

Original Synthesis Article

Recent out of Yemen: new version of the theory of unique and recent origin of modern man

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Abstract - It is generally accepted that the human evolutionary history was started in sub-Saharan Africa by the emergence of first individuals belonging to our genus *Homo*. But details of this evolution, particularly those of its last stage relating to the modern man (*Homo sapiens sapiens*) emergence, represent until now a controversial topic. Confusion and imprecision associated with certain concepts and definitions have accentuated this controversy and therefore helped to curb the progress of the research in this topic. In this paper I present these problems before presenting a new detailed version of the theory of unique and recent origin of modern man. This version designated “Recent out of Yemen” thesis represents a refined grand synthesis in which my advanced hypotheses are brought together with new additional details. First, from an objective definition of modern man and several solid anthropological arguments I have proposed dates, of about 45,000 years ago for the emergence of our species and 20,000 years ago for that of our subspecies. Second, from analyses of basic genetic results I have shown that the southern Arabian Peninsula would be the most probable place of a so recent emergence of modern man. The various elements of my thesis are presented and discussed following an empirical approach, and then summarized in a scenario that represents a new more consistent image of our evolutionary history.

Key words: Human evolutionary history, Origin of modern humans, Recent out of Yemen thesis, Date of modern man emergence, Place of modern man emergence, Genus *Homo* definition, Modern man definition, Single origin theory.

The principal objective of this paper is to provide a more reasonable and convincing answer to the classic question “When and where modern humans emerged?” by presenting a new detailed version of the model of single origin. Before this I prefer present confusions and inaccuracies associated with the single original model while providing corresponding corrections and clarifications necessary for a good start in the construction of my new version designated “the recent out of Yemen thesis”.

