstrated by the use of sensitive films such as are used for taking dental X-ray pictures. These were worn by the men and women for several days and when developed showed unmistakable evidence of exposure to radiation. The principal areas of exposure were the head, arms, and hands.

The probable reason for the effect of the rays from radium on the blood, while X-rays have no such influence, is stated to be that the more penetrating gamma rays of the radium affect the bone marrow, which is known to be the source of the blood cells. While none of the workers observed was invalided during the period of the test, one had just recovered from an illness diagnosed as anemia and showed fewer blood corpuscles than normal, both red and white. Practically all the others showed a tendency to diminution of the blood corpuscles especially of the white ones, which are those concerned largely with immunity from and resistence to disease.

Blood pressure was below normal in practically all the workers during the whole time of the study.

As a result of these findings it is recommended that workers in radium should be protected as far as possible by the use of metal screens opaque to the rays; that they should be subjected to frequent physical examinations; that they should not be permitted to work more than five days a week with at least a two day period intervening between the two rest days; and that they should have vacations of two weeks, taken at six months intervals, and spent as largely as possible out of doors. Further investigations are in progress.

FISH RESENT BEING STUNG

That the gray snapper, a common fish of Florida waters, is a canny creature has been recently demonstrated by Dr. W. H. Longley, professor of biology at Goucher College, Baltimore. It can be taught not only what a good meal looks like but also to distinguish real food from damaged goods by the mere look of it.

Little minnows, the equivalent of bacon and eggs in the life of the gray snapper, were taken and painted in streaks and bands and then fed to the snappers. The larger fish were suspicious and it took quite a number of trys before they ate them as fast as they did the plain, old-fashioned looking ones. Then pieces of stinging jellyfish, which are very unpleasant to the snappers, were sewed into the mouths of the banded and striped minnows and these hot mouthfuls were offered to the fish.

After a few meals of minnows so treated the snappers concluded they had been stung and avoided them altogether, even after they no longer were served with jelly-fish sauce. Dr. Longley says it showed the snappers are able to distinguish simple patterns and associate their significance with them. At least it showed that like most humans, the snappers do not like being stung by their boarding house keeper.

MOLECULES MAY BE ABODE OF LIFE

Life may inhabit groups of molecules, smaller than the most minute and primitive bacteria or other single-celled creatures, states Dr. Frederick W. Twort, English scientist, in a recently published article. Although amoeba and bacteria are usually regarded as the lowest forms of life they are actually highly developed and complex organisms in comparison with these much more primitive forms, he declares.

Certain disease agents such as those which cause infantile paralysis and small-pox are too small to be seen with a microscope and pass through the pores of the finest porcelain filter. Their presence would not be known except for the fact that disease is caused in animals inoculated with the pathological fluid which has passed through the porcelain filter.

"It is now felt", says Dr. Twort, "that life in such state may not be composed of formed particles which can be demonstrated, but is in a formless condition, and consists of smaller groups of molecules than those composing bacterial cells."

Dr. Twort declares that the evolution of life began much farther down towards the so-called inorganic and lifeless world of matter than is commonly supposed and says:

"It is almost inconceivable that life should have started suddenly as a bacterium or amoeba. If life has been built up according to the laws of evolution, then more simple forms than the living cell must have existed and probably do exist. This extremely primitive living matter can be regarded as occupying a place in the evolutionary scale as far below the single cell as the latter is below multicellular types."

Dr. Felix Loehnis of the U. S. Department of Agriculture has reported that some bacteria, kept in an unsuitable medium, passed through a formless stage, organized cells being formed as soon as conditions again became favorable. The studies of Dr. Twort indicate that it may take but relatively few molecules to be the abode of life.

GIZZARD STONES OF DINOSAURS EXHIBITED

Relics of the internal economy of dinosaurs whose eggs are now articles of commerce, which rival in interest those ancient prototypes of the first syllable of a lunch counter breakfast, are being exhibited by Dr. Willis T. Lee of the U. S. Geological Survey. They are gizzard stones with which, after the manner of modern birds and fowls who are their linear descendants, these brute members of the first families of America ground up in their stomachs the rough and ready food they swallowed some ten million years ago.

Dr. Lee found these pebbles in the course of his explorations last summer of the oil fields of Wyoming. A bed of red clay lies between two of the oil sands and contains thousands of the pebbles with many fossil dinosaur bones. They are of quartz and agate and vary from less than an inch to more than three inches in diameter. Although irregular in shape they are nicely polished from many years rolling around in the uneasy dinosaurian stomachs.

