LANCELET AND ANSCENTRAL BODY

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Once upon a time there was a tiny animal that appeared in the sea nearly 540 million years ago. He left descendants, very similar to him, which are still alive and may be seen here and there. We ourselves, the human beings, owe to him what we are.

The creature, a worm, has no name yet. The descendants closer to him were named by the scientists with the boastful name *Branchiostoma lanceolatum*, currant name : *Lancelet* in English and French.

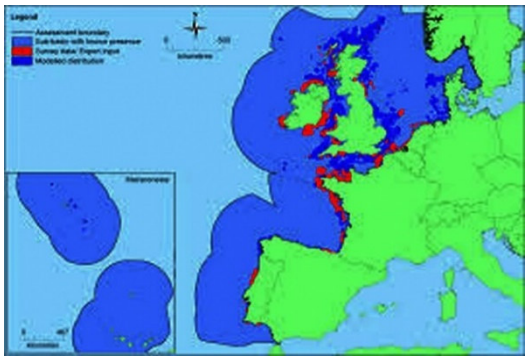
the progenitor, sea worm 2 cm long

spoon shaped tail rounded mouth

the lancelet, his descendent, half worm half fish

caudal fin body anterior part

During the evolutionary process, the ancestor's tail turned into a caudal fin and the anterior part of its body into the lancelet's head and mouth. Both are the first chordates in the evolution history, distinguishing by having a nerve chord which developed originating the vertebrates (01 01A).



BLUE = continental plate RED = higher incidence

Soft bodied animals decompose as soon as they die. Their fossils are rare. Thanks to their living parents can scientists understand how such creatures were in their origins and decipher what that means in evolution. They keep their morphology, the basic characteristics of a primitive body (there are several species of lancelets) and inhabit certain zones of the oceans of today.

Knowledge of considerable importance, acquired since the end of the first decade of the 21st century in the area of genetics, brings us surprising revelations with diverse implications in other areas : a revolution in science (02).

IN ORIGIN

Among others in similar state of conservation, which preceded it in the evolution of chordates (03), an intact lancelet fossil was found on the cliffs https://mapcarta.com/pt/33030624/Mapa of the northern shores of the Peniche peninsula http://www.centerofportugal.com/peniche-portugals-geological-paradise/ (04). The uncommon concentration of soft bodied fossils from successive epochs, quite preserved on this shore, is an added value, which unquestionably reinforces its geological significance, recognized as unique universal heritage (05).

A large number of these fossils has no similar anywhere. Some lack a careful study. Animals from the Jurassic https://en.wikipedia.org/wiki/Jurassic **embody smaller ones from the Cambrian** https://en.wikipedia.org/wiki/Cambrian. **Some of these remain unknown.**

This place, incorporated in the Lusitanic Basin https://en.wikipedia.org/wiki/Geology_of_the_Iberian_Peninsula, is an incredible show case of ancient fossils. Buried in the clay soil or stuck to rocks characterized by regular and symmetrical fractures due to dilations and contractions caused by extreme temperature variations during millennia, the fossils that one may see here contain mysteries that will take a long time to be unveiled.

http://rcfilms.dotster.com/arribas-ABALO-CRAKED-WEST-VIEW.jpg

TRANSPERENT ANNELIDES

(length : + - 2 cm)

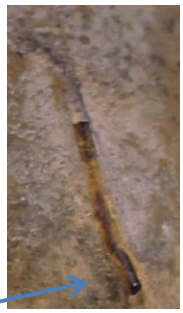
http://rcfilms.dotster.com/arribas_ABALO_CONGER_1_LONG_WORM_CONTEXT.jpg

This is a soft bodied annelid. It has an opaque head and a mouth with jaws, next to a digestive tube full with black ovules until its tail. Apparently it moves swimming or crawling. Its anus is implanted on the posterior part of the body. It displays flagrant similitudes with this one :

http://rcfilms.dotster.com/arribas_ABALO_CONGER_1_LONG_WORM_2.jpg

It resembles the first one, but its head appears to be a little different. Its tail is inside a tube shell dug in sediments, as wide as its body, made of transparent nodules as well. Inside, all along its body, one may see that most of the nodules involve the same ovules. Do both animals belong to the same species?

