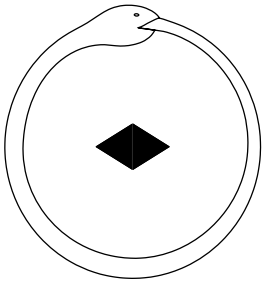


THE SUN AS A SOURCE
ENERGY, MASTERY, INSPIRATION
Aliny Pires



notebooks
SELVAGEM



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This notebook consists of the translation of the transcription of Aliny Pires' talk about the Sun, filmed on March 14, 2024, at the exhibition [Mbaé Ka'á](#) showcased by the Botanical Garden of Rio de Janeiro. Aliny's video can be [accessed here](#) as part of the Sun Cycle, which comprises 17 talks.

The Sun, for all its importance, sometimes goes unnoticed in our routine. Do we realise the power it exerts on everything we understand as life on this planet?

If we think of the Sun as an object in the sky, we will realise that, in fact, much of what the Sun is equates to what we also are, in material terms. Inside this giant in the sky there are a lot of atoms colliding, producing an enormous amount of energy. Through atomic processes with various elements energy is generated, which travels a distance of approximately 150 million kilometres, falling upon the surfaces of the Earth. This luminous energy, the photons, arrive here and reach a life which has established itself as so and that depends on this Sun. Life only exists because things have happened this way.

So the Sun has an importance that ranges from the constitution of life on this planet to maintaining it here. And here I am talking about maintaining life, not necessarily from a single perspective, which is perhaps the Sun's essential function for life in terms of its energetic importance. This solar energy reaches some plants, some organisms, some bacteria and algae, which are capable of transforming this luminous energy into chemical energy. This is how other organisms are able to obtain the energy they need to survive. They work almost like a currency exchange office, so to speak. The Sun sends an enormous amount of energy and this is converted into chemical energy. Of course this conversion, like that of a currency exchange office, has its fees, it is not 100% efficient. But at the same time, it allows us to use this energy in our activities, us

and all living beings. That is why we rely heavily on these organisms that are capable of making this conversion.

So, when this luminous energy arrives and reaches the inside of the chloroplasts, all the cellular machinery is able to make these transformations within the chemical process of photosynthesis, trapping energy within a chemical molecule. And then we have the energy to carry out all our biological activities. The Sun's essential function is perhaps its importance as a source of energy for the planet, in terms of access to mainly food resources.

There are other functions performed by the Sun: the entire functioning of life on the planet uses the Sun as a signal for everything. Life is organised around the dynamics of the Sun and its interaction with our planet. Whether it is the establishment of the seasons or the dynamics of day and night, life in general reacts to the intensity with which this Sun arrives and when it arrives. I think that the Sun, as well as being this energy bank, is also a great maestro of everything that happens here in the life of the planet, coordinating processes that are fundamental and that are signals where life has established itself. So I think that is another point, that the Sun is also a conductor of this vital process, as well as being an inexhaustible source of energy.

This energy has a very interesting number: it seems that the amount of energy we consume over the course of a year, the quantity of energy that the Sun would need to send to the planet to keep us going for a year, is something like an hour. So all the energy that the Sun sends to the planet in one hour is equivalent to the demand for energy consumption that we have on our planet. In other words, there is a huge amount of energy from which we can also create alternative uses, devising new possibilities. Today we understand, for instance, that the energy crisis is perhaps one of the most complicated for the dialogue between biodiversity conservation and climate change. This is perhaps the most challenging sector. And the Sun once again appears as a source. With technology and knowledge, we can harness this energy, which we still underutilise, to solve critical problems in our society. We can thus maintain a better relationship with biodiversity, with nature on our planet. There are physical processes that govern

the harnessing of solar energy into chemical energy and ensure the sustenance of life as well.

