

SCIENCE NEWS

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RAIN AND SNOW AS FERTILIZERS

RAIN and snow water the fields and meadows, but not many people know, says Dr. Frank T. Shutt, Dominion chemist of the Canadian Department of Agriculture, that they also fertilize the soil. They wash down out of the air and into the earth enough nitrogenous substances to make a real difference in the farmer's fertilizer bill. In the vicinity of Ottawa, the amount of such fertilizer added free of charge to the soil each year has been measured and found to be equivalent to 44 pounds of expensive imported Chile saltpeter per acre. There is then after all a pot of gold at the rainbow's end, at least for the farmer.

"The Canadian experiment," Dr. Shutt said, "covered a period of seventeen years and has given valuable information on the part played by rain and snow in maintaining soil fertility. Precipitation also plays an important rôle in purifying the atmosphere, and the Ottawa experiment has approximately measured the extent of this useful work."

Every rain- and snow-fall for seventeen years that yielded enough for experimentation was analyzed, Dr. Shutt explained, and the amounts of free ammonia, nitrates, nitrites and albuminoid ammonia were measured. These are the forms in which the sort of nitrogen of the air which can be assimilated by plants as food occurs.

Although air is normally four fifths nitrogen itself, it is only the small quantities of this substance already in combination with other chemical elements that are of use to plant life. The enormous quantity of nitrogen gas in the air is useless, and plants may starve for nitrogen while immersed in an atmosphere of it.

The "combined" forms of nitrogen enter the air in various ways, Dr. Shutt says. Plant and animal matter contains nitrogen, and ammonia gas forms and goes into the atmosphere when these decompose. Smoke from houses and factories spills its compound nitrogen into the air, and lightning bolts in thunderstorms smash atoms of hydrogen and nitrogen together to form ammonia, just as the difficult electrical "arc process" does in the man-made laboratory. These substances are sooner or later washed out of the air into the soil.

Most of the combined nitrogen of the air occurs as free ammonia, and this is always much larger after forest or bush fires. There has also been a steady increase in recent years in ammonia in the air, Dr. Shutt said, because of the increased use of soft coal.

The amount of total nitrogen brought down to the soil out of the sky each year varies greatly, according to Dr. Shutt, and it is not always possible to account for the variations. Around Ottawa the average amount of nitrogen thus added to the soil is from six to seven pounds per acre in a year. During one year this amount jumped to more than eleven pounds, and this was believed to be due to the new factories in the vicinity.

Snow is decidedly poorer in nitrogen than rain, it was found. It carries only one half as much free ammonia and

also considerably less of the other nitrogen compounds. Snow carries only about half as much useful nitrogen as an equal amount of rain, and as there is more rain than snow during the year rain contributes nearly six pounds of nitrogen to the soil while snow gives a little more than one pound.

CANCER INOCULATION

Cancer has been transferred from animal to animal but never until now has there been any authentic record of its being transplanted from person to person.

The theory that cancer has its origin in a germ, which has recently excited so much discussion in medical circles, has always received its principal setback from the fact that cancer is not contagious like the other germ-caused diseases. But now comes a report from France of the first known instance of what is apparently the inoculation of a medical attendant with cancer from a patient, and the medical world is greatly agitated.

According to details reported to the American Medical Association, a French medical student let fall a syringe in which he was collecting fluid from a wound left after an operation for breast cancer. The needle stuck in the palm of his left hand, carrying the cancer juice deep into the tissues. The student cauterized the wound himself and no bad effects were observed until two years after when there began to be pain in the hand and swelling at the point where the needle had penetrated. Later the glands in the armpit began to swell and were removed. A month after the operation, however, the local tumor showed up again and spread to the forearm. There was no longer any doubt of the malignant character of the growth so the whole arm was amputated at the shoulder. At the end of six months the patient was still free from any recurrence in any other part of the body.

The case is important as the first one reported of an accidental cancer inoculation. The editors of the *Journal* of the American Medical Association, however, come out clearly with the statement that "the evidence is by no means convincing that this is a true instance of inoculation of cancer from man to man, for the reason that the cancer of the breast of the first patient was a carcinoma, while that of the medical student was a spindle cell sarcoma, not at all resembling the breast cancer."

"Had the growth been a carcinoma similar to that of the breast there would have been no room to doubt that it was an example of a transplant in a human subject," continues the editorial comment.

They argue that the cancer that was present in the hand might have arisen as a consequence of the wound from the needle and the mere mechanical irritation set up by its contents, since it is well known that cancer follows in the wake of a bruise or irritation.

The American doctors admit that though the cancer in the hand was of a different type from that in the breast it does not exclude entirely the possibility that it was the result of implantation from the latter, since there have

been instances in animal experiments in which both kinds of cancer have eventually developed from transplants from the carcinoma type.

