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EDWIN E. SLOSSON, Director
WATSON DAVIS, Managing Editor

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THE SCIENCE OF THE SUMMER GIRL

By Dr. Edwin E. Slosson

Dr. Leonard Hill, director of the National Institute of Medical Research, London, and the leading British authority on heliotherapy, says that to get the full effect of the life-giving rays of the sun, a woman should leave her neck and arms bare, and should wear a short shirt and synthetic silk stockings.

Seems to me I have seen a costume like that somewhere recently, worn by some body who had never heard of Hill and couldn't tell ultra-violet rays from infra-red. That is the nice thing about science. After a custom has been established, in spite of popular opposition and natural conservatism, the scientists come along and prove the rationality of it. As it is the business of philosophy to provide resons for what we want to do, so it is the business of science to provide reasons for what we are already doing. Crops were rotated to maintain fertility and baseballs were rotated to prevent the batter hitting them, long before scientists explained why it worked.

So, too, the summer girl has long been laughed at by the world at large, caricatured by the cartoonists and scolded by the moralists because she followed all too literally the advice expressed in the old song:

"Mother, may I go out to swim?"
"Oh, yes, my darling daughter,
Hang your clothes on a hickory limb
But don't go near the water."

The portion of the sunshine that has a beneficial effect upon the physiological functions consists of those dark rays which have a wave length of less than one hundred thousandth of an inch. They increase the percentage of lime and phosphorus in the body fluids, and increase resistance to disease. Tanning is an essential part of the process. Now the "bathing beauty" (to use the conventional phrase although she is rarely bathing and even more rarely beautiful) wasacting in conformity with all the requirements, so far as local law allowed, when she kept out of the water and spread herself on the sands. Unjustly accused of desiring to make herself conspicuous, she was really seeking the invisible component of the sunlight, and it is not her fault that these are inseparably associated with rays that render her visible to the passer-by and even the by-stander.

Having proved the therapeutic value of ultra-violet rays on the seashore, the summer girl has carried the bathing suit inland and now appears upon the street in all seasons in a costume that meets the requirements of heliotherapist.

Though she may be barred from European cathedrals, the American maiden shelters herself under the Second Amendment to the Constitution, which stipulates that the right of the people to bare arms shall not be infringed. The new style of sleeves in fringes will, if they spread downward, interfere with the exercise of the right as well as the left, but so far the threatened eclipse is being kept at arm's length.

This raises a question demanding masculine consideration. Will not these sunkist flappers when they grow up- if they ever do- be too big to beat and to smart for the unenlightened wits of men? For, as Professor Hill points out, modern masculine costume could hardly be worse from the standpoint of heliotherapy. Dr. Hill denounces tight collars and long trousers as particularly pernicious to masculine health.

Our Anglo-Saxon ancestors boasted of being "free-necked men" but their degenerate descendants are scrambling for white-collar jobs even though they involve impeding the blood supply to the brain and shutting out the sunshine from their throats.

Golf knickers are being worn oftener and longer (in time). But thick wool stockings, though they may be more artistic and convenient, are still impentrable to solar radiation.

The shorter the wave length the less the penetrationsas a rule. The long red heat rays will pass through the fingers as anyone can prove by holding up his hand to the sunlight. The short ultra-violet rays at the other extreme are caught in the outer layer of the skin, yet they are, in some mysterious way yet unexplained, able to effect the entire body. It is largely these rays that cause the tanning, and also the burning and blistering when one takes the sun cure in too large a dose.

Tropical sunshine ranges no farther into the region of these shorter dark chemical rays than the sunshine of our own clime. Since the atmosphere easily absorbs the shorter rays of the sun, the best "bathing beaches" are to be found on arid mountain tops. Where complete clothing is required, either as protection against over-zealous police or excessive insolation, it may be made of a white, thin, loosely woven fabric of cotton, or some of the silk substitutes, such as rayon or lustron. This allows free passage to air and affords the least interference with the passage of the ultra-violet rays.

And if anybody objects to the lessening of clothes on the ground of morality, quote to him the saintly John Wesley:-

"The less clothing one wears by day and
night the stronger he is."

