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# The Emergence of Humans: Brains (Bodies and Hands), Mind and Soul

Yves Coppens

Before describing the current situation of Nature and Humanity, I think that my duty today, as a geologist and a paleontologist, is to try to tell you when and how Nature was born and grew and when and how Humanity was born and grew.

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According to astrophysicists, our universe is appearing in our scientific perception, in our knowledge, 13.7 billion years ago, let's say around 14 billion years ago. But Science does not know where from, or what for and Science, in an elegant way, is saying that the origin of our Universe is an open question!

But Science is able to tell the whole history of these last 14 billion years.

The very first result is that this history is growing towards more complexity but also more organization, a beautiful paradox which means that this history has a direction of growth, synonymous of meaning. In French, I would say that «comme l'histoire de l'Univers a un sens, elle a du 'sens'».

The astrophysicists are also saying that for them, this Universe, our Universe, is like a physical object, quite homogenous, where the physical laws have been the same all along these 14 «visible» billion years.

And they are describing a succession of structures, going from sort of large and flat pancakes to less large galaxies and, at last, to stars and planets. And inside these structures, matter, very simple and non-organised, is becoming less simple and more and more organized.

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The astrophysicists again, but this time with the geologists, are telling the history of one of these stars, the Sun, born in a galaxy, the Milky Way, 4.6 billion years ago. And among the planets of this star, appeared one of them, not too far from the star, not too big, not too small, I mean big enough to keep water on it and gas around it. Our oceans and our atmosphere did exist as soon as 4 billion years ago; their composition was different

but their existence allowed water to reach a new level of complexity and organization: associations of molecules became cells, able to exchange matter and energy and able to duplicate themselves.

Part of the inert matter became a more complex matter, the living one (sometimes, more is different).

At this level of the history, I have an important point to make.

Many colleagues are currently claiming their sadness because our planet, so beautifully covered by Nature, is changing, becoming, because of Humanity, "anthropised". Most of the landscapes, more and more, are showing humanity marks. And they declare their nostalgia of Nature before Man.

But these colleagues are forgetting that the Earth had a completely different aspect before Nature. In a comparative way, when after 500 to 600 million years of mineral landscapes, life appeared in water and, after 3.5 billion years, at last covered the surface of our planet, the aspect of the Earth, because of Nature, has been changing, becoming "biologised". I guess that, if some colleagues had existed at that time, they would have had the nostalgia of Mineral before Nature.

This remark is to point out that mineralization, biologization, anthropisation are only comparative successive phenomena, probably followed by something else in a while.

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So life has existed on the Earth since 4 billion years, maybe a bit less. And a large part of it will change, according to a necessity of adaptation to different environments, in the direction we have already mentioned: more complexity and more organization with an obsessional goal, to survive long enough for reproduction and transmission.

But in an interesting way, I would say that a new paradox is appearing as a guideline for life. More organized but more complex, life is also becoming more diversified but more constrained. I mean that its inventiveness to find adaptive strategies to survive is going with the development of successive mechanisms inside the organisms: RNA, proteins and then DNA, to control the succession. Life has the privilege of reproduction but with rules, called heredity.

Life is a precious patrimony of the earth, not yet known elsewhere in the Universe, useful for the biological equilibrium of humanity, useful for its needs, useful for its inspiration. So it would be good to take more care of its sustainability, useful, as far as we currently know, for the sustainability of Humanity itself. It would be good to respect it.

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Life is evolving building the tree of filiations, from some beings composed of one cell to beings composed of several cells, from some beings with an inside skeleton in water to some vertebrates with lungs outside water, from some of them with hair and milk, laying eggs, to some mammals with placenta and, among these mammals, from Primates with binocular vision and climbing equipment to the so-called Prehumans, permanently upright for the first time, new bipedal locomotion but still climbing, new diet and new teeth, new behavior and new brain; standing posture means free hands, means also new vision, towards the horizon, towards the sky.

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This is the beginning of what can be called Hominids. A very important event and we are able to say when this event happened: this geological time is ten million years ago.

Where: the geographical place is tropical Africa.

Why: because the climate is changing and the landscape is opening.

How: in changing posture, locomotion, diet, behavior, new way of looking, new way of thinking about it, new way of using hands, and improving their ability.

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Around 3 million years ago, a second big step happened in the history of Hominids.

Prehumanity (Prehumans) had to adapt its anatomy, its diet, its behavior, its strategy, to survive to a new climate change, a drought. All the animals, hominid included, had to find new adaptations to this new situation.

And Hominids found three answers:

- A robust one, still with a small brain but with a strong, dissuasive body and bigger teeth to eat remaining fibrous plants;
- A gracile solution, still with a small brain but better anatomic equipment to walk and run faster;
- And a second gracile solution, with a small body but with a much bigger brain (more volume, more complexity, more irrigation) and teeth to eat almost anything, including meat, and this solution is called Man.

A particularly important event of course, and we are able to say:

When this event happened: the geological time is 3 million years.

Where: in tropical Africa.

Why: because the climate is changing and the landscape is opening more and more again.

How: the new brain for *Homo* (like bigger teeth for Elephants and like the new leg for Horses), means changing behavior, diet, a new way of looking, including inside ourselves, a new way of thinking, a new way of exchanging ideas, thanks to articulated language, permanent dialogue between thoughts, language, hands, tools, creations and symbols since the very first one – which means invention of a new environment, Culture.

And Man is Man as soon as he is Man, I mean Human and not Prehuman any more.

After the first paradox (more complexity, more organization), after the second one (more creativity, more control), appeared with Man a new paradox: more liberty, more responsibility which is soul.

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I used to tell the history of Humans, of Humanity (the last three million years), in four steps, as far as the relationships of Humanity and the environment is concerned.

1. From 3 million years ago to ten thousand years ago, *l'environnement est subi*, the environment is not transformed because Humanity is not, demographically, important enough to do so. Humanity had to support the environment and its development was, of course, sustainable.
2. From 10 thousands years ago to the nineteenth century, *l'environnement est conquis*, it was the end of the last glaciation, the beginning of sedentarism for Humanity, which is developing agriculture and breeding.
3. From the nineteenth century to the first half of the twentieth century, *l'environnement est surprise,* like a surprise and like an excess. We were a few thousand people 3 million years ago in tropical Africa; we were about 10 million people, 10 thousand years ago, all over the world; we were about 200 million people at the time of the Christ, and for the first time, one billion at the beginning of the 18$^{th}$ century.
   The consequence has been the necessity of mass production to feed humanity and it has been, at the same time, the time of the development of industry, technology, science. But Humanity was unconscious at the time of this turnover that development was becoming insidiously unsustainable.

4. Human demography increased from 1 billion people to 7 billion in less than two hundred years; a little more than half a century ago, several sciences, dealing with environment, inform us that the sustainability of Nature became a problem, as well as the sustainability of Humanity. I am calling this current epoch *l'environnement compris*.
   We understand that we now have to cope with this new situation. It is the reason why we are here, at this symposium dealing with our responsibility in this new change.