the possible extent and causes of this solution were not evident. Sulphurous fumes had been reported by some of the first observers at the hole, but this is very doubtful and there is seemingly no reason to consider seriously a cause other than the subsidence that frequently accompanies removal of soluble rock by underground water.

The writer visited Sharon Springs on April 13 and spent the following few days in observations at the sink and in neighboring parts of western Kansas and eastern Colorado. He found that the depression at Smoky Hill Basin had appreciably enlarged since the time of Mr. Lambert's visit, being fully 150 by 290 feet in diameter at the top. Numerous side cracks, in part roughly concentric to the depression but in part trending for a distance as much as one hundred yards directly away from it to the south indicated that the size of the opening was slowly but steadily being increased. Indeed, there was a readily observable change during the short period of the writer's study.

A systematic series of soundings of the pond revealed a gradual increase in depth of water to about fifty feet, but in an area comprising about one seventh of the bottom the soundings increased very suddenly to 160 or 170 feet. A survey showed that the depression formed by the subsidence has a volume of a little over one and a half million cubic feet. Taking into account the volume which is occupied by the fallen rock débris, which by reason of its fragmentation may be assumed to fill a space at least 20 to 30 per cent. greater than its original volume, the size of the cavity under ground must be large. The depth from the original surface to the top of the material filling the deeper part of the hole is 245 feet; the depth to the bottom of the original cavity may be 500 feet, although this is only an approximate estimate.

The stratified rock exposed in the walls of the depression at Smoky Hill Basin is the basal part of the Pierre shale. The underlying Niobrara chalk which, according to borings in the vicinity, has a thickness of slightly more than seven hundred feet, is only a little below the surface at this place and it crops out in the Smoky Hill valley not far to the east. The chalk is readily soluble, although the large amount of clay in part of the formation impedes the circulation of water. It is not readily possible for water to enter the chalk in this part of western Kansas where the impervious Pierre shale overlies it, but there is a large area in eastern Colorado where the chalk is exposed at the surface or is concealed only by a thin veneer of Tertiary and Recent sand. The elevation of this Colorado area is more than 4,000 feet above sea level, while the top of the chalk east of Sharon Springs is less than 3,300 feet, the stratified rocks being gently inclined from southwest to northeast so that water entering the chalk in Colorado migrates northeastward, dissolving a part of the chalk as it travels. The water is confined to the porous chalk by impervious shale formations above and below it and it is finally released where the chalk reaches the surface at various places in Kansas. Evidence of the solution of the chalk is found not only in subsidence phenomena but in the large amount of calcite which is deposited along fracture or fault planes in the chalk. It is not improbable that the small faults so common in the Niobrara represent settling following removal of material in solution.

The sudden subsidence at Smoky Hill Basin has attracted attention partly because it is fairly large but more because it is very uncommon in the experience of the plains people. Such subsidences are really by no means rare in regions where underground solution is active, but even in limestone regions like Kentucky it is not common for sudden large subsidence to take place under direct observation; rather it is the evidences of past subsidence that are found on every hand.

Western Kansas does not lack evidence that subsidences have taken place in the past; indeed, there are very abundant marks of local sinking. A few miles northwest of Sharon Springs is an excellent example of an old sink, locally known as Old Maid's Pool. This is a nearly circular depression over eighty feet in maximum depth, approximately three eighths of a mile in diameter at the rim and holding at the bottom a permanent small lake about three hundred feet wide. On all sides the rim forms a divide so that topographically the depression is a very striking feature. In relation to geologic structure Old Maid's Pool corresponds closely to Smoky Hill Basin except that a slightly greater thickness of Pierre shale overlies the chalk. Undoubtedly the origin of the two depressions is the same, but the one antedates the other by several scores or perhaps hundreds of years. There are many other, though generally less distinct and accordingly older, depressions of like character. The so-called "buffalo wallows" which dot portions of the plains are small or large subsidence areas resulting from solution, mostly in the Tertiary sediments. There are some very large subsidence areas affecting many square miles in southwestern Kansas.

