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TWO KINDS OF CONSERVATION

By Dr. Edwin E. Slosson.

Conservation is one of those deceptive words that have a double meaning. It is doubly dangerous because its meaning in one case is quite the opposite of its meaning in another case.

For instance, in the conservation of our natural resources. A politician with an agate-bearing tongue may say: "I am in favor of the conservation of our petroleum and water power."

Very good. But he and his audience do not always realize that contrary policies must be adopted in the two cases.

The conservation of oil means not using it, for all the oil that is used is forever lost.

The conservation of water power means using it, for all the water power that is not used is forever lost.

Oil and water do not mix. Both oil and water are limited and inadequate to our needs. But the oil supply is exhaustible while the water supply is inexhaustible. Day by day the sun pumps up water from the ocean and the winds carry it over to the mountains where it falls as rain and fills the streams.

But there is no reason to think that Providence will ever renew the supply of oil that we are so lavishly and wastefully using. Dividing the amount of petroleum left in the earth of our country, estimated at about nine billion barrels, by the amount we withdrew from deposit last year, 745,000,000 barrels, we get 12 as a quotient. That means in a dozen years or thereabouts we will run short of the gasoline and oil that we have been getting from petroleum and that we will have to seek other sources. What those sources will be we do not know, but we may be sure that liquid fuel and lubricants will be dearer and more difficult to get in the future. We might get them from oil shale, it is true, but shale has to be mined and extracted while petroleum runs out as soon as its reservoir is tapped.

In some parts of our country we can still see the blazing beacons of natural gas burning all night from our pipes, but most of the communities which formerly have been favored by free use of gaseous fuel have had to fall back on coal.

And there is not enough coal to go around or to last long. Three continents,

Africa, South America and Australia have not enough coal to support an industrial civilization like that of modern Europe. But Europe cannot keep up its present consumption of coal for many centuries. The United States and China seem to be the most favored nations in the matter of fossil fuel. They have enough coal to last several thousand years, but that is not forever, and we hope it will be but a short chapter in the history of the human race.

Meantime we are wasting the greater part of our coal by inefficient combustion and by toting it back and forth across the country unnecessarily. The miner gets only one crop while the farmer gets a new crop every year. That is because the miner is using up the accumulated carbon of past ages while the farmer accumulates his carbon anew with the aid of each summer's sunshine. One is living on the capital of the world's wealth; the other on its interest. The central power house of the solar system has been sending out its energy by radio without any perceptible diminution for some millions of years in the past and seems likely to last at least as long in the future. An impartial Providence has arranged it that the earth revolves as a spit before the fire so that every land receives in turn a share of the sun's rays. Furthermore every land has been supplied with a supply of carbon and oxygen in exact proportion to its area, since these are free as air.

But only the plants possess the secret of economically separating carbon from oxygen and storing up the former as food and fuel for future use. And even the plants are not good at it although they had practiced the art of manufacturing carbohydrates for many millenia before man came on the scene. The green leaf wastes ninety-nine per cent. of the energy it receives from the sun. But on the one per cent. of the original solar energy that is recoverable on combustion of the combined carbon depends all the life of the world and all the power of the machinery of man except what little he gets from waterfalls and windmills. Water power we are beginning of late to utilize, but wind power we employ less than we used to when it propelled all the ships and ran many of the mills. We have more wind than we want in some places, yet we waste the most of it without a thought of conservation.

The best definition of this ambiguous word I ever saw is that of Acheson; "Conservation consists in the utilization of the inexhaustible for the preservation of the exhaustible". Coal, oil and gas are exhaustible. Water, wind and sunshine are inexhaustible.

WHEN A BEE FINDS A FLOWER HE TELLS IT WITH JAZZ

Jazz dancing is used by bees to tell one another where the best cafeterias are located. Prof. Karl von Frisch has discovered that when a bee finds a field of juicy clover or other source of highly valued bee nourishment, it immediately flies back to the hive and performs a sort of jazz dance on the surface of the honeycomb. Other bees are attracted by this singular performance and stand around in a circle. The performer then dashes out among them and gives now to one, now to another, a sort of secret grip.

The bee thus let into the secret immediately flies away searching for the rich pasture. Other bees soon start out in other directions, but the flight is not all haphazard. The pioneer bee has brought back a faint scent of the

flowers showing what other foragers may expect, and he has also left a scent of his own on the field so that the other bees may identify it.

To conduct this research, von Frisch worked out an elaborate marking system, daubing different color combinations on the bees, so that swarms as numerous as 599 bees could be traced.

