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CANCER AND BLOOD ALKALINITY

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STUDIES of significance on the cancer problem have been reported by Dr. Ellice McDonald, director of cancer research at the University of Pennsylvania Graduate School of Medicine, and his associates, Gladys E. Woodward, Janetta W. Schoonover, Edith G. Fry and Edward G. Torrance.

The blood of patients with untreated cancer is more alkaline than normal, they found. This increased alkalinity seems to be related to the speed with which the disease will kill the patient. "The greater the alkalinity, the quicker the disease kills," said Dr. McDonald. Treatment by X-rays or radium, which may cure or at least retard the disease, affects the alkalinity of the blood.

These observations, reported in the forthcoming issue of the *Journal of Laboratory and Clinical Medicine*, indicate that in the condition of the blood may be found a means of predicting the course of the disease and the success of treatment. Likewise a new method of treatment may be developed which would turn out to be the long-sought specific cure for this dreaded malady. The important point is that environmental conditions outside the cell influence the course of the disease.

Cancer is a disease in which cell growth is abnormal. Cancer cells have been called wild cells because of their erratic growth. Investigators have been studying the cells microscopically and with moving picture cameras in the hope of finding what makes some cells turn into the wild cancer cells. It appears from Dr. McDonald's report that the cause of their erratic growth is to be sought outside the cell, in the surrounding tissues and in the blood.

"The state of the blood in cancer is of great importance because cancer becomes a systemic disease and cancer cells receive their nourishment from and give off their waste products to the blood," his report begins. "Therefore it is to be expected that the blood of cancer patients should differ from normal blood."

The difference, Dr. McDonald and associates found, is in the degree of alkalinity. The average alkalinity of the blood in the 26 untreated cancer patients studied was 13 per cent. above the normal. The alkalinity of blood or other biochemical solutions is determined by measuring the concentration of hydrogen ions. This is called in the chemists' shorthand, pH.

"Alkalosis of the blood plasma of untreated cancer patients seems to have a bearing upon the duration of their lives, or duration of life is a function of pH. In the series, the more alkaline the blood plasma of untreated cases, the worse the prognosis. Warning should be given in applying this rule to patients whose pH may be modified by treatment, complications or medication," Dr. McDonald's report stated.

The diagnosis of cancer in the patients of the study was confirmed by examination of a small piece of tissue removed from the tumor, or by post-mortem examination of the patient's body.

"This is very far reaching in the future study of cancer," according to Dr. McDonald. "In marine eggs, if the balanced sea-water is made more alkaline, the rate of division and multiplication is increased and *vice versa*. The analogy holds for cancer and the obvious is to attack the disease through the blood or environing fluid, which may have some hope of success."

THE USE OF WOOD ALCOHOL

SAFEGUARDING the public health from possible deleterious effects of methanol, or wood alcohol, used as an anti-freeze in automobile radiators was recommended in a resolution passed by the Conference of State and Territorial Health Officers with the U. S. Public Health Service. The resolution was based on the following report of the committee appointed by Surgeon-General Hugh S. Cumming at the opening session of the Conference:

"Your committee has considered the matter of the increasing use of methanol as an anti-freeze in automobile radiators and in industry and feels that the use of this substance should be surrounded by the necessary safeguards through agreement of the Public Health Service with the industry.

"If such an agreement can not be reached, the Surgeon-General is requested to inform the several state departments of health of that fact and suggest to them such standard safeguards as he deems necessary for the protection of the public health as a basis for state laws and sanitary regulations."

The report was signed by Dr. S. H. Osborn, chairman of the committee and state health officer of Connecticut, and by the committee members as follows: Dr. T. B. Appel, state health officer of Pennsylvania; Dr. A. J. Chesly, state health officer of Minnesota; Dr. R. H. Riley, state health officer of Maryland, and Dr. J. P. Leake, of the U. S. Public Health Service.

The safeguards necessary to protect the public health from this new menace will be based on the findings of investigations now being carried on by the U. S. Public Health Service. These will be announced at the completion of the studies.

Methanol, or wood alcohol, is a poison which may cause blindness and death if taken internally. According to some authorities it is equally poisonous if inhaled or absorbed through the skin. A cheap method of making it synthetically has made it practical for use as an anti-freeze. Public health authorities are now trying to determine how to eliminate the dangers from the wide use of so potent a poison.

DROPS ACTING LIKE LIVING CELLS

DROPS of lifeless solution, suspended in another solution equally lifeless, can act as though they had life in them. They will increase in size, then divide, and the

"offspring" drops in their turn grow and divide again.

