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Article

On the Mechanical Equivalent of Heat and Occupation

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Abstract

The ubiquitous phenomenon of human occupation, defined as the activity in which one engages, a synonym for work, symbol W, and the mechanical equivalent of heat, symbol J, defined as the ratio of a unit of mechanical energy to the equivalent unit of heat, are argued to be connected. [1] In simple term, the work a person does in life is hypothesized to be directly related to the ratio of the transformation of solar heat into human mechanical or mechanistic work.

Article

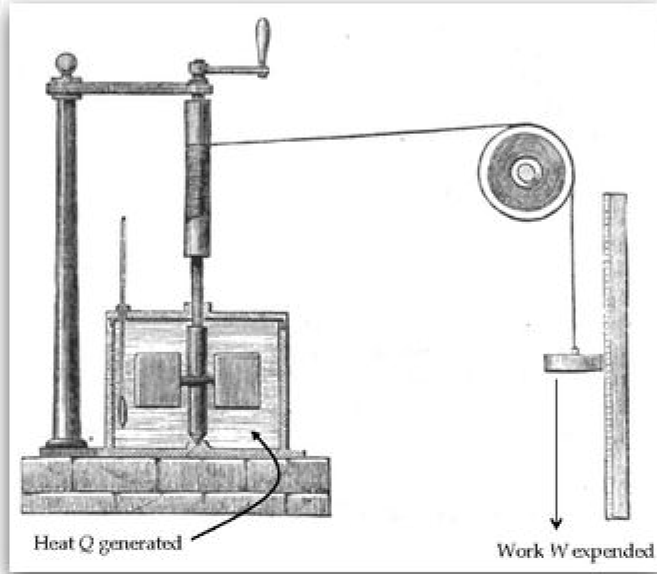
That heat can produce motion is postulate long ago established in the various Sun mythologies of humankind, particularly in Egypt. The first recorded steam-powered device, the aeolipile, was described by Hero of Alexandria (Heron) in 1st century Roman Egypt, in his manuscript Spiritalia seu Pneumatica. [2]

Steam ejected tangentially from nozzles caused a pivoted ball to rotate; this suggests that the conversion of steam pressure into mechanical movement was known in Romanian Egypt in the 1st century. At the time, the device was regarded as a mere curiosity. Some, however, claim it was used to perform simple work, such as opening temple doors. [3]

More concretely, as French physicist Denis Papin conceived in 1679, by watching pressure-release valve rhythmically move up and down on a pressure-cooking bone digester, and his resultant idea of hypothetical "piston and cylinder steam engine", heat can be converted into mechanical work. [4] Conversely, as American-born English physicist Benjamin Thomson showed in 1798, by watching heat being generated in the boring of cannon barrels, in the workshops of the military arsenal at Munich, mechanical work can be converted into heat. [5]

The unification of the mutual equivalence of these two effects, heat into work or work into heat, were put on experimental footing by those as: Marc Séguin (1839), Robert Mayer (1842), Ludwig Colding (1843), James Joule (1843 to 1849), Carl Holtzmann (1845), and Gustave-Adolphe Hirn (1856). [6]

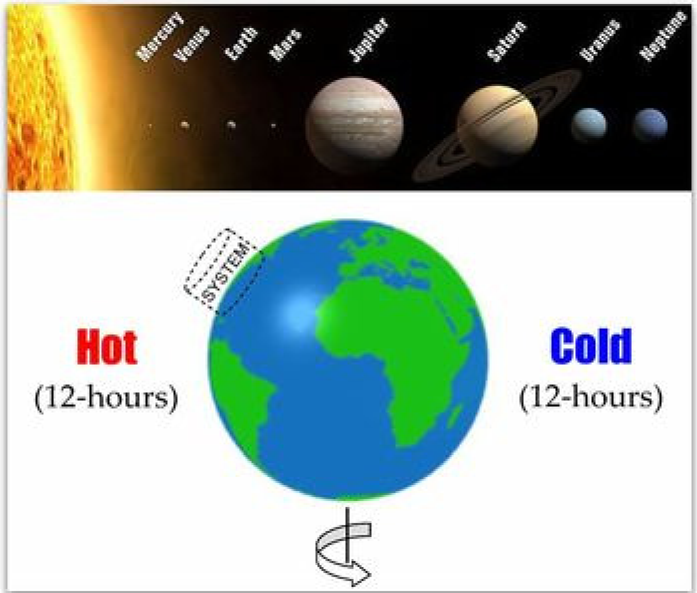
The unifying experiment of the phenomenon of the mutual equivalence of heat and work was English physicist James Joule's 1843 paddle wheel experiment. In this experiment, a falling weight was attached to wound rope to a wooden paddlewheel immersed in a tub of water. When the weight fell, the paddle wheel turned, causing agitation in the water and as a result a temperature increase. [7] The depiction shown below is an engraving of Joule's apparatus for measuring the mechanical equivalent of heat from the August 1869 issue of Harper's New Monthly Magazine, No. 231.



