

could have made her strong and happy—they will unite at last, remembering the martyrdom of the millions of those like Joan.

"They will remember the wars between nations that have served so well to divert them from anger at their own starvation, at the murder of their own children by poverty.

"They will ask: If, in war, there is always limitless credit to kill people, so that no war ever stops for lack of dollars, francs, marks, or pounds, why then isn't there limitless wherewithal to arm our science so that it will give life to all future heartwrecked children like Joan?

"At last the fundamental issue will be clear and absolutely simple, as it must be to move the mass to anger, to action.

"At last there will be the tramp, tramp, tramp of humanity marching, in spite of the tear gas and vomit gas bombs, in spite of the machine guns, till finally the leaders of the mass will stand face to face with those who now monopolize our common heritage, then those leaders will ask—

"Who owns our science?

"And they will give their own answer."

Science News Letter, March 21, 1936

PHYSIOLOGY

Increasing Waistline Called Menace to Health

WARNING for the man of forty whose waistline is so rapidly increasing that he must bend over to see his feet is to be found in a clinic held at the meeting of the American College of Physicians by Dr. William J. Kerr of San Francisco.

The pot belly is a menace to health as well as to manly appearance. Dr. Kerr, with the aid of two patients and numerous charts, showed how the sheer weight of the "bay window" throws the body out of line, interferes with breathing and eventually leads to failure of heart and lungs.

To relieve this condition, Dr. Kerr and his associate, Dr. John B. Lagen, first give the patient a heavy two-way-stretch elastic support to hold the heavy abdomen in place. When this is put on the patient, he immediately stands better, holds his head a little higher and straightens the sway-back. Next step in the treatment is diet to gradually reduce the big abdomen to normal. With this are prescribed strengthening exercises.

Science News Letter, March 21, 1936



The Importance of Lichens

LICHENS are those peculiar spreading patches of green and yellow and gray that look like spots of paint on the surface of rocks. They are sometimes loose and crumbly, like paint films that have peeled and cracked and curled up. Other kinds of lichens are loosely misnamed "moss," like reindeer moss, and the beard-lichen which Longfellow immortalized:

"The murmuring pines and the hemlocks,

"Bearded with moss . . ."

Lichens are strange among plants in that they literally lead double lives. Each patch of lichen is composed of masses of two entirely distinct kinds of plants: long fibers or filaments and fruiting bodies of a fungus, related to the molds and the mushrooms, and innumerable little one-celled green plants of the low order called algae. It has long been standard botanical doctrine that this is a mutual benefit society, but of recent years opinion has been swinging round to the idea that the fungus takes advantage of the alga, as a parasite. If the lichen is a plant society, it is a master-and-slave society.

Lichens are important to man in many and curiously diverse ways. Outstanding, however, is the lichens' function in turning stones into bread. Not that lichens are themselves much eaten by human beings. They are used as food only by peoples most hard-pressed for food, like the Japanese.

But lichens almost invariably the first attackers on the face of rock that is eventually to become soil. Their slow-creeping filaments, which take no account of years, can live through heat and cold, drought and wet, on the naked surface of the rock. Whenever conditions are right for them to grow a little more,

they secrete a little acid, that slowly etches and roughens the rock surface, and thus begins the long cycle of its breakdown into soil that other plants can live in. It is an immensely slow process, but in the long aggregate an immensely effective one.

Lichens not only help to give man bread; they give at least some of us meat. The lichen known as reindeer moss is the mainstay of reindeer in northern Eurasia and of caribou on the Arctic slopes of North America. Hence it means meat in the pot, and skin clothes on the back, for Lapps and Tunguses and Eskimos and the Athapaskan Indians. Nor must it be forgotten that once upon a time our own forebears, in Ice Age Europe, were hunters and eaters of reindeer.

Lichens finally are friends of the chemist. Litmus, without which a chemical laboratory can hardly be imagined, is the product of a lichen.

Science News Letter, March 21, 1936

ASTRONOMY

Plan Joint Expeditions To Study Solar Eclipse

AN expedition to Soviet Russia to observe the total eclipse of the sun June 19, 1936, will be sponsored by the Harvard College Observatory in collaboration with the Massachusetts Institute of Technology.

The totality belt, about 75 miles wide, starts in the Mediterranean and then swings northeastward across Greece, the Black Sea, Manchuria and northern Japan, ending at some point well out in the Pacific Ocean. The eclipse will not be visible in the western hemisphere.

By *Max Born*

The Restless Universe

The mystery of perpetual change and the puzzles which relativity, electricity and the newer mathematics have presented are explained with authority and clarity in almost ABC language by an eminent physicist, who at present is Stokes Lecturer in Mathematics at the University of Cambridge. "The tremendous task of making the marvelous achievements of modern inquiry in physics, chemistry and astronomy intelligible to the lay reader . . . is performed in masterly fashion." — *Book-of-the-Month Club News*. Uniquely illustrated: by flipping the pages you can actually see atoms in action. \$2.50

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In charge of the expedition will be Dr. Donald H. Menzel of Harvard, assisted by Dr. Joseph C. Boyce of Technology. Other members of the party have not yet been announced.

