

THE SCIENCE NEWS-LETTER

A Weekly Summary of Current Science

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COPPER FROM STILL CAUSES LIVER HARDENING

Copper, dissolved from the "worm" of the still during the making of liquor, is a cause of the disease popularly called "hardening of the liver", rather than the liquor itself, Dr. Frank Burr Mallory, of the Boston City Hospital, announced to the medical profession. Copper in foods prepared in copper vessels or colored green with copper salts can produce the same malady. Chronic copper poisoning is a more common disease than has been thought, he says, for in 3.4 per cent, of a large group of post mortem examinations he has found evidences of its harmful action.

Copper starts the poisoning of the system by causing the red coloring matter of the blood to decompose, forming a yellow pigment. This condition of the blood Dr. Mallory calls "Hemachromatosis". The yellow pigment accumulates first in the liver, but when the liver becomes overloaded it gathers also in the pancreas, kidneys, lymph nodes, heart, thyroid and adrenal glands, and the skin of the hands and feet.

In the liver the cells where the pigment accumulates sicken and die. New cells grow, but the tissue thus formed is more like tumorous growth than healthy liver cells. Hardening of the liver follows. Accumulation of the poisonous pigment in the pancreas causes a breakdown of the tissue, followed by diabetes. When the adrenal cortex is attacked, abnormal darkening of the skin follows. So far as Dr. Mallory has observed, the kidneys are able to repair successfully whatever mischief is done there. The liver, however, is always the first organ to suffer.

Copper poisoning is always slow in showing its effects. "Clinical cases show that ordinarily it takes fifteen to twenty-five or more years to produce the symptom complex," says Dr. Mallory. He places considerable stress on the importance of copper as an impurity in alcoholic drinks, and has investigated many samples of bootleg liquor seized by the Boston police. In nine out of eighty-four seizures of cheap "hooch" he found appreciable amounts of copper, and he has shown the metal to be present in home brew and fortified wines as well. In several of the cases he examined the victims were habitually alcoholic. One of them, an ex-bartender who had turned bootlegger, had drunk a pint of whiskey and four or five glasses of beer every day for many years.

Finally, Dr. Mallory suggests that poisoning may result from the eating of

foods prepared or kept in copper vessels, or canned foods, like peas and pickles, colored green with copper salts.

"Now that the danger of poisoning has been pointed out," concluded Dr. Mallory, "steps should be taken to prevent copper from getting into liquors and foods, and to protect workers in occupations involving copper from inhaling or ingesting copper dust."

TYPHOID EPIDEMIC SPREADS OVER COUNTRY, SOURCE UNKNOWN

An epidemic of typhoid fever, novel because its victims are chiefly adults from wealthy homes, is spreading over the country and has reached serious proportions in Chicago, New York, Pittsburgh and Washington.

"The fact that the cases are confined principally to the homes of the wealthy and to persons over fifteen years of age, relieves milk and water supplies of any suspicion of taint," said Dr. W. F. Draper, assistant surgeon general of the U. S. Public Health Service. Lettuce, under suspicion by the health officers in Pittsburgh, has also been given a clean bill of health.

Public suspicion points to oysters as the cause, and in the popular mind a clear case of circumstantial evidence has been built up against them. Due to fear of oysters and other shellfish the oyster growers have suffered financially, as their sales have fallen off to half. There is a possibility that the source of infection may be traced to "bootleg" oysters which have been stolen from polluted and condemned beds and sold in open market. In Chicago a twenty-five dollar fine has been announced as the penalty for eating raw oysters, and they are under ban in the states of New York and Pennsylvania.

A sensational mystery has grown out of the present epidemic in the death of William McClintock of Chicago, a millionaire orphan. In spite of the fact that the examination of the body showed no sign of violence and only the presence of typhoid bacteria, an investigation of his death will be made by the January Grand Jury. Charges were brought against the guardians of the rich orphan.

Typhoid fever is nearly four times as prevalent now as in normal times according to the latest U. S. Public Health Service data. One hundred and five cities reported 197 cases of typhoid fever for the last week in December, 1924, as against 54 for the same week in 1923. Under ordinary circumstances, these cities may be expected to develop ^{on} an average 52 cases during that particular period.