HEAD



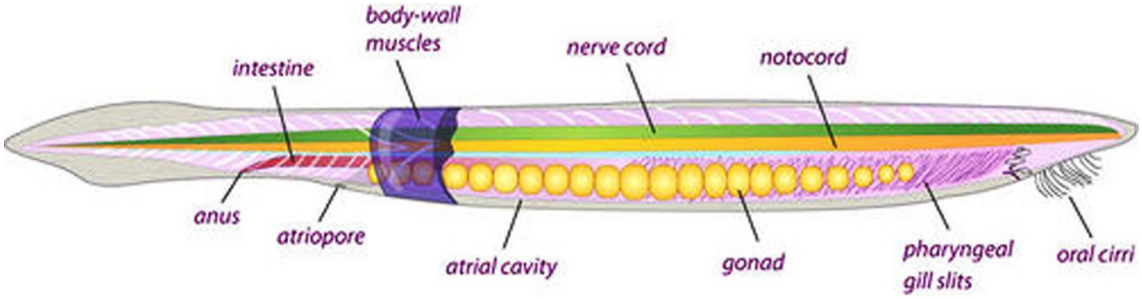
It is evident that these transparent worms are older than their nameless annelid neighbor. It is possible that one of these creatures is its ancestor. That's quite possible that there was an intermediate parent between generator and generated, as far as striking differences are perceptible in both.

1 Evolution of the body and tail of the ancestral worm to the lancelet

2 Both the living lancelet and the fossil from Peniche are black

NOTE :

1 – The living lancelet's body is a bit transparent. The fossil from Peniche is opaque. It is reasonable to admit that it was relatively transparent as a living being. It is important as well to take into account that the anatomy patent in the fossil will be identical to that of the living lancelet :



The anscentral body

The ancestral genitor was a chordate, a small fusiform worm two centimeters long, a muscled annelid owing a dorsal nerve chord with no vertebrae. Behind the dorsal nerve, underneath the nerve cord, from one end to the other, there was a notochord where all the muscles of the animal's body were implanted, and that is why it is called cephalochordate or simply chordate. In the evolution to vertebrates, the notochord would be protected with vertebrae, giving solidity to the body. There was, in its anterior part, a region capable of exerting brain functions. The brains of vertebrates would develop from that region. The worm was almost always upright, with its mouth out of its shelter, feeding on microorganisms. Sometimes it left the shelter to hunt on the seabed during the day. It was able to swim. By ingesting water with nutrients, the food was retained and digested by an extensive filtering organ, located just after the pharynx. The water the animal ingested and its droppings were expelled from the digestive tract by rapid contraction of the muscles of the whole body, which allowed it to use the intestinal flow to travel by jet, a faculty inherited by cephalopods such as octopus, squid and cuttlefish. With these, however, the water is ejected by pockets independent of the digestive system : two siphons in parallel on the head of the octopus (mantle), a funnel implanted under the head of the squid and cuttlefish, which expels the water by abrupt contraction of the mantle, causing the animal to swim backwards, but allowing it to move forwards by inverse action. Thanks to a caudal spoon-shaped membrane that served as a rudder, the primitive worm moved to where he wanted, swimming forwards. It had a couple of rudimentary frontal eyes, with predominant central vision, surrounded by tiny tactile oral cirri that served to help its eyes detect and identify the food.

The rampant evolution of tiny bodies to gigantic beings

Gluttony is the reason. The lancelet has always been an unstoppable vacuum cleaner, genetically transmitting this inescapable impulse to the human species. Gluttony makes one fat by increasing the weight of its body and nourishes many more by giving them enough sustenance to overcome others, and even more, degenerating into greed. Rarely is the social cohesion of the species able to halt such a purpose. That is why we are confronted today with serious risks of extinction. That is why old Charles Darwin said one day, without being tongue-tied and quite rightly, that the human being is nothing more than a worm.