READING REFERENCE - Kellogg, Vernon. Insect Stories. New York, D. Appleton and Company, 1923.

Maeterlinck, Maurice. The Life of the Bee. New York, Dodd, Mead and Co., 1902.

MAH JONGG DISEASE FOLLOWS NEW GAME

Mah Jongg, the new game which has infected many, brings with it a new disease, Mah Jongg dermatitis.

The American Medical Association has received reports of eight or ten cases, in both New York and Chicago, of a new skin eruption due to the lacquer on the boxes containing Mah Jongg sets.

The first cases described by Dr. Walter J. Highman of New York were those of two sisters who had played Mah Jongg 24 hours previously. Scrapings of the lacquer were dissolved in sodium hydrate solution and applied to the skin. They produced an immediate reaction and showed that specific sensitization existed.

Cases have also been described by Drs. Oscar Levin of New York and Erwin Zeisler of Chicago, who were able to trace the eruptions definitely to the lacquer from new Mah Jongg sets. In treating the condition physicians clean the skin of the lacquer and apply soothing lotions.

The lacquer is made from a plant called Rhus vernicifera, or the Japanese lacquer tree. Skin trouble has been caused previously by canes or other objects coated with the lacquer.

Dr. I. Toyama, a Japanese investigator, was able to show that the lacquer on a Japanese vase that had been buried for a thousand years was still able to cause the eruption when applied to the skin of a person that was especially sensitive to it. Like the poison ivy of America, the Rhus toxicodendron, the lacquer does not affect all persons equally but only those having a special sort of response to it.

Standard for whiskey and brandy as medicines will be included in the new Pharmacopoeia now being revised.

DIRECTIVE RADIO BEACON WILL HELP NAVIGATORS

A new, directive type of radio beacon which will be of great use to navigators of the air or water has been perfected by the U. S. Bureau of Standards in cooperation with the Signal Corps and Air Service of the Army. It will make direction finders on shipboard less necessary.

The beacon consists of two coil antennae so placed as to cross each other at an angle of 135 degrees. The transmitting set is automatically connected first to one and then to the other, one letter of the signal being sent over each. The intensity of the signal from an antenna of this type varies from a maximum in the plane of the coil to almost zero at right angles. A receiving set located along the line bisecting the angle between the coils will therefore receive signals of equal intensity from both.

A ship or airplane receiving the signals will be able, by first proceeding to the point where the two signals are of equal intensity to steer directly for or away from the beacon without regard to conditions of visibility. The signals may be received by the most ordinary receiving set and may thus be of value to motor boats and small craft generally.

The invention will be of the greatest value in aviation. Its efficiency was recently proved when an airplane flew from Dayton to a point 100 miles away, with the pilot depending for guidance entirely upon signals received from one of these beacons by means of an ordinary airplane receiving set.

It will also be used in the navigation of rivers and crooked channels to supplement the range lights now employed. Beacons can be placed at the range light locations and navigators will be able to follow a straight course on the foggiest nights. It has already been tested successfully along the Potomac river and Chesapeake Bay by the Lighthouse Service, and may be used on the Mississippi river. Lighthouse stations along the coasts may be equipped with the new device, but it cannot be used on lightships since they are continually shifting their directions with wind and tide.

OYSTERS DOMESTICATED AND INDUSTRY IS SAVED

The domestication of the oyster has been accomplished and there is ground for hope that the threatened extinction of this important and delicious seafood has been indefinitely postponed. The achievement is the work of the New York State Conservation Commission. Dr. William Firth Wells, biologist to the commission, has devised a method for the successful commercial application of well-known laboratory methods of oyster propagation and culture, and the new methods will be tried out on a large scale during the coming season.

Unlike fish, oysters have hitherto not been susceptible to artificial propagation. The minute size of the delicate, free-swimming oyster larvae has been the most serious obstacle, and a deplorable one, for oysters when "set" are a stationary and therefore an important commercial "crop". It is the decline of this crop which has caused millions of dollars loss to states through the decline in the value of the rentals of oyster beds, to the growers through loss of their crop, and to the public through higher prices.

In order to remedy this acute situation, the New York State Conservation Commission has been conducting an experimental shellfish hatchery at Bayville Bridge, Long Island. Ever since Prof. W. C. Brooks of Johns Hopkins University showed in 1879 how easily millions of eggs could be artificially fertilized and carried through the initial stages of development, it has been the dream of biologists to propagate oysters as other fish are propagated. Dr. Wells has now applied centrifugal principles to concentration of the larvae and the setting stage has been finally reached with possibility of important commercial applications.

