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.

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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

to their present condition of domestication. In the opinion of the present writer, who is now in Peru and who has lately been in Bolivia as well, this argument is of slight, if any, value. From close study of the matter it becomes clear that the llama is only partially domesticated. There are several criteria of domestication: If an animal depends upon a man for its food, if it breeds while in captivity, if it needs to be artificially sheltered from the stress of weather, if it is obedient to the wishes of its owner, it may be said to be domesticated. It is quite certain that by far the greater part of the llama species to-day feed themselves, refuse to breed in captivity (or, at any rate, generally breed when as far as possible from man), and do without shelter. It is true that the llama is more or less obedient to its owner, but it is a docile animal by nature, and, so long as it is not overloaded, it is a ready worker in its own way. Since this is so, it is quite clear that the llama is only partially domesticated, or rather, that it has been partially subjected to the uses of man, and it is certain that its status does not imply any long period of human influence.

PHILIP AINSWORTH MEANS

LIMA, PERU,
November 29, 1917

THE ORIGIN OF THE CUSTOM OF TEA DRINKING IN CHINA

TO THE EDITOR OF SCIENCE: I have been much interested in a statement which occurs in the late Professor King's book "Farmers of Forty Centuries" relative to the origin of the custom of tea drinking in the Orient. Professor King states (p. 77):

> In a sampan managed by a woman and her daughter, who took us ashore, the middle section of the boat was furnished in the manner of a tiny sitting-room, and on the sideboard sat the complete embodiment of our fireless cookers, keeping boiled water hot for making tea. This device and the custom are here centuries old and throughout these countries boiled water, as tea, is the universal drink, adopted no doubt as a preventive measure against typhoid fever and allied diseases.

And (p. 323):

> The cultivation of tea in China and Japan is another of the great industries of these nations, taking rank with that of sericulture, if not above it, in the important part it plays in the welfare of the people. There is little reason to doubt that the industry has its foundation in the need of something to render boiled water palatable for drinking purposes. The drinking of boiled water has been universally adopted in these countries as an individually available, thoroughly efficient and safe guard against that class of deadly disease germs which it has been almost impossible to exclude from the drinking water of any densely peopled country.

These statements would indicate the following sequence of events: (1) the pollution of the drinking water, (2) disease arising from this pollution, (3) boiling of the drinking water to prevent disease, (4) addition of tea leaves to mask the insipid taste of the boiled water. While I have no doubt but that the first two items occurred in the order given, I have very grave doubts as to the sequence of the third and fourth items. It is extremely improbable that it was recognized centuries ago that typhoid fever, etc., were disseminated by pollution of the water supply, especially inasmuch as there was no knowledge of microorganisms or of the rôle which they play in disease until the work of Pasteur (1857–1863). Undoubtedly disease with the Chinese, as with every other people, was early regarded as the act of demons or a visitation of the gods.

To my mind, cause and effect were somewhat as follows: (1) The drinking water was undoubtedly polluted and typhoid, cholera, dysentery, etc., were endemic. (2) Certain families or clans found that a pleasing beverage could be made by steeping the leaves of the tea plant in hot water with the result that they drank very little if any of the polluted waters without previously boiling it. (3) Their neighbors or neighboring communities observed that these families or clans who drank tea had relatively little disease as compared with the non-tea drinkers and as a result the custom of tea drinking spread