The stones are thought to be really gizzard stones from the fact that they are entirely foreign to the geological formation in which they are found and have frequently been found with the skeletons of the dinosaurs, and within the fossil skeletons of some of the aquatic relatives of the dinosaurs. Dr. Lee finds no reason to doubt that the pebbles are gizzard stones except their great numbers and when asked for his reasons said:

"Why not? This morning I had fried dinosaur eggs for breakfast and yesterday roast dinosaur for dinner. In helping my wife to prepare the roast I took several pebbles out of its gizzard. Of course, in these modern times we call them fowls, not dinosaurs. But all wise folks know that fowls are the linear descendants of dinosaurs and since the fowls use pebbles in their gizzards to grind their food, it is not strange that their ancestors did the same. The interesting thing is that the fashion has been so faithfully followed for ten million years."

But another geologist has suggested that these stones may have had an even more striking and peculiar use. Some of the dinosaurs were swamp dwellers. They were huge in size, "bigger than several elephants", said Dr. Lee, and ungainly. So it has been suggested that before wading into the swamp muck where his predatory enemies could not follow, he swallowed a bushel or so of stones for ballast and proceeded to snooze in security. A capsized dinosaur would be out of luck.

"This," said Dr. Lee, "is carrying a good suggestion too far."

However, it is certain that some of the reptiles that inhabited the open sea had the habit of swallowing stones. Gizzard stones have been found in the chalk beds of Kansas nearly one thousand miles from their probable source.

Incidentally, these gizzard stones have an important economic use. The red clay in which they are found, and which is 50 to 200 feet thick, forms a layer between the lowest and the next to the lowest of the oil sands of Cretaceous beds of Wyoming. It contains great numbers of the polished pebbles giving a clue to the large extent of the dinosaur population of those days so long ago. Any well driller, says Dr. Lee, can distinguish the clay from the oil bearing sands by its color. Thus in drilling such important structures as the Salt Creek oil field and Teapot dome, the pebble-bearing clay is a recognizable key rock.

"It is an interesting thought," says Dr. Lee, "to consider a hundred ton dinosaur billing over the rocks about his native swamp, and selecting from the worthless material the agates which would take a beautiful polish in his internal lapidary mill, to be handed down to admiring posterity as beautifully finished ornamental stones."

READING REFERENCE - Lucas, F. A. Animals of the Past. New York, American Museum of Natural History, 1922.

SIMPLE SCIENCE

By WOW

(WOW is a professor of chemistry in a large university. And his pseudonym is his initials as well as an exclamation. This is the first of five articles by WOW.)

AIR

Air's funny. You can't feel it 'till it moves, or you do. You can't see it, but you can shove it into a tire and ride on it. There's quite a lot of it around. It's free too, except in Summer Resorts.

Most people like air, but some don't seem to - rather stay in the city, where there isn't any. North people like warm air; South people like cold air.

This would be a queer place without air; we'd all be dead, likewise all flies, mosquitoes, etc. Nothing would burn, so it would be very cold in Winter.

When you press air hard enough, and make it cold enough, it goes to a liquid, like water. Then if you stick your finger into it, you can snap it right off, if you want to. It's very dangerous. Air is usually a gas, and not very dangerous, unless you fall down a long ways through it. The air on an acre of land weighs ninety million pounds.

When an airplane flies, it beats the air with its propeller. It seem funny to be hitting something you can't see. When moving air strikes a hill, it skids off to one side, or goes up, or both. That's why motorless airplanes can stay up, because they sit on top of these air currents. Birds like to do this too, especially hawks, when looking for chickens.

Every five quarts of air contain about one quart of Oxygen; the rest is something else, mostly Nitrogen. Oxygen is very lively; nitrogen very tame. Oxygen makes things burn. Chemists call this "combustion"; so do other people. When we breathe air in, the oxygen sticks but the nitrogen slips out again. A funny thing - you can't live in Oxygen, and you can't live in Nitrogen, but air's all right.

A million quarts of air contain four quarts of Helium. They use this in airships now, because it's nearly as light as hydrogen, and it can't burn, even if a bomb hits it. Most kinds of air contain a little steam, carbonic acid gas, and a few other things. City ait is mostly smoke and smells.

PROJECT TO HARNESS BAY OF FUNDY TIDES

Application for permission to harness a small part of the mighty tides of the Bay of Fundy, between Nova Scotia and the mainland, has been made to the Federal Power Commission, disclosing one of the most ambitious water power projects ever conceived. The scheme involves the damming of Passamaquoddy Bay between Maine and New Brunswick by five miles of dams between the mainland and intervening islands.

