Humans from the Water Edge or Savannah?

By

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The common acceptance that the evolutionary origin of bipedal man is said to be on the Savannah. But this only begs the question: 'Is the savannah theory the only explanation of human evolution'? To be more specific, could an aquatic or semi-aquatic environment offer a more plausible scenario for human evolution? How do the arguments in favour of the waterside ape stack up? In the scientific community there is enormous resistance to accepting any new evidence that challenges the savannah theory. It seems that whenever the issue is raised with scientists and non-scientists, a series of arguments are rattled off without critical analysis. Arguments are often just presented as *ex cathedra* beliefs. Therein lies the problem, scientific results are not to be "believed" in but accepted or rejected based on evidence. This paper provides a summary of arguments in favour of the evolution of a putative Waterside Ape into *Homo sapiens*.

1. Introduction

Elaine Morgan, a science researcher and author, spent a large part of her life trying to make the aquatic ape theory accepted by mainstream anthropologists and other evolutionary scientists. Her work is well described in the book "*Elaine Morgan, 100 years Towards Origins*" by Kuliukas (2020) which convinced the author of the scientific evidence for the Waterside Hypothesis of Human Evolution. The aim of this paper is to give an overview of some of the scientific arguments that form the basis for the theory. The paper is built around the book by Peter Rhys-Evans "*The Waterside Ape, An Alternative Account of Human Evolution"* (2021). One can get a summary of Peter's and others ideas by viewing some videos online, for example at the WHAT Talks website (2023), from which amongst others seminar recordings can be viewed. These Zoom seminars look at human evolution from different scientific angles by experts in different fields. Some of the titles of these seminars are listed in the reference sec-

tion [1].

The Waterside Ape Theory is also described under several names such as The Aquatic Ape Theory (AAT), the Amphibious Ape Theory, the Marine Chimpanzee Concept and others. When new scientific evidence emerges, theories or hypotheses need to change or at least one expects there to be an acceptance that an alternative theory is possible. A not uncommon problem at times in the scientific community where some theories are so entrenched that any alternative is squashed, and even academic journals reject publication of such new ideas. This is the case with some the theories of the origin of bipedal hominins. The savannah theory of human evolution has become commonly accepted, partly due to ignorance of other ideas. An alternative is that humans became bipedal in a more aquatic environment. There is a need for an alternative theory because as Rhys-Evans' points out in his book (2021, page xiii) "*In the absence of testable hypotheses, the savannah theory must actually be nothing more than pseudoscience, and disproved pseudoscience at that".*

The 'Savannah Theory' originated in the 19th century and has stayed mainstream until now in the 21st century. One of the pieces of evidence in favour of this paradigm was that in the Miocene (23 – 5 Mybp) the climate changed to a drier period in Africa, so there was a loss of habitat. As to how the 'savannah theory' explains the question bipedal origins, we can look to Peter Rhys-Evans (2021, page 6) for one of the common arguments "… *According to this theory, the one crucial development of bipedalism in savannah ape evolved because of the advantage of standing upright on two legs and being able to see further over the plains and high grass in search of prey and avoid predators. Later, the advantage of having two hands free to carry weapons enabled humans' development as hunters in pursuit of game. …*".

In 1960 marine biologist Sir Alister Hardy wrote an article in the New Scientist in which he merely asked *"Was Man More Aquatic in the Past?"* He based his findings on observations that many human traits have more in common with aquatic and semi-aquatic mammals than with terrestrial mammals. Later, others would show that at the time of early human evolution in east Africa there were many inundated areas providing and ideal environment for the hominins to make use of the abundant food of aquatic sources. The response to Hardy's idea has been very disappointing. For example, still in 2016 Sir David Attenborough was criticised for

[1] References are only given where the text relates to a specific author, so most the paper is based on the bibliography. The author likes to thank all those presenters for their diverse input into Waterside Ape Hypothesis.

hosting a forum on the BBC radio named *"The Waterside Ape"*. No solid arguments were produced in this criticism which was based on non-scientific reasoning.

2. What Makes Humans Different from Other Terrestrial Mammals

Looking at mammals in general there are about 4000 species of which about 200 belong to the Primate (There are four great apes, and about 20 species of ape altogether) family. Of all these, only one is bipedal, hairless with large brains, namely the human. The quadruped gait is the common locomotion of ground dwelling mammals. One advantages being it is more stable and therefore gives more independence after just a few days to a newborn.

Even though we share approximately 98.5% of our genetics with chimpanzees, humans are very different. Here is a selected list, in no particular order, of traits different from chimpanzees that suggest humans have evolved in or near water and discussed in the subsections.

