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THE EVAPORATION OF MAN

By Dr. Edwin E. Slosson,

When Hamlet expressed the despairing desire "that this too, too solid flesh would melt, thaw, and resolve itself into a dew" he did not realize that his wish was being granted even as he spoke. The louder he lamented and the hotter he got about it the more of his flesh was being resolved into a dew which besprinkled his forehead or was thrown off with his breath. Everybody is evaporating in the same way all the time even when he is not conscious of perspiring. In fact, the insensible perspiration accounts for a greater loss of water than what is seen and felt as sweat. All that is necessary to prove this is a sufficiently sensitive balance.

There was such a balance on exhibition at the Carnegie Institution in Washington the other evening. It was so strong that a man could sit in its scale pan and so sensitive that a pin's weight would tip the beam. Dr. F.G. Benedict of the Nutrition Laboratory who had charge of the experiment had to keep putting on weights to make up for what the young man was losing in the way of water vapor while we watched him. Since he had on an overcoat it was evident that most of the water was given off from the lungs and not through the skin. In fact, other experiments have shown that a man when clothed loses water by evaporation more rapidly than when nude.

Of course exercise of any sort increases the loss of water. Dr. Benedict found that a football player lost 14 pounds of his weight in a game lasting an hour and ten minutes. A marathon runner lost eight and a half pounds in a three-hour race. A varsity oarsman lost five and a half pounds in a four-mile race lasting 22 minutes. Most of this loss is perspired water, largely from the lungs, but a small fraction of it comes from body tissue burned up in the fires of life.

Even when in bed and asleep the loss of water and carbon dioxide goes on continuously. In 158 experiments on 50 different men there was an average loss of one and a third ounces per hour while lying quietly in bed. So the average adult wakes up in the morning after eight hours sleep some ten ounces lighter than when he retired. We restore the loss when we eat and drink.

From these experiments it is evident that scales accurate enough to ascertain the weight of the breath may serve as a measure of metabolism, an index of the activity of the bodily processes, in place of the more bothersome

methods now in use, the determination of the heat production by the calorimeter or of the analysis of the expired air by chemical methods. The new method has already been used in hospitals where it is important to know the metabolism of the patient. Six women patients were found to lose from six to thirteen ounces each during eleven hours in bed.

Each breath of air that we inhale adds some oxygen to our bodily substance. But with each breath of air that we exhale the oxygen escapes again, carrying off with it some of the carbon and hydrogen that has served us as fuel. The food we eat keeps up our energy and the water we evaporate relieves us largely of our surplus heat. So the income and outgo of both matter and energy are kept perpetually and automatically in balance. Or if they are not, we become speedily bankrupt and finally defunct. Stopping our outgo of evaporated water would kill us quicker than stopping our income of food and drink.

SCIENTIST DISCUSSES KAMMERER'S WORK

An airing of the biological problem of the inheritance of acquired characteristics is now taking place, Prof. H.S. Jennings of Johns Hopkins University says in a statement prepared at the request of Science Service. Dr. Kammerer, an eminent biologist of Vienna, is in this country on a lecture tour and his arguments and experiments in favor of the transmission of environmental effects have created considerable public as well as scientific interest.

"Dr. Paul Kammerer has carried on more extended and serious experimental investigations on the inheritance of acquired characters than anyone else has ever done", says Prof. Jennings. "For many years continuously he studied, mainly in amphibians and reptiles, the changes induced by altered environments, on their instincts, markings and structural features; and the heritability of these changes. The accounts of these investigations are published with great detail in standard journals of research; they report that in many different cases such 'acquired characters' are inherited.

"In the interest of the solidity of science, any investigator who brings revolutionary conclusions, opposed to the common experience of workers in the same field, meets skepticism and thoroughgoing criticism; his work is not accepted until it has been sifted for all possible sources of error, and has finally been confirmed or refuted by the work of others. Though inconvenient, the history of science shows this to be necessary, and no investigator can escape it. Such a sifting the work of Kammerer is now undergoing. The materials with which he works are extremely variable in their genetic and other phenomena; some investigators hold it probable that unconscious selection among the variations, rather than the inheritance of acquired characters, may account for Kammerer's results. Attempts have been made to point out in his work errors, which, if they are typical, would raise a presumption of inadequate care in so difficult and complex a field; but none that are fatal to his general conclusions have yet been demonstrated. A number of investigators are repeating crucial parts of his work; until their reports come in a final judgment is not possible. Some eminent students of modern genetics feel certain

of the overthrow of his conclusions; some eminent biologists in other fields believe strongly in their validity. If confirmed, the work would be of course of tremendous importance.

