

Two letters to Marx on Podolinsky

Friedrich Engels, December 19 & 22, 1882¹

London, December 19, 1882

My idea of the Podolinsky business is as follows. His real discovery is that human labour has the power of detaining solar energy on the earth's surface and permitting its activity longer than would be the case without it. All the economic conclusions he draws from this are wrong. I have not got the thing by me but recently read it in Italian in the *Plebe*. The question is: how can a given quantity of energy in a given quantity of food leave behind it a greater quantity of energy than itself? I solve it in this way. Assume that the amount of food daily necessary for one person represents an amount of energy expressed as 10,000 H.U. (heat units). These 10,000 H.U. remain for ever = 10,000 H.U. and in practice, as is well known, lose in the course of their transformation into other forms of energy, through friction, etc., a part of their availability. In the human body this is even considerable. The *physical* work performed in economic labour can never therefore = 10,000 H.U. but is always less.



But this does not mean that physical labour is *economic* labour; far from it. The economic labour performed by the 10,000 H.U. in no wise consists of the *reproduction* of the same 10,000 H.U., wholly or partially, in this or that form. On the contrary, most of these are lost in the increased heat and radiation of the body, etc., and what remains available of them are the fertilising potentialities of the excrements. The economic labour which a man performs by the employment of these 10,000 H.U. consists rather in the fixation for a greater or less time of *new* H.U. radiated to him from the sun, which have only this labour connection with the first 10,000 H.U. Whether, however, the *new* quantity of H.U. fixated by the application of the 10,000 H.U. of daily nourishment reaches 5,000, 10,000, 20,000 or 1,000,000 H.U., depends solely on the degree of development attained by the means of production.

This can only be represented arithmetically in the most primitive branches of production: hunting, fishing, cattle-raising, agriculture. In hunting and fishing new solar energy is not even fixated, only what has already been fixated is turned to use. At the same time it is obvious that, assuming the fisher or hunter to be normally nourished, the amount of albumen or fat he gets by hunting or fishing is independent of the amount of these foodstuffs which he consumes.

¹ Source: *Marx and Engels Correspondence*, International Publishers, 1968.

In cattle raising, energy is fixated in the sense that vegetable matter, which would otherwise rapidly wither, decay and decompose, is systematically transformed into animal albumen, fat, skin, bones, etc., and therefore fixated for a longer time. Here the calculation is already complicated.

Still more so in agriculture, where the energy value of the auxiliary materials, manures, etc., also enters into the calculation.

In industry all calculation comes to an end: in most cases the work added to the product can no longer be expressed in H.U. If, for instance, this is still possible with a pound of yarn because its toughness and capacity for resistance can just, with a lot of fuss and trouble, be reduced to a mechanical formula, here already this appears as an utterly useless piece of pedantry, and in the case of a piece of unbleached cloth, still more in the case of bleached, dyed and printed cloth, becomes absurd. The energy value of a hammer, a screw or a needle calculated according to the cost of production is an impossible quantity. In my opinion it is absolutely impossible to try and express economic relations in physical magnitudes.

What Podolinsky has entirely forgotten is that man as a worker is not merely a fixer of *present* solar heat but a still greater squanderer of *past* solar heat. The stores of energy, coal, ores, forests, etc., we succeed in squandering you know better than I. From this point of view even fishing and hunting appear not as the fixation of new sun heat but as the using up and incipient waste of solar energy already accumulated.

Further: what man does deliberately by work, the plant does unconsciously. Plants--and this is an old story already--are the great absorbers and depositors of sun heat in a changed form. By work, therefore, in so far as it fixates sun heat (which in industry and elsewhere is by no means always the case) man succeeds in uniting the natural functions of the energy-consuming animal with those of the energy-collecting plant.

Podolinsky has strayed away from his very valuable discovery into mistaken paths because he was trying to find in natural science a new proof of the truth of socialism, and has therefore confused physics and economics.

London, December 22, 1882

To return once more to Podolinsky; I must make a correction, namely, that storage of energy through work really only takes place in *agriculture*; in cattle-raising the energy accumulated in the plants is simply transferred as a whole to the animals, and one can only speak of storage of energy in the sense that without cattle-raising, nutritious plants wither uselessly, whereas with it they are utilised. In all branches of industry, on the other hand, energy is only *expended*. The most that has to be taken into consideration is the fact that vegetable products, wood, straw, flax, etc., and animal products in which vegetable energy is stored up, are put to use by being worked upon and therefore *preserved longer* than when they are left to decay naturally. So that if one chooses one can translate into the physical world the old economic fact that all industrial producers have to live from the products of agriculture, cattle-raising, hunting, and fishing – but there is hardly much to be gained from doing so....

I am glad that on the history of serfdom we 'proceed in agreement', as they say in business. It is certain that serfdom and bondage are not a peculiarly medieval-feudal form, we find them everywhere or nearly everywhere where conquerors have the land cultivated for them by the old inhabitants – e.g., very early in Thessaly. This fact has even misled me and many other people about servitude in the Middle Ages; one was much too much inclined to base it simply on conquest, this made everything so neat and easy. See Thierry among others.

The position of the Christians in Turkey during the height of the old Turkish semi-feudal system was something similar.