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**WHAT DID THE
FIRST
VERTEBRATE
LOOK LIKE THAT
ENTERED LAND ?**

THE STANDPOINT OF
INITIAL BIPEDALISM
THEORY

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Résumé :

The purpose of the present paper is to outline briefly the problem of which kind of vertebrate once left the water. Traces of land-breathing vertebrates are recorded from the Devonian period, and it is commonly supposed that the ancient amphibians derived from some fish-like aquatic ancestors, living in pre-Devonian times. So far nothing has really been said about the role of mind in the evolution which led from a water creature into the first land-dwelling vertebrate. The author of this paper advances the thesis that it was then a bipedal and big-headed pre-hominid (Homonculus), characterized by a sense of curiosity, and definite mental dispositions. The first land-dwelling Vertebrates, indeed, had nothing to do with the Crossopterygians, commonly regarded as having conquered the land, but which in fact had

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no mental or physical capabilities to leave water and to progress on land. One of the most relevant problems concerning the vertebrate phylogeny is presented here together with a working hypothesis for its solution.

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The earliest *known* vertebrates are the Armoured Fishes of the Silurian. They have had hard skeletons and carapaces, and that is why they were capable of fossilization when they died in seawater-pools or lagoons, under conditions favourable for their preservation.

Incomplete and fragmentary as it is, the geological record only gives *indications* about ancient faunae. This does not represent the actual links in the evolutionary chain, nor does it demonstrate any evidence of chronological order (fish, then amphibians, reptiles, birds and mammals) *in which the series of the vertebrates should be listed.*

Pisces, indeed, appear to be highly specialized water animals which proceeded from more primitive vertebrates that preserved *less evolved* features, such as 4 legs and functional lung, that transformed in fish into fins and natatory bladder... The remarkable thing about Crossoptérygiens, and also *Dipnoi* (lungfish), is that they preserved *choanae* or internal nostrils, and lungs for air-breathing [gills being posteriorly added].

According to a classical view, the land vertebrates which flourished in Carboniferan times were clumsily built amphibians. However, even though fossil records have not been discovered as yet, there lived logically at the same time with several more completely terrestrial lineages which sprung from some branch of the *homonculian* stem.

Fossilized mammals are known from early Triassic layers as small creatures said to have originated from reptiles. However, only the mammalian level of structure should have reached such perfection and adaptability to produce set-types which specialized in various ways and at different times during early geological periods. It means, we must believe the contrary, i.e. that reptiles once evolved from mammalian creatures. We can call this process (an adaptive *simplification* of body structures) : *reptilization*. This entails the fashioning of various reptilian and reptile-like lineages from *original mammals* ; and the evolution may develop further to amphibians or to completely aquatic forms, such as the fish.

I'd like briefly to present here my individual concepts about the morphological appearance of the first vertebrate that was intended to conquer the land.

In this article we will not evoke problems as to demonstrate whether a fish looking like a crossopterygian could really have walked on its paired fins [in which the bones *have remained comparable* to those of the tetrapod fore and hind limbs, or we will not discuss if such fins should necessarily disappear, as the fish was winding about on land [like a snake] by undulating the whole body in a horizontal movement. Let me only stress here the fact that such a creature entering land must have had a *real* motivation to move forward onto a new and hostile environment !

A *small-brained*, also *physically unadapted*, crossopterygian fish would be indeed not capable to undertake such an adventure.

This *biological* fact seems to have been forgotten, perhaps because observers have adopted the habit of imagining here *something like a tadpole* that leaves its native pool, before changing into a land-living and air-breathing frog !

The first land vertebrate really had -without any assistance of heredity- to adapt itself to a strange new world, to avoid the drying of its organism, to endure and support the daily changes in temperature, to carry a body that became heavier on land... Food searching was also a problem ! It was necessary to improvise and to make do with what was possible to find on land : algae, perhaps a few animals with shells, or arthropods.

During the Precambrian time, the archaic vertebrate already made the decisive step towards land-conquest, leaving the ocean where its ancestor have lived. Our present human endeavour and trend to travel through countries and to reach new unexplored places is still *a continuation of this fundamental trend of archaic pre-hominids !*

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The *Homonculus* in its *archepagoge* [full aquatic] stage has just developed its brain, its osseous skull and its limbs. The spinal column, quite *upright*, was indeed ossified *before the pre-hominid left the water !* Dessication and thermic regulation of the whole body were the chief problems for a creature that was trying to make the 'big step' out of the ocean... On land, the differences in temperature are large and sudden.

It was very essential, too, to avoid the dessication of the body. The skin of the first land vertebrate had to be kept *supple*, but also covered with an outer *horny* layer that would restrict the loss of water, and owning an isolating *hairy* coat ! The *sweat* glands in the skin did intervene in case of too much heat, producing sweat which evaporated and cooled the organism. The *sebaceous* glands served to lubricate the skin and the hairs.

This is a self-regulatory system, able to maintain a stable body temperature, despite external variations. Such control permitted an adaptation to *life on land after* past life in the ocean.

The development of teeth which allow the *Homonculus* to chew and to digest its food more quickly is connected with the acquisition of *homeothermy*, which also requires a great need of energy. The apparition of isolating hairs is indeed connected with the demand for *thermoregulation*. All these characters were present before the end of the aquatic stage !

The globular form of the human skull, also a primitive (*plesiomorphic*) feature, *represents the final evolution of the sea-living Homonculus's floating and sustenance organ* : such a round configuration could only develop naturally in water !