It is important to emphasise that it is not just the Sun that is fundamental to understanding life as it is on the planet. Primary production, for instance, uses compounds and traps solar energy into chemical energy, but it depends on a number of other factors. There needs to be water. So, if you have a place with a lot of Sun, indeed a lot of Sun, will the productive capacity of these systems increase absurdly? No. In fact, there is a balance between a series of processes.

I emphasised the role of water as an important element in this balance, but not in the sense of trying to diminish the importance of the Sun. Water, and how we understand how it works on this planet, also depends on the Sun. The entire water cycle is regulated by this dynamic. So, water evaporates because there is energy falling upon it that comes from the Sun. This water evaporates and then precipitates, distributing the water on the planet, making this happen and allowing all the production that sustains life to continue. So even when the Sun is not alone, it co-operates within other cycles to make life happen. I think this relation between the Sun and the hydrological cycle, the energy dynamics of the hydrological cycle, is also very beautiful: there is coordination so that we actually have the possibility of life. And then, of course, all of this plus taking into account the dynamics of the Earth's rotation, inclination, distance from the Sun, seasons, all of this makes life on this planet unique. At least as we know it. It is precisely this synchronisation of interactions that also makes life a miracle from this perspective.

Thinking about the dynamics of the Sun's effect on the hydrological cycle, there is an upward movement. Then, you throw energy into the ocean water, this water rises in a form with more energy, it falls, it distributes itself over the earth's crust, allowing life to establish itself, including our life. And with that it also releases energy. So, these processes of releasing energy are closely linked to the Sun and end up allowing us to create mechanisms to harness the energy that is released.

Brazil today, for instance, has an energy matrix that is mostly geared towards hydroelectric production. This comes from the dynamic of

containing and somehow regulating the hydrological cycle so that we are able to transform this water energy into electricity. Then, if I am using the microphone right now, if we are taking photos, if we are talking on social media, all of this is also indirectly related to the potential that the Sun has in the dynamics of our lives and the use we make of this transformed energy, especially in our country. So, I think that in a direct or indirect way, the Sun has this influence on the dynamics of our lives as a whole.

I wanted to leave you with this reading about the Sun, this great source of energy for life, this maestro that conducts biological processes in a broad way for all forms of life on this planet, as well as the role of the Sun as an inspiration for what we understand as life and for the analogies we can draw from our relation with it. The Sun as an inspiration for the solutions that our society demands. And also the Sun as the great ally of all the other processes that make life possible. Along the way, I think the interaction between the Sun and the water, and how water behaves, is quite iconic. The distance of our planet from the Sun allows water to exist in a liquid state within a very particular balance of the Universe. That is very beautiful.

ALINY PIRES is a biologist with a PhD in Ecology from the Federal University of Rio de Janeiro. Her main research interest is in understanding the role of biodiversity in a wide variety of contexts, including for ecosystem processes and functions in aquatic environments and for human well-being. At Selvagem, Aliny has already conducted the **Biosphere study cycle**, which led to the Selvagem notebook *Todo verde tem parentesco* [All green has kinship]. In recent years, Aliny has been investigating the role of biodiversity for human well-being, especially in the context of climate change.

TRANSLATION
ANA LOUREIRO JUREMA

Member of the Selvagem community, working as a language crafts-woman, contributing as a tongue-reveller, an everlasting learner.

TRANSLATION REVISION
MARGIT LESNER

Artist, etc. Since 2014 she runs [Farol Arte e Ação](#), an independent initiative devoted to the notion of mobility (e.g. urban mobility, transit among languages, etc.) and the program “How to talk about Performance?”, among other initiatives. She is interested in Performance as an open system. Margit is an English teacher, she works as a translator and is an assistant to ants in Piraquara, Paraná, Brasil.

The editorial production work of the Selvagem Notebooks is carried out collectively with the Selvagem community. The editorial direction is by Anna Dantes, and the coordination is by Alice Alberti Faria. Layout by Tania Grillo and Érico Peretta. Coordination of English translations by Marina Matheus.

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