"Although the principal demand at present is to increase the yield of seed, undoubtedly the next step will be to improve the quality of oysters", said Dr. Wells. "The selection of breeding stock will inevitably lead to favorable varieties, as this has always followed the domestication of animals and plants. True domestication is not complete until such control is within power of the culturist. Experiments along this line have been very encouraging, and it is not too much to expect that we shall some day select shellfish varieties as we do oranges or grapes."

CHINESE PIONEER INVENTORS BUT FAILED TO APPLY IDEAS

China produced fundamental discoveries and inventions of greatest value to the human race long before the rise of western civilization, Chung-Yu Wang, consulting mining engineer of Hankow, China, claims in a statement to the Engineering Foundation of New York. He said, however:

"Unfortunately for China, and indirectly for the World, the Chinese mind, through centuries of classical education, has failed to make application of its new ideas and to make any progress from the inventions and discoveries of the ancients".

Mr. Wang points out that the Chinese invented the compass, paper, printing, glass, the seismograph, and many alloys, and, in addition, anticipated modern medicine.

"Records show that Chow Kung in the Chow Dynasty, about 1122 B.C. used a kind of wagon equipped with an instrument that pointed always toward the north", he declares. "Paper was first made by Tsai Lun, out of tree fibers, rags and hemp, during the Dynasty of Eastern Han, the early part of the first century.

"Fung To originated the art of stereotyped wooden plates about the year 932 A.D., but later investigation made by the sinologue Stanislas Julien has shown that the invention actually dated from the year 593.

"Glass was first manufactured by Pun Fang about the early part of the second century, and he had a piece carved with 130 designs.

"An instrument, resembling perhaps the present day seismograph, was invented by Chang Heng in the first century, during the Han dynasty, which could record any slight earthquake not perceptible by human senses.

"In Tai Hao's time (2852-2737 B.C.) metallic coin was already in circulation. The inventive genius of the ancient Chinese can nowhere be more explicitly shown than in the art of making alloys. An alloy, similar to German silver, under the name of Pait' ong, was obtained by fusing 'red steel' with arsenic. The manufacture by the ancient Chinese of gongs and tom toms, with their perfect tones, still remains to us a mystery, although their chemical composition has been determined.

"We may laugh at some of the ridiculous prescriptions of Chinese doctors; but I believe that there is a good deal of Chinese medicine that is both useful and illuminating when viewed in the light of occidental medical science. The Chinese anesthetic, known as Ma Fat powder, a sort of hashish, was discovered by the famous Chinese surgeon, Hwa To who lived in the early part of the second century during the Eastern Han dynasty. An old Chinese text tells us that Hwa To administered the medicine to his patients to render them unconscious before being operated upon. This happened long before ether or chloroform were discovered in Europe."

GOLDFISH SOMETIMES KILLED BY KINDNESS

Materials for a bedtime tragedy to be entitled "Poor Pinky, the Pet Goldfish, or Why He Died when She Gave Him the Air" have recently been collected by local goldfish tamers and the chemists of the city water department.

Complaints had been coming in to dealers in animal pets that their goldfish did not seem to be of the hardy varieties, and that when removed from their native aquaria to those in the homes of their new owners, they soon proceeded to die. Indignant grief wept and raged.

The unsentimental dealers suspected something wrong with the water supply. City chemists were set to solve the mystery and solve it they did. The piscatorial fatalities all happened in tanks where there was a heavy and continuous supply of fresh water, bringing with it an oversupply of oxygen. Oxygen is indispensable to fish, but there can be too much of a good thing. In aquaria where the water flowed slowly or merely dripped, the little gilded playthings of the household remained alive and well.

The chemists say there are two morals to this story. One is, that there can be too much of a good thing; and the other is that if you want to keep a tame goldfish, don't give him the air.

WATER POWER DEVELOPMENT

New York state leads all the others in the amount of water power development, the extent of the utilization being 1,300,000 horsepower. The largest single development is at Niagara Falls. The second state in the use of "white coal" is California where something more than 1,100,000 horsepower are developed. There is a big gap between these figures and those for Washington which occupies third place, using 454,000 horsepower. Maine is fourth with a few thousand less horsepower, and Montana is fifth with 344,000 horsepower development.

BUMPS ON WHIGHWAYS WRITE OWN RECORD

Automobile roads in New York are now being required to write a record of their roughness.

An automatic autographic testing device which reveals the bumps in the road and records the amount of such irregularities has been adopted by the state, Col. Frederick Stuart Greene, superintendent of the Department of Public Works recently announced through the Engineering News-Record.