In short, through this and other experiments, Joule showed that the work energy, inherent in the position of mass in the gravitational field of the earth, released when a one pound weight falls through a height of 778 feet can affect a temperature increase of one degree in a pound of water, through a number of means of energy conversion.

In 1845, German mathematician Carl Holtzmann began to assign the letter "a" to the mechanical equivalent of heat and stated, in reference to the effect whereby heat produces work, that "I call the unit of heat the heat which by its entrance into a gas can do the mechanical work a—that is, to use definite units, which can lift a kilograms through one meter." [8]

On this logic, the postulate outlined here, is that this statement by Holtzmann, as discovered by Papin, investigated by Joule and others, is the essential description of the nature of occupation and existence of animate life on Earth. This principle extrapolates to the effect that when a unit of heat enters into the various "working bodies" (systems) attached to the rotating surface of the earth, the driving force of this heat mediates a mechanical effect or occupation in the chemical species, such as human molecules, of the system, just as it does in Joule's numerous experiments, as shown below:



By 1854, the phenomenon of the equivalence of heat and work had been formulated by German physicist Rudolf Clausius into what he called the theorem of the equivalence of heat and work as such: [9]

> "Mechanical work may be transformed into heat, and conversely heat into work, the magnitude of the one being always proportional to that of the other."

This logic was then molded, via a number of arguments, into the (a) the conservation of energy and (b) the equivalence-value of all uncompensated transformations (entropy); or what are commonly known as the first and second laws of thermodynamics, respectively; which are said to govern actions of all life. [10]

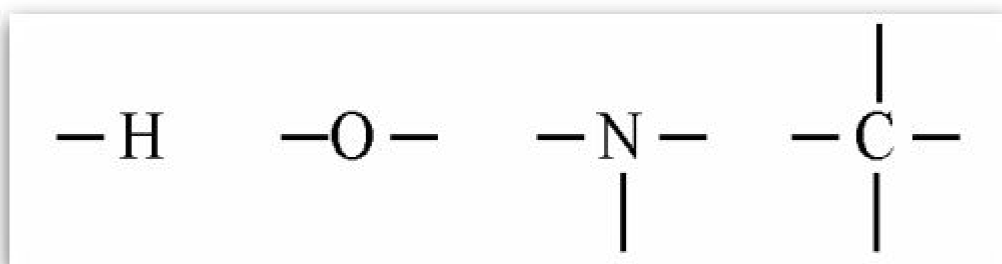
In terms of human productivity and existence, Clausius' theorem of the equivalence of heat and work implies that for every unit value of heat dQ that enters a system of the biosphere a proportional amount of mechanical work dW will be driven into action. [11] This is the origin of work and wealth. [12]

The amount of bulk work mediated per input, per system will be constant. What will vary, however, is the level or intensity of work per individual species or molecule, which will depend on neuro-system octet rule stability tendencies, where in each atom, molecule, or species will move or evolve, producing work in the process, towards configurations of maximal quantum-electromagnetic stability.

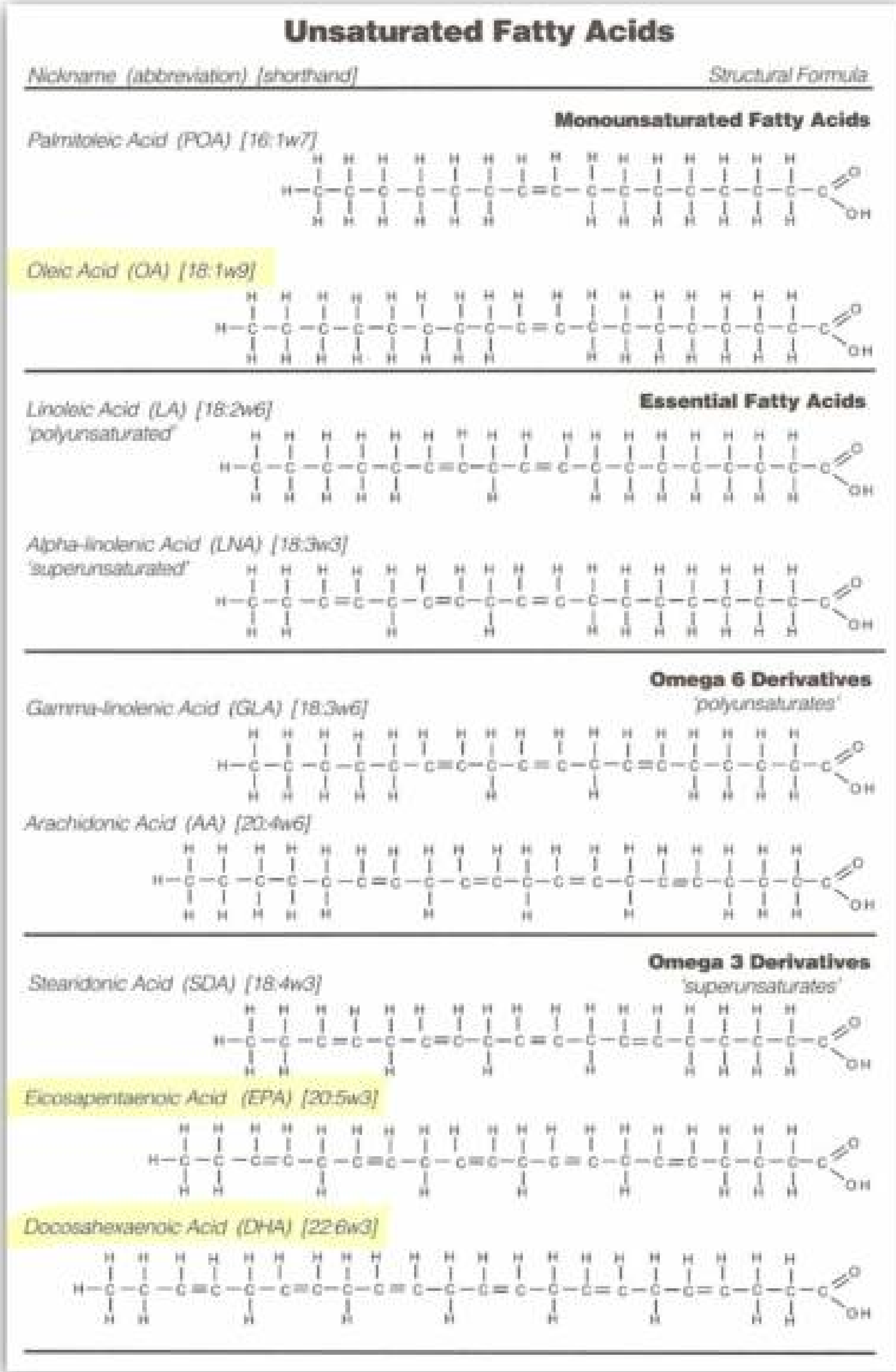
The effect of this mediated stability tendency, however, is system-constrained. This means that a structures work-minded ability or need will vary depending on system constraints. To cite an example, one study done in the early 1980s found that ants can be divided into two categories: one consisting of hard workers, the other of inactive or 'lazy' ants. [13] Interestingly, the study found that if the "system" were shattered by separating the two groups from one another, each in turn developed its own subgroups of hard workers and idlers. In other words, a significant percentage of the 'lazy' ants suddenly turned into hard working ants.