"The recent reports by Pawlow, Guyer, Stockard, Griffith, Kammerer and others show that we are in for another upheaval and airing of the problem of the inheritance of acquired characters. Since this is upon us, it is desirable that it be made as thorough as possible. Americans should therefore welcome the opportunity of hearing Dr. Kammerer's conclusions from his own mouth; experience has shown that the personality of the worker is not irrelevant, in such fields, to the question of how he came to his conclusions. The history of former upheavals of this matter does not predispose one to predict a favorable outcome of the test now in progress. But while we wait, Dr. Kammerer must be given credit for the most courageous and thoroughgoing attack that has ever been made of this important problem; for bringing to light many important matters, whatever their final significance; and for giving a powerful impetus to further investigations in this field."

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SHENANDOAH MAY FIND LAIR OF COLD WAVES

The Shenandoah in her projected flight over the unexplored Arctic ocean north of Alaska may make discoveries which will have great value in forecasting North American weather, Major E.H. Bowie, supervising forecaster of the U.S. Weather Bureau, says that if land is discovered in that vast region, and especially if it be of large area, it might possibly serve as a location for an outpost of the Weather Bureau to stand guard over this breeding place of cold waves.

For the entire polar cap is, said Major Bowie, a vast reservoir into which flows, settles, and becomes unduly cold the air of the northward flowing currents from southern latitudes, and especially is this true during the long winter night of the polar region, a night which north of the Arctic Circle begins in September and ends in March. These northward flowing aerial rivers chilled on their way north, by contact with ice and snow covered surfaces, and by rapid loss of heat by radiation, pass onto the polar basin, settle to the earth's surface and build up, it is believed, a great semi-permanent area of high barometric pressure. This results from the increasing weight of the cold air, and to this the incoming air flowing in aloft from regions farther south, is added.

At intervals and especially in winter, this reservoir of cold outflows and spills southward into the temperate zone, the force of its flow being sometimes enough to carry relatively cool air all the way to the tropics. If it could be known when this was about to occur it would be possible to make forecasts of cold waves or of colder weather for a week or more in advance, while on the contrary if the polar reservoir of air were known to be depleted, a northward flow of warm air over the temperate zone might reasonably be expected, bringing a hot wave in summer and mild weather in winter.

The Weather Bureau now has a number of stations in Alaska, but the northernmost of these are in the Yukon Valley. If one might be established at Pt. Barrow on the northern coast and another several hundred miles north on the land supposed to exist there, these changes in the quantity of air in the polar reservoir might be more readily seen and their effects predicted. So the bureau is keenly interested in what the Shenandoah may find.

RED MEN CHOOSE RED AS FAVORITE COLOR

The red man's fondness for gaudy color schemes has long been known but it has remained for Dr. T. R. Garth of the University of Denver to scientifically ascertain the color preferences of the Indians in the southwest.

Full blood Indians were found to prefer red to all other colors, then blue, violet, yellow, and white in the listed order. White men, living in the same social and educational environment, preferred blue, then green, and then red.

The education of the red man has little apparent influence upon his favorite colors. The squaws and the braves agreed more closely in their select colors than the whites and the Indians did. The full blood Indians were found to be very emphatic in their color preferences, much more so than the mixed bloods and the whites.

SAME FISHERMEN CATCH SAME COD THREE TIMES

Codfish No. 231 has been caught three times by the same fishermen at least twenty miles from land on a fishing ground many square miles in extent. This is a fish story vouched for by the scientific records of the U.S. Bureau of Fisheries.

Experts on the government boat "Halcyon" caught this cod on Nantucket Shoals, Mass., June 28, and promptly clamped a metal tag bearing the number 231 upon his tail. He was turned loose, but on October 3 was again caught by the Halcyon while continuing its experimental work in the same waters. The number was noted and the fish again released. On October 15, No. 231 was again back with his old acquaintances on the "Halcyon".

This is one of 128 returns from over 10,000 fish tagged by the Bureau off the New England and Canadian coasts in an effort to learn more of the migration routes and habits of valuable food fish. Since October 15, fish tagged off

Massachusetts have been taken off the New Jersey coast and the records indicate that they are migrating toward the south. It is expected that a comparatively large number of fish tagged this summer will be caught in the vicinity of New Jersey during the coming winter and spring.