In evolution, little creatures start growing more and more, eating the tiny ones. Fish, octopuses, squids, dinosaurs, which among all others are the most pretentious, gave birth to terrifying monsters. Fossils of dinosaur can't be seen in the cliffs of Ponta do Trovão https://engineering.purdue.edu/Stratigraphy/gssp/detail.php?periodid=62&top_parentid=0, in Peniche. But all around the peninsula, eastwards, northwards, and southwards, there are many. There they left a lot of bones and even entire skeletons, which greatly rejoice the people of Lourinhã, a neighboring town to Peniche. As for traces of giant octopuses and squids, they are not missing in the fossil showcase of this town, a beautiful museum.

It's hard to believe but that's true. Suspicious as they have always been, the insular people of Peniche insist on making deaf ears at such thigs. But that will change. They just need to open their eyes. For that, others must show them what they have never seen : the mayor, the minister of culture, a few fools they trust. People who dress for parodies of carnival, sooner or later will end up doing a parade to put in the spotlight the fat ones that are plotting us : by degeneration, turning into pernicious creatures, both to us and to themselves.

INOVATION

Topics

* A Portuguese snake fossil discovered near Leiria https://en.wikipedia.org/wiki/Leiria is one of the oldest in the world (note that such geographic proximity involves the same habitat as that of the Peniche peninsula) (06). The snake evolved from the lizard, a small quadruple reptile whose ancestor is an amphibian, the salamander.

* A fossil of more than two meters, nicknamed "super salamander" (*Metoposaurus algarvensis* https://en.wikipedia.org/wiki/Metoposaurus), about two hundred million years old, the size of a man, was discovered in Portugal, in Algarve https://en.wikipedia.org/wiki/Algarve, in the village of Penina, near Loulé https://en.wikipedia.org/wiki/Loul%C3%A9. "Its big, broad, almost flat upper and lower jaws were hinged together at the back and could snap shut like a toilet seat to gobble up fish, other amphibians, and maybe even small dinosaurs and mammals." (atavistic trend from the ancestral worm). It is supposed to belong to the order *Temnospondyli* (07).

* Genetics: phenotype. "The phenotype results from the expression of the organism genes, the influence of environmental factors and the possible interaction between the two (08)."

NEW HYPOTHESES AND RECENT DISCOVERIES

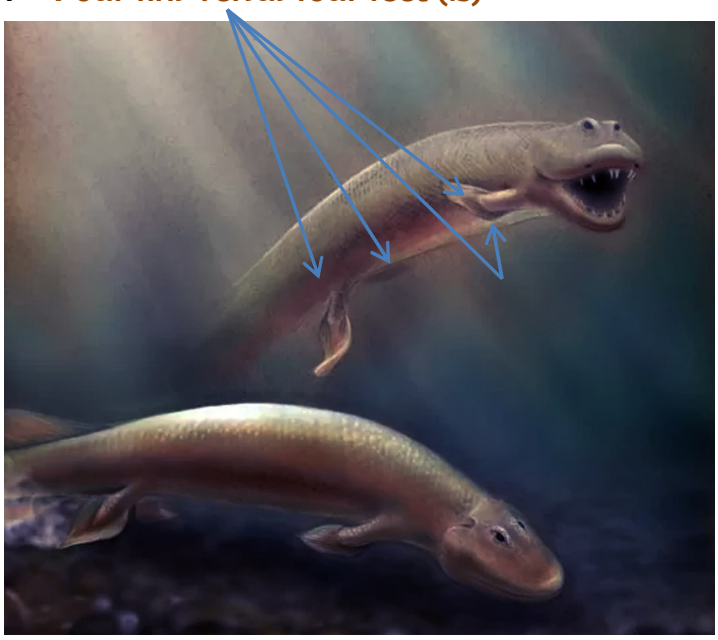
Galleonosaurus

* Discovery of a reptile that resembles a mammal, its distant ancestor. The finding implies a new version of the history of species evolution. The reptile had four stout limbs and nine tons of weight. It was discovered in southern Australia (10).