The U. S. Public Health Service is making a survey under the direction of Dr. L. L. Lumsden of every person in the badly infected areas who has typhoid in an attempt to find out the source of the infection. As soon as the data has been completed the results will be announced so that doctors and laymen may guard against the outbreak.

A large gift has been made by the Rockefeller Foundation to the U. S. National Park Service for the development of museums in the American national parks.

POISONOUS FISH CAUSE DEATH IN PHILIPPINES

Fish with poisonous flesh are a danger to be reckoned with by dwellers and travelers in the Philippine tropics. Dr. Albert Herre of the Bureau of Science at Manila has investigated the reports that there are poisonous fishes in the islands, and states that in many cases they are only too true..

According to Dr. Herre, the most violently poisonous species belong to the puffers and porcupine fishes. The poisonous property is due to the presence in various parts of their bodies of a substance chemically similar to the deadliest of the mushroom poisons.

"The poisonous quality of these fishes is well known to all the tribes dwelling along tropical coasts," says Dr. Herre, "but strange to say there is hardly a fishing village in the Philippines where there are not foolish or reckless people who eat these fishes. Not a year goes by without several deaths. The poison seems to act first on the nerves of the alimentary canal, and soon afterward on all the muscles of the body, giving rise to violent spasms during which the patient dies in from one to four hours.

"We in the United States are accustomed to look upon any fish with an appreciable amount of flesh as being more or less desirable for food. It is true we reject some, but only because they are exceedingly bony or the flesh is very scant, hard, or of poor flavor, but in no case are they considered dangerous. In the tropics, however, we have other conditions to face."

BLACKBERRY FROM FLORIDA CREATES STIR IN MARKETS

Blackberry growers of Florida announce the arrival of a 1,825 quart baby; such is the yield claimed for a single bush of the newly heralded Florida Marvel which was only ten months old when picking was commenced. The average time which a small-fruit grower has to wait for his crop to pay is eighteen to thirty-six months.

According to Mr. George Darrow, blackberry expert of the U. S. Department of Agriculture, the Florida Marvel has several points of superiority over other Florida blackberries; it is resistant to leaf spot and rust diseases which trouble other semi-tropical varieties, and unlike the northern favorites it enjoys a hot climate. As the Florida Marvel ripens early in the southern spring it is expected to make a stir in the early berry markets of the north.

Local fruit fanciers are said to be offering any price to get a single plant of the Florida Marvel. The first plant that was ever bought cost Dr. Ballough of New Smyrna, Fla., fifty dollars, then considered a ridiculous sum. He purchased it from an old Swedish woman who had the only plants. The land, before she owned it belonged to an Australian farmer, and long ago was the site of a colony of Spanish conquistadores. Mr. Darrow stated that scientists had not succeeded in identifying the plant with any Florida species and the rumor that the Florida Marvel is a relic of a garden of foreign plants is not without foundation.

LOWLY BACTERIA TELL FERTILIZER NEEDS OF SOILS

Fertilizer needs of any soil can be learned in two days with almost no expense, instead of requiring a couple of years of costly field tests, by a new method devised by M. D. Chonchack, a French agricultural scientist.

M. Chonchack's system depends on two facts that have been known for a long time as matters of pure science, but were never thought of as possibilities in economic application. It is well known that the fertility of the soil depends on the activity of the microscopic organisms it contains, largely bacteria and fungi. It is also well known that the mineral salt requirements of these bacteria are about the same as those for the higher plants that make up our crops. Therefore, reasoned M. Chonchack, a soil that harbors a rich growth of bacteria will produce a good harvest.

A difficulty arose in the matter of determining the bacterial content of the soil, for methods of direct counting under a microscope are difficult and inaccurate. Here again M. Chonchack made use of the fact, well-known to everyone who has ever used hydrogen peroxide as a mouth wash or as an antiseptic on a scratch that bacteria cause this chemical to give off oxygen. The amount of oxygen given off is always in proportion to the total quantity of bacteria present. Therefore, by treating his soil samples with hydrogen peroxide and measuring the oxygen that bubbled out, M. Chonchack was able to get a measure of the bacterial life present.