A LA CARTE RADIO MENUS IN EVERY ROOM

Bedtime stories served restfully in bed, jazz accompaniment to dish-washing, and the strains of "Last Night on the Back Porch" for the delectation of any quiet twosome in that favored locality, may all become realities in the same evening in the same home if the latest adaptation of the radio comes into general use. It is a system of radio outlets similar to those used in electric lighting and connected with a central switching station that can apply the proper program to the right place at the right time. Such a device is now in operation at the home of O. H. Caldwell, editor of Electrical Merchandising at his home near New York.

The various house circuits are controlled by a group switch which short-circuits the lines not to be operated. The plug which feeds this house circuit can be plugged into the radio set directly, for operating headphones only, or can be plugged into a jack on the amplifier, when it is desirable to build up volume for the loudspeakers in the various rooms. All the circuits are in series, with short-circuiting jacks, except the pair feeding the various bedrooms, which is a pair in the 10-wire cable for the various house intercommunicating phones. Outlets tapped from this pair are bridging connections, with jacks that remain open-circuited on removal of the plugs.

ADULT OF PESKY CHIGGER DISCOVERED BY SCIENTIST

Another chapter in the mysterious life of the chigger has been revealed and the eradication of this summer pest brought closer by a discovery of Dr. H.E. Ewing, of the division of insects of the U.S. National Museum. Dr. Ewing has announced that he has found the hitherto unknown full grown form of the common chigger, together with strong indications that the rabbit is largely responsible for its spread.

The adult chigger has long been known to entomologists as Trombicula, a harvest mite which lives in the soil. In finding this mite most frequently associated with the tiny red larval form familiar to the picnicker in the woods, Dr. Ewing suspected its identity. He collected a number of Trombiculae and bred them in captivity. The resulting young were the characteristic red chigger about one-fiftieth the size of the adult mite, which is orange-red in color and about as large as the head of a pin.

From the chigger stage of life the insect passes first into a nymph stage for a few weeks and then to the adult stage. The insect lives about ten months in the adult stage, Dr. Ewing said, and is almost amphibious, requiring a great deal of moisture. Dr. Ewing plans to attack these mites in experiments at the Pennsylvania State Forest Camp near Stone Valley, Huntington County, Pa. By raking over the soil, letting it dry, and by using sulphur, he hopes to free

the site from chiggers.

The indications are that there is but one generation a year, he says, and if the adults can be exterminated by depriving them of moisture, the chigger may be checked. Another possibility of control is by getting rid of the rabbits. Although it is not definitely known yet whether rabbits are the only animal which is the natural host of the chigger, the indications are that it is the principal one.

Dr. Ewing tried raising chiggers on men, field-mice, and other animals. After swelling up with a full meal of the blood-serum of man, and most other animals, they drop off. Chiggers never bury themselves under the human skin as was formerly supposed, but merely attach themselves by their mouth parts to the outer skin.

The chigger is not known to carry any disease to mann in this country, but the Japanese chigger is held responsible for transmitting the very serious and prevalent "flood fever" of that country which is similar to the Rocky Mountain spotted fever in this country.

PLOW AND POISON TO KILL GRASSHOPPERS

Man-power, money, and arsenic are the best weapons in the fight of northwestern farmers against the grasshopper pest which caused millions of dollars damage to grain crops last summer, says Dr. George A. Dean of the Bureau of Entomology, U.S. Department of Agriculture, who recently returned from a tour of inspection which included most of the states west of the Mississippi.

The grasshoppers breed in the unplowed pasture land of the cattle ranges, he said. Where, as in Kansas and Nebraska, the proportion of such land is small as compared with that of the thickly settled and well tilled farm land, the pest may be more readily controlled. In the Northwest the grasshoppers so outnumber their human enemies that they can eat up all the poison which the few inhabitants of a large area can afford to provide for them, and then can sweep on over the bodies of their "shock troops" into the luscious crops awaiting them.

The two direct methods of attack on the grasshoppers are by the use of bran-mash bait poisoned with arsenic, and the cultivation of the soil, as plowing and disking distrubs their egg pods buried there to await the coming of spring. In Kansas, cooperation has made possible the practical control of the pests for the past five years. In Montana and Wyoming there are too many breeding grounds and too few enemies, so the grasshoppers flourish. Weather conditions during several seasons were ideal for them and for their depredations, since the dry weather favored their breeding and dried up their natural food, the pasture grass, and so directed their attack upon the farmers' crops.