The possibility of this and other lifelike behavior was demonstrated on mathematical grounds by Dr. N. V. Rashevsky, of the Westinghouse Research Laboratory, East Pittsburgh, Pennsylvania, before the American Physical Society. Dr. Rashevsky has not carried out experiments to demonstrate his theory, but the principles he laid down may be the general explanation for such special cases of "artificial cells" as those shown by Dr. George W. Crile, at the Cleveland meeting of the American Association for the Advancement of Science, last winter.

The growth and division of the imaginary, artificial, lifeless cells were all accounted for by Dr. Rashevsky on the simplest of physical assumptions. That a cell may keep its shape intact through several changes was also explained without considering any of the complicated structure actually occurring in the living cell.

"One of the most fundamental phenomena of life, if not the most fundamental one," said Dr. Rashevsky, "is the multiplication of a cell through division. All the facts of growth and multiplication of more complicated and highly developed organisms reduce in the last analysis to the growth and division of single cells."

Instead of attempting to give a detailed theory of such complicated phenomena, Dr. Rashevsky decided to investigate first some intentionally over-simplified cases, which are never found directly in nature. It is through the study of intentionally over-simplified arrangements that finally remarkable progress has been achieved in other exact sciences outside of biology.

"Let us for a moment forget about actual living cells," Dr. Rashevsky said, "and investigate mathematically whether it can happen, and, if so, how it can happen, that a small liquid drop will spontaneously divide into two parts.

"It is found that such spontaneous division can not occur, if the drop is in a perfectly resting state and is not undergoing any changes. "Consider the case that a drop, which is surrounded by another liquid, interacts chemically with this liquid, so that the amount of liquid which constitutes the drop increases, just as would be true with a small organism. If the drop thus grows at the expense of certain substances, contained in the surrounding liquid, then under some very general conditions, the drop will divide into two on reaching a certain size. Each half will then again grow up and again divide and so on."

Generations of droplets showing an evolution to more and more complicated chemical constitution can thus be formed without the interference of the experimenter, Dr. Rashevsky's theory indicates. This happens when the intervals between the successive divisions are unequal.

If the drop is below a certain minimum size, it will not grow but dissolve away. Thus in no case can an imitation droplet-cell be formed spontaneously. On the other hand the number of drops may increase continuously through the process of division and subsequent growth, as long as substances necessary for this growth are contained in the surrounding liquid. "Life" persists so long as "food" is available.

EXCESS FAT OF BODY CHANGED INTO SUGAR

IF you eat too much fat and not enough sugar, will your body automatically transform some of the excess fat into carbohydrate fuel food? Dr. John R. Murlin, of the University of Rochester, has suggested that the versatile human body thus answers its own demands for proper food by manufacturing the needed sort even if the raw materials fed it are not just what are needed.

Volunteers lived on a diet of pure cream for five days in the experiments reported to the Federation of American Societies for Experimental Biology, by Dr. Murlin and Miss Estelle E. Hawley, his associate. Each morning and evening they were fed their meals of cream and then they were put through tests to ascertain how the body used this unbalanced food ration. One brave temporary martyr to science remained in an ice box for an hour and a half in order to test his metabolism on the fat diet under the influence of reduced temperature. He shivered for an hour during this experience.

Sufferers from diabetes seem to be able to eat fat without filling their blood with sugar that is dangerous to them. This has caused physiologists to believe that the body could not manufacture sugar or other carbohydrates from fatty foods.

Physicians have recognized heretofore that sugars could be converted into fat by the body and they have repeatedly warned pleasingly plump people against eating too much sugar and starches. Now, if Dr. Murlin's experiments are further confirmed, they can feed their obese patients high fat diet in necessary cases with the assurance that the body will look out for itself and make the sugar that it needs to supply its energy.

WILDFLOWER SANCTUARIES

ESTABLISHING sanctuaries and protected areas for threatened wildflower species is not enough to insure their survival. The special needs of the plants, especially their soil preferences, must be studied and adjustments made accordingly.

So said Professor Edgar T. Wherry, in a radio address delivered under the auspices of *Science Service* recently. The talk was broadcast over the network of the Columbia Broadcasting System. Professor Wherry said, in part: "Before extensive transplanting of wildflowers into such preserves is undertaken, some study must be made of the soils existing there, and the requirements of the individual species concerned. There will be no use trying to grow trailing arbutus or moccasin flower for instance, in a patch of neutral or alkaline soil, as such plants are sure to die in a year or two unless an acid-reacting humus soil is provided in the first place, and permanently maintained in that condition. And it will not do to jump at the conclusion that a soil is acid just because moss is growing on the ground, or lots of dead leaves are strewn around. The only way to be certain that the acidity is high enough is to make tests with indicators, that is, dyes which change their colors with different degrees of acidity and alkalinity.

