

Mayer's Forces

"From these ideas, Nature presents itself in simple beauty, and anyone can comprehend much of what the most instructed philosophers cannot" – Robert Mayer

I always believed that the great minds of mankind would be recognized, idolized, and that their contributions to human knowledge would mark themselves in the memory of the generations to come. I was far too wrong.

In March 20th of 1851 I would get to know one of those figures in a place as far as unexpected: Carson City's Sanatorium. My name was already forgotten by the years I have lived inside these walls due the condemnation of one of my great talents: foreseen the future by analyzing kindling forms; however, the name of this gentleman I would never forget. Julius Robert Mayer was been hospitalized for a reason that really got me: a suicide attempt. In a few days I would become closer to this person to understand the despair that was driving him mad.

As our intimacy was growing, I was figuring out that he was born in Heilbronn, Germany, at the time that this rural city was starting to see railroads tearing off their plantations, and the machinery brought from abroad was strengthening their new industries. His father and oldest brother, both apothecaries, would always bring to their home machines, instruments, and other chemical, botanical and mechanical apparatus of that time. Mayer, encouraged by them, would become a doctor, but was always reminding me during lunches of his passion as a child to see windmills or water wheels working tirelessly. According to him, this habit would bring him an idea: would it be possible that a machine work forever, without the needs of the wind or the coal to feed it? I believe it is awkward for a doctor that works with scientific questions distant from his field of work, but this one did not give up to search for answers to those questions.

I always thought it was curious the fact that Robert was so religious and so spiritual. However our beliefs were divergent, I respected his position that had helped him in his toughest moments. Nevertheless, I did not understand his suicide attempt, as during his life he had lost three children and still held on. Something else would have happened in that month that I was unaware.

One day while we walked between the Carson City's trees, Mayer would have tell me about a great trip he had done as a ship doctor to Dutch colonies located in Asia. The habit of letting blood from sick sailors motivated an observation that caused him amazement. He noticed and confirmed that there was a difference between the venous blood color when the sailors were in tropical climates and when they were in cold climates. In Germany's cold clime, the venous blood showed a darker color, hence a 'poorer' blood, and Mayer associated this high blood waste with the heat loss from human body towards the environment!

I started to understand why this madman was here, but he kept surprising me and proving my ignorance. Given up the opportunity to go out the ship in the dockyards full of entertainments, Mayer would constantly stay working in his great idea that he came to call as *force*. Not exactly the force we know, but something that exists in all universe, be it in the windmills or the living beings. It would transform itself at all time, from one form to another, but still perpetuating in a general way in an *indestructible force*, that would allow the existence of the universe.

Thinking as well, such forces are very weird. For someone that imagines the world made only by matter, touchable things, to imagine something so immaterial is a great challenge. In my understanding, the only thing in the universe that is indestructible and conserves itself is the matter, but I stopped to think and let him talk.

While Mayer was still euphoric with his memories, we sighted a windmill far away, and unexpectedly he started to run in its direction. The walls blocked our path, but we got the closest that we could while he, breathless, explained me:

-The way this windmill runs is not far from how our body works. Both need 'nourishment', be it the Wind or my Apple, and both loose, unavoidably, a *force* while we work. Do you know what I am referring to?

-Excrement? Well, the windmill does not release any of it...

- No, heat! This way this windmill would never be able to run forever if it only received a push, as this force would be lost in form of heat, therefore we need constant winds to feed it and make it grind our wheat. Likewise, my body loses heat by internal functions and by the attrition between our bones, muscles and ligaments.

Something started to make sense, although it was not plain to me. Mayer was affirming to me that there are some types of *force* that we acknowledge in our surroundings, be it on Earth or in the Universe, as for example: a *force* contained in moving objects, the *force* from an object that is dropped from a certain high and the heat contained in our bodies. We could, in thesis, transform one into another, such as a falling body gaining speed and heating the place it collides. Besides mechanics, we would also find forces from chemical and electromagnetic nature, as in the Alessandro Volta's batteries.

This way this doctor made his way through in a universe of incredulous scientists with his affirmatives and his boldness to mix the world of organic and inorganic bodies. Moreover, the way he described, with so many beauty analogies and images of examples in the nature did not bring him the deserved recognition. There were not a few who confronted his 'poetical' ideas and his audacity of naming his articles as 'scientific', with the little mastery of the mathematical and scientific language they presented.

There came the mercy shot. In a quiet night, while the madmen were raving in their dreams, Mayer told me his great frustration. He had taken as challenge to act as a researcher of the time and to use the mathematic as speaker of his ideas. His objective would be to show that motion transforms in heat and that we can *measure* this transformation, so that we could take this calculation to any activity!

His experiments were running well, the calculations were showing results and many conclusions would prove to be correct, resulting in a conversion coefficient between motion and heat, which for him was his master piece. However, destiny would not be so sweet with his expectations. Another scientist, a British called James Prescott Joule would have being working in the same conversion and with better results. The scientific community in the face of both works decided to celebrate the British success and to turn a blind eye to the efforts of the bold doctor. The rejection would find a discouraged Mayer by the death of a son, and that would be the trigger for his suicide attempt.

I write this on June 21st of 1853 and my dear friend is almost leaving me. It is wonderful to see him healthy and inspired to go back to his researches. As you are listening, I can foretell some of the coming years in the life of this famed figure: Mayer will go back to his search to improve the coefficient and will find values next to the accepted ones in 150 years from now! Besides that, his attempt to unite the organic and inorganic worlds will bring the science a groundbreaking vision, a new path to be followed. And yet, his results will still be questioned and not totally accepted in the next decades. You can even ask how I know all of this. Well, the kindlings never lie, right?

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