1. Bipedalism
2. Ear exostosis, related to Swimming and Diving.
3. Paranasal Sinuses, Nose breathing and Speech.
4. Subcutaneous Body Fat, especially in infants.
5. Large Brain.
6. Sweating and absorption water through skin.
7. Social behavioural impacts.
8. Venix caseosa Bipedalism.

2.1 Bipedalism

Fossil footprints in Crete, of 6 million years ago, is evidence of early bipedalism of hominins. These footprints show adducted hallux, slight arch, large ball and narrow heel which make it easier to walk bipedaly. Crete was at the time part of a warm wet environment with coral reefs, while eastern Africa was dryer and so that prompted migration northwards to the 'Mediterranean' (Figure 1).

Large quadruped primates like chimpanzees, orang-utans or gorillas, can move bipedally wading in the aquatic environment then do not have to support themselves in this position with their upper limbs. The paleo habitats are consistent with that possibility.

An additional possible reason that bipedalism is unlikely to have started on the savannah occurred to the author after a discussion with Dr Richard Yin (2023) about that older people tend to stoop and become prone to falling. However, Yin says "*I think that one reason older people stoop is that their proprioceptive and vestibular system becomes poorer, and they are more reliant on visual input to maintain balance. So, they are 'watching their feet'. ... But leaning forward doesn't mean necessarily destabilize you, as long as you maintain your centre of gravity over your feet. Why I ask people not to look down and stay upright is to keep training their proprioception and vestibular system and not become reliant on visual input to maintain balance*". But when arboreal apes descended to the savannah and lifted their hands off the ground it would not have been possible to have their body's centre of gravity over their feet. That means they would have been imbalanced and unable to walk or run bipedally. In other words, this suggests that bipedalism did not start on the savannah, later on the savannah it possibly improved the gait.

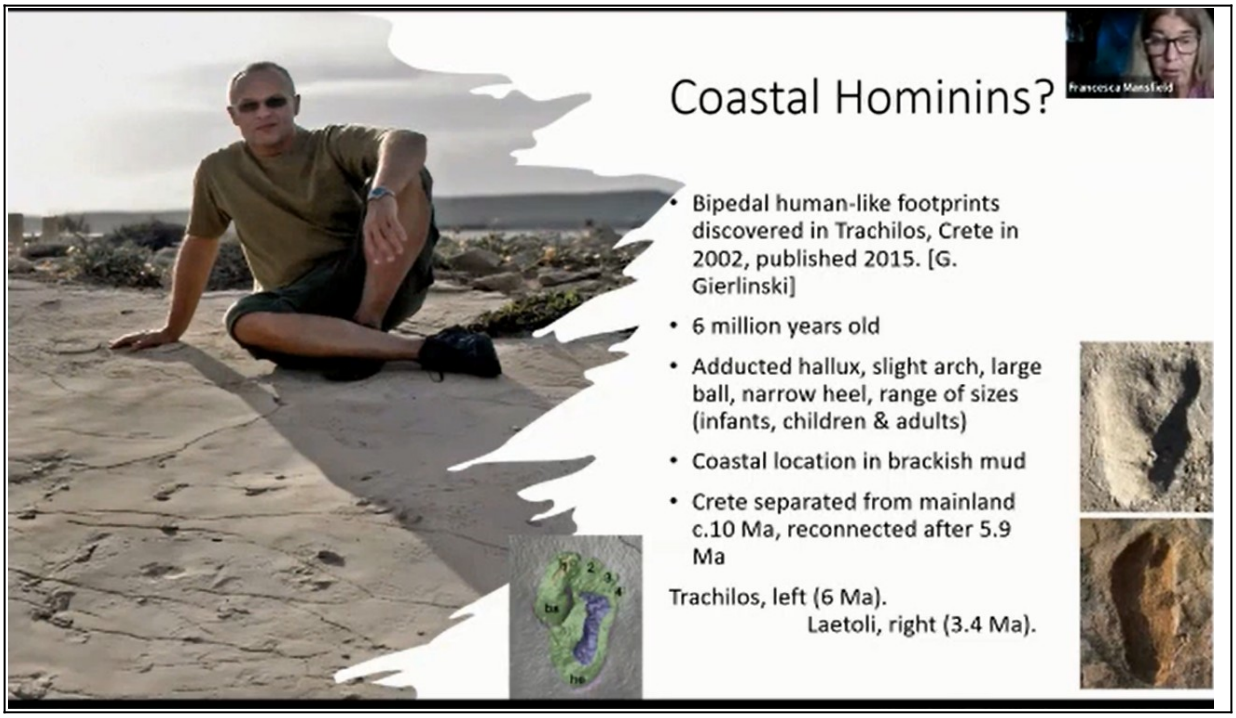

Figure 1. Image copied from Mansfield, 2022.