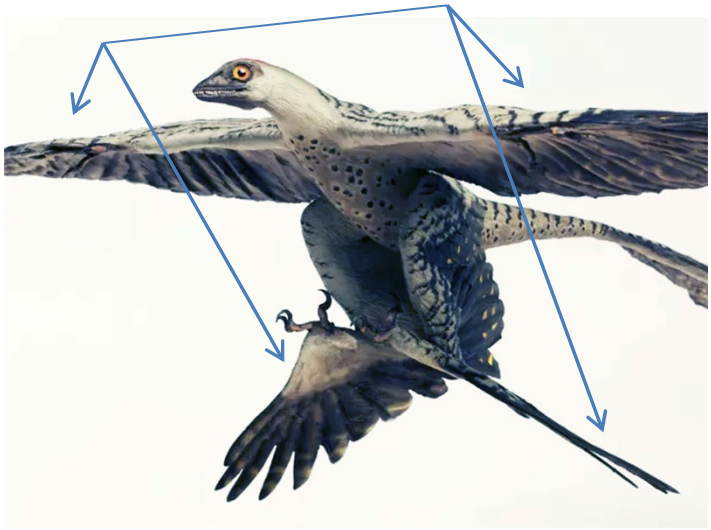
* The bilateral symmetry of the vertebrate body (11) is projected in its dynamics (12).

This will be the result :

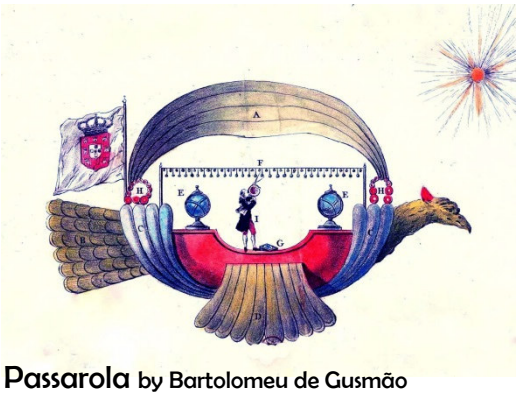
1 – Four fins versus four feet (13)



2 – Four feet versus four wings (14)



Sapeornis, the first bird https://en.wikipedia.org/wiki/Sapeornis

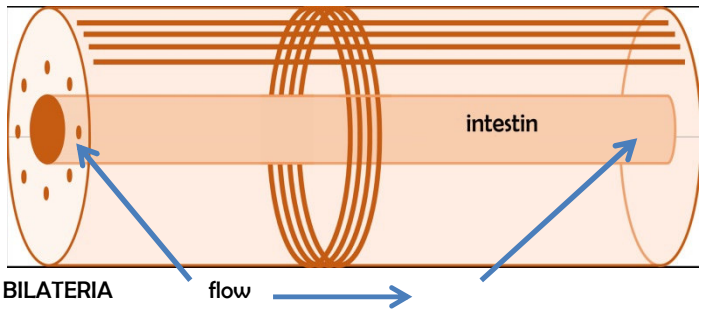


Passarola by Bartolomeu de Gusmão
https://en.wikipedia.org/wiki/Bartolomeu_de_Gusm%C3%A3o

Flying man among geese

GENETICS

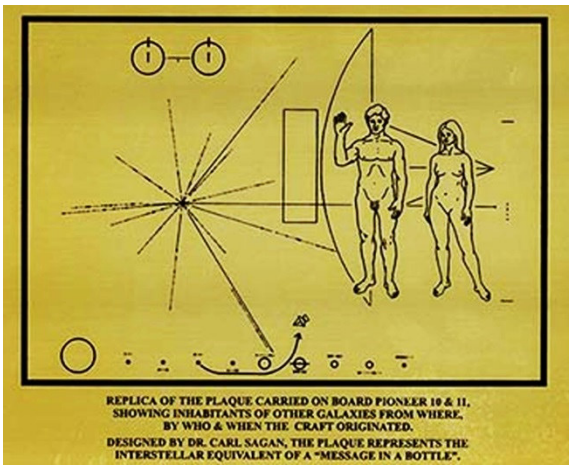
It is common ground among connoisseurs that the vertebrate genome has been subject to duplication. In the evolutionary process, each of its genes gave rise to two others. Each of them, as in a child's play (you and me, me and you), has beautifully served the trend of chordates innovation. They belong to the animal kingdom and are characterized by bilateria, two determinant rounds in the ineffable game of life.



