

SCIENCE NEWS

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THORIUM

DISCOVERY of the rare radioactive element thorium in the sun is announced by Dr. Charlotte E. Moore, of the Princeton University Observatory, and Dr. Arthur S. King, of the spectroscopic laboratory at Mt. Wilson. The element was found to occur in the ionized state only.

Although search for thorium started in 1938, the investigation was hindered by lack of suitable experimental work on the spectrum of the element in the laboratory under different conditions of temperature and magnetic field strength. When such experimental work recently became available the search was begun anew and this time was successful.

The basis for the discovery was chiefly the detection of lines in the solar spectrum that matched the lines of thorium most easily produced in the laboratory and which are generally the strongest lines of an element. These are known as its ultimate lines and if they are absent it is hopeless to look for any others.

One line of thorium which stood out in strength above all others and was therefore believed to be its ultimate line coincided almost exactly with a faint unidentified line in the solar spectrum. Other strong lines of the ionized element could only be tentatively identified with solar lines. But as the very strongest line of thorium is represented so weakly in the sun the absence of the other lines is not considered surprising.

Two of the strongest lines of neutral thorium coincided with solar lines, but the agreement was believed to be accidental from another line of evidence. Since sunspots are about 1,500 degrees Centigrade cooler than the surface of the sun surrounding them, they should contain less ionized thorium and consequently more of the neutral atoms. Hence, if the lines really belonged to thorium, they should be strengthened in the spectrum of sunspots. But since the lines were not strengthened in the sunspot spectrum the investigators were forced to reject the coincidences as accidental.

SCIENCE, SOCIAL SCIENCE AND THE HUMANITIES

THE physical sciences, necessarily given priority in present-day training programs to meet the war emergency, will not dominate post-war education, Dr. James B. Conant, president of Harvard University, emphasized in an address before the New York Academy of Public Education. They will maintain the gains they are making, but the social sciences and humanities will have to catch up with them, to maintain a balanced and a livable world.

The old notion that there is a basic opposition between two kinds of training, and that one kind is parasitic on the other, was decried by the speaker. The real relation, he said, is not one of parasitism but of symbiosis—the kind of thing you have in a lichen, in which two quite different types of organism are mutually beneficial to each other.

Such a symbiosis has long obtained in human affairs, Dr. Conant continued. Historically, the system of political liberalism under which we live has made scientific advance possible; and in turn scientific advances have fed our sense of freedom. "If we are to have a free society on this continent we must continue to have advances in the fundamental sciences, and these advances in turn can take place only if man is free. The symbiosis must continue if this nation is to prosper. . . . Let no man who admires science or extols new industrial techniques look with favor on any abridgment of human liberty unless he wishes to encourage forces which will eventually destroy those things he values most." He emphasized the necessity for post-war planning, if only to avoid further wars: "We can not maintain a free society in a world in which we must face the terrible and disrupting burdens of modern war once every generation."

In concluding, he offered a five-point outline of a master plan for future research: (1) Provide an educational system which offers real equality of opportunity. (2) Find the exceptional men among those given this opportunity while they are still in training. (3) Give these men every advantage and facility in the way of machines and helping hands. (4) Be certain that there are many rival and independent groups competing for scientific and technical achievement, and that no group can long perpetuate itself. And finally, (5) Beware in times of peace of coordinating agencies with dictatorial powers—of ideas of a peacetime scientific general staff.

THE ACCURACY OF MEASUREMENT

THE 52,000-ton full-load displacement of the new "Iowa" class battleships may actually be as much as 52,052 tons or only 51,948 tons without any one knowing the difference. That a battleship can not be weighed with an accuracy closer than one part in a thousand, was pointed out by Dr. Harvey L. Curtis, of the National Bureau of Standards, in his address as retiring president of the Washington Academy of Sciences. By contrast, a kilogram weight (basic unit of the metric system, a little more than two English pounds) can be compared with another with an accuracy a little less than one part in a billion.

Biggest things and smallest things are most difficult to measure and weigh. A battleship is about the biggest lump of matter which human means can weigh directly. In the opposite direction, the antipneumococcus germ or virus particle is among the smallest of living things. It would require one octillion of these to weigh as much as a blue whale, largest of all animals. Far below this tiniest of germs, however, is the electron, smallest of all known objects. Its mass has been determined within an error of one per cent—but this is an accuracy of only one part in a hundred, as compared with one in a billion when kilogram weights are being compared.

As with weights, so with lengths. The standard meter

bar (the laboratory's "yardstick") can be compared with another meter bar with an accuracy of one part in ten million, perhaps under very favorable conditions to one part in fifty million. The error amounts to something between a twentieth and a hundredth of the diameter of a fine spiderweb.