At any rate, the case is conceded to be the nearest thing to human cancer inoculation that has ever been observed and reassures us that cancer is not infectious in any ordinary sense since the proof of this one instance is open to question.

THE INDIANS OF SOUTHEASTERN ALASKA

INDIANS of southeastern Alaska who are facing serious economic problems might be helped by the development of the Alaskan timber resources or by some other new industry, is the opinion of Herbert W. Krieger, curator of ethnology at the National Museum, who recently returned from spending some time in that region for the Bureau of American Ethnology.

The big Alaskan fish canneries, which mean progress and financial gain to the white man, have brought hard times to these Indians.

"In the old days," Mr. Krieger says, "the Indians would put out their small nets at the mouth of a creek and catch enough fish for their families and some to sell. Now, the canneries place big fish traps far out at sea at places where large quantities of salmon can be caught. Small streams used by the Indians are reserved by the government either as fish hatcheries or for spawning ground, in order to safeguard the salmon supply. The Indians' best understood occupation and his outstanding source of food are therefore practically lost to him. He and his family have no choice but to work in the canneries or to eke out an existence working for other people."

Ill health is another difficulty which these Indians face, Mr. Krieger says. "The natives of southeastern Alaska have been one of the strongest Indian races known. They have always been athletic and they hardened their infants by the Spartan method of throwing them into the ocean each morning.

"They lived in loosely built, and consequently well ventilated, houses made of split cedar slabs, with a fireplace in the center for the only heating plant. They dressed in furs and well-made blankets, and lived a hardy, outdoor life. The weak soon died off.

"But now they have learned to build tight houses and wear lighter clothing and they use stoves that eat up the air. The Bureau of Education tries to teach them sanitation, but they are an easy prey to the white man's diseases. Influenza and small-pox have almost wiped out entire villages. Such diseases as tuberculosis, catarrh and throat troubles are prevalent."

Because of the fact that their food supply and Indian style of independence have been so affected, some of the most disgruntled natives are agitating for the government to take care of them as Indians in the United States are provided for.

Cooperative enterprises have also been suggested as a possible solution, since one such enterprise was successfully undertaken by Father Duncan at Matlakatla, back in the eighties. A group of Indians were moved to a new

village site on Prince of Wales Island, and he helped them to build houses, a hospital, a school and a church, and taught them to operate sawmills. Several other cooperative schemes, notably the venture at Saxman near Ketchikan, have failed because of inexperienced leadership and, in part, owing to the migratory tendency of the Thingit and Haida Indians.

The climate and soil conditions of southeast Alaska make agriculture practically impossible. Rearing of fur-bearing animals, such as blue foxes, is as yet in an experimental stage. The pulp-wood industry seems to offer a solution, but requires the investment of a large amount of capital.

SYNTHETIC PETROLEUM

A NEW method of cheaper synthesis of a high-grade motor fuel in Germany may go far toward the solution of the motor fuel problem in the future. The Berlin professor, Franz Fischer, who recently devised means of making liquid fuels synthetically from coal products, has now simplified his process so that he can dispense with costly high pressure apparatus that has stood in the way of its commercial development.

The new method produces a pleasant smelling gasoline as clear as water and one which will not harden or become gummy on exposure. The gasoline is highly volatile and is largely made up of unsaturated compounds like olefines which impart to the gasoline valuable anti-knock properties. This enables it to be used in efficient high compression motors without objectionable knocking and with great economy.

A number of valuable by-products may help to put the process on a sound commercial basis in the future. Certain substances of high boiling point condensing to heavier oils may by the use of catalyzing agents be changed to hard paraffine. The purified crystallized substance could be used in the manufacture of candles and other paraffine products, it is claimed.

Semi-coke, a new industry by-product for which a commercial use has not yet been found, may be used as the basis of synthesis of this new gasoline. Semi-coke is left over in the low temperature carbonization of coal in the making of tar oils. In the Fischer process water gas from which the new liquid fuel is condensed can be made from coke or semi-coke, and the latter, it is claimed, would be an ideal starting material.

Coke and coal are almost completely gasified when steam is led over them at a high temperature, and water gas, a mixture of carbon monoxide and hydrogen, is formed. If this water gas could be entirely transformed into liquid motor fuel, the problem of the wasteless transformation of solid coal into liquid fuel, the dream of the modern chemists, would be accomplished.

The Badische Anilin und Soda Fabrik first succeeded in commercially synthesizing liquid fuels from this gas mixture in Germany by means of Dr. Fischer's early method, in which pressures of 1,500 pounds per square inch or more were employed. By his new process, however, Professor Fischer has succeeded in synthesizing gaseous, liquid and solid carbohydrates from carbon

monoxide and hydrogen at ordinary pressure. Hitherto all reduction of carbon monoxide without pressure yielded methane, but Fischer found that by using an iron-zinc oxide catalyzer more complicated products were formed. Other metals and their compounds were studied and a cobalt chromium oxide mixture was found to stimulate the formation of gaseous, liquid and solid carbohydrates, when heated to about 518 degrees Fahrenheit.

