LETTERS

Properties of Materials at Low Temperatures

Dr. Hilsenrath in his review of the compendium *Properties of Materials at Low Temperatures* (*Physics Today*, August 1962) gave a fair and fully justified account of the regrettable circumstances surrounding the publication of this book. The purpose of this letter is to express sincerest apologies to all concerned, and to give an assurance that this unfortunate matter was entirely unintentional.

Let me say first of all that the fact that the compendium was issued by the Office of Technical Services and, being therefore in the public domain, did not require legal authorization before it could be reprinted, in no way excuses the omission of not consulting the editor and the sponsoring body beforehand. In publishing—and in scientific publishing in particular—a close and friendly cooperation between authors and publisher is of paramount importance, and it is the established practice of Pergamon Press not to publish anything without consulting those concerned with the work in question. We have reprinted a considerable number of publications in the "public domain", quite a few of them from the National Bureau of Standards, and we have throughout followed this practice and received friendly and constructive cooperation from many authors, for which we are duly grateful. It was through one of those rare but very unfortunate combinations of human errors that this standard procedure was not followed with this compendium; and it was equally unfortunate that by the time our attention was drawn to this mistake through a letter by Dr. Tilley of the NBS, the book had been printed and it was too late to do anything. The human errors occurred because our Oxford office thought that our New York office had followed the usual procedure of consultation and likewise our New York office thought that Oxford had taken care of this.

For all these unhappy events, I, as head of the Pergamon Press, must take the blame and I wish to express my sincerest personal apologies to Dr. Victor F. Johnson, of the NBS Cryogenic Engineering Laboratory, the editor of the compendium, and to all his colleagues who helped with the work, for any embarrassment or annoyance that may have been caused by reprinting the compendium without consulting them.

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Naperian Terminology

John Napier (1550–1617) or, in the Scottish spelling, John Neper, Laird of Merchiston, was a fascinating character to whom science is indebted for important mathematical techniques and terminology. Among these are the Naperian logarithm and the decimal point. In partial commemoration we now have also the neper: a dimensionless unit buried in the exponent of the Naperian base "e". Unfortunately, the Naperian logarithm is usually called the natural logarithm, the origin of the decimal point has been forgotten by most people, if they ever knew it; and the neper is a difficult concept to explain to the nonscientist, besides sounding to the non-Scot like a deliberate parody of the man's name.

Oral tradition is to the effect that we owe the name neper, instead of napier, for this unit to the prudery of the Swedish delegation in the International Advisory Committee on Long Distance Telephony in Europe in 1928 (See W. H. Martin, *Bell Syst. Tech. J.* 8, 1, 1929: "Decibel—The Name for the Transmission Unit"). They argued that napier would be abbreviated nap, which is Swedish for teat, and this wouldn't do. Considering that the jiffy, the jot, and the barn now exist with varying degrees of acceptance and respectability, nap seems unobjectionable to most of us.

Be that as it may, John Napier is without suitable commemoration in the world of Science. It is the purpose of this letter to suggest that there is an appropriate use for his undistorted name. Consider, for example, the "time constant" RC of an electric circuit, the time lag in adjustment of stress to strain in a viscoelastic medium, the so-called "relaxation time" of a gas or liquid that shows a specific heat lag with the passage of a sound wave, the reciprocal of the damping constant in damped SHM, and let them and all similar times referring to an inverse exponential return to equilibrium be denominated the "Napier time". Since "e" is the Naperian base, the time to reduce a disturbance to $1/e$ of itself is most suitably called the Napier time. Its reciprocal will be the Napier frequency.

It is usually desirable to divorce the names of phenomena from an implied physical mechanism causing them, since the explanation may be outdated by new knowledge. To use the term Napier time for "relaxation time" is indeed now desirable, since by an extension (caused by the identity of mathematical formulation) the term relaxation has been applied in many circumstances where it is not only inappropriate but actually in implicit contradiction to the common meaning of the term in nontechnical language. For instance, as the frequency of the sound passing through carbon dioxide is raised through the "relaxation frequency", the internal specific heat "relaxes out" (lags behind the temperature variation) and C_p/C_v rises, leading to a higher effective bulk modulus and a correspondingly higher sound velocity. The gas is actually "stiffer" after the "relaxation". This is a bit of etymological nonsense that makes teaching and understanding the subject unnecessarily difficult. In the case of a suddenly strained viscoelastic medium, "relaxation" is directly appropriate.

Again, what has relaxation to do with the decay of the charge on a condenser? One can speak meaningfully of the relaxation of stress in the dielectric, but to do so puts a concept of mechanism into the unit, and goes behind the phenomenon itself. In radioactivity the terms half-life and average life are too directly applicable to be changed, but the average life in radioactive decay is just the "napier time".

A further term is the "napier number": the number of collisions required to produce the $1/e$ approach to equilibrium in any gaseous system showing thermal lag, and the damping constant of damped SHM would be the "napier constant".

If these terms are adopted and any reference to "relaxation" avoided in future, the language of physics will have taken a small but useful step toward clarity, as well as suitably remembering a most unusual man.

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