The idea (15) consists in instigating novelty, such as the creation of heads and limbs (16). This means that social behavior, or culture, somehow interferes with the genetic makeup of an individual, by his DNA.

This concerns an experiment carried out with 113 persons tested in the observation of pottery dating from 4,000 BC until our time. " The results indicate that the visual behaviour follows the same evolutionary trends as those that drive the evolution of the complex societies that built these archaeological materialities. " (17), that's to say forcing the modern observer to spontaneously direct the line of his gaze to the tracing of these vessels, of these figurines or, in the case of rock painting, to let them show what they saw, what for them was essential, on the rocky slopes where they hunted (see Rock Art Sites of Coa http://www.patrimonioculturaL.gov.pt/en/patrimonio/patrimonio-mundial/portugal/sitios-pre-historicos-de-arte-rupestre-do-vale-do-rio-coa-e-de-siega-verde/) or in the caves in which they took shelter (18).

FREE WILL



Among the chordates, Man is the most evolved animal. Highly developed brain, abstract reasoning, language use, ability to introspect, complex problem solving, easy learning, all that allows you, despite your typical duality, change innate tendencies. These qualities are your distinctive traits.

The genes of Man allow him to be a versatile being on the one hand and on the other hardly changeable in view of the preservation of the species. One story illustrating the difficulty of mutating a human being is that of twins James Springer and James Lewis https://www.youtube.com/watch?v=HbNVIWMC7fU, who were separated at the age of one month and adopted by different families, only coming back together at thirty-nine, in 1979. Only then did the psychologist Thomas Bouchard of the University of Minnesota study his case (19). Being separated and knowing nothing of each other, they both married and divorced women with the name of Linda and remarried others with the name of Betty. They were interested in mechanical drawing and carpentry, in school they got along well with mathematics

and were weak in writing. They smoked. They ate and drank well, one and the other. They had headaches every day, at the same time.

Some philosophers and scientists who study the genetics of behavior https://en.wikipedia.org/wiki/Behavioural_genetics understand that free will can be restricted or nullified by genetic intervention (20). There is no shortage of people who revolt at the possibility of such a thing happening. It is true that each of us is unique, although we may have flagrant looks with others. It is true that, although we may confuse one with the other, we have effective, innate or cultural means of identifying who is or is not : as the dog that identifies us by smell or as the seagull that, at a glance, recognizes you for having destroyed the nest that it has abusively done on your roof and threatens you one month later flying close to your head. What to do with a dog that does not like you and bites or a seagull that stings? What ethical standard should you use?

OUR EARTH

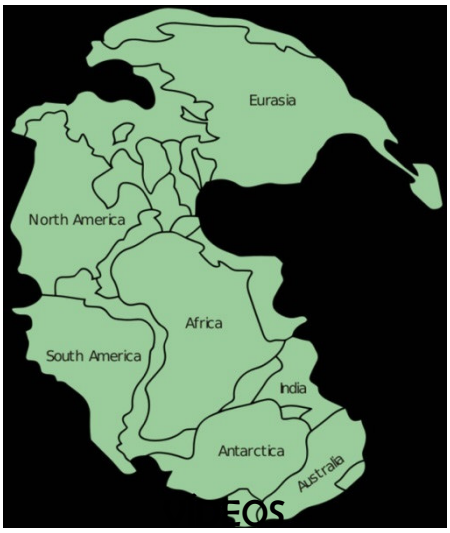
Once upon a time there was a crust of earth made up of gigantic volcanic rocks that fit together like a jigsaw puzzle. This story lasted about 160 Ma, between about 200 and 500 Ma. Around this crust everything was sea. There was only one continent, to which an enlightened man of the twentieth century gave the name of Pangea. His name is Alfred Wegener https://en.wikipedia.org/wiki/Alfred_Wegener. The planet Earth https://en.wikipedia.org/wiki/Earth was already inhabited by chordates in the lower Cambrian, understood more or less between 542 and 513 Ma. The primitive chordates appeared in the previous era, in the Ediacaran (between 630 and 542 Ma) (21).