If all the oceans of the world were dried up, they would yield about four and a half million cubic miles of salt.

Almost two thirds of all known kinds of animals can either fly or glide through the air.

INVADING SOUTHERN PEST ENTRENCHED IN NORTH

Despite determined efforts of the U.S. Bureau of Entomology chemical warfare corps to dislodge it, the Mexican bean beetle army has held its own during the past summer, and has even begun the conquest of another northern state. Although it has been in the South for five years, and has thoroughly established itself in the heart of Dixie, the beetle made no serious invasion of the North until 1924, when it annexed the state of Ohio, reaching the shores of Lake Erie at a number of points. This year it has widened its salient and established a line across the southeastern part of Indiana.

Elswhere the depredations of the beetle were not extended greatly beyond last year's holdings; some eastward extension in the mountainous regions from Pennsylvania southward to North Carolina has taken place, but little new territory has been seized elsewhere. These small eastward drives, however, are causing officials of the Bureau of Entomology some concern; for if the insect army passes the natural barrier of the Appalachian chain it may overrun the piedmont and coastal plain regions.

The Mexican bean beetle, according to J. E. Graf, in charge of the Bureau's work on truck crop pest investigations, is a sneak as well as an enemy, for he appears in the uniform of a large lady-beetle, which we have always been taught to regard as a friend. But there are several lady-beetles in Mexico, Mr. Graf states, that prey on man's crops instead of on the enemies of his crops; this is the first that has invaded the eastern part of the United States, appearing, no one knows whence or how, in northern Alabama in 1920 and extending rapidly north and eastward each year.

Though the adult beetle does considerable damage, the real harm is done by the squashy grubs or larvae, which feed voraciously on the leaves of beans and to a certain extent on other plants, skeletonizing the leaves and causing them to turn yellow. Thus far the only effective means of combat have been spraying and dusting with arsenical chemicals. The Bureau of Entomology has twice imported natural parasitic enemies of the pest from Mexico, but the parasites have failed to survive, while the beetle, apparently more easily adaptable to northern climatic conditions, has remained and thrived. What appeared to be a bacterial disease broke out among the beetles in Alabama a couple of years ago, but unfortunately the epidemic died out again. Government scientists are continuing their researches on diseases and natural enemies of the beetle, hoping that eventually a means of control less expensive and laborious than poison spraying and dusting may be found.

SCIENTISTS DEVELOPS METHODS FOR FARMING OCEAN

True fish culture in the watery deeps, corresponding to the fertilizing, seeding and weeding of dryland crops, may eventually result from the experiments of Prof. A. B. Klugh, of Queen's University, Kingston, Ontario. Prof. Klugh has succeeded in growing under artificial, controlled condition, the lowly plants and animals which contribute to the diet of the commercial fish of both fresh and salt water.

The investigation has already determined the part which the floating life of fresh water and the creatures which teem in the sea play in the diet of the larger fish. The next step is to decide how much each microscopic plant, each tiny animal, is influenced by heat and cold, light and dark, acidity and salinity, and to what extent the aquatic creatures are limited by one another.

So accurately have these factors been determined in the cases of the microscopic sea plants, and of the copepods or water fleas that eat the plants and are themselves the prey of young fish, that Prof. Klugh is now able to raise successive crops of both seaweed and copepods.

The method in essence is exactly that used to produce a successful harvest on land. Clean water, of the correct acidity and properly fertilized, corresponding to good soil; the elimination of other growths which would cause pollution, which is virtually weeding; andthe prevention of the depredations of the larger fish, just as one must take precautions against birds and beasts on land, are the measureswhich must be adopted, Prof. Klugh has learned.

The foundation has thus been laid for the providing of the exact kind of diet which fish desire. In salt water, the water fleas are the chief food of small herring, familiarly known as sardines, and the herring themselves are eaten by cod. In fresh water, the fleas fatten valuable fish through similar stages. Thus it is likely that the indiscriminate dumping of fry into waters where they may not thrive now practised extensively and expensively, may give place to the providing of the proper conditions for the fish which are already there.