"Some provision must also be made to exclude weeds. I once was invited to look at a wild garden which had

been laid out on a large estate at considerable expense, in which, so I was informed, there had been planted hundreds of attractive and delicate spring flowers. When I reached the spot, I saw there a most luxuriant mass of poison ivy, and only after some search was I able to discern a few miserable hepaticas and trilliums fighting a losing battle to maintain themselves. The owner refused to spend the additional sum which would have been necessary to employ a gardener with enough knowledge to keep down the weeds without injuring the introduced native species and so succeeded only in preserving some plants which needed no protection whatever. Remember that a wild garden must be weeded quite as much as a cultivated one, and count on employing some one sufficiently acquainted with native plants to be able to tell the weeds from the flowers.''

CONSERVATION OF WILD LIFE IN AUSTRALIA

AUSTRALIA, which has had a development more or less analogous to that of the American West, is now passing through a phase also experienced in America—the realization that reckless slaughter is threatening extermination of many of its unique animal species. This is resulting in activities looking toward their protection and preservation.

The koala or ''native bear,'' an animal looking more or less like a bear but really a marsupial related to the kangaroo and the opossum, is an object of special solicitude. In New South Wales and other regions where it has been exterminated, efforts are being made to reintroduce it.

The so-called marsupial wolf or thylacine, not so harmless and good-natured as the koala, has been mercilessly hunted and now survives only in northwest Tasmania. The Government of Tasmania has lately taken steps to protect the survivors of the species, and now forbids the exportation of thylacine pelts.

The Australian opossum is another animal that is being over-hunted. In the state of Victoria alone, which has a three-month open season, at least one million are killed annually, and conservationists are becoming concerned lest the fur trade destroy itself through its own over-eagerness for profits. New South Wales is the only state where the opossum is given official protection.

Although there are laws on the books to protect the native animal and plant life of Australia and Tasmania, there are not enough rangers in service to secure proper enforcement. However, voluntary assistance of interested persons is now being enlisted; and there is a movement on foot to establish nature sanctuaries and parks.

ITEMS

WITH a series of eight earthquakes, culminating in the destructive Caucasus shocks at the end of the month, April has maintained the high earthquake record of the first quarter of 1931, and has followed the example of the preceding month, which ended with the wrecking of Managua on March 31. The total of major earthquakes for the year, up to April 30, now stands at 43. Last month's quakes occurred on April 4, 6, 15, 19, 20, 22, 24 and 27. The last date was that of the destructive quake in the Caucasus region, though the telegraphic reports of it did not come out from Moscow until the twenty-ninth. None of the other seven quakes, fortunately, caused any notable damage to life or property. One, a very mild one, rattled dishes and doors and cracked a few ceilings in the Hudson and Mohawk valleys in New York State. This was on the twentieth. The second and third quakes of the month, on the sixth and fifteenth, respectively, were mid-ocean earthquakes on opposite sides of the earth. The first agitated the Pacific Ocean bottom almost on the equator, in the neighborhood of the Caroline Islands, and the second occurred in the Atlantic, a little west of the Azores.

COAL mining accidents that only injured miners and did not kill them are being studied by the U. S. Bureau of Mines. This does not mean that the Bureau of Mines neglects to study fatal accidents, but rather that it is extending the scope of its studies to include both fatal and non-fatal accidents in an effort to lower the figures of 100,000 men injured and 2,000 killed each year in the coal fields. Reports have already been received from about half the operating companies on non-fatal accidents that occurred in 1930.

THE interior of the human ear can now be photographed with a new camera developed by Dr. Richard Millar, director of the photography division of the Methodist Hospital of Indianapolis. The ear camera is hailed by the medical world as a distinct step forward in the treatment of ear diseases. For the first time in medical history a pictorial record of different stages of ear diseases can now be kept. The camera takes pictures 120 times as large as the inner ear. With the use of a special concave mirror, a powerful beam of cold light is focused ingeniously into the patient's ear. The exposure is made through a hole in the center of the reflecting mirror which is turned to deflect the light from the lens of the camera. Heat is extracted from the light beam by passing it through a flat glass flask filled with ice water before it reaches the ear.

A BIRD that displays something of the languor of the tropics is described by Dr. T. A. Jaggar, director of the Hawaiian Volcano Observatory. The malau bird, a unique inhabitant of Niuafou, one of the Tonga Islands, digs a hole three to five feet deep in the slope of the warm volcanic sand, lays her long, pink egg in the bottom, scratches her way out, filling the hole behind her with sand, and lets nature do the rest. The sun heats the sand to from 85 to 95 degrees Fahrenheit. If the natives do not molest the egg and it is allowed to hatch, the young bird digs its own way out. The egg is the size of that of a goose. In another effort to save labor, different hens reoccupy the same holes over and over.