Harley Dunbar, one of the state's engineers, is the inventor of the instrument which is installed near the dash board of a car, where it is in plain view of the observer. Cars equipped with this device are simply driven over a pavement at twenty to thirty miles an hour. When either front wheel strikes a hole or a bump in the pavement the motion is transmitted to the pencils of the instrument causing them to draw on a small moving paper chart an irregular or straight line according to whether the road is rough or smooth. It is so arranged that the observer can make notes on the chart. The device constantly adds up the irregularities transmitted to the pencils, so that if the dial is read at the beginning of the road and at any time thereafter, the difference between the readings gives the amount of irregularities in the pavement.

According to Col. Greene, before pavements are now accepted, they must pass the test with this instrument. From experience, he says, The Department has found that the practical allowance for irregularities per mile for the various types of pavement, as shown by use of this machine on experimental roads, is for concrete, brick, or asphalt block 50 inches per mile of pavement, for bituminous macadam mixing method 75 inches, and for bituminous macadam 125 inches.

"We feel", Col. Greene states, "that the use of this machine and the limitation of surface irregularities so that they shall not exceed the specified inches per mile will not only result in a much better pavement, so far as riding qualities are concerned, but will give the state a longer life for its roads."

CARBONATED DRINKS NEARLY GERM FREE

Soft drinks, if carbonated, are safer than uncarbonated beverages. Researches conducted at the Mellon Institute in Pittsburg indicate that carbon dioxide in solution is fatal to bacteria and that carbonated beverages which when bottled were not bacteria-free become almost sterile after storage of some weeks. The higher the bottling pressure and the greater the amount of carbonic acid gas in solution, the greater is the germicidal effect.

The investigation was carried on by J. R. Donald, and A. R. M. MacLean of J. T. Donald and Co., of Montreal; and by C. L. Jones, industrial fellow of the Mellon Institute, who state that the average bottled beverage, when not carbonated, is a fine medium for rapid bacterial growth. Such beverages may become highly dangerous if originally contaminated with germs which cause disease. Carbonation prevents this, they declare, basing their opinions on a large number of experiments.

These indicate that a beverage carbonated and bottled under sanitary conditions and with sufficient pressure, remains in a sanitary condition and actually improves in purity with storage. The experiments also show, in the opinions of the experimenters, that the fatal effects on the bacteria are proportional to the amounts of gas used and to the pressure employed. Higher bottling pressures are therefore advocated in the interest of health.

The experimenters take pains to state that carbonization is not to be considered a substitute for cleanliness or the use of water or materials of doubtful purity. In such cases the initial contamination may be so high that in spite of the germicidal effect of the dissolved gas, the drink will be dangerous, especially if consumed soon after bottling. The alternative of pasteurization after bottling is not recommended since it is apt to cause changes in the beverage which are hurtful to appearance and flavor. In conclusion, the experimenters declare that:

"From the standpoint of the consumer, especially when in a strange vicinity with an admittedly doubtful or dangerous water supply, the chances of immunity from disease are better if one drinks only highly carbonated water or beverages."

"NG" HARDEST SYLLABLE FOR EAR TO HEAR

A syllable ending in "ng" is the most difficult speech-sound for the ordinary ear to grasp, according to data recently secured by Dr. V.O. Knudsen, physicist in the University of California, Southern Branch. "S", "W" and "Y" on the other hand, are easy to grasp and score high in a hearing test.

A large audience was tested in an acoustically poor auditorium. An announcer called out at intervals a succession of meaningless syllables while several hundred auditors recorded what they thought they heard. Only 48 per cent of the audience caught such expressions as "ting" and "bong", but 90 to 100 per cent were right on sounds like "wis" or "yox". The sounds "d", "b" and "th" made a poor score. Changes made in the choice of auditorium and announcing personnel did not alter the results markedly.

Theseexperiments are part of a research program to reduce the present vague principles of acoustics to a mathematical basis. Results so far obtained show that an audience must attain on the average at least 65 per cent accuracy on all speech-sounds, in every part of an auditorium, if the acoustics are to be judged satisfactory. Telephone engineers, using these methods, require 75 per cent accuracy before a talking circuit is pronounced adequate. The telephone listener is at a disadvantage because he cannot see the speaker's lips, and thus must be able to hear a larger part of incoming syllables before he can safely guess the rest.