The experiments constitute one phase of an extensive program of research organized by the Biological Board of Canada, which aims to determine what the factors are which limit the size and numbers of commercial fish, so that conditions which promote growth may eventually be produced through human agency, and restricting influences removed. In cases where it is not economical to interfere with natural methods, the wealth of data built up by the corps of scientists working on the scheme will provide a rational basis on which to establish conservation, according to the aim of the Biological Board, which numbers at present outstanding Canadian biologists and oceanographers.

WILL SUN OVERHEAT? ASTRONOMER ASKS

Will the sun, the power plant of the earth, some time in the future reduce or increase its light and heat production by five per cent? This is the question raised by a paper presented to the National Academy of Sciences meeting at the University of Wisconsin by Dr. Joel Stebbins, director of the Washburn Observatory.

Changes in the heat pouted out by the sun, causing great inconvenience or death to humanity, are considered possible by some scientists, and Dr. Stebbins told of stars that nearly doubled their production of heat in a year.

Some great celestial heat regulating mechanism or law that keeps the stars at a proper heat level, just as an automatic thermometer controls the furnace or electric heater, must exist, Dr. Stebbins said, in considering the possible consequences of long continued inconstancy of the sun and stars.

"It has been demonstrated by the work of the Smithsonian Astrophysical Observatory and its station, under the direction of Dr. C. G. Abbot, that the sun may be called a variable star," said Dr. Stebbins. "That is, the amount of radiation in the form of light and heat which the sun emits is not always the same, but changes to the extent of several per cent. oneach side of the average. The results of the Smithsonian observers are being used to study the connection between weather changes and variations in the sun, with considerable promiseof success."

Since the sun is only one of many million stars, the question arises how near is this variability of the sun typical of the stars in general. Roughly, the stars may be divided into those which are white hot, yellow hot, and red hot, the sun being a yellow star. The chief work of the Washburn Observatory lies at present inthe measurement of minute fluctuations inthe light of stars by means of an electric-cell photometer. With this instrument it is possible to measure the constancy of the light of one star by referring it to two or more other stars for comparison. In this way the eclipses of stars by dark companions may be studied, and also other variations in light. Several cases have been found where white hot stars have changed asmuch as one per cent. between oneyear and the next, and other cases where the change is more rapid- two or three per cent. in as many weeks. Some yellow stars like the sun seem to have irregular variations of two or three or even five per cent.while certain red stars may change as much as twenty, thirty, or forty per cent.

"These minute changes like that of one per cent-per year may not seem very great," Dr. Stebbins commented, "but when it is considered that the stars are supposed to shine with much the same brilliance for thousands or millions of years, it is evident that any progressive change of one per cent. annually cannot continue for many years in succession. It is suggested that the stars have some way of automatically regulating their radiation so that when they aresoo much below normal in some way they recover, and likewise when they become brighter than normal the successive radiation is made to decrease."

ECLIPSE STUDY MAY SOLVE ICE AGE MYSTERY

Measurements of the heat of the solar corona, to be made by astronomers from Harvard University during the total eclipse of the sun visible on the 14th of next January in Sumatra and Borneo, may aid scientists in a solution of the problem of what caused the ice ages that visited the earth at times in the past. The Harvard party, the third group from American institutions to go to Sumatra, is now en route on the "President Harrison", which sailed from San Francisco on November 7, and will be chiefly concerned in measuring the radiation from the corona. This announcement was made by Dr. Harlow Shapley, director of the Harvard College Observatory. The expedition is in charge of Dr. Harlan True Stetson, assistant professor of astronomy, and will also include Dr. W.W. Coblentz, physicist at the U.S. Bureau of Standards, inventor of the Coblentz radiometer, which was used last year to measure the heat from Mars, Mr. Weld Arnold, explorer from the Amazon expedition under Dr. Hamilton Rice, and Mr. William A. Spurr, Harvard'25, a student in astronomy.

Similar measurements of the heat of the corona were made by Drs. Stetson and Coblentz from Middletown, Conn., during the eclipse last January. These seemed to indicate that 30 per cent. of the corona radiation is heat, and that the coronal temperature is about 5,000 degrees Fahrenheit. This is considerably cooler than the temperature of the sun itself, so it is thought to be due to the presence of dust-like particles around the sun which reflect some of the sunlight directly, causing the corona which is seen during a total eclipse, but which also absorb some of the energy, and then send it out again as long heat waves. Many such clouds of dark matter are known,to exist in various parts of the sky, and it is quite likely, according to Dr. Shapley , that the ice ages in the past, during which the earth was much colder than it is now, were caused by the earth passing through such clouds, which kept out the normal supply of heat from the sun.