Accuracy of comparisons falls off with either increase or decrease in lengths being compared. The standard base line used in the most accurate kind of surveying is usually 1,000 meters. Its accuracy, however, can be determined only to one part in a million, as compared with one in ten million for the single meter.

The millimeter (a thousandth of a meter) can be determined with an accuracy of only one part in a few hundred thousand. The distance between the nuclei of a hydrogen molecule is known only to one part in a thousand, while the diameter of a proton, the smallest known object, has not yet been determined within an error of less than one part in ten.

ALASKA HIGHWAY CONSTRUCTION

OLD-TIMERS in Alaska and the mountain country of western Canada declared that a road couldn't be built where the Army Engineer Corps planned to put it, but airplane reconnaissance found a way through, and "guts and tractors" built the road.

This, in a one-sentence summary, tells the story of the building of the Alcan Highway, which was presented at greater length before a joint meeting of the American Philosophical Society and the Geographical Society of Philadelphia on February 18 by Major Roswell P. Rosengren, chief of the Office of Technical Information.

The story of the road is a saga of decision, speed and determination. Only a little more than a year ago, on February 2, 1942, Brig. Gen. C. L. Sturdevant, of the Engineers, was told that a road was to be built and instructed to bring in preliminary plans. Forty-eight hours later he submitted them. He received from the Army High Command a directive on February 14 to proceed with the project.

The Canadian Government immediately gave informal permission for survey parties to go to work in their territory, and this was made formal on February 26. By March 10, American troops were arriving at the railhead at Dawson Creek, B. C., in temperature around 40 degrees below zero Fahrenheit. Further contingents reached other construction centers during April.

The route selected was criticized by local men who thought they knew the country because a considerable part of it apparently would have to traverse a 6,000 foot plateau. Actually, the airplane parties found a route no part of which had to climb above a 4,000 foot altitude. All of it lies in timbered country.

Several engineer regiments (one of them colored) tackled the job which looked like one to daunt Hercules. Each regiment moved up "heavy artillery" in the form of 44 big tractor-bulldozers, with scores of trucks, power shovels, piledrivers and other machinery; and of course the omnipresent, indispensable jeeps. The country fought the invaders with miles and miles of sullen muck and

millions of mosquitoes. The road, as one writer put it, "was built as in battle, with every hardship except bullets." And the Corps of Engineers, U. S. Army, won their fight.

ITEMS

THAT the first sunspot of the new cycle may have already appeared, nearly a year before the end of the present cycle, it has been announced by Dr. Seth B. Nicholson, of the Mt. Wilson Observatory. The spot-group was visible for one day only on December 20, 1942, in the relatively high latitude of 32 degrees north, on the sun's surface. One of the most fundamental characteristics of the solar cycle is that toward the end spots are confined to a belt about 10 degrees wide on either side of the sun's equator. But when spots of the new cycle appear they are much farther from the equator than the old, usually above latitude 25 degrees, as was the case of the short-lived group of December 20. As a rule, the cycle to which a spot-group belongs can be decided definitely from its magnetic polarity as shown by the preceding and following members as they move across the sun's disk, the magnetic polarity of spot-groups of one cycle being opposite to those of the next. But in this particular case, the preceding spot was so little in advance of the other that it was hard to say whether the group should be classified as having a polarity the same as other spots of this cycle or not.

ABOUT three fourths of the moon was blacked out by the shadow of the earth on Friday night, February 19—the last lunar eclipse that will be visible in the United States until 1945. A nick appeared in the lower left edge of the moon three minutes after midnight. By 1:38 A.M. Saturday it was nearly immersed in shadow. A dull, coppery glow covered the eclipsed portion because some light is bent into the shadow as the rays pass through the earth's atmosphere. Since blue waves of light are scattered by passage through the air, giving the sky its blue color, light which reaches the moon has a preponderance of red waves, causing the copperish hue. The eclipse was observed until 3:13 A.M.

THAT cold wave we've just been through wasn't a local affair. It covered pretty much the entire country east of the Rockies, according to the U. S. Weather Bureau. And it was the coldest weather we've had this winter. Temperatures ran as much as 12 degrees below normal, as contrasted with 10 or 15 degrees above normal during the previous week. Drops to 20 and 25 degrees below zero Fahrenheit were common in the north central states, and even as far down the map as central Georgia there were freezes at 10 or 15 degrees above zero. A good deal of harm may have been done to growing vegetable crops and dormant fruit buds in the South, but the extent of the damage has not yet been determined. Stock in the Northwest suffered from cold and deep snow, and there seems to have been some killing of uncovered winter grains, especially in the southern Plains region. And through it all, the Far West basked in temperatures well above normal for the season.