A pest doing great damage in the Southwest, Dr. Dean found to be the alfalfa-seed chalcis fly which lays its eggs in the immature seed of the plant. As much of the southwestern crop of alfalfa is raised for seed, this creature is an enemy to be feared. The best methods of control, Dr. Dean said, were clean culture and close cropping which do not permit stands of the plant to be abandoned and in this way furnish attractive homes for the pest.

CHEMICAL SOFT DRINKS MAY HARM SAYS DOCTOR

The use of synthetic foods or drinks containing pure acids such as the acetic acid of vinegar, rather than the acids made in Nature's own laboratory was condemned on scientific grounds by Dr. Henry Leffmann of the Philadelphia College of Pharmacy and Science in a recent address before the Franklin Institute. It has been found, he said, that in natural fluids such as milk, blood, fruit juices, and fermented liquids, there are substances which modify the irritating effect of the acid and cause what is known as the "buffer effect". So-called stainless steel is not affected by malt vinegar, but is corroded by a solution of acetic acid of equal strength although the acid is the same in both cases.

The determining condition in the effect of acid solutions on living things is not merely the chemical acidity, but what is known as the "hydrogen ion concentration", a term rapidly coming into use, Dr. Leffmann said. This merely means the relative number of electrified hydrogen atoms or "ions" in the solution. All acids contain hydrogen, which when the acid is dissolved in water is split off in an electrified form from the rest of the molecule of the acid.

The lecturer contrasted ordinary vinegar of four per cent acidity with nitric acid of the same acidity. The former may be eaten without ill effect, the latter is corrosive. The reason for the difference in behavior is that the nitric acid solution has a greater proportion of "hydrogen ions" which are the cause of its greater activity. "Modern investigation has shown", said Dr. Leffmann, "that in the case of the nitric acid a large amount of it has been changed by the water with which it is mixed in such a manner that its hydrogen (to which its acidity is largely due) has been in great part given an electric charge which has made it very active, while in the case of the acetic acid only a very small portion of the hydrogen has been so electrified."

The concentration of hydrogen ions in the water in the soil, upon which plants depend for growth, has been found to have a most important effect upon such growth. Rhododendrons were cited by Dr. Leffmann as a plant which requires a high concentration of hydrogen ions in order to thrive, and some diseases of the potato may apparently be controlled by growing it in a soil where the concentration is high enough to kill the disease but not to injure the plant.

READING REFERENCE - McCollum, E.V. The Newer Knowledge of Nutrition. New York, Macmillan Company, 1922.

Sherman, H. C. Food Products. New York, Macmillan Company, 1921.

The manufacture of cornstarch has grown to such proportions in the United States that the industry now consumes about 50,000,000 bushels of corn each year.

Bagdad now gets its thousand and one nights entertainment at motion picture theaters.

FRIENDS OF MEDICAL PROGRESS ORGANIZE TO RESIST FOES

A national lay society for the purpose of resisting the efforts of the anti-vivisection and pseudo-medical societies constantly urging legislation dangerous to the health and well-being of the American people has been organized in Boston under the name of the Friends of Medical Progress, Inc.

Its further objects are to encourage and aid all research and humane experimentation for the advancement of medical science and to inform the public of the truth concerning the value of scientific medicine. Dr. Charles W. Eliot is honorary president and Dr. Thomas Barbour of the Agassiz Museum of Comparative Zoology is acting president.

Honorary vice-presidents include: Dr. James Rowland Angell, president of Yale University; Charles Evans Hughes, Secretary of State; the Right Rev. Alexander Mann, Bishop of Pittsburg; Archbishop William Cardinal O'Connell of Boston; Dr. Ellen F. Pendleton, president of Wellesley College; Ernest Thompson Seton, Greenwich, Conn.; Owen Wister of Philadelphia.

"Within the last fifty years many societies have been organized to prevent the advancement of medical science by experimental methods, to break down the bulwarks of preventive medicine, and to substitute for the scientific treatment of disease various forms of pseudo-science and quackery," said Dr. Barbour, in explaining the objects of the new society. "We are in a position to know that these organizations have reached the danger point. It must be fully understood that if this anti-medical program should succeed the hands of the doctors would be tied and no further progress in experimental medicine could be expected. No reliable insulin would be available for diabetics, no antitoxin would be possible for diphtheria or lockjaw, no vaccine could be procured to protect the country against smallpox, and it would be utterly impossible to test such essential drugs as ergot, pituitrin and digitalis.

"This organization will oppose legislation dangerous to public health. By so doing it will perform a highly important function, hitherto assumed with difficulty, as a civic duty, by the medical profession."