Preliminary tests have shown that the method holds good within certain limits in determining the fertility of soils, and more extended investigations are planned for the coming season.

CATS KEPT MAD BY OPERATION

What makes the wild cat wild? What happens in the physiology of any of us when we get angry? These are questions which Prof. W. B. Cannon of Harvard University and his collaborators in physiological research are answering. They have discovered a way to operate on the brains of animals that will make them permanently angry and at the same time remove all sense of pain.

Cats so treated show many signs of emotional excitement. The cat's hair stands on end, its claws are drawn out, and it scratches and spits. Sweat pours out over the paws, there is a great increase in the heart rate, and the blood pressure is high.

These symptoms, however, are only incidental to the main purpose of the research, which is to discover what changes in the chemistry of the blood and body tissues accompany the emotions of anger and fear. The two most notable changes are greatly increased secretion of the adrenals, which are ductless glands located near the kidneys, and a five-fold increase in the concentration of sugar in the blood,

Plants will thrive on artificial light, but the pseudo sunning is by no means a profitable plan for marketable plants, flowers or vegetables, according to experiments at the Boyce Thompson Institute for Plant Research, Yonkers.

FINDS PASTEURIZED MILK DEFICIENT AS FOOD

Though pasteurization makes milk safer, it destroys part of its nutritive value, is indicated by experiments recently conducted by the British Medical Research Council, at the Agricultural Research Institute of Aberdeen.

A number of calves were taken and some fed on natural milk while others were fed on pasteurized milk. It has been found that the latter are less in weight than the former and that their hair and skin show signs of faulty utilization of the food.

These results were announced at a representative meeting of delegates from the various boroughs of London called to consider how to improve London's milk supply. In the course of the debate, it was pointed out that the average American child receives four times as much milk as the average London child.

CHILDREN'S EYESIGHT IMPROVES WITH AGE

Children with normal eyesight or with moderate defects see better as they grow older. Snellen's eye test given to 9,245 children showed that the percentage of children with normal vision increased as the children grew older and the percentages of those with minor defects decreased. The number of children with marked-defective vision increased, however, with age.

Of all the children tested, 63 per cent were found to be normal, 27 per cent moderately defective, and only 10 per cent had poor eyesight. The percentage of boys with normal eyesight was slightly higher than the girls, but the average for those with very poor vision was the same.

BAKELITE TRANSPARENT TO INFRA-RED LIGHT

Transparency to infra-red light is the remarkable property discovered in bakelite, the American synthetic resin, now widely used for radio panels and phonograph records. The discovery was reported by M. Georges Kimpflin to the French Academy of Sciences. The transparency is not so high as that of window-glass with common white light, but still offers interesting possibilities of mechanical application.

Infra-red light is not visible to the human eye. Recently secret-signal systems have been developed for military use, based on infra-red radiation. It now appears possible to filter the light of the secret signal through bakelite so that the tell-tale visible rays are excluded. Furthermore, filtered infra-red rays are expected to have medical application in the practice of dermatology.

Bakelite may be doped with iron and certain other useful ingredients without seriously reducing its infra-red transparency. The new experiments recall the recent development in America of a black glass, impervious to common light, but transparent to ultra-violet light, the opposite extreme of the spectrum.

DISCOVERS NEW MOVEMENT IN WINKING EYES

Don't wink while you are aiming a gun, if you expect to hit anything. This is the advice of Dr. W. R. Miles, professor of experimental psychology at the University of California, who announced the discovery of a new reflex movement of the eye at a meeting of the American Physiological Society. He says that your eyeball shoots upwards with lightning speed every time you wink, either consciously or unconsciously, and furthermore, that your eyelids themselves have a circular, wiping motion. They don't move up and down, as it is usually supposed. This is why particles of soot and grit accumulate in the inner corner of your eye, Dr. Miles explained.

The discovery was made as a result of a careful study of the movements involved in winking which the psychologist made with an apparatus similar to that used for studying eye movements in reading horizontal and vertical type. The image of the crater of a carbon arc lamp on the cornea or white of the eye, which served as a convex mirror, was recorded on a photographic film. The movements of the eyelids were traced similarly by the reflections of the same arc from two tiny convex mirrors, placed one on the edge of each eyelid. The subject's head was steadied, and then tracings of winks were taken on a travelling film. The result was that both lids were seen to move together and towards the nose at the same time, and as they did so, the eyeball shot upwards through an angle of 15 degrees.

