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LOW TEMPERATURES.

LECTURE BY PROFESSOR RENNIE.

"You cannot boil an egg on the summit of Mont Blanc," Professor Rennie told a large audience in the Prince of Wales theatre, Adelaide University, in his lecture on "Low temperatures" on Tuesday evening. Those who had not read Mark Twain's "Tramp Abroad" possibly did not know the reason until the lecturer proceeded, "because the higher you get, the lower the temperature at which water boils, and at the altitude of Mont Blanc, although the water is boiling, there is not heat enough in it to cook an egg." This is an illustration of the fact that the most dry-as-dust scientific lecture may be made intensely interesting if the subject is capably handled, and popular language used. Professor Rennie dealt with a highly technical subject in such a way that the veriest layman present could understand him. The subject of the evening was the liquefaction of gases. He began by explaining that ordinary thermometers were useless for measuring the intense degrees of cold of which he would have to speak, as mercury, and even alcohol, would freeze. Other and more delicate methods of proving temperatures had to be adopted, such as evaporation, and pressure. If the pressure of the atmosphere could be reduced, evaporation was facilitated. A few years ago the ice-making machines depended upon developing the necessary degree of coldness by the rapid evaporation of ammonia, but modern freezing machinery depended upon different methods. He outlined the experiments of Faraday and other distinguished scientists in the liquefaction of gases, both by pressure, and by coldness, but it was discovered that pressure alone was all that was necessary. Faraday liquefied many gases by applying a pressure equal to 600 lb. to the square inch after zero had been reached. Another scientist had succeeded still further in this direction, but oxygen, hydrogen, nitrogen, and a few other gases resisted all attempts to liquefy them, although they were subjected to the enormous pressure of 24 tons to the square inch. They were, therefore, called the permanent gases, but these had now been conquered, and only one gas—that known as helium—had not yet been converted into liquid.

Professor Rennie illustrated his lecture by a number of experiments, the most interesting of which was that in which he demonstrated that it was possible for evaporated liquid to freeze itself. "Whenever liquid evaporates it produces cold," he said, "and it is possible for it to develop so much cold as to freeze itself." He then took a cylinder filled with liquid carbon dioxide, borrowed from the Government freezing works, fitted a cap to one end of it, and in a few seconds produced the contents of the cap frozen solidly through the action of the liquid carbon in the cylinder. The frozen substance was handled by the audience, and although its temperature was 80 below zero (Centigrade), it could be handled without danger, the lecturer explaining that a vapor partially protected the human skin. Nobody held it for any appreciable length of time, however. In his second lecture next Tuesday, Professor Rennie will deal with the liquefaction of air.

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LOW TEMPERATURES.

UNIVERSITY EXTENSION LECTURE.

In the Prince of Wales Theatre at the University on Tuesday evening Professor Rennie, M.A., D.Sc., gave the first of two lectures dealing with low temperatures. The seating accommodation was almost overtaxed by notetaking students and a large section of interested citizens, including the Chancellor (Sir Samuel Way) and members of the University staff. The subject, with the illustrative aid of experiments, proved exceedingly interesting, and at the close of his lecture Professor Rennie was heartily applauded.

By way of introduction, earlier methods of producing low temperatures were demonstrated. The lecturer explained that a certain amount of heat was necessary to convert a solid into a liquid or a liquid into a gas, and that therefore if a solid could be liquefied or a liquid vaporized without the direct application of heat, heat would require to be absorbed. In other words, cold would have to be produced. The principle thus involved lay at the foundation of all the earlier methods used in producing cold, and it was shown that while the liquefaction of solids was of only limited application, the vaporization of liquids could be extensively used. By way of diversion and illustration experiments were introduced which explained methods of producing rapid evaporation. The relationship between liquids and gases was explained in lucid terms. Two methods had been used either separately or conjointly to bring about the liquefaction of gases. One was pressure, and the second the lowering of temperature. The latter, however, was shown to be the all-important proceeding. Early experimentalists found it impossible to change the state of certain gases into liquid because they tried to do so by means of pressure and the reduction of temperature to only a moderate degree. With advanced knowledge and means of experimenting it had since been definitely discovered that liquefaction could not be brought about unless the gas was first cooled below what is known as the critical temperature—a degree varying with the denomination of the element under experiment. The highly interesting works of scientists of the past century—that notable Frenchman (Cagniard de la Tour), and Northmore, Thilorier, Faraday, and Andrews—were touched upon lightly to precede experiments demonstrating the liquefaction of sulphur dioxide by cold and pressure. Finally, by allowing liquid carbon dioxide to escape into the air under pressure, the rapid evaporation of part of the liquid was shown to produce sufficient cold thereby to freeze the remainder of it. A large cylinder containing the gas, lent by the manager of the Government freezing works at Port Adelaide, allowed of the experiment being shown clearly.

Professor Rennie's second lecture next Tuesday night will be of a particularly interesting nature, as experiments will be made in the turning of air into a blue-tinged watery element by means of newly installed apparatus at the University laboratories.