that they follow these rules as such rules are usually followed, that is only so far as they conflict with no personal opinion?

In the above-mentioned note Mr. Hebard expresses regret that well-known names should be changed on debatable grounds. In view of this statement it is interesting to note his use in the same paper, page 19, of the name *Schistocerca serials* Thunberg instead of *Schistocerca americana* Drury, a name in common use long before *Pedeticum* was erected. That the original inclusion of the species *americana* in the genus *Libellula,* which makes it a primary homonym of *Libellula americana* Linn., a true dragon fly, was a *lapsus* seems clear for several reasons, a matter too complicated for discussion at this time. However, even if granted as obviously a *lapsus calami,* there appears to be no definite authority in any code of rules for the setting aside of this reference. Thus Mr. Hebard's suppression of the name *americana* is accepted, but, until a decision is rendered on the case by the International Commission, the grounds upon which he suppresses it are certainly debatable, more so, in fact, than those upon which the present writer resurrects the genus *Pedeticum.* Indeed this action of Mr. Hebard would probably not be sustained by the International Commission if it acts on the case, as its decision would very likely agree with the private opinion of its secretary, Dr. C. W. Stiles, as stated in the authorized quotation here given from a letter written on April 10, 1916:

> . . . In the case of *Libellula americanus* Drury, 1770 (in index of later date) it seems clear that this is a *Lapsus calami.*
>
> Without attempting to commit the Commission to any view, I personally would not reject—especially at the present moment—a well-known name like *Gryllus americanus* seu *Schistocerca americana* because of an obvious *lapsus calami.*

Dr. L. Stejneger, also a member of the Commission on Zoological Nomenclature, authorizes the statement that his present views on this matter coincide with those expressed in the above quotation.

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THE CURRENT "DEFINITIONS" OF ENERGY

TO THE EDITOR OF SCIENCE: In a communication which appeared in a recent number of SCIENCE[1] Professor M. M. Garver criticizes the current definitions of energy, such as "the capacity for doing work," the "ability to do work," and the "power of doing work," on the ground that these definitions are not consistent with the concept of energy. The terms "capacity" and "ability" do not mean entities, while energy is not only a physical entity but it has the property of conservation.

It seems to me that Professor Garver's criticism is well taken, but the alternative he proposes is open to criticism also. For Professor Garver would have no definition of energy at all or, if it is insisted upon, he would have it based on the principle of the conservation of energy.

Energy is first introduced in text-books of physics as a mechanical concept. Therefore any definition of energy should form an integral part of a logically developed system of mechanics. It should be the direct and natural result of the dynamical concepts which precede it and should form an adequate basis for the new ideas which follow it. Further it should have such a form as to lend itself easily to a mathematical expression of the definition. Elementary mechanics is usually based upon postulates, such as Newton's laws of motion or the action principle, which involve the concept of force. Therefore the definitions of energy and momentum as well as the principles of the conservation of energy and of momentum should be made the direct consequence of the postulates which have been selected as the starting point of the development of mechanics. This necessitates the definition of energy as the "result of the action of force in space" and the definition of momentum as the "result of the action of force in time." In other words, energy should be defined in terms of work and momentum in terms of impulse. The definition of energy contained in the following extract fulfills these conditions. It is not only consistent, but has the advantage of leading to the mathematical expressions for kinetic and potential energy.

[1] SCIENCE, April 21, 1916.

Energy may be defined as work which is stored up. Work stored up in overcoming kinetic reactions is called kinetic energy. Work stored up in overcoming non-frictional forces, such as gravitational forces, is called potential energy. Work done in overcoming frictional forces is called heat energy.

Potential, kinetic and heat energy are different (at least apparently[2]) forms of the same physical entity, *i. e.*, energy. Energy may be changed from any one of these forms into any other form. Whenever such a change takes place energy is said to be transformed. Transformation of energy is always accompanied by work. In fact the process of doing work is that of transformation of energy. The amount of energy transformed equals the amount of work done.[3]

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UNITS OF FORCE

To the Editor of Science: I have read with much interest Professor Kent's article in Science on the units of force. I might say that I have taught mechanics in my physics course this year, using the units the way Professor Kent recommends. The results have been entirely successful and highly gratifying. I used the pound and the gram as the units of mass and the pound and the gram as the units of force. As far as the results to the student go it has resulted in conciseness and clearness of thought and an avoidance of the unescapable confusion that results from introducing units that nobody but a teacher of physics wishes to use. Not only did this apply to force equations but it had a good result all along the line in problems on work energy and power. I embodied in my method of teaching the things that Professor Kent recommends and also many of the things that Professor Huntington recommends. I believe that a great deal of the trouble is due to the fact that most of our teachers of physics do not have the point of view of the engineer (they should have if they teach engineers) and I believe that the only way to get this point of view is in the school of practical engineering. This hodgepodge of units which some of us wish to use are undesirable and pedagogically unsound.

Paul Cloke

[2] Recent developments in physical sciences tend to show that differences between different forms of energy are only apparent and that all forms of energy are, in the last analysis, kinetic.

[3] H. M. Dadourian, "Analytical Mechanics," 2d edition, p. 248. H. M. Dadourian

THERMOMETER SCALES

To the Editor of Science: In a letter published in Science of May 5, 1916, page 642, a correspondent advocating the retention of the Fahrenheit scale says that "nine tenths, probably, of the use of the thermometer is for the weather" a statement that should not pass unchallenged; but even if there were no other uses of the thermometer, the Fahrenheit scale would still be objectionable. If your correspondent will visit any extensive meteorological library, he will find that nearly all national weather services now use the Centigrade scale and that internationally no other scale has been recognized for some years. Even the few weather services retaining the Fahrenheit scale, restrict its use and banish it from all investigational and research work.

It is urged that "the common people are familiar with the Fahrenheit scale." They may be familiar with it and yet not understand it. When the temperature is 64° F., is it clearly understood by every one, that the temperature is 32 degrees above freezing; and on the other hand when it is —32° F., that the temperature is 64 degrees below freezing? The scale says one thing and means another. It is true that the Centigrade scale division is nearly twice the length of the other scale division; and much has been made of this by some who insist upon accuracy to the tenth of a degree; but it may be well to remember that most air temperatures are a degree or more in error. Even with official instruments, errors of exposure or time, exceeding several degrees, go uncorrected, while instrumental errors are applied to a tenth of a degree. On the daily weather map one finds isotherms charted from readings made at different hours and different elevations. A reading made at 5 A.M. in the Nevada desert is linked up with readings made at 8 A.M. on the Atlantic seaboard. Some years ago, I suggested to the