WOOD ALCOHOL LESS HARMFUL THAN GRAIN

Alcohol relations appear to be reversed in the barley world. Wood alcohol is less harmful than grain alcohol. This is the inference from some recent experiments performed at Rothamsted, England, in which barley seedlings growing in water cultures had varying quantities of the two alcohols added to their culture solutions. One part of grain alcohol to 1000 parts of solution proved fatal but plants lived when the concentration of wood alcohol was five times as great.

In the case of those plants growing in non-killing strengths of alcohol it was noticed that the grain alcohol favored the production of ear or reproductive shoots, whereas the wood alcohol favored the growth of ordinary leaves.

When the dose of alcohol was withheld until the plants were well under way it required more alcohol to poison. Old barleys stand up better than the young in the presence of alcohol.

USES BLUEBOTTLE FLIES AS RAT DETECTIVES

The use of vermin of one kind as an ally in war on vermin of another is a novelty introduced in England's anti-rat crusade.

Mark Hovel, a well known surgeon, is cooperating with the London College of Pestology for the extermination of the rat from England. For the solution of one problem connected with the rat he advocates calling in blue-bottleflies to act as detectives.

"If," he recommends, "a rat or a mouse dies in the summer months, the simplest way to discover the precise spot where the body is lying, is to catch several

blue-bottle flies with a butterfly net. Then having closed the windows and doors of the room in which there is the odor, liberate the flies and notice where they all settle; that will be the place below which the dead animal is lying. If there are no blue-bottle flies in the house, they can be procured by putting a piece of meat out of doors and catching those which settle on it."

ACCIDENTS MADE SAFE BY NEW INVENTION

Making the street safe for the pedestrian is the object of a newly invented safety fender for automobiles patented by M. Laurenceau. His invention works on the principle of the cowcatcher of a locomotive and is simply a steel net with arms which operate automatically in picking up any obstruction in front of the car. The car stops automatically when the catcher operates and the driver is forced to pay some attention to his unexpected passenger. If a man is standing when he is hit he is seated abruptly on the frame. If, however, he is knocked down the device acts as a cushion for him comfortably until the car stops and he can be disengaged.

This invention is practicable for any size car from a small one to the largest and most powerful cars built. M. Laurenceau designed it primarily for use on taxicabs.

OVERCROWDED WHEAT ACTS LIKE OVERCROWDED CITY

That a field of wheat is in many ways like a city of men was brought out by studies conducted by Drs. J. E. Weaver and Herbert Hanson of the University of Nebraska.

Wheat planted only half as thick as usual produced fine individual plants that developed large heads, though their total of bushels per acre was not so great as it was where plants stood closer together and did not thrive so well; a case of a large mediocre population turning out a larger mass production than a smaller number of higher-type individuals. But where the planting was four times as dense as normal, it was found that not only were the individuals spindling and stunted by their crowding upon the meager supplies of water, fertilizer and even air and sunshine, but that their much greater numbers could not make up for their inferior individual abilities, and the total yield was very low. It was a case of America compared with China, transferred to the plant world.

WARM-WATER SPONGES FOUND IN ALASKA

Two live sponges, the largest six inches in diameter, were attached to the anchor rope of the mine tender Leo when drawn from the water. One sponge was bright yellow and of fine texture. Capt. Cedric Davis dropped a gauge overboard and discovered the temperature of the sea twenty fathoms down was 18 degrees warmer than that of the surface. The condition of the floor of the ocean off here is believed ideal for the development of sponges. News of the sponge discovery aroused almost as much excitement as did the old-time gold craze; scores of fisherman are seeking diving outfits to explore the submerged rock for sponge beds.

SCIENTISTS PRY INTO SECRETS OF VOLCANOES' DEPTHS

Relief valves of Hell! Such was the old idea of the function of volcanoes, supposed to tap the center of an earth filled with a molten magma that would make the Devil himself envious.

