SCIENCE NEWS

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THE ECLIPSE OF THE SUN

THE moon will blot out the sun on Thursday, February 4, along what might be a bomber's route between Alaska and Japan. But it is a safe bet that this will be the one total solar eclipse of the century that no very serious astronomical expedition will be observing.

For one thing, most of the choice points in the band of temporary total darkness are at sea where there is no stable base for telescopes. The main difficulty is that there is a war on. Astronomers in normal times might be tempted to take a run up to Anchorage, Alaska, where the totality lasts 48 seconds shortly before sunset that day. They might be interested in rechecking upon the Einstein gravitational effect that bends starlight passing by the sun. Or they might photograph the corona, the sun's halo. Just now many astronomers are busy with ballistics, navigation, making military telescopic cameras or other such important war jobs.

Soldiers, sailors and airmen will pause a few minutes in their fighting and work to see the glory of a total eclipse, the clouds and fog of the Alaskan winter permitting. The moon's shadow will touch earth in Manchuria at sunrise on February 5. The eclipse will begin a day before it ends, by the calendar, because it crosses the international date line in its sweep across the Pacific. After crossing the Sea of Japan, passing across the Japanese island of Hokkaido, it travels swiftly across the ocean. After running south of the Andreanoff Islands, the shadow will go just south of Dutch Harbor, darken part of Kodiak Island and cross Alaska on its way to leave the earth in the northern part of the Canadian Yukon at sunset.

The sun will be seen partially eclipsed throughout Alaska, along the west coast regions of Canada and the United States and Hawaii.

As the Chaldean astronomers first discovered, eclipses recur at intervals of 6,585 ⅓ days, known as a saros. This figures back to January 24, 1925, when a total sun's eclipse was seen by astronomers and public alike under good conditions in New York, southern New England, as well as farther west.

As consolation for missing the February 4 eclipse, astronomers will have to look forward to the next eclipse to come within possible reach. On July 9, 1945, there will be a total solar eclipse beginning near Boise, Idaho, traveling northeastward through Montana, Saskatchewan, Manitoba, across Hudson's Bay to Greenland and on into Europe and Asia. Perhaps astronomers can conduct victory expeditions to observe this astronomical event, transported by bombers that will be through with carrying out other missions.—WATSON DAVIS.

SIGMA XI LECTURES

TEN quadrillions of stars: 10,000,000,000,000,000. That's the modest census of the part of the universe within photographing range of our largest existing telescopes, with which Professor Harlow Shapley, director of Harvard College Observatory and vice-president of Science Service, concludes the opening chapter of a new "symposed" book, Science in Progress, published by the Yale University Press.

The ten chapters in the book were edited from lectures presented by ten leading American scientists, on tour over the country under the auspices of the Society of the Sigma Xi. Assembling them into book form was the work of Professor George A. Baitsell, of Yale University, secretary of the society. They present the highlights of some recent developments in astronomical, physico-chemical and biological sciences. The volume has been made a science book-of-the-month by the Science Book Club.

Professor Shapley bases his staggering figure on a conservative estimate of the number of stars in our own galaxy, the Milky Way system—about a thousand millions of them. In the sphere of space which present telescopes can reach there are at least ten million more like it. Ten million times a thousand million multiplies out to ten quadrillion—if that number means anything.

A typical galaxy, like our own "home" mass of stars, is a more or less disk-shaped affair, perhaps 50,000 or 100,000 light-years across, frequently showing a spiral pattern in its organization. We can tell how far away other galaxies are by spotting certain types of stars in them, giants and super-giants, novae and super-novae, and comparing their known actual brightness with the much lower brightness they present because of the dimming effect of distance.

A second chapter on an astronomical subject, the expanding universe, is contributed by Professor Edwin Hubble, of the Mount Wilson Observatory. All the galaxies we know appear to be receding from our part of space at terrific rates, from 150 miles a second for near-by ones to nearly 25,000 miles a second for those near the limit of telescopic range.

That the universe is expanding (perhaps exploding would be a better word) is the only explanation at present possible for the so-called red shift of light given off by these distant masses of stars. The reddening of their light is apparently caused by a "dragging out" of the light waves as their sources speed away. Other explanations have been attempted, but, says Professor Hubble, they have all failed. If there is another valid explanation, it involves a principle in nature of which we are still ignorant.

What fuels the terrific energy production of the stars is the cosmic puzzle taken up by Professor Hans A. Bethe, of Cornell University. Earlier theories, as that stellar heat and light are due to the gravitational compression of their substance as they shrink together, would not keep up the fires long enough. Most satisfactory, it appears, is the concept that atomic nuclei within the stars' interiors capture atomic particles (neutrons) and in so doing are transformed into other elements and at the same time give off energy.

