If the freezing mixture is lower than − 7° C, freezing usually sets in at 0° C, and if the mixture is warmer than about − 5° C, the water in the test tube undercools, but usually does not freeze when agitated, and will remain in the undercooled condition indefinitely.

The thermometer used in this experiment is a pair of copper-constantan junctions in a thin-walled glass tube, with a wall galvanometer indicating the current, which is roughly proportional to the relatively small temperature differences.

Rabel's suggestion that the "freezing nuclei" are "active . . . between 10° and 12°" seems to be borne out by this experiment. If the "10° and 12°" means + 10° C and + 12° C, then the agitation probably inhibits the action of the nuclei; if − 10° C and − 12° C is meant, then freezing does not take place, because this range of temperature is avoided by keeping the freezing mixture substantially warmer.

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In a recent communication under this same title (*Science*, May 28, p. 567), Gabriele Rabel called attention to an important paper by Walter Rau (*Schriften der deutschen Akademie fuer Luftfahrtforschung*, 1944, Vol. 8, Pt. 2, pp. 65–84) in which is reported the supercooling of water to − 72° C. Two striking and very pertinent observations made by Rau were, however, not mentioned.

Rau reported that the ice that formed at − 72° C melts near − 70° C, and that occasionally he had observed freezing near − 55° C, yielding ice that melted below − 40° C. Obviously, neither of those ices is ordinary ice (Ice-I). He gives reasons for inferring that the − 72° C ice is Bridgman's Ice-VI and thinks that the − 55° C ice is one of the other ices that have been observed under pressure.

His observations indicate that, in the absence of motes of some kind in the water, ordinary ice never forms spontaneously. That accords with the conclusion drawn by the writer 10 years ago in a preliminary report (*J. Res. nat. Bur. Stand.*, 1938, **20**, 799–808 (RP1105)) in which it was shown that the observations are consistent with the idea that the size of the mote is a very important factor. Much additional data—none lower than − 22° C—confirming that conclusion have been obtained since then. They and a new theory of the initiation of freezing are given in a forthcoming paper (*Trans. Amer. phil. Soc.*, 38, Pt. 3).

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Gabriele Rabel's note on "Water at − 72°" (*Science* May 28, p. 567) summarizes Walter Rau's work on undercooled water. It should be noted that Dr. Rau's work has been severely criticized by B. M. Cwilong in "Observations on the Incidence of Supercooled Water in Expansion Chambers and on Cooled Solid Surfaces" (*J. Glaciology*, 1, 53–57). Cwilong points out that Rau's phenomena are not reproducible unless some contaminant such as ether or acetone is present in the system.

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Low-Temperature Spectroscopy of Biological Compounds

Scott, Sinsheimer, and Loofbourow (*Science*, March 19, p. 302) have given a method of rendering more characteristic absorption spectra of polar organic compounds by cooling. Aqueous solutions of such compounds naturally cannot be investigated below 0° C. The new method involves cooling of thin solid films consisting of the pure substances.

It may be useful to draw attention to an alternative method (Broda and Goodeve. *Proc. roy. Soc.*, 1941, A179, 151), which was successfully applied to the optical and photochemical investigation of the polar compound (conjugated protein), visual purple, at the temperature of solid CO_2. Visual purple, like many other polar compounds, is soluble in glycerol. The solution, when chilled, vitrifies without crystallizing and therefore remains homogeneous and clear. The absorption spectrum of the visual purple sharpened very considerably. The glycerol method would no doubt prove valuable with other polar bodies.

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On the Purification of Rabies Vaccine

Rabies vaccine made from the brain and cord of rabbits is a mixture of inert and of antibody-producing fractions. The effect of removal of an inert portion upon the immunizing value of the residual has been studied, and the result warrants a brief report.

Fats and lipoids, extracted from desiccated vaccine (*J. inf. Dis.*, 1912, **10**, 369–377; 1913, **13**, 155–164) with various solvents and injected into mice, do not confer protection or provoke evidence of toxic response when given subdurally or intraperitoneally. Lipids may be removed with ether, chloroform, acetone, or xylol, but in the process much or all of the living virus may be killed. But when the extraction is made at a low temperature (− 65° C) with a petroleum ether of low boiling point (20°–40° C), the virus is not destroyed nor is its antigenic value impaired. Tests of the residue made one year after the extraction show the amount of living virus to be as large as in an untreated sample of the same lot.

Comparative tests also show there is no significant loss in immunizing value. The results justify the conclusion that immunity is effectively established earlier with this fraction than with the whole. A single intraperitoneal injection has resulted in the protection of Swiss mice against a challenge of 1,000,000 times the LD for unprotected mice.

Experiments to determine accurately the value of the lipid-free fraction under variation of time and temperature are continuing and will be the subject of a later report.

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