2.2 Exostosis, swimming and diving

A feature of mammals that spend a lot of time in water is the presence of exostosis or ‘surfer’s ear’. Exostosis is bone growth in the ear canal and caused by prolonged exposure from ‘cold’ water. Fossil evidence of exostoses in skulls indicates the hominin spent long periods in water.

Chimpanzees are not good swimmers and are more likely to drown while the humans can swim and dive. Various native groups around the world in warmer water ‘free dive’ for food, that is while just holding their breath. The Ama women in Japan, aged 18 to over 90 years, dive to about 10m to collect shellfish. The Bajau in Indonesia – Malaysia, ‘free dive’ to 20m and spent 5 hours underwater of their 9-hour working day. To do all this free diving there need to be physical ways to able to do it to hold more oxygen. For example, the heartbeat goes down to 30bpm and they tend to have a larger spleen.

Aquatic and semi-aquatic mammals can be grouped by depth’s ranges they can dive to, so shallow, moderate and deep. Humans fall in the group of shallow divers as shown in figure 2.

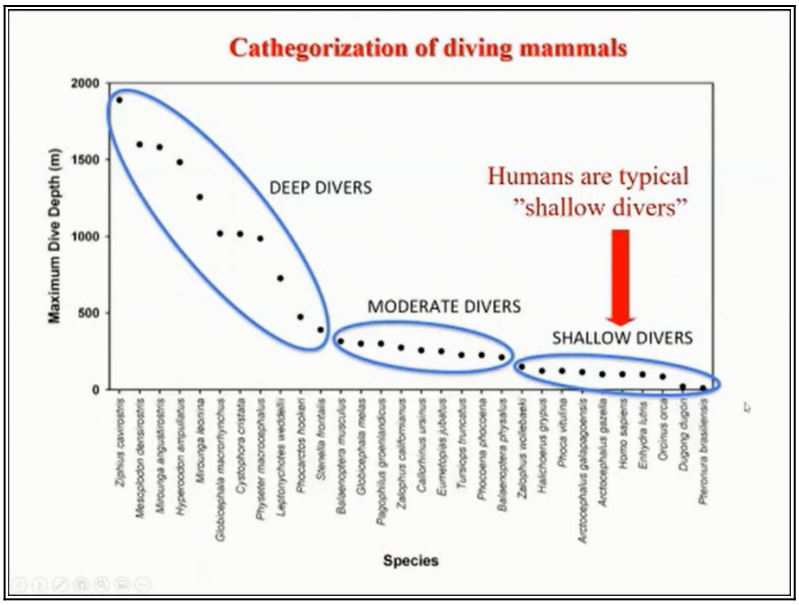

Figure 2. Graph copied from Schagatay, 2022.

2.3 Paranasal Sinuses

Rhys-Evans (2020, page 87) records that '… *The first contributory factor is human's upright posture, which has a distinct disadvantage in providing drainage of the sinuses and which previously had evolved quite satisfactorily in quadruped mammals over many millions of years ...'.* With our flatter faces the sense of smell has been reduced, possibly because smell is not as important in aquatic and semi-aquatic mammals.

From all terrestrial mammals humans are the only ones that do not have to breath through their nose. However, they can eat and breath at the same time, just like a breastfeeding infant can drink at the same time as breathing. Weaning is when a human infant starts eating independently, and this is the stage when the larynx starts descending. The latter is important to assist blocking the airway while diving. The ability to speak became only possible when the larynx descended, with it to hold our breath and importantly mouth-breathing.

2.4 Fat Body

Other terrestrial mammals differ from humans in they do not have this layer of subcutaneous fat under the skin. This fat tissue, similar to blubber, is however found in aquatic and semi-aquatic mammals who need this layer for insulation and buoyancy. This is especially true for human babies, *infant adipocity,* which are born 5x fatter than chimps; it is genetic and not depending on mother's diet. This extra weight in a human baby does not provide a survival advantage in trees or on the savannah, however it may save its life in or near water due to higher buoyancy.