The carbon of the carbon monoxide is said to be made into carbide by the metal, and the carbide then split by the hydrogen in the gas mixture. As a result the metal is regenerated and carbohydrates are formed.

In the old Fischer method a large proportion of the synthetic products formed were highly oxidized, but in the new normal pressure process they are unoxidized. Professor Fischer found that if the temperature was raised the formation of higher carbohydrates stopped and methane was again formed.

ITEMS

FLOUR made from fish or fish refuse has now been found to be good food for domestic animals. After a series of tests on cows and pigs, Professor Nils Hansson, former Swedish minister of agriculture and head of the government's experimental station, has declared this flour to be as valuable for stock animals as other special food stuffs such as nut or seed cakes. By a special process the oil is extracted until 3 per cent. remains and the flour contains not less than 65 per cent. protein and from 16 to 17 per cent. of mineral substances, useful for bone building. All refuse and all varieties of fish not suitable for human food are now carefully saved and each day shipped by boat or barge to a special factory where it is first cooked in vacuum kettles and then dried, poured out and sifted. The screenings are used for chicken feed, while the flour is sold to farmers for fattening pigs or as special fodder for milch cows. For the latter the best daily ration has been found to be from two to three pounds, mixed with grain or other substances.

CHEMICALLY treated pine needles have worked out in Germany as a substitute for wool for certain purposes very successfully. By varying the process a woolly product is obtained that comes either in the shape of fine sheet wadding or in soft fleeces that are used to stuff mattresses. The pine wool has fine, strong fibers not unlike hemp, and finds its best use when woven into heavy materials such as carpets and horse blankets. The new process has a valuable asset in one of its by-products that results from the chemical treatment necessary to remove the resin from the needles. The sticky residue is shaped into resinous briquettes which have a very high fuel value and which have found a ready use in the manufacture of artificial illuminating gas.

PHOTOGRAPHS that show up the tiniest blood vessels and all the gory details of major operations in natural colors, is one of the latest feats of medical science reported to the American Medical Association. The elaborate technique necessary to get operation pictures in color has been devised by Dr. von Schubert, of the Women's Clinic and Charity Hospital, in Berlin. A gas-filled high-power incandescent bulb furnishes a light of 10,000 candlepower,

the color of which does away with the need for a yellow ray filter. By means of a reflector and a series of mirrors, light from two to five times as strong as daylight is thrown on the operating table, while the photographer keeps track of the operation through a telescope. At the psychological moment he throws a switch that sets the movie camera in motion and an electric motor does the cranking. Three partial negatives exposed simultaneously help produce the colored effect, though there is only one objective and only one film. When the latter is finally projected on the screen, apparatus is used which superimposes the three partial pictures one over the other and introduces the necessary complementary light filters.

TESTS on rubber block pavement, laid one and one half years ago at the entrance to the Boston City Hospital, have shown marked advantages. In addition to having worn but little during the interval, the pavement has the advantage that snow and ice do not collect on it in winter as on other types of pavement, thus doing away with slipperiness. The blocks are also almost noiseless and vibrationless. These rubber paving blocks are an invention of R. F. Herrick, a consulting engineer of Boston. They are made largely of reclaimed rubber. Those used in the present test are 12 by 6 inches in area and 2 inches thick, and are laid in plastic sand and cement directly on the street foundation. Their edges were given a coat of asphalt paint immediately before laying. sheltred and peculiar conditions. "The human dwell-

A HIGHLY fatal malady called melioidosis, formerly considered peculiar to rats and other rodents, has lately attacked human victims in the region of Singapore. The causative agent is a bacterium but how it is transferred is not known. The disease is of short duration resembling cholera while death sometimes follows within 72 hours. Of the fifty cases that have occurred only two patients have recovered.

HAFF

ABOUT half a year ago I noticed in Science News a report on the "Haff sickness" showing a complete misunderstanding of the word "haff," and a repetition of the same error is contained in the issue of SCIENCE of July 30. Since this is a German geographical term, SCIENCE ought to correct the error. Haff is by no means a proper name, but a generic term, and it neither is nor can be given to the "stretch of shallow water between Koenigsberg and Danzig," since this is no geographical entity. The depth or shallowness of the water does not enter into the definition of a haff (related to German Hafen, English haven).

Haff is the German word for any body of water which by a reef or long island is almost completely, save for one or several narrow channels, cut off from the main body of the sea and filled with brackish rather than strongly saline water. The three principal "haffs" of the Baltic (in Denmark they are called "fjords") are one near Stettin, one between Danzig and Koenigsberg, one near Memel. The sickness, unless my memory fails me, was observed on the first mentioned one, the Pomeranian Haff.

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