To collect the coronal rays, the Sumatra expedition will use apparatus ten times as powerful as that used in Connecticut, while the radiometer will be three times as delicate in measuring the heat. The largest instrument will be a 20 inch reflecting telescope. Other improvements will permit half the time consumed during the precious moments of totality to be saved, and as the eclipse will be nearly twice as long a great many more readings can be made and more accurate results obtained.

Already two expeditions from the United States have gone to Sumatra for the eclipse. These are from the U.S. Naval Observatory at Washington, and the Sproul Observatory of Swarthmore College. The former is in charge of Capt. F. B. Littell, astronomer at the Naval Observatory , and also includes Dr. John M. Anderson, of the Mt. Wilson Observatory at Pasadena, Calif. The Sproul Observatory party is under the direction of Prof. John A. Miller, director of the observatory. Dr. Heber D. Cutis, director of the Allegheny Observatory at Pittsburgh, is also a member of the expedition. The Swarthmore and Harvard parties will be located at Benkoelen, on the west coast of Sumatra, while the Naval Observatory astronomers plan to locate inland at Tebingtinggi.

"MAKE HAY WHILE SUN SHINES" PROVES SCIENTIFIC MAXIM

"Make hay while the sun shines" is more than a mere poetic slogan, for hay made in the dark is devoid of rickets preventing properties".

This was the keynote of a discussion on the importance of light for the maintenance of animal life before the meeting in Washington of the National Academy of Science, by Drs. H. Steenbock and E. B. Hart of the University of Wisconsin.

The hitherto unappreciated importance of the ultra-violet radiation from the sun is now recognized, and this invisible light is known to be the factor deciding between success and failure in animal rearing, Dr. Steenbock said. Animals obtaining sufficient full sunlight, or the proper kinds of foods on which sunlight has shone, live healthily and normally; but, said Dr. Steenbock:

"Unfortunately these rays are not present in sufficient degree to provide a wide margin of safety for the animal. As a result we have rickets in the young and poor dentition, restricted lactation, abortion and impoverishment of the skeleton in lime to a dangerous extent in the adult. All of which appears to be of greater importance in animal welfare than has been generally realized."

The prevention of these dire results, in animals as well as in human beings, has been shown to depend on the normal action of the blood in laying down the element calcium in the proper places and sufficient quantities. This building of the limy parts of the body has in turn been shown to depend on the action of the invisible short-wavelight rays, which may be administered directly or through certain types of food, especially those rich in cholesterol, a substance related to the fats.

Spiders that glow like fire-flies have been discovered in Central Burma.

SUN SPEEDS THROUGH SPACE AT 660 MILES A MINUTE

At a speed of nearly 11 miles or 17,3 kilometers a second, the sun is hurting through space, carrying the planets with it. This is the figure announced to the National Academy of Sciences by Prof. Edwin B. Frost, Dr. Storrs B. Barrett, and Dr. Otto Struve, of the Yerkes Observatory, as the result of a new determination of the speed of the sun by the spectrograms of stars rich in helium, the gas now used to support dirigible balloons. A total of 2431 spectrum photographs have been made of 368 of these stars since 1901. These photographs show the dark lines which appear when the star's light is analyzed by passing it through the spectroscope. Each line is due to the presence in the star of a certain chemical element, and differences in the positions of the lines in the stars from that for similar elements on the earth permit a determination of the stars' motions, towards or away from the earth.

Since the stars are moving in all directions ,their average motion should be practically zero, but the earth, along with the sun and other planets, is itself moving through space, so all the stars ahead of us seem to show motions towards us, while those behind seem to be retreating. By finding the differences, the speed of the solar system itself is obtained, and by locating the stars where the apparent motion is greatest, the exact part of the sky towards which the sun is moving may be found. This is in the constellation of the Lyre, near the bright star Vega, which in the evenings now appears as a bright star low in the northwestern sky.