Following somewhat similar lines, the Southern California Telephone Company has recently abandoned many word-prefixes of Los Angeles telephone numbers, and has adopted a new series promising higher accuracy. Such words as "Capitol", "Drexel" and "Metropolitan" are accurately heard by operators, and at the same time carry the proper lettering to suit new switching machinery.

TALLEST TOWERS TO CARRY POWER TO SICILY

Electric power derived from waterpower in Italy is to be carried across the water to Sicily by means of one of the most notable aerial transmission lines yet planned. Bids have been received from the American Bridge Company for the construction of two steel towers, higher than the famous Eiffel tower in Paris, which will carry the transmission cables across the Straits of Messina.

The height of the towers will be approximately 1082 feet and the distance between them will be two miles. There will be two circuits of three cables each, running 30 feet apart. The cables will be of steel, about four-fifths of an inch in diameter, and will clear the water in the center of the Straits at a minimum height of 230 feet. At one terminus, the cables will have automatic movable attachments to allow for changes in temperature and for wind pressure.

THYROID NOT SAFE SHORT-CUT TO SLIMNESS

Use of thyroid extract as an anti-fat cure was condemned as dangerous by Dr. James H. Means of the Massachusetts General Hospital in a popular lecture at the Harvard Medical School recently.

"Thyroid reduces the weight all right, but how?" he said. "By intoxicating with an excess of the thyroid hormone. Stout people who take thyroid tablets ro reduce their weight correct one evil, but a worse one is produced. Experiments show that when thyroid is used the pulse goes up, the individual gets nervous, perspires to excess and feels rather done up. Hard as it may be, the right way to treat obesity is through diet restriction and increased exercise."

Dr. Means told how the food consumed by a person is utilized as mechanical work or heat. The calories that a person uses can be determined by simply measuring the oxygen used by his lungs.

"The rate of combustion within the body of any given human or other warm-blooded animals measured under conditions of rest is remarkably constant if size be taken into account," Dr. Means said. "The performance of work and the taking of food markedly accelerate this metabolism, but if these factors are excluded, metabolism is found to proceed at a very even pace. We may compare the human or other warm-blooded animal to a lighted gas jet so arranged that it cannot be completely shut off. We may open the cock wider and get a brighter flame but we cannot extinguish it.

"There is a fundamental minimal or basal rate of metabolism in the warm-blooded animal upon which the effects of other factors such as those of activity are superimposed. It is in the establishment and maintenance of this rate that the thyroid hormone plays its major role.

"In cold-blooded animals, the reptile for example, there is no fundamental metabolic rate; the metabolism varies with the outside temperature. A snake has a fast metabolism and is highly active when warm, when cold its metabolism sinks

to a very low rate and the animal goes into a lethargy. We find somewhat analagous phenomena in the human being when the supply of thyroid hormone is altered through disease, that is to say, an increased rate of metabolism when the gland is over active and a decrease when under active."

READING REFERENCE - Harrow, Benjamin. Glands in Health and Disease. New York, E.P. Dutton & Co., 1922.

TABLOID BOOK REVIEW

SCIENCE OF COMMON SENSE; By Samuel F. Tower and Joseph R. Lunt., D.C. Heath & Company, New York, 1922. $1.60

A text book designed for use in the courses of general science which are now an important part of high school curricula.

HOT SPARK PLUGS MAKE ENGINES START EASIER

One reason why an automobile engine is more apt to balk when starting than after a period of continuous running has been determined by Dr. F. B. Silsbee of the U. S. Bureau of Standards for the National Committee for Aeronautics. It has been found that the ignition spark will pass more readily when one or both of the electrodes are heated to redness. This effect is stated to be independent of the temperature of the gas mixture.

Spark plugs so designed as to make the electrodes run hot are therefore the most efficient although to balance this gain there is the danger of producing preignition. The experiments also show that sparking is somewhat easier when the hot electrode, which is almost always the central electrode, is negative than when the polarity is reversed.

WATER AS A NON-CONDUCTOR

Pure water does not conduct electricity to any appreciable extent. A column of chemically pure water one twenty-fifth of an inch long has as much resistance to the passage of an electric current as a copper wire of the same diameter as long as from the earth to the moon. What makes ordinary water a moderately good conductor is not the water itself but the material dissolved in it. When, for example, a molecule of salt is put into water it breaks up into what are known as ions, one positively, the other negatively charged. If then an electric current is given a chance to pass through the water, it rides on the ions which carry the electrical charges through it. If there are no ions, that is, if there are no salts in solution, the current cannot get across. But all water outside of chemical laboratories contains enough dissolved substances to make it a fairly good conductor although chemically pure water is not.