2.5 Large Brain

Humans have a much larger brain than our ape cousins. This brain makes it possible to develop language skills, that is understanding of abstract concepts. The co-evolutionary fact of the lowering of the larynx may have helped the development of speech. For brain development the omega-3 fatty acid Docosahexaenoic acid (DHA) is important. Food sources rich in

DHA are most abundant in shellfish, indicating a coastal habitat for the early hominins. The intake of omega-3 fats from seafood have an impact on the development of the neurological system of the human brain. The orthodox view is that man, a scavenger, would have eaten bone marrow and brains of their prey to obtain sufficient DHA. This could explain how man living in drier areas get their omega-3 fats.

The savannah theory proposed that hominins made stone tools and so could kill large mammals would provide meat which stimulated brain growth. However, making sophisticated stone tools is a complicated process that needs a large brain to accomplish the task. So, it was tools that made it possible to kill animals as a food source.

In the Archaeological Museum of Bologna (MCA, 2023) a display of the development of stone tools nearby shows that it took 100 thousands' years to acquire the ability of making efficient stone tools. It was around 800,000 ybp that *Homo heidelbergenis* lived close to the shore lines near Bologna. They made elementary tools from siliceous pebbles, using archaic chipping techniques. Around 350,000 ybp new stone tool making techniques appeared, showing objects more similar to each other and being more functional. The near water finds of these tools and the time line are in favour of AAT.

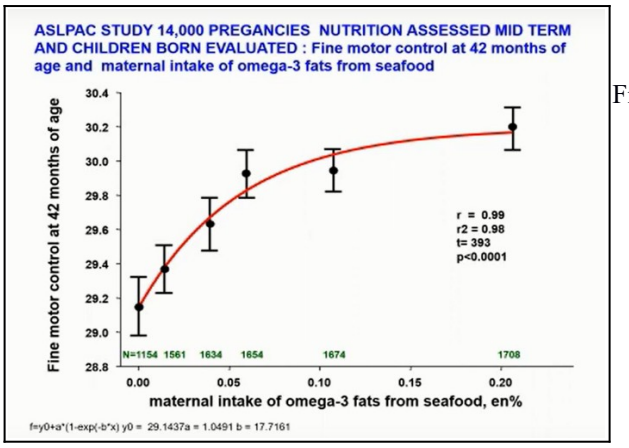

Figure 3. Crawford, 2022.

2.6 Sweating and Absorption of Water

Observing a dog pant when hot or after exercise, appears an ineffective way of cooling. However, it is very questionable if human sweating is more efficient, as with water loss there is

also salt loss. Humans sweat through their eccrine glands that cover the whole body. The other type a gland, apocrine, are only found in their armpits and around their genitals. Chimpanzees have 90% apocrine and 10% eccrine glands which is the reverse from humans. Even when it is hot, theirs and other apes' skin is dry. To evolve to a sweat system which loses a lot

of water in a dry savannah is evolutionary not logical. But in semi-aquatic environment eccrine induced sweating may be an advantage to cool down and, of course, the best and quickest way to cool down is to go for a dip. In the savannah the threat of sunstroke due to dehydration is real, the need to keep fluid intake up when working in hot conditions is something that constantly stressed upon by company health officers working in the Australian outback.

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The opposite of sweating is water uptake. In the coastal marine environment, there can be a lack of freshwater to drink. So how does the hominin get their water? Research (Morgan, 2022), albeit as yet only through early pilot studies, show that the human body takes up water through the skin, the exact mechanism is not yet clear. Swimming and/or bathing unlike running, does not make you thirsty. Divers and snorkelers that plunge in the water feel very soon a need to urinate, this has been linked to water absorption through the skin. We think and hope that the phenomenon of water uptake can be properly demonstrated in further research.