RUSSIANS USE ALCOHOL TO PURIFY ALUMINUM ORE

Alcohol will purify half-worked aluminum ore and rid it of its troublesome iron content, according to Prof. N. Vittorf, of the Institute of Economic Mineralogy and Petrography, inventor of the process.

A common method of treatment of bauxite, the common ore, which is an oxide of aluminum, has been to treat it with sulphuric acid, converting it into aluminum sulphate. But in this treatment iron, which exists in all bauxite deposits as an impurity, stays in the treated product also as iron sulphate, which has proved to be very troublesome and difficult to get rid of.

In Prof. Vittorf's method, the aluminum sulphate is treated twice with alcohol which reduces the iron content from about three per cent. to four ten-thousands of one per cent. , or virtually to nothing. This method, it is claimed, will make possible the working of bauxite beds hitherto considered of too low grade to be practicable, as well as some high-grade deposits that have alarge iron content. Prof. Vittorf believes that it will be possible to apply this method on a large scale with very little loss of alcohol through evaporation.

RECORD WHALE CATCH MADE IN ALASKA WATERS

The greatest whaling season ever experienced at the Akutan, Alaska, station, reputed one of the largest in the world, has been recorded this year, according to the members of crews of eighteen vessels arriving in Tacoma for winter wharfage. More than 500 whales were harpooned, the whaler Moran having bagged forty-two in twenty-six days, considered a remarkable record.

The largest whale caught this season measured 86 feet in length and weighted close to 100 tons. He straightened out forty fathoms of heavy hawser in efforts to dislodge the harpoon and dragged the vessel many miles at five knots per hour. The world's record whale was 98 feet six inches in length.

Thousands of barrels of whale oil and an enormous quantity of fertilizer were processed this season. The oil has been marketed to eastern soap makers, leather and steel manufacturers.

One of the peculiarities associated with the sperm whale is that it changes diet twice each month with the phases of the moon. The sperm's favorite food comprises squid, devil fish, sharks and halibut. With massive ivory molars the sperm masticates like a cow. For two weeks the remains of squid or devil fish were found in the stomach of sperms, then for a fortnight nothing but halibut or small sharks.

The presence of numerous schools of whales off the Alaska coast this past summer was accredited to great runs of small fish, sardines, herring and anchovies. Finback whales followed the small fish into shallow coves in the face of danger of being stranded on beaches or reefs.

FILMS SO THIN THAT "24,000,000 MAKE INCH

Some of the thinnnest films onwater ever subjected to scientific measurement were described before the National Academy of Sciencesby Prof. W. D. Harkins and J. W. Morgan of the University of Chicago.

They are composed of only one layer of the molecules or building bricks of material substances , and some of them are so very thin that ordinary X-rays could not do their vibratory dance within the thickness if such a location were selected for their performance. Numerically, the thickness of some of the films were found to be 24 billionths of an inch or, more scientifically expressed, 6 Angstrom units. Prof. Harkins explained that such thin films can be easily formed by simply spreading the proper kind of organic substance upon water.

WESTERN SPORTSMEN TO BE FIRE WARDENS

Next year every holder of a hunting or fishing license in the state of Washington will be a deputized special fire warden-at-large, if the proposal supported by numerous organizations, including the state forestry conference, the game and fish co commission, and prominent lumbermen's associations, is adopted by the Washington Forest Fire Association.

There are annually about 150,000 licenses issued in this state for fishing and hunting, which would make the deputized aggregation the largest body of law enforcers in the nation. The effect on fire control would be phenomenal, declare foresters.

The Seattle chapter of the Izaak Walton League of America plan to submit the proposal to the national organization at its next annual convention in April 1926.

The plan is regarded as the most constructive move for forest protection ever proposed. The awakening of a fire consciousness has been the aim of the state forestry officials for years. By deputizing the active sportsmen of the state it is believed hundreds of incipient fires, any of which might start a conflagration, will be snuffed out and offenders penalized. To the licensed sportsmen themselves the official responsibility will serve them to realize the importance of playing safe with camp fires, smoking tobacco, and matches.