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SCIENTIFIC EVENTS

THE SOLIDIFICATION OF HELIUM

PROFESSOR W. H. KEESOM writes to *Nature* from the University of Leyden on his work on the solidification of helium as follows:

On June 25 helium was compressed in a narrow brass tube forming communication between two German silver tubes. The brass tube and part of the two German silver tubes were in a liquid helium bath. At a pressure of 130 atmospheres the tube system appeared to be blocked. When the pressure was diminished by 1 or 2 atmospheres the tube system was open. The temperature of this experiment was somewhat uncertain. By diminishing the pressure of the liquid helium bath the same phenomenon was observed at a temperature of about 3.2° K. at 86 atmos., and at a temperature of about 2.2° K. at 50 atmos. From the regularity of the phenomenon it appears that we were observing the solidification curve of helium. This method of observing solidification has indeed already been used by Kamerlingh Onnes and Van Gulik in preliminary measurements on the curve of solidification of hydrogen.

A repetition of the experiment on July 1 confirmed the early observations. At 4.2° K. helium solidified at 140 atmos. The solidification curve was prolonged to 1.1° K., and the helium solidified then at 26 atmos. The exact numerical data will be given elsewhere. The solidification curve bends so that at the lower temperatures it shows a tendency to become parallel to the axis of the temperatures. So far as can be ascertained from these observations, helium is expected not to have a solid-liquid-gas triple point.

Finally, helium was compressed in a glass tube provided with a magnetic stirrer after the pattern of Kuenen. The observations on the solidification of helium were confirmed. The stirrer was seen to stick when the helium solidified. In one experiment part of the substance was liquid and part solid. One could hammer the solid block with the stirrer that was in the liquid part. A limiting surface between the solid and the liquid could not, however, be seen. Solid helium forms a homogeneous transparent mass, the refractive index of which probably differs extremely little from that of the liquid.

RADIATION FROM THE CARBON ARC

AN investigation is being made at the Bureau of Standards of the radiation from the carbon arc, a matter of great importance in the treatment of diseases by exposure to light, especially sunlight. However, sunlight can not always be obtained, hence the demand for an artificial source approaching sunlight in its characteristics.

The investigation is being made in duplicate: (1) By mapping the ultra-violet spectrum by means of a quartz spectroradiometer, and (2) by measuring the spectral components of the total radiation emitted by the arc, by using a thermopile and screens which completely absorb certain spectral regions and freely transmit others.

Thus far studies have been made of the standard carbons on the market, *viz.*, "white flame," "red flame," "yellow flame," "blue flame" and "neutral core" carbon electrodes; also several special carbons with cores of nickel, tungsten, etc. The effect of varying the current has been studied, using 15, 30, 60, 90 and 122 amperes.

The high-intensity arc (120 amperes) has been found to be closest to the sun in spectral composition. It emits considerable radiation of wave lengths longer than 4μ, which are not in the solar beam, but this can be eliminated easily by using a window of fused quartz, which absorbs the long infra-red rays.

THE COMMITTEE ON INTELLECTUAL CO-OPERATION OF THE LEAGUE OF NATIONS

THE following despatch from Geneva, dated July 29, appeared in a recent issue of *The Boston Transcript:*

The intellectual and scientific leaders of the world are attending this week the meeting of the committee on intellectual cooperation of the League of Nations in Geneva. The committee has taken steps toward coordinating the intellectual work of the world under the chairmanship of Professor H. A. Lorentz, one of the world's most noted physicists and secretary-general of the Netherlands scientific society. Others present were Dr. Albert Einstein, representing Germany; Dr. Vernon Kellogg, permanent secretary of the National Research Council, representing the United States; G. A. Murray, professor of Greek at Oxford, representing Great Britain, and Mlle. K. Bonnevie, zoologist, representing Norway.

Questions affecting universities, especially concerning progress in arts, letters and sciences and also policies in bibliography, were discussed. Exchange of students between countries was urged as the most effective means of advancing the intellectual life of the nations by the American delegate, Dr. Vernon Kellogg. "In my opinion no more important step toward fundamental development in internationalism has been made in recent times than the multiplication of international scholarships for the élite of the younger generation of scholars."

To facilitate the development of international scholarship, the committee considered the possibility of easier passport regulations, less expensive visas and reductions in transportation rates for international students, and encouraged the formation of international student associations. The committee also urged the establishment of university information offices by all countries and the cultivation of courses in internationalism at all universities.

An important report on scholarships was presented on behalf of Mme. Curie, who is absent in Brazil. In her recommendation she points out that since science has become so highly specialized, students must go to the particular places where they can obtain the best training for the subject in which they are interested, regardless of whether it is at home or abroad. She advocates two kinds of scholarships; one for the student who is just beginning his research, the other for the advanced worker