



ASTER

SEEDS HackSciArt

SEED 10-IA

## RESEARCHERS

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## 1. ESSENTIAL DIMENSION

*(Objective descriptive information of the scientific seed)*

### NAME

“XENO BIOLOGY”

### KEYWORDS

Exoplanets, xenobiology, extraterrestrial life, ecosystems and environment.

### BRANCH

Biology, Ecology, Physics, Chemistry, Astronomy.

### ABSTRACT

Starting from the scientific bases related to Physics, Chemistry, Biology and Ecology, it is necessary to be able to imagine what organisms, ecosystems and their evolution would be like on planets other than Earth and to be able to relate these ecosystems with ours and the problems of climate change.

### METAPHOR

Just as the circumstances that surround us (education, family and society) affect our personal growth, different environmental conditions cause organisms and species to evolve in different ways.

## PHASES OF THE USUAL SCIENTIFIC METHOD

1. Understand the physicochemical laws that influence the creation of ecosystems and habitats, such as temperature, pressure, atmospheric composition and in the lithosphere on planets other than Earth.
2. Understand how these laws influence the emergence and evolution of different types of life.
3. Devise possible forms of evolution of the first beings towards higher organisms and the basic relationships between them, such as symbiosis, predation, etc.
4. Visual and/or descriptive recreation of the appearance of these species and ecosystems.

## TOOLS

Source of scientific articles on exploration within the solar system, atmospheric composition on early Earth, climate models, astronomy related to seasonal cycles on planets, etc.

Possible atmospheric model simulation software.

## RESOURCES

1. First level: Development and evolution of life on a planet other than ours.

a) Chapter 9 of the book "The Magic of Reality" by geneticist Richard Dawkins (The Selfish Gene) where he discusses the possible designs of electromagnetic radiation capture systems (commonly called eyes) that have evolved on Earth. Examples of convergent evolution (which can occur on other planets) are given, as well as other designs that since technology have only been able to simulate biological equivalents. He also talks about the habitable zones around stars with exoplanets and how the mass of the planet can influence the appearance of the beings that could live on it.

b) Series on Netflix about ecosystems on different exoplanets:

<https://www.netflix.com/es/title/80221410>

c) News in National Geographic about the recent discovery of the composition of an exoplanet's atmosphere by the James Webb telescope:

[https://www.nationalgeographic.com.es/ciencia/telescopio-james-webb-descubre-dioxido-azufre-curiosa-composicion-atmosfera-exoplaneta\\_19128#:~:text=Se%20trata%20de%20un%20gigante,primera%20vez%20en%20un%20exoplaneta](https://www.nationalgeographic.com.es/ciencia/telescopio-james-webb-descubre-dioxido-azufre-curiosa-composicion-atmosfera-exoplaneta_19128#:~:text=Se%20trata%20de%20un%20gigante,primera%20vez%20en%20un%20exoplaneta)

d) Andy Weir's novel called "Project Hail Mary" where it is detailed in great detail, but following the lines dictated by scientific laws, what possible beings endowed with intelligence would be like but who lived on a planet with totally different characteristics from those our.

e) Possibility of basing biochemistry on an element other than carbon:

<https://blogs.20minutos.es/ciencias-mixtas/2019/06/22/otra-vida-alienigena-es-posible-2-la-bioquimica-alternativa/>

2. Second level: On a planet formed by degenerate matter, essentially different from all the matter that surrounds us.

a) Robert L. Forward proposes in his book "The Dragon's Egg" the possibility of the existence of intelligent life on the surface of a neutron star (residue of what would remain of a star with a greater mass than the sun when its fuel was finished nuclear). Apart from physical conditions that are radically different from those we know, there is also the great difference in terms of relative time, which passes a million times faster in the vicinity of the neutron star than on our planet, and the difficulties that communication entails. between them and us.

3. Third level: In a universe where physical laws are different from ours.

a) Isaac Asimov's book on the possibility of the existence of life in other universes with physical laws different from ours (see especially its second part):

[https://es.wikipedia.org/wiki/Los\\_propios\\_dioses](https://es.wikipedia.org/wiki/Los_propios_dioses)

4. Fourth level: In a universe that has fewer (or more) dimensions than we have.

a) Edwin Abbot's spectacular exercise in imagination in "Flatland" is worth studying from a mathematical point of view, but also from an anthropological point of view.



## **2. ADDITIONAL DIMENSIONS**

*(The following sections add subjective information from the scientific seed, in order to inspire creatives in the creation of a SciArt work. Some of the sections may not have information if the researcher chose not to specify anything.)*

### **SCIENTIFIC MOTIVATION**

If we can imagine how life would be possible on other planets with different environmental conditions, it would also be possible to imagine how life on our planet would be possible if those conditions change. We can anticipate how climate change might affect our lives so that we can be better prepared to deal with it or devise ways to reverse its effects.

### **METAPHYSICS**

What adaptability does life have? Is he capable of succeeding in other environments? Or has the case of the Earth just been a fortuitous accident and we are alone in the Universe?

### **ETHICS**

Is man really the "measure of all things" as Protagoras said? Or is it rather necessary to relativize the role that humanity has in the Cosmos and face how tiny we are?

If physiology can be simulated, how will it change our concept of the influence of caring for our environment and at the same time benefiting all living things in it?

### **COLORS**

Red planet, blue planet, green planet... Different atmospheric compositions cause the dispersion of radiation to act differently on the perception of colors by living beings living on that planet. In addition, the very star around which the planet orbits can cause the range of visible radiation to be different.

For example, a red dwarf emits much more radiation in the infrared range than our sun, so it is possible to think that the organs of vision of organisms are adapted to this characteristic.

### **AROMAS**

Ammonia, as a possible equivalent to water in the role of universal solvent on other planets(<https://blogs.20minutos.es/ciencias-mixtas/2019/06/24/otra-vida-alienigena-es-possible-3-seres-sin-agua/>).

### **SABORES**

Sweet (reward for finding the food).

## FLAVORS

Sound of life in a forest.