Emphasis on Spectrograms

According to Dr. Menzel, the party's program will be chiefly spectrographic, with particular effort to be directed to obtaining spectrograms of the chromosphere and the corona over a wide range of wavelengths. Special emphasis will be placed on the infra-red region of the spectrum, where present knowledge is only fragmentary.

The chromosphere, technically the outer layers of the sun, is a rarefied atmosphere enveloping the shining surface. Due to the brilliance of the sun, observations of the chromosphere are best obtained during an eclipse when the sun is hidden and only the rarefied atmosphere protrudes from behind the moon. From the observations to be taken, scientists hope that its chemical composition, the source of its excitation, the nature of its structure and many other problems in connection with the chromosphere may be cleared up.

The solar corona which lies above the chromosphere presents additional mysteries. Although the chromosphere has been spectrographically found to consist of helium, hydrogen, calcium, iron and other elements in their gaseous form, not a single one of the many known coronal lines has been positively identified.

Need More Data

Some scientists believe that the predominant element is a well-known substance, hidden by peculiar conditions existing in the corona. Dr. Menzel and Dr. Boyce have provisionally suggested that oxygen might be responsible, but additional data which may be obtained from the contemplated study of the infra-red coronal spectra are required to settle the question.

The Harvard-Technology expedition will be the guests of Dr. Boris P. Gerasimovic, formerly associated with the Harvard Observatory and now director of Poulkova Observatory at Leningrad.

Observations will be made from a point near the town of Ak-Bulak in the southern Ural mountains. Although Tomsk is a more favorable location, since it lies close to the central totality line and since the sun will be higher in the sky there, collected weather reports indicate that the chances for clear weather are appreciably greater at Ak-Bulak.

Totally here will occur at 8 a. m., local time, when the sun is 36 degrees above the horizon.

Dr. Boyce sailed early in February and will spend two months at the Solar Physics Observatory at Cambridge, England, before proceeding to Russia. The rest of the party will sail sometime in April.

Another joint expedition to observe the total eclipse will be sent to Soviet Russia by Georgetown University and the National Geographic Society, it is announced by the two sponsoring organizations.

PHYSICS

Studies May Yield Knowledge Of Heavy Water's Effects

A NEW and more precise value than has ever been obtained for the viscosity, or flowing qualities, of "heavy" water has been calculated in research conducted at Harvard University by Prof. Grinnell Jones and Dr. H. J. Fornwalt. Better knowledge of what effect heavy water may have on the body is only one possibility of the research.

Using an automatic timing device instead of the hand-operated stop watch employed for timing in previous viscosity tests, the two scientists have found that deuterium oxide, as heavy water is technically known, has a viscosity 23 per cent. greater than that of ordinary distilled water.

Although this figure differs only slightly from the results of other experimenters, who found a value of 23.2 per cent., the new figure is considered of prime importance in view of the extreme precision necessary in the calculations of modern science.

This precise viscosity measurement, for example, may prove to be of considerable importance to physiologists studying the effect of heavy water, which constitutes two hundredths of one per cent. of ordinary water, as found in the human body.

Many of the other investigations which have been in progress since the discovery of heavy water in 1934, may also benefit from the more accurate measurements. Outstanding among these are investigations to determine how the fluid affects animals and plants and research seeking to determine the electrical conductivity of the new liquid

Dr. Paul A. McNally, S. J., director of the Georgetown College Observatory, will be leader of the expedition, accompanied by five others to be chosen from the staffs of the University and the Society. They will leave sometime in April and return in July.

Observations will be made from a point near Orenburg, Soviet Russia, because past weather records show that this region offers one of the best promises of clear weather along the whole path of the eclipse.

Science News Letter, March 21, 1936

The Harvard measurement is also expected to aid scientists checking the possibility that the double-weight hydrogen atom alters important calculations and assumptions made by scientists before heavy water's discovery.

Prof. Jones' viscosity tests are similar to others in that the speed of fall of the liquid in a glass capillary tube forms the basis of measurement. In early experiments on heavy water, however, observation of the speed of fall was made by the human eye, and the time recorded with a hand-operated stop watch. This method, of course, involves the possibility of inaccuracy on the part of the observer and does not give a satisfactory timing record, since even the best stop watches are accurate to only a tenth of a second.

The Harvard scientists in their experiments used an automatic timing device which replaces the human eye with the infallible photo-electric cell. Time records were made on a fast-moving chronograph tape which enabled measurements accurate to one hundredth of a second. Possible error, they estimate, cannot exceed three or four thousandths of one per cent.

The research was undertaken at the suggestion of Dr. Harold C. Urey, discoverer of the liquid, after he had seen Prof. Jones' equipment for precise viscosity measurement. Prof. Jones is now conducting experiments to determine the surface tension of heavy water, also at Dr. Urey's suggestion. The fluid for both experiments was supplied by Dr. Urey.

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