CONICAL SNOW

THE writer has read with much interest recent articles in SCIENCE, treating of conical snowflakes. Every late autumn and early spring there occurs at Jericho, in northern Vermont, and of course at other similar localities, several falls of such snow, and also an occasional one in winter. It comes only out of cumulo-nimbus clouds, and more commonly when the surface temperature ranges from 34° to 44° F. Conical snowflakes have a granular texture and are built up mainly from countless undercooled cloud droplets that have frozen loosely together. Their greatest diameter ranges from one sixth to one third inch. The writer assumes, from a longtime study of this form of snow, that the nuclei usually, if not invariably, consist of branching tabular crystals.

It is of much interest to consider the conditions within a cumulus cloud that conspire to make the undercooled droplets so arrange themselves upon a tabular snow crystal as to form a granular snow cone. It is certain that, owing to its lightness, a tabular branching snow crystal within a cumulo-nimbus cloud is first wafted upward and about by turbulent air currents. This causes it to become thickly coated on both sides with frozen cloud droplets or granular snow. It now begins to fall with the denser side turned downward, and since it falls faster than the cloud droplets, light granular material then rapidly collects on (is caught by) the under face, thereby destroying the former gravitational equilibrium of the mass and causing it to upset, whereupon the granular snow is caught exclusively, or nearly so, by the new underside, and thus the whole converted into a more or less well-defined double cone with its abutting bases on the opposite sides of the initial tabular crystal. It is conceivable, given a cumulo-nimbus cloud of sufficient thickness, that additional upsettings might occur and thus cause the double cone to become more nearly symmetrical about its basal plane than it otherwise would be.

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RELATIONS BETWEEN FUNDAMENTAL PHYSICAL CONSTANTS

IN an article with the above title, J. E. Mills[1] gives a number of numerical coincidences, such as $(2\pi\, c) m_0^6 = 10^{-151}$, $(2\pi\, c) h^{3/2} = 10^{-28}$, $(2\pi\, c) e^{6/7} = 10^{23/7}$, where c = velocity of light, m_0 = mass of electron, h = Planck's constant, e = electronic charge. Since the numerical values of the constants that he quotes are those suggested by me in 1929[2] I may perhaps be permitted a few words on the subject.

It seems necessary, from time to time, to call attention to the fact that the *numerical* value of any constant, or combination of constants, is entirely arbitrary if the constant, or combination, possesses dimensions. The value in such cases depends directly upon the unit adopted for each dimension. Mills uses values in the C. G. S. system, and these values accordingly depend upon the arbitrarily chosen units of length, mass and time—the cm. gram and second. It is almost inconceivable that there should be an accidental theoretically significant relation between these three units, whose origin is too well known to restate. All the combinations of constants given by Mills have dimensions, and all are equated to 10^n, where n is an integer or fraction.

It is only in the case of dimensionless combinations that the numerical value can have theoretical significance. The two most famous combinations of this character are the fine structure constant α $(= 2\pi\, e^2/hc)$ and the ratio of the mass of the proton to that of the electron. There are in the literature several articles discussing the possible theoretical significance of these two pure numbers (approximately 1/137 and 1840, respectively). As a much more striking example of the type of numerical coincidence found by Mills, one may quote the known values, mass of electron $= 9.035 \times 10^{-28}$ gram, angular momentum (spin) of electron $= 9.02 \times 10^{-28}$ erg. sec (see, for instance, Pauling and Goudsmit, "Structure of Line Spectra" page 54). But one can not equate grams to erg. sec any more than one can equate horses to oranges—to use a homely but correct analogy.

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SPECIAL CORRESPONDENCE

THE PHILADELPHIA INSTITUTE FOR MEDICAL RESEARCH

MEDICAL service is about to receive an important addition through the creation of the Philadelphia Institute for Medical Research. The institute will begin its work next fall. Dr. Leonard G. Rowntree, now director of clinical investigation of the Mayo Clinic, Rochester, Minnesota, and professor of medicine in the University of Minnesota, has been appointed director.

This institute will center its activities in the great Philadelphia General Hospital. Here, in so far as medical research is concerned, it will afford a common meeting place for all medical school services cen-

[1] An obituary note of Mr. Bentley will be found in the present issue of SCIENCE.

[1] SCIENCE, 75: 243, Feb. 26, 1932.

[2] *Physical Review Supplement*, 1, 1, 1929.