This ocean-dwelling *pre-hominid* then started to evolve into the first land-living 'true' vertebrate. This is what I refer to as '*Homonculus* in his *phytophore* stage', or 'archaic man'. As we have also emphasized, this creature had an *inborn* tendency to explore, and he possessed an effective nervous system [the *big brain* developed from the marine floating organ]. The *Homonculus* already had the required physical pre-adaptations, such as : *bipedal* gait and *orthograde* body-position, air-breathing, thermoregulation, and digestive organs that allowed him to eat the terrestrial plants and the small animals that were living all around.

Hypothetical reconstruction of the *Homonculus*
at his *phytophore* stage,

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as the first vertebrate that ever entered land

Bipedalism certainly preadapted the early hominids to a life on land. The upright position was already acquired before leaving the ocean lagoons. Further modifications of the post-cranial skeleton, such as *the configuration of the plantigrade foot*, resulted from the constraints that were imposed by the environment, and by *an active awareness of these new terrestrial habits*.

It was, indeed, in remote times, the *completion of the human form*, and the conception of the original type of placental mammals. The *phytophore* Homonculus presented the important new characteristic of conceiving and bringing into world *living young* [offsprings]. Before the birth, the child grows and develops in his mother's uterus. The *placenta* is the organ that feeds and discharges it from waste [through the umbilical cord], while the *amnios* is the cavity filled with water where the foetus floats.

A *derived* feature is that of the mammals *without* placenta (*Marsupialia*), and of other vertebrates ! There may be a 'more evolved' feature in the egg-laying of birds, reptiles and also of some mammals (*Monotremata*)... where the embryo [which still needs to develop in water] is surrounded with the same *amnios*. This organ then becomes superfluous when the level of organization of amphibian and fish is reached ! They indeed constantly live in water, or use water for their larvae [which exhibit aquatic specialization : this allows the species to *spread through lakes and rivers* !]. The eggs of fishes and of amphibians are consequently without calcareous shell, and don't develop the *amnios* or *allantois* of 'higher vertebrates'.

Now, thanks to his viviparity, the *Homonculus* on land should have assured a good rate of reproduction. Above all, this disposition permitted a *complete growth* of the big brain in the uterus, and preserved the *globular form* of the human 'primitive' skull. Viviparity also allowed a definitive independence of all aquatic contingencies.

Just after this hard step of leaving the water, the terrestrial *Homonculus* was ready to colonize this new milieu that became open to it. By pursuing their structural evolution (*specialization*) beyond the achievement point of the human form, diverse mammalian creatures could arise... a part of them became *quadrupeds* by adaptation, but all belonged originally to our own *bipedal* line of ascent !

These animals established on dry land and in many other (for exemple, semi-aquatic) environments, or also reintroduced the ocean. In this way, fishes (*Pisces*) themselves have returned *secondarily* to life in water, just like some reptiles or mammals did. In such a hypothesis, today (and fossil) groups of fishes evolved several times from different 'amphibian' lineages, which developed themselves from reptiloid quadrupeds.

From his remote prehuman ancestors, man has inherited the ability to stand erect on his hind legs (*initial bipedalism*). The forelimbs, relieved from any locomotory function, were set free - since the beginning - to serve the large brain in providing for its needs.

As a matter of fact, man has remained morphologically and anatomically the same through out the course of geologic ages. Among living - and fossil - vertebrates, he is the *least removed from the ancient prototype* !

Man preserved the original *orthograde* body position, a head resting *without musculature support* on the vertebral column, a *big brain* and the *round-shaped* skull, the *hands* in primitive form and the *plantigrade foot*.

Many features (aptitude of perfect bipedal gait !) *have been lost by today apes*, and already by australopithecines and other fossil-known hominoids. The chin, also, kept in man its original characteristics, while it has disappeared in other primates [included '*Homo erectus*' and similar forms] because of the strong development of the jaws, the lengthening of the skull, and the

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specialization of teeth. These various groups of homin(o)ids have followed their own evolution *parallel* to *Homo sapiens'* progression, and at the same time *branching out in different lineages*. Such a process is called : *dehumanization*.

Another evolved feature in hominoids may be the development of *animal* hairs that are added to original *human* hairy coat. It's a relevant characteristic of *dehumanized* beings, demonstrated for instance in Dr. Heuvelmans' *Homo pongoides* [see the illustration to the article of Michel Raynal in the same issue of *Bipedia*] and by living apes.

The unborn chimpanzee, indeed, has hair on his head like a human, but little hair on the body. Then, the ape-baby develops his specific hairs. The apparent 'hairlessness' of man is not due to an absence of hairs, but it is due to the fact that these hairs remain normally small and thin. As a matter of fact, man is not a 'naked ape'... and the apes' hairs are the result of a *more advanced* evolution than man never followed ! The strong development of the teeth, jaws, chewing muscles, and mouth of non-human mammals is indeed *in inverse proportion* to the brain development. At a certain point of its embryogenesis, the animal embryo *carries on* developing after the point where the human embryo was complete... and the formation of a large brain is countered as dentition and jaws become more powerful !

As a matter of fact, only the human lineage (*Homo sapiens*) preserved a primordial brain disposition and a globular skull [which were acquired before the passage from an aquatic to a terrestrial existence]. This indeed carries the problem of *anthropogenesis* back to a very early stage in the evolution of the vertebrate line...