NEW, QUICK-HARDENING CEMENT COMING TO AMERICA

A new, quick-hardening cement that is superior to portland cement for certain uses will be produced in America during the next year, according to cement experts.

It is a French invention, and has been used on a limited scale in Europe under the name of "ciment fondu". American engineers first came in contact with it when it was used in the construction of artillery implacements during the war.

It consists essentially of a mixture of two aluminates of calcium, compounds not present in ordinary portland cement.

The principal advantage of the new cement is that it attains in one day the strength that ordinary portland cement takes one month to acquire.

This allows wooden forms for buildings to be removed earlier than usual and roads and pavements to be opened in a few days instead of weeks. The cost of the new cement is expected to be about two to three times that of ordinary portland. Claims are also made that the new cement will resist sea water and alkali better than that now on the market.

American cement experts, among them H. S. Spackman, Philadelphia engineer, and P. H. Bates, chemist of the U. S. Bureau of Standards, have previously called attention to the value of calcium aluminate cements, but the French were the first to discover and exploit their commercial possibilities.

SURFACE AREA OF ANIMALS SURVEYED

Science has surveyed the cow. The problem of working out a formula for the determination of the surface area of the skin of cattle and swine, a matter of considerable interest to students of animal husbandry and possibly to buyers of hides, has been worked out by Prof. Albert G. Hogan and Charles I. Skouby of the College of Agriculture, University of Missouri.

The smaller any object is, the greater surface area it has in proportion to its weight. Cattle and other animals are no exception to this general principle and since the amount of heat they radiate depends largely on their area, and the source of the heat is the food they eat, the knowledge of just what is the extent of surface is of importance to students of how much food is needed to keep the animal machine in good working order.

By application of this new formula, all that is needed to know is the length of the body of the animal, its weight, and a certain number called a constant which enters into the equation and is the same for every species. With these the area of the beast may be figured out. Results are accurate to less than five and a half per cent.

The length of the body of the animal is measured from the point of the withers to the root of the tail. The "point of the withers" is defined as the point above the junction of the second and third thoracic vertebrae. If any portion of the neck of the animal is included, measurements are likely to be inaccurate and no reliable formula can be worked out, since a change of position would affect the result, and, as the experimenters relate, "it is impossible to secure any cooperation from the animals in taking these measurements."

Fogs cause digestive troubles among small mammals and birds in the London Zoo, the animals losing their appetite and most of the birds refusing to eat unless there is plenty of light.

Ostriches do not seem to understand the slipperiness of ice, and may fall and break their legs if allowed access to frozen ponds.

TABLOID BOOK REVIEW

PIERRE CURIE, By Marie Curie, including autobiographical notes. New York: The Macmillan Co., $2.25

An account of the discovery of radium and an insight into the characters of the discoverers, told in a simple and interesting way. The struggle of Marie Curie and her husband incident to their great scientific triumph are vividly portrayed, making the book as fascinating as it is instructive.

COSTS AND PROFITS; THEIR RELATION TO BUSINESS CYCLES, By Hudson Bridge Hastings. Published by Houghton Mifflin Company for the Pollak Foundation for Economic Research.

The author offers an analysis of the causes of business depressions based on an attempt to measure the total value of tangible goods produced for sale in relation to the total purchasing power available.

HAY FEVER AND ASTHMA TREATED BY NEW METHOD

New studies of rickets and of the convulsive disorders called tetany have shown that benefit follows the giving of calcium with thyroid extract and the use of ultra-violet light. Physicians have treated hay fever and asthma for some years by giving preparations of calcium because good results followed in many instances.

In a report to the American Medical Association, Drs. F. J. Novak and A.R. Hollender of Chicago report the results of studies made on patients with hay fever and asthma who were treated by a combination of these modern methods. When the blood of such patients was found to be abnormally low in calcium they administered preparations of calcium combined with thyroid extract and found that the patients had the usual temporary relief. These patients were then exposed to the mercury vapor quartz light which appeared to fix permanently the calcium content of the blood. The investigations are recent and further experience will show whether or not they have practical and enduring results.

MINNOWS AND MALARIA

American top minnows have become the successors of the famous cackling geese which saved Rome. According to recent historians, malaria was largely responsible for the decline of Roman power and the depopulation of the city once rescued by the web-footed fowl. Fish from the United States are now being used to wipe out the malaria-carrying mosquitoes. In 1921, the U.S. Bureau of Fisheries shipped top minnows to Spain where they multiplied rapidly. Italy obtained stock from Spain and is now breeding these little fish in considerable numbers for use in malaria infested districts of the Roman campagna.
