memorial to their son, whose death occurred on February 24.

BY the will of Mrs. Charlotte M. Fiske, of Boston, public bequests to the amount of $130,000 are made. Tuskegee Normal School, Roanoke College and Bates College receive $5,000 each and Wellesley College receives $10,000 and the residue of the estate.

SENATOR W. C. DENNIS, president of the *Halifax Daily Herald,* has presented $60,000 to Dalhousie University in memory of his son, Captain Eric Dennis, killed at Vimy Ridge. The gift provides that the university shall found a chair of government and political science.

DR. EDWIN BISSELL HOLT, assistant professor of psychology at Harvard University has resigned, his resignation to take place on September 1, 1918.

AT the University of Chicago Dr. Harvey B. Lemon, instructor in the department of physics, has been promoted to an assistant professorship; and Dr. A. L. Tatum, professor of pharmacology in the University of South Dakota, has been made an assistant professor in pharmacology and physiology.

T. J. MURRY, formerly associate bacteriologist of the Virginia Agricultural Experiment Station and associate professor of bacteriology at the Virginia Polytechnic Institute, has been appointed associate professor of bacteriology at the State College of Washington and bacteriologist of the Washington State Experiment Station.

DISCUSSION AND CORRESPONDENCE

THE NOMENCLATURE OF THERMOMETRIC SCALES

TO THE EDITOR OF SCIENCE: Present usage in nomenclature of thermometric scales is a cause of indefiniteness and confusion of ideas, and some revision seems called for. Accordingly, I hope the statement of the case which follows[1] will elicit helpful suggestions and tend toward useful results.

The consensus of scientific opinion and practise is all but universally in favor of the familiar Centigrade scale of temperatures by which the temperature of melting ice and of condensing steam, both from water and under a pressure of one standard atmosphere, are designated 0° and 100° respectively. By general consent the value of other temperatures than the two points thus fixed by definition are defined by the normal constant volume hydrogen thermometer of the International Bureau of Weights and Measures as realized by certain mercury in glass thermometers. In recent years the scale of temperatures defined by the varying resistance of pure platinum is also accorded the status of a thermometric standard when its thermal coefficient as defined by the Callendar equation is evaluated by observations at the melting and boiling points of pure water, and at the boiling point of sulphur under standard conditions defined to be 444.5° or 444.6° C.

All other thermometric scales that depend on the physical properties of substances may, by definition, be made to coincide at the ice point and the boiling point with the normal scale as above defined, but they will diverge more or less from it and from each other at all other points.

To obviate the difficulty which arises because thermometers of different types and substances inherently disagree except at the fixed points, Lord Kelvin proposed many years ago that temperatures be defined by reference to certain thermodynamic laws. This course furnishes a scale independent of the nature or properties of any particular substance. The resulting scale has been variously named the absolute, the thermodynamic, and more recently in honor of its author, the Kelvin scale. The temperature of melting ice by this scale on the centigrade basis is not as yet accurately known, but it is very nearly 273.13°, and that of the boiling point 373.13°.

Occasions arise with increasing frequency in which meteorologists, physicists, and others in dealing with problems of temperature are required to use an absolute scale or an approximation thereto, and to publish temperature data in those units. It is not convenient, and in many cases not necessary, to adhere

[1] See also Monthly Weather Review, Nov., 1917.

strictly to the true thermodynamic scale. In fact, the general requirements of science are very often largely met by the use of an *approximate* absolute scale which, for the centigrade system, is defined by the equation

$$T = 273. + t° \text{ Cent.}$$

The observed quantity, $t°$, may be referred to the normal hydrogen centigrade scale or be determined by any acceptable thermometric method. This approximate scale is often called the "absolute" or the Kelvin scale, perhaps for the sake of brevity or convenience. Of course, no one can disregard the technical differences between the real and false or approximate, absolute scale.

Such a scale differs from the true Kelvin scale, first, because 273° is not the exact value of the ice point on the Kelvin scale; second, because each observed value of $t°$ other than 0° or 100° requires a particular correction to convert it to the corresponding value on the Kelvin scale. These corrections will differ according to the kind of thermometer used in obtaining the value $t°$ and while they are small for temperatures between 0° and 100° they are large at extreme temperatures and are important in all questions involving thermometric precision.

The *approximate* absolute scale is sufficiently exact for nearly all purposes, it is most convenient in computations and in the publication of results; further, its numerical quantities are strictly homogeneous, and should any necessity arise data published in its units may be readily reduced to the absolute Kelvin scale by simply applying the appropriate correction for the zero point of the scale—about 0.13° C.—and the other appropriate correction to reduce the observed temperature, $t°$, to the true thermodynamic temperature. It is thus clear that much confusion and uncertainty of terminology and meaning would be obviated and Kelvin's suggestion properly appreciated if scientists would agree to *give the approximate absolute scale a particular name of its own* and reserve the name "absolute" for the scale that is truly absolute, viz., Kelvin's absolute thermodynamic scale.

In accordance with the foregoing ideas, the thermometric scale and nomenclature in the centigrade system may be set forth in the following manner:

THERMOMETRIC NOMENCLATURE

AS IT IS

	Fiducial Points	
Centigrade scale	Freezing	Boiling
Normal hydrogen constant-pressure thermometer	0°	100°
Thermodynamic scale, Absolute scale, Kelvin scale, Approximate or "near-absolute" scale defined by the equation $T = 273 + t°$ Cent.	All frequently loosely designated Absolute Scale in scientific literature.	

AS IT SHOULD BE

Centigrade scale	0°	100°
Thermodynamic scale, Absolute scale, Kelvin scale	273.13°	373.13°
	Strictly synonymous and strictly one ideal scale.	
"Approximate-absolute (?)"	273°	373°

Let us prevent confusion and uncertainty, make the meaning of scientific writings clear and distinct, by giving an appropriate name to the scale

$$T = 273 + t° \text{ Cent.}$$

Such a name will have the significance of—

Quasi-absolute, symbol Q or A_q.
Approximate absolute, symbol A_a, or *aa*.
Pseudo-absolute, symbol P.

It should be a short word if possible and suggest a good symbol for its abbreviation. The above list of names is tentative and suggestions from others are requested.

C. F. Marvin

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THE DOMESTICATION OF THE LLAMA

To the Editor of Science: For many years one of the favorite arguments of those who wish to prove an immense antiquity for the peoples of the Andean area has been that thousands of years must have gone by before the llama and its kindred, the alpaca, the vicuna, the huanacu, could have been brought