But now, although volcanoes still terrify those who live near them, geologists say they are mere boils on the skin of the earth. The interior of the earth is solid and hard, and volcanoes are not constitutional but merely superficial phenomena.

Volcanoes have always held for men the double fascination of the terrible and the unknown. It is no wonder then that primitive peoples made these fire-mountains the abodes of their most terrible and angry gods, and that volcanoes all over the earth -- Etha, Fujiyama, Kilauea, Popocateptl -- have become objects of religious tradition or superstitious awe.

Other times, other man, other ways. Western civilization now looks no longer with dread at the chimneys of Vulcan's forge, and even the swarthy children of the Pacific islands have learned to withhold their propitiatory offerings of living victims from the goddess of the fire-pit. Man may now go where he please, and question what he will, even volcanoes.

But though man has been prompt and curious in the exercise of his freedom to question nature, many secrets are still not made manifest. And of these, among the least satisfactorily explained are the secrets of the volcano. Man may climb a fire mountain during an interval of peace, they may descend the inner slopes of its crater to its very heart and feel the pulse of the seething lava lake at its bottom, they may breathe (though at their peril) of the volcano's very breath; but the roots of the mountain, deep in the bosom of the earth, no man has ever seen. And until someone does, the mystery of the eruptions, of the still tides of lava that sometimes pour down the mountain's sides, of the belching storms of ash and pumice that roar into the air, will not be wholly unveiled. In the meantime, one investigates as far as one's means permit, and builds hypotheses.

In the earlier days of the modern era of science, when the earth was thought to have started its career as a huge ball of liquid magma, slowly cooling off until a thick crust surrounded a still fluid interior, volcanoes were thought to derive their lava and flames from this interior reservoir of heat. But geologists and mathematical astronomers some time ago routed this idea, and volcanoes were deposed from their jobs as cosmic safety-valves. The interior of the earth has been shown to be virtually as rigid as steel, and volcanoes are reduced to mere local affairs, and dependent upon local supplies of lava for their fireworks.

The theory proposed pictured the base of a volcano as sitting over a considerable mass of lava, bearing the same relation to it as the narrow neck does to the body of a bottle. Some volcanologists even held that certain groups of volcanoes were connected by common conduits to the general supply of lava beneath, like a bottle with several necks.

Now comes Dr. Arthur L. Day, director of the Geophysical Laboratory of the Carnegie Institution of Washington, and denies volcanoes even this limited bellyful of fire. His investigations, conducted for many years on many volcanoes, but especially on great Kilauea in Hawaii and on our own neighborhood volcano, Lassen in California, have led him to the conclusion that the sources of the lava in volcanoes are scattered in small masses in many rifts and pockets. His picture of

the roots of a volcano would be a picture closely resembling that of the roots of a tree.

As for interconnection between volcanoes, Dr. Day scouts the idea. He points out the case of two Hawaiian volcanoes, Mauna Loa and Kilauea. Mauna Loa is 10,000 feet higher than Kilauea, yet it erupts lava much more frequently than does Kilauea, which would hardly be conceivable if the two were interconnected. Lava is three times heavier than water, and certainly no more ready to flow uphill. Moreover, he says, the activity of one volcano rarely finds an echo in that of the other.

Dr. Day's conclusions as to the true aspect of the underearth parts of a volcano are the results of his studies of the temperatures of the lava in the great pool of Kilauea, and on the chemical nature of the gases that bubble up through the boiling lava. One of the first things that led him to suspect the truth of the "boiling flask" theory was the discovery that the temperature of the lava at the surface of the lake in Kilauea was higher than it was at a short distance beneath. Lava temperatures anywhere are high enough. The surface temperatures in Kilauea's lava pool averaged 1000 degrees Centigrade, or about 2000 degrees Fahrenheit. But a few feet beneath the surface they stood about 100 degrees centigrade lower.