Passamaquoddy Bay opens into the Bay of Fundy where the tidal range averages 35 feet. It is proposed to install a system of gates that will maintain an operating head of from 27 to 16 feet at all times, developing from 400,000 to 500,000 horsepower.

The great difficulties to the project are engineering and those due to the interruption of navigation. A maximum depth of 200 feet of water will be encountered on the dam site. Vessels bound to or from Eastport, Lubec, or Calais, Me., or St. Andrews, N.B., would have to be locked through the dam, and it would be difficult to construct locks which might be used in rough weather, thus greatly impairing the value of these ports as harbors of refuge in storms.

The applicant for permit is Dexter P. Cooper of New York, who asks for three years in which to make preliminary surveys.

COD LIVER OIL MAKES COWS GIVE BETTER MILK

Cod liver oil is not only good for growing children, it is good for cows and pigs. English scientists have found it to be a valuable cattle food. More than that, it provides cows with the essential vitamin A which then appears in the milk, keeping up the vitamin content when, as in winter, it is not available from natural sources.

It has been found that cows fed on cod liver oil do not show an increase of fat in their milk, the milk is no richer in cream, but the amount of vitamin is greatly increased. Cows normally get their supply of vitamin A from fresh grass, but it is absent in dried hay and in grain feeds so that the milk in winter is deficient in this respect and children fed this milk do not get from it the vitamins so necessary to their growth.

Cod liver oil feeding solves this difficulty and makes possible the production of milk rich in vitamin at all seasons. Only a small amount of oil is needed, two ounces a day being enough for a cow. Even in larger doses no fishy or oily taste is given the milk.

BLACK WOLF HIDE MAY BE HALF DOG

The skull and hide of "The Black Wolf of Ontonagon" thought by many to be really a cross between wolf and dog, has been sent to the experts of the Michigan state university in order to determine its real ancestry. This creature was trapped last October in Ontonagon county. When it was announced that it had a black pelt, federal officials were interested since wolves of that color are rare and the skin was wanted for the Smithsonian Institution.

Inspection of the hide, which is jet black in the center with tawny yellow and grey on the edges and on the legs, convinced J. S. Ligon, federal predatory animal inspector, that the beast to which it had belonged was half dog and half wolf, or a dog-wolf as they were known in frontier days. Other experts say that "there ain't no such animile". The University experts are expected to settle the question.

Dog-wolves have been known for more than a hundred years, and there is some evidence that such crosses are not always sterile as most hybrids are, although they tend to die out eventually. Such animals are considered by many old woodsmen as more dangerous than wolves since they inherit much of the intelligence of dogs and their familiarity with men and their ways.

TABLOID BOOK REVIEW

SCIENCE AND RELIGION - A series of popular pamphlets showing the compatibility of religious faith with modern science is being published by the American Institute of Sacred Literature, Hyde Park, Chicago, Ill. The titles to date include: "Evolution and the Bible" by Edwin G. Conklin, "Evolution and Mr. Bryan" by Harry E. Fosdick, "How Science Helps Our Faith" by Shailer Mathews and "A Scientist Confesses His Faith" by Robert A. Millikan. They may be had at 3 cents each, $2.00 a hundred.

DIAMONDS OF LIME

Nature, working deep beneath the surface of the earth under great pressure, has made our familiar transparent diamonds from carbon.

By another method of Nature, dazzling imitation diamonds have been formed in limestone regions. Underground waters trickling through the earth in limestone areas dissolve out lime and later deposit it as crystals of calcium carbonate and calcium sulphate in subterranean caverns. The crystals of calcium carbonate are the more brilliant and, if free from contamination by other minerals in solution, are transparent or pure white. Such crystals, when illuminated by artificial light, will dazzle the eye as other diamonds do in the sunlight.

The most beautiful example of these diamonds of lime is found in the "Diamond Lake" in the Endless Caverns at New Market, Va. The islands and shores of this miniature lake, 290 feet below the surface, gleam with the sparkle of millions of diamonds of lime, when a white light is thrown on them.

RUNNING AWAY FROM WEATHER

The first result of man's study of the weather was apparently to run away from it. Sir Napier Shaw, the English authority on meteorology, points out that the first civilization of which we have much record, that of Egypt, existed where there was really no weather. This civilization may have been the result, he says, of a migration of all the bright individuals or races from other parts of the world, who fled their inclement native climes and settled in Egypt. A similar movement seemed to be in progress at the present day.