HOOKWORM DISEASE SPREADS TO PALESTINE

Modern methods of agriculture are blamed for the introduction of hookworm into the Holy Land, Dr. A. Felix of the Rothschild Hospital in Palestine, who found that about one out of every twelve workmen in the orange groves is affected by the disease, attributes it to the increased use of irrigation in the land.

"It is very difficult to trace the source of the infection," said Dr. Felix, "but Egypt, where the hookworm disease is known to exist, is the most likely source because of the large number of Egyptian soldiers who worked here during the war."

ASTRONOMER FINDS CROSS MOTIONS OF STARS

Motions of stars across the line of sight, or "proper motions", as the astronomer calls them, to distinguish them from motions directly towards or away from the earth, have been measured by Dr. Frank E. Ross, of the Yerkes Observatory. He told members of the National Academy of Sciences that these measurements have been made by the use of a "blink microscope" which permits photographs made of the stars at different times to be compared, and the changes detected. The late Prof. E. E. Barnard, of the Yerkes Observatory, made star photographs covering nearly half the sky about twenty years ago, and Prof. Ross is now duplicating these, and comparing them with the modern plates. "There is urgent need," he said, "of surveying the entire sky in this manner, for the detection of all rapidly moving stars, in order that we may have an accurate picture of the space around our sun."

CASE OF "ARMORED HEART" IS FOUND IN AUSTRIA

One of the rarest known of pathological conditions is shown in a case of so-called "armored heart", first discovered in 1908, of which Dr. Lenk gave notes recently to the Society of Physicians at Vienna. It is a case of so-called "armored heart", first discovered in 1908, of which so far only fifteen cases have been known to medical history.

X-ray examination of the patient in question revealed that the shadow cast by the heart was extraordinarily dark, besides being of unusual size. It was found that a perfect crust of chalk had formed around the heart except at the point; there it is probable that the throbbing had interfered with the formation of chalk deposits. An operation will be made for the removal of the "armour". There are several cases of such operations having been performed with success.

TABLOID BOOK REVIEW

THE PRINCIPLES AND PRACTICE OF MEDICINE. By Sir William Osler, Bt., M.D. F.R.S. Revised by Thomas McCrae, M.D. Appleton's. 1925

Beginning with 1892, this work has passed through thirteen printings. "Best Sellers" in more ephemeral fields of literature, even of scientific literature, sometimes go through as many editions, but they do not keep it up for over a generation. When a book does that, it has got into the class of the Bible, Shakespeare and the dictionary, and is entitled to the rarely attained distinction of being a "best-selling classic." It were an idleness as well as an impertinence to undertake a critique of the contents at this date. The mere fact that there is a new edition of Osler out, the first since 1920, should be sufficient to send all persons who maintain a medical library to their booksellers.

PARIS, or THE FUTURE OF WAR. By Capt. B. H. Liddell Hart. Today and Tomorrow Series. New York: E. P. Dutton & Company. 1925

Capt. Hart is a pronounced military modernist. He believes that the future of land war lies mainly with two weapons, airplanes and fast tanks, both making heavy use of gas. He rejects the doctrine that the prime object of war is to destroy the enemy's armed forces, which has dominated strategy since Napoleon, and revives the older teaching that the proper objective should be breaking of the enemy's will by attacking centers of control and supply, and especially by demoralizing civilian populations. War of the future, as he envisages it, will be an affair of motion, almost of perpetual motion--except for the luckless and defenseless ones who get in the way of the airplanes and tanks.

CHEMISTRY IN INDUSTRY. Edited by H. E. Howe. The Chemical Foundation.

This is the second volume of a source book in industrial chemistry that in addition to authority has the recommendation of simple language. Experts in various lines of chemistry have contributed chapters which are well illustrated.

Electric power was recently transmitted from British Columbia to the state of Washington to help make up a shortage of power due to lack of rain in the Pacific Northwest this fall.

Modern dog hospitals have fully equipppdd operating rooms, medical dispensary, surgical wards, observation wards, and wards for contagious diseaaes.

Clover which ordinarily requires two years to mature has been full grown in three months in experiments at the Boyce Thompson Institute greenhouses.