Pressures such as those existing in the interior of the earth, if not of the stars, are described by Professor P. W. Bridgman, of Harvard University. In exceedingly

massive machines, pressures measurable only in terms of dozens of tons per square inch are applied to various solids and liquids, solidly cased in massive blocks of metal so that they can not "squeeze away." Under such pressures familiar matter assumes unfamiliar forms: a kind of ice with a temperature far above boiling, and so dense that it would sink in water; a variety of phosphorus that is black instead of yellow, and that conducts electricity instead of resisting it.

In other chapters, Dr. V. K. Zworykin, of RCA Research Laboratories, tells of the formation of electron images; Professor Lionel S. Marks, of Harvard University, discusses recent developments in power generation; Professor James Franck gives glimpses of what goes on in a green plant while food is in the making; Professor John G. Kirkwood, of Cornell University, presents a picture of the structure of liquids; Professor Perrin H. Long, of the Johns Hopkins University, outlines the mode of action of sulfanilamide, and Professor H. Mark, of the Polytechnic Institute of Brooklyn, gives the theoretical basis underlying the manufacture of synthetic rubber.

SCIENCE IN 1942

MEDICAL SCIENCES

(Continued from January 8, 1943)

A method of investigating motor nerve end plates and their control of muscle fibers which should give fundamental aid to investigations of paralytic and muscular diseases was developed.

Search for a chemical cure for cancer, involving tests of some 70 compounds, resulted in discovery of one type of chemical which in the test tube apparently interferes with the health of human breast cancer cells and in the same concentration does not interfere with the well-being of any normal organ tissue which has been tested so far.

Indication of prevention of both breast cancer and leukemia in mice by diets lacking only the one chemical, cystine, was reported.

Conclusive proof that normal subcutaneous mouse fibroblasts can be transformed, while growing in culture in vitro, into sarcoma cells, as shown by the production of highly malignant tumors following inoculation of these cultures into mice of the same strain which furnished the normal cultures, establishes for the first time that at least in this instance cancer cells can be produced without the operation of factors (systemic) involving the animal body as a whole.

Chemical structure of biotin, vitamin essential for rat nutrition and believed to hold a clue to solution of the production of liver cancer in rats, was discovered.

Development of a 3,000,000-volt X-ray machine and encouraging results in its use to treat deep-seated human cancers were reported.

Two new cancer diagnostic tests were reported: one distinguishes cancer from overgrowth of the adrenal glands, the other detects early cancer of the uterus by microscopic examination of surface cells shed by the cancer during its rapid growth.

Vitamin C was reported effective in treating and preventing heat cramps and heat prostration and its use for preventing shock after injury or surgical operations was suggested.

Totaquine, from cinchona bark, and two synthetic chemicals, pamaquine naphthoate and quinacrine hydrochloride, were put into the new U. S. Pharmacopoeia XII as acceptable anti-malarial drugs that can be used in place of quinine.

Evidence that vitamins are important for resistance to disease germs appeared in the discovery that mice were more susceptible to fatal infection with Type I pneumonia when their diets were deficient in two B vitamins, thiamin and riboflavin.

A cat infection was linked with the atypical human pneumonia cases of the past few years.

Instruction courses in the Sister Kenny method of infantile paralysis treatment were established by the National Foundation for Infantile Paralysis.

Albumen extracted from human blood was used successfully in treating shock and efforts were reported under way to prepare a safe beef blood albumen for the same purpose.

Successful treatment of headache and dizziness following concussion of the brain, expected to be more frequent as a result of war injuries, was achieved with the synthetic chemical, prostigmine.

Discovery of Kitol, a new parent chemical for vitamin A, expected to double the amount of the vitamin that can be obtained from whale and probably other fish liver oil, was announced.

A new "butter" that resists temperatures up to 110 degrees Fahrenheit and can be shipped without refrigeration was developed by the Army Quartermaster Corps and is being shipped in large quantities to U. S. troops overseas.

Successful vaccination against influenza A of 43 out of 44 boys directly exposed to the virus in a controlled experiment was reported.

Isolation of a toxin from the influenza bacillus (not the virus) and production from it of a vaccine successful in protecting rabbits against this bacillus was announced.

28,585 cases of jaundice, with 62 deaths, occurred in the Army among men vaccinated with certain batches of anti-yellow fever vaccine but following a change in the method of producing the vaccine and restriction of its use to men destined for service in yellow fever endemic areas, cases of the jaundice stopped.

Greater, because safer, usefulness for the sulfa drugs may result from discovery that certain toxic reactions to the drugs, including agranulocytosis, probably result from drug interference with hitherto unknown and as yet unidentified members of the vitamin B group.

Two new sulfa drugs, sulfapyrazine and succinyl sulfathiazole, were announced.

Sulfa drugs appeared as possible preventives of whooping cough; dysentery; bad colds, bronchitis and pneumonia; and as possible cures for Asiatic cholera on the basis of animal experiments and some clinical evidence.

A new kind of surgical dressing for burns and wounds, consisting of a plastic film carrying 30 per cent. to 50 per cent. sulfadiazine, was developed.

Two new germ-fighters isolated from microorganisms were discovered: fumigacin and clavacin.