Using bacteria for biofuel production: a path to sustainability and social equality

Federico Turco

New York, United States. An unpredictable storm is going to hit as hard as never happened, and temperature is going to drop down to -100 °C degrees. It's suddenly the beginning of a new ice age and mankind is entirely to blame for it. Luckily, this is not the forecast for tomorrow, but the main plot of "The day after tomorrow" a climate science fiction disaster movie, directed by Roland Emmerich in 2004.

Despite we are not there yet, scientific community nowadays is strongly convinced of the influence of mankind on the earth climate. Violent rainfalls, desertification, loss of biodiversity, emission of carcinogenetic chemicals, unprecedented tropical diseases outbreaks as well as deep gender inequalities are all connected to fossil fuel-driven climate change. Therefore it seems clear that in order to turn the "selfdestruction key" on the off side and in order to create a more equal society, we need to tackle climate change, by modifying our habits regarding energy use and sources.

Several efforts have been done more recently in order to implement renewable energy technologies. Solar, hydroelectric and wind power are just few example of the vast array of the choice we have for sustainable energy production. However unfairly too few attention has been given to biology and microorganisms as tool for large scale fossil fuel-free energy production.

Cyanobacteria appeared on earth 2,5 billion years ago and were the first organisms able to fulfil photosynthesis. They are extremely robust, since they are known to be able to colonize all the environments on earth and they require only sunlight CO_2, H_2O and other few nutrients to thrive. But how could they help for the purpose of producing renewable energy?

The idea is to use them as a solar driven platform for biofuel production. By rearranging their genome, by means of consolidated genetic engineering techniques, cyanobacteria have been already successfully used for producing biofuels and biofuel related compounds such as, ethanol, 2,3 butandiol (potential substitute for oil derived gasoline). Nevertheless, at the current state of the research, we are developing a molecular tool, to allow efficient production of H_2 in cyanobacteria.

Along with other means for production of renewable energy, the use of cyanobacteria is an exciting and promising way to finally set an end to fossil fuel era, venturing into a new future based on prioritizing sustainable technological progress as well as social equality.

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Supervisor: Karin Stensjö, Adam Wegelius and Xin Li