The four closest planets of the Sun : Mercury, Venus, Earth and Mars

EARTH HISTORY https://en.wikipedia.org/wiki/History_of_Earth

PANGEA

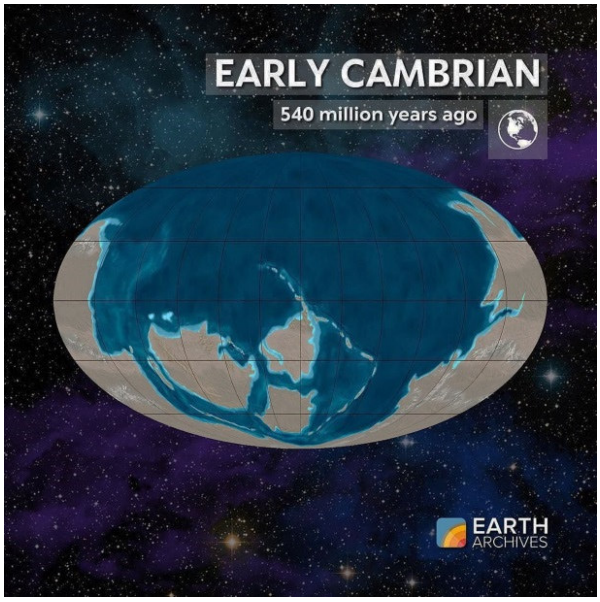
mother of seven continents



https://www.youtube.com/watch?v=q_iEWvtKcuQ
https://www.youtube.com/watch?v=UvIDxu7twpc

Times ago the blue planet wasn't blue at all. Your earth boiled, melted, cooled for a long while, from red to blue. White, covered with ice, slowly it warmed up again. And now, little by little, it warms more and more, going from blue to red. Listen man, that's no insignificant issue at all, neither for the poor nor for the rich, nor for those who intend to demote them, standing upright alone with a few guys from their band. And the more the thing warms the more there will be band heads. And the worse they are, more trouble will come and more headaches will you have. Is that what you want?

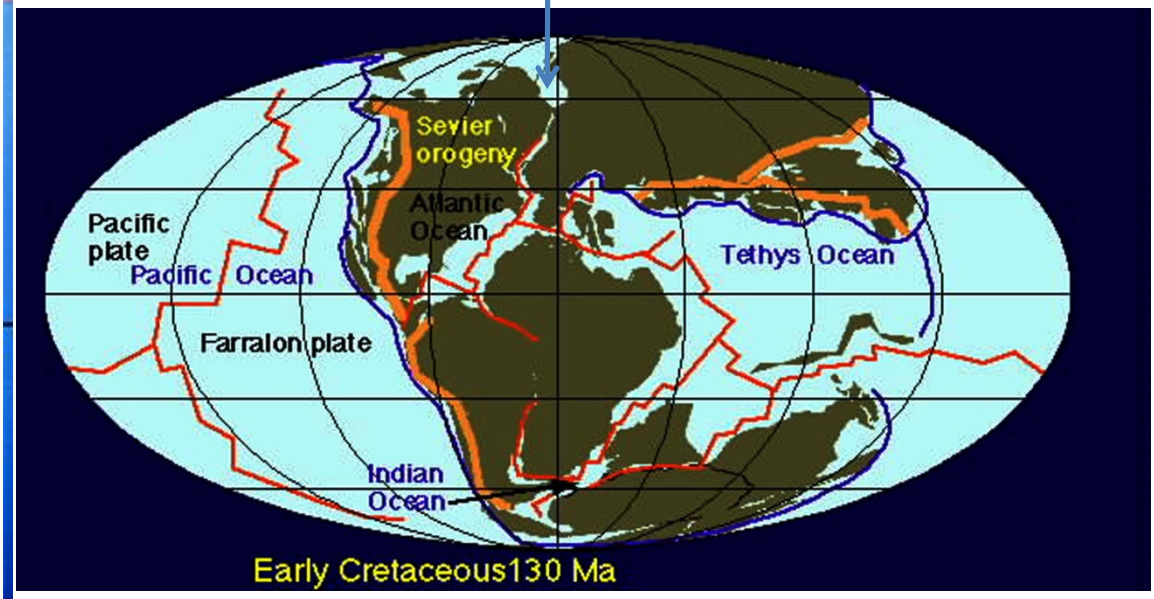
540 Ma ago so was your Earth : http://dinosaurpictures.org/ancient-earth#540