2.7 Social Behaviour

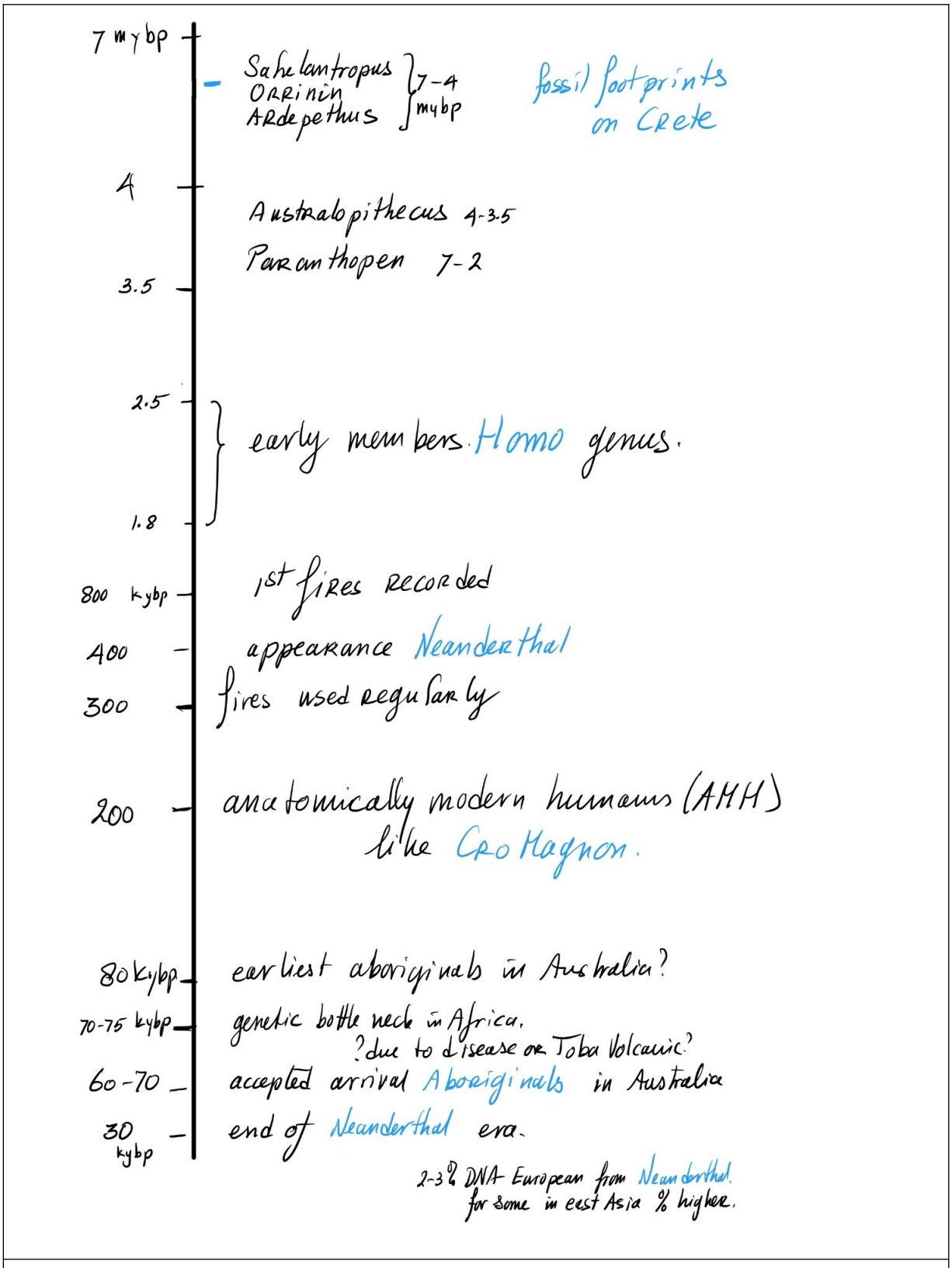
Behavioural evolution is driven by female primates, because they tend to decide where to live in order to acquire a good food supply. So when they came down from the trees they made a choice, namely the more likely move to water rich areas with abundant food or the dry savannah. In the orthodox theory of human evolution this was the opposite. Between chimpanzees (*Pan troglodytes*) on the savannah there is less cooperation between females, while in the water rich areas the cooperation is large. Look at the Bonobo (*Pan paniscus),* related to the chimpanzee, that live in the water rich south of the river Congo. In the savannah theory the male is dominant, which is the opposite to the arboreal primates. Why the change in behaviour to male domination, when the female primates look for food to feed their offspring. However this is not saying that chimpanzees do not have complex social behaviour.

2.8 Vernix caseosa

Vernix caseosa (cheesy varnish), a substance found on babies, not all, when born. It consists of about equal amount of lipids and proteins. The formation start around 27 weeks and peaks at about 37 weeks of gestation. It shows when the amniotic fluid becomes cloudy with vernix in the third trimester.

There is no evidence of vernix in other terrestrial animals. However, it was found on sealion pups, who were given birth on the shoreline, so vernix points to a possibly more aquatic past. It is suggests that vernix may protect newborns gastro-intestinal gut as the first bacteria are arriving to colonize the gut.

3. Timeline



A rough timeline of human evolution from various sources.

Conclusion

The common thread of all observations described above is that they favour a semi-aquatic evolutionary environment. None of the features indicate an evolution on the savannah. Therefore, supporting the Aquatic Ape Theory, however that does not mean that living on the savannah has not influenced human evolution.

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