Here then was a puzzle. Something must be happening in the liquid lava immediately within reach, some chemical change that was releasing energy in the form of heat. And the process must be going on up to the very surface itself. Dr. Day set about finding some phenomenon that might explain it. He and his assistants put on gas masks, and they collected the gases that bubbled out of the liquid stone in special apparatus. Chemical analysis showed these gases to be of the most varied constitution. He found a list of eleven; nitrogen, water (as steam), carbon dioxide, carbon monoxide, sulfur dioxide, free hydrogen, free sulfur, fluorine, ammonia, and even argon, a rare atmospheric gas. Now, some of these elements and compounds are chemically very active; at the high temperatures that prevail in the pool it can hardly be imagined that these gases have come up together from some central source without uniting. It is more probable that they have come from several independent sources, are uniting very actively as they approach the surface and giving off heat as they do so, and thus causing the paradoxical situation of higher temperatures at the surface than just beneath it.

Having thus found an explanation for the peculiar behavior of lava temperatures, Dr. Day turned to the problem of the source of the energy for such explosive eruptions as that of Lassen Peak in 1915, and the historic Vesuvian eruption that buried Pompeii. Volcanic eruptions of the explosive type are accompanied as a rule by huge outbursts of steam, which condenses in the cold outer atmosphere and falls as rain; frequently mixed with volcanic ashes as a rain of mud.

Dr. Day, like a modern Moses, paradoxically shows that water can be squeezed from solid rock. He said: "Freed from chemical terminology the mechanism is simply this: A silicate solution in its liquid state can take up water in solution in considerable quantity. A simple solution of silica and potash when heated under pressure in the laboratory is capable of taking up as much as 12.5 per cent. of water in solution. A rock magma in the earth is such a silicate solution, although more complicated in character, and is entirely competent to carry five or six per cent. of water in solution under appropriate conditions. If it should happen that the lava beneath a volcano carries such quantities of water in solution, then all the phenomena of volcanism become appreciably clearer, for in the 8000 or more analyses of crystalline rocks of igneous origin which have been gathered together there is none containing more than one and one-half per cent. of water, and less

than one per cent. is usual. This must mean that in the process of crystallization of the rock from the magma the water content is for the most part discharged. Should it happen that this discharge of water takes place in a closed space then immense pressures might develop and explosive activity of tremendous intensity might result."

COURT FREES INDIAN WHO EATS RARE ROOT

That Indian wizards possess a root which when chewed in a court room will give off a perfume and alter the minds of judge and jury toward the prisoner, is the claim of a Chickasaw interpreter presented to the American Association for the Advancement of Science by Dr. John R. Swanton of the Smithsonian Institution. Dr. Swanton stated that he was merely telling various beliefs connected with witchcraft among the Indians as they had been told to him, but could not say to what extent the aboriginal beliefs had been added to from white and negro sources.

Wizards were employed by the Chickasaws, his informant said, to help win ball games. When the people heeded the wizard's warning they usually won, if he was better than the conjurer on the other side. When his side won, the conjurer was well paid but when they lost he received nothing. If he was suspected of helping the opponents, he was killed. When a game was in prospect the conjurer had to begin his preparations several days in advance. He had to fast for a certain number of days, drink medicine made from certain herbs, and was not allowed to sleep. After the game, he usually felt sick for several days on account of the sleep he had lost and the medicines he had taken.

TABLOID BOOK REVIEW

EPIDEMIOLOGY AND PUBLIC HEALTH: By Victor C. Vaughan, M.D., LL.D. Vol. I, 686 pages, 1922. Vol. II, 917 pages, 1923. Vol. III in preparation. St. Louis: C. V. Mosby Company.

These three volumes will be foundation-stones of the newly-differentiated science of public health. Encyclopedic in their scope, and bringing down to date everything now known about epidemic diseases and their prevention, botulism and kindred food poisonings, protection of water and milk supplies, and a host of related subjects, they are no less than necessities upon the reference shelves of all who sign themselves "Dr. P. H.", as well as of progressive practitioners of the older and parent arts of medicine and surgery. The thorough-going discussions of recent epidemics, illustrated with clear and striking graphs and charts, will appeal to the public health man, while the careful symptomologies of even obscure diseases and toxic effects will be highly useful to the physician. Each chapter is followed by its appropriate bibliography, and each volume is thoroughly indexed.

Table salt contains only 0.1 per cent of insoluble matter other than the calcium sulfate used to keep the salt from caking.

More than 63 per cent of the telephones of the world are in the United States