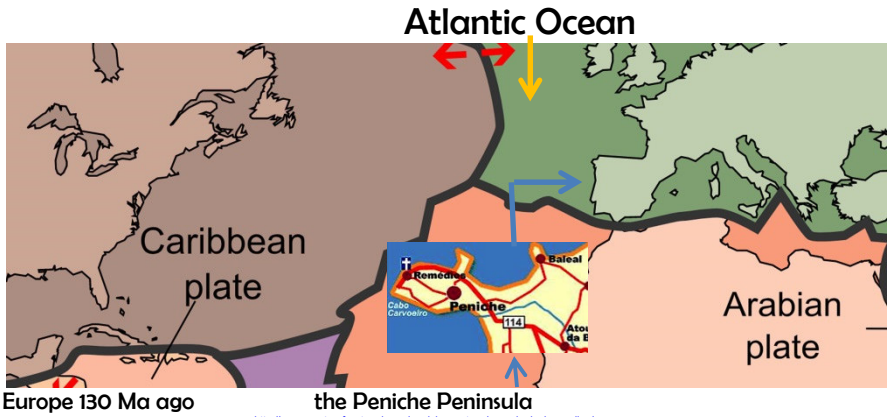
And so it was 100 Ma before our days : http://dinosaurpictures.org/ancient-earth#105

There were moments when deep fissures opened on the ground of our land, breaking it in large pieces. We, the living creatures, were then carried on horseback of the new continent where we now find ourselves, alive, but always fearing some evil surprise. Here we go, on the same place where we were millions of years ago, which is slowly slipping : on top of a body more and more fat.

Hic et nunc here we are. That took place about 100 Ma. We were once for all stopped in time, living on the top of an extensive cliff, which moves slowly away from its twin. The sea floods the gap between North America and Europe, carrying with it the gigantic mass of nutrients that the surrounding continents poured into it, carried by intense rains.



The gap is widened, and the new ocean, the Atlantic, expands north, east, and west. To the west, it empties into the Pacific, the largest of the oceans, precarious in living, and fertilizes it. From an insignificant niche, unique in the world in its smallness, in its humble and infinite richness, beaten by winds and tides, it releases into the air and the water the seeds that will make life explode. The unnamed worm is one of them and, of all, with a little help from their old parents, will be the most fertile. It is one of those who learned to pierce in the spacetime.



Europe 130 Ma ago the Peniche Peninsula

http://www.centerofportugal.com/peniche-portugals-geological-paradise/

NOTES

(01) – Ancestral annelid worm http://seaworm.penichefossil.net/

(01A) – The ascentral worm has a spoon-shaped appendage on the back of the body that, in evolution to the lancelet, develops a small caudal fin, as well as a very thin one, from one end to the other of the dorsum. The name of *Trachyteuthis hastiformis* is attributed by German experts to an intermediate species of this animal. There are two fossils of this transition in Germany, one in Berlin, at the Museum of Natural History https://en.wikipedia.org/wiki/Natural_History_Museum,_Berlin, and another at the Museum of Solnhofen https://www.solnhofen.de/index.php?id=683%2C1, a town in the far south of Bavaria https://en.wikipedia.org/wiki/Bavaria. A picture of the first specimen may be seen on page nine (NOTE 2) and ten (NOTE 3) of our article *21st Century Innovations In Cephalopod Research* (PENICHEFOSSILNET http://penichefossil.net). The link that opened the image gives now an error, which has remained since the article was created, shortly after we sent an image of the fossil of Peniche to the director of the museum, warning him that their classification was wrong. As a consequence, his response was rude. Concerning the Solnhofen museum, it is identified as *Trachyteuthis hastiformis jura* http://rcfilms.dotster.com/arribas-ABALO-TRACHYTEUTHIS-HASTIFORMIS-JURA.jpg. Jura is a reference to the place where the fossil was discovered https://en.wikipedia.org/wiki/Franconian_Jura. According to the identification given by the museum, it is the ancestral of a squid of the Jurassic, seen as having two lateral flaps on the head, considered as being swimming membranes (https://en.wikipedia.org/wiki/Trachyteuthis). Such reasoning is absurd in that the creature has a fin (seen as its head) in the front of the body and two on the back.