These findings correlate well with what is called the Pareto principle or 80-20 rule which says that 80 percent of a system's wealth is typically confined to 20 percent of the population. [14] This view comes from the 1890s studies of French-Italian mathematical economist Vilfredo Pareto who, in his observations on the connection of income and wealth, noticed that 80% of Italy's wealth was owned by 20% of the population. Specifically, according to Pareto, 'some affirm that all social ills come from alcoholism, others that they come from immoral literature and others, the greatest in number, accuse distribution of income.' He continues, 'they would go to absurd lengths to be able to discount the necessity of admitting that in the human species, as in all living species, individuals are not born equal, they have diverse characteristics and certain individuals are more suited to the environment in which they live.' [15]

Pareto also viewed people to be "human molecules" and society as being a system similar to American mathematical physicist Willard Gibbs' physico-chemical thermodynamic systems. [16] As such, in modern terms, where humans are large aggregates of atoms, just as atoms, such as hydrogen H, oxygen O, nitrogen N, and carbon C, of which human molecules have evolved from, have unique bonding, reactivity, and system work stability functions as determined by their inherent quantum electrodynamic structures (as depicted below), then so to do human molecules (in their quantum electrodynamic bonds) and that this accounts for the division of wealth and work function desires and satieties in society:



Of interest in this diagram are the bonding tendencies of hydrogen, mono-valent, and carbon, tetra-valent, being that the majority of the central nervous system is composed of hydrocarbon molecules, such as DHA (docosahexaenoic acid) and AA (arachidonic acid), the most abundant structural fats in the gray matter, and EPA (eicosapentaenoic acid), the central component of white matter. About 25 percent of the brain, for instance, is DHA. These hydrocarbon molecules are shown below: [17]


Unsaturated Fatty Acids
Nickname (abbreviation) [shorthand]
Structural Formula
Monounsaturated Fatty Acids
Palmitoleic Acid (POA) [16:1w7]
Oleic Acid (OA) [18:1w9]
Essential Fatty Acids
Linoleic Acid (LA) [18:2w6]
'polyunsaturated'
Alpha-linolenic Acid (LNA) [18:3w3]
'superunsaturated'
Omega 6 Derivatives
'polyunsaturates'
Gamma-linolenic Acid (GLA) [18:3w6]
Arachidonic Acid (AA) [20:4w6]
Omega 3 Derivatives
'superunsaturates'
Stearidonic Acid (SDA) [18:4w3]
Eicosapentaenoic Acid (EPA) [20:5w3]
Docosahexaenoic Acid (DHA) [22:6w3]

In summary, how "heat", in the form of gamma ray photons, affects the force of sensory stimulus, as mediated via structural changes in octet rule bonding stabilities of these CNS hydrocarbon molecules, central to the motivating forces of the human molecule, is what transmits the mechanical equivalent of heat in the varieties of occupation, human endeavor, otherwise known as "work".

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