(02) - The amphioxus genome and the evolution of the chordate karyotype, Nature, volume 453, pages 1064–1071 (19 June 2008) https://www.nature.com/articles/nature06967 / Scientists look to map the genes of thousands of animals https://phys.org/news/2018-09-international-vertebrate-genomes-high-quality.html / Haikouichthys-Ercaicunensis (the first fish) https://en.wikipedia.org/wiki/Haikouichthys / http://www.prehistoric-wildlife.com/species/h/haikouichthys.html / http://news.bbc.co.uk/2/hi/science/nature/504776.stm

(03) – Cordate https://en.wikipedia.org/wiki/Chordate

(04) – Peniche Peninsula (map) / https://mapcarta.com/pt/33030624

(05) – Classification of Ponta do Trovão as GSSP https://hal.archives-ouvertes.fr/hal-01403277/document

(06) – Evolution of the Portuguese snake. The oldest known snakes from the Middle Jurassic-Lower Cretaceous provide insights on snake evolution, Nature Communications volume 6, Article number: 5996 (2015) https://www.nature.com/articles/ncomms6996

(07) – Meet the super salamander that nearly ate your ancestors for breakfast https://theconversation.com/meet-the-super-salamander-that-nearly-ate-your-ancestors-for-breakfast-39221 (article by Stephen Brusatte https://theconversation.com/profiles/stephen-brusatte-133378, 24/03/201)

(08) – Phenotype https://en.wikipedia.org/wiki/Phenotype

(09) – Class https://en.wikipedia.org/wiki/Class_(biology)

(10) – *Galleonosaurus* https://en.wikipedia.org/wiki/Galleonosaurus

(11) – Symmmetry in biology https://en.wikipedia.org/wiki/Symmetry_in_biology

(12) – Mechanics of animal movement https://www.cell.com/current-biology/fulltext/S0960-9822(05)00901-2

(13) – Tiktaalik fossils reveal how fish evolved into four-legged land animals https://www.theguardian.com/science/2014/jan/13/tiktaalik-fossil-fish-four-legged-land-animal, article at The Guardian, 13 Jan 2014

(14) – The Rise and Fall of Four-Winged Birds https://www.nationalgeographic.com/science/phenomena/2013/03/14/the-rise-and-fall-of-four-winged-birds/, article by Ed Yong, https://www.nationalgeographic.com/contributors/y/ed-yong/, National Geographic, March 1

(15) – Os Olhos da Ideia (the Eyes of Idea) http://rcfilms.dotster.com/ideia.pdf (essay)

(16) – What makes vertebrates special? We can learn from lancelets https://www.eurekalert.org/pub_releases/2018-11/oios-wmv111918.php Okinawa Institute of Science and Technology (OIST), November 2018

(17) – Proofs of parallel evolution between cognition, tool development, and social complexity https://www.eurekalert.org/pub_releases/2019-03/snrc-pop030619.php SPANISH NATIONAL RESEARCH COUNCIL (CSIC), 8 March 2019

(18) – U-Th dating of carbonate crusts reveals Neanderthal origin of Iberian cave art http://science.sciencemag.org/content/359/6378/912, article at Science, 23 Feb 2018: Vol. 359, Issue 6378, pp. 912-915 DOI: 10.1126/science.aap7778
(19) – Sources of Human Psychological Differences: The Minnesota Study of Twins Reared Apart http://web.missouri.edu/~segerti/1000H/Bouchard.pdf
Revista Science, New Series, Vol. 250, Nº 497 (Oct.12, 1990), 233-228
(20) – Do your genes determine your entire life? https://www.theguardian.com/science/2015/mar/19/do-your-genes-determine-your-entire-life. Article by Julian Baggini at The Guardian, March 19, 2015 / Free Will and Genetics https://philpapers.org/browse/free-will-and-genetics several references

article created on Mars 22, 2019 **work in progress**