Confusions linked up with the model of single origin

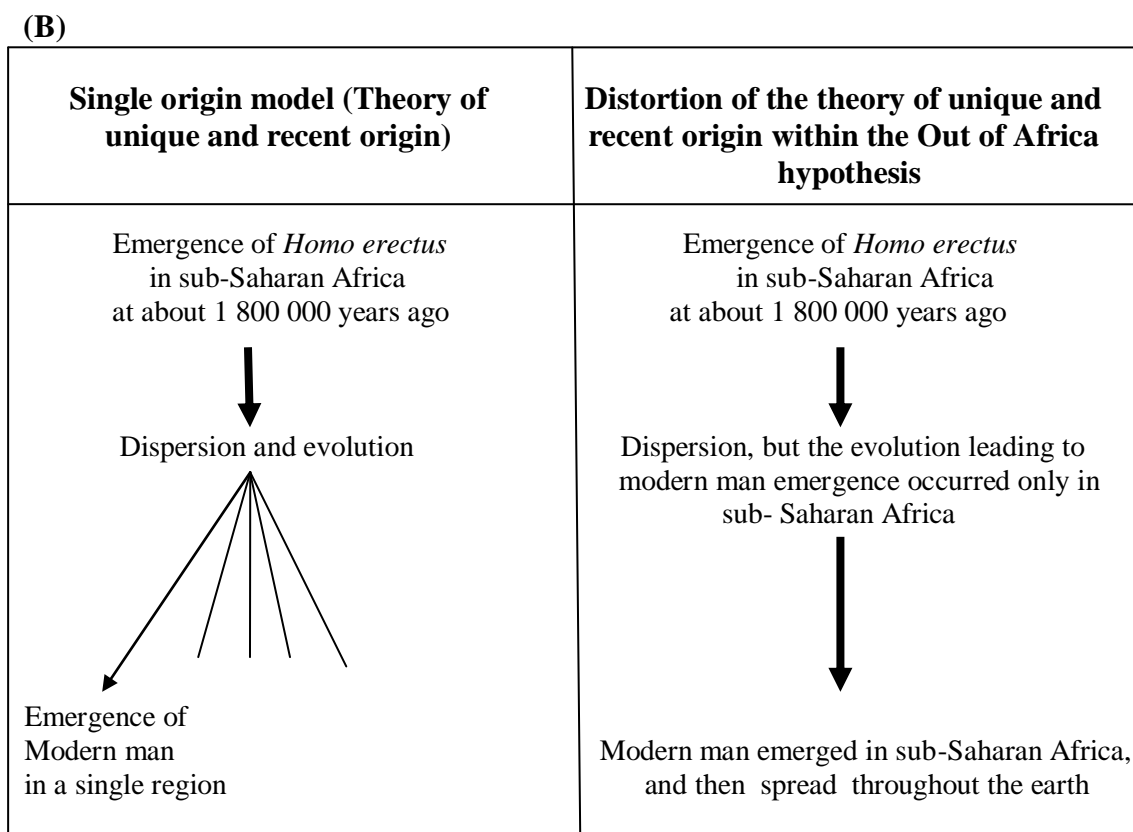
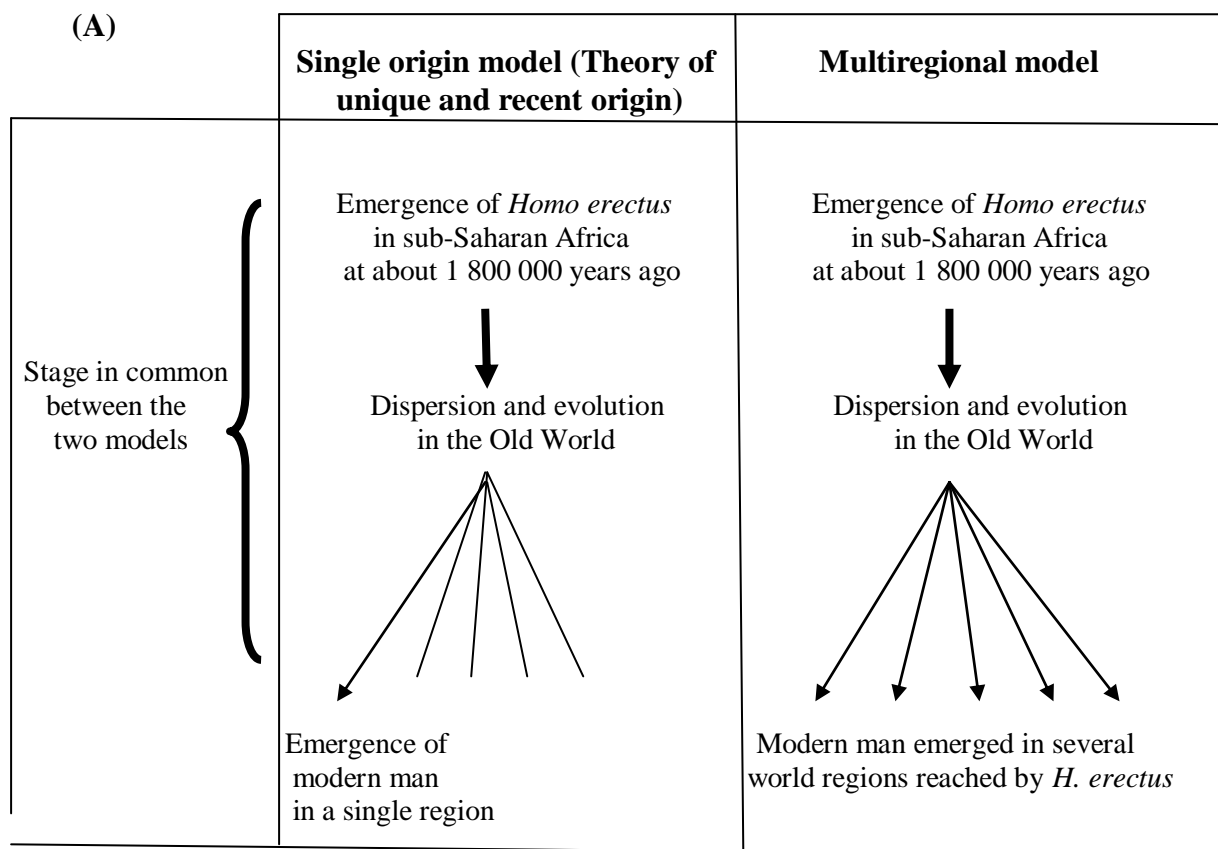
Anthropologists have long debated the origin of modern humans, and from 1980 two principal models emerged: the model of multiregional origin argues that the early *Homo* peoples migrated out of Africa and thus the emergence and evolution of modern humans took place independently in different parts of the world; while the model of single origin suggests that all current human populations descend from a single ancestral population of modern humans who, spread throughout the earth, having completely replaced the preceding archaic populations without interbreeding. As shown in these two descriptions the two models are opposed only for the last period of the human evolutionary history that concerns the emergence of modern humans: this emergence took place in a unique place for the model of single origin and in many parts of the world for the model of multiregional origin; while before the emergence of modern humans, both models consider that the first *Homo* peoples were appeared in sub-Saharan Africa and then widespread in other continents of the world, where they had continued their evolution (Fig. 1, A).

The single origin model has been strongly supported by rigorous genetic results (e.g., Denaro et al. 1981; Barbujani et al. 1997), which showed a surprisingly small amount of genetic variation noted throughout all present-day human populations. According to these results our origin is not only unique but also recent and consequently the model of single origin is become a general theory: the theory of unique and recent origin of modern humans. At the same time, this theory is indirectly supported by analyses of linguistic data showing that all current languages would originate from a unique and recent ancestral tongue (e.g., Shevoroskin 1989).

Unfortunately from the publication of the study of Cann et al. in 1987, where the ‘Out of Africa’ hypothesis was presented, several anthropologists have, very likely without realizing, included two principal confusions in the real theory of unique and recent origin making it globally opposing to the multiregional model. First, they have confused the well-accepted general theory with the so-called ‘Out of Africa’. In the latter, although the principle of the general theory has been adopted, the date and the place of modern man emergence, that still represent a controversy, have been proposed. Therefore the ‘Out of Africa’ hypothesis could be considered as a version of the general theory and not the theory itself. Second some anthropologists who align on this ‘Out of Africa’ version imply that all evolutionary divergences leading to modern man emergence were happened only in sub-Saharan Africa. But this consideration could not be accepted: in other words how the earliest *Homo* peoples emerged in sub-Saharan Africa and spread in several regions of the world had evolved only in sub-Saharan Africa? In fact this consideration get away from the well accepted general theory according to which only the divergence of the modern man were accomplished in a single place while that of his predecessors, such as archaic *Homo sapiens* or some eventual sub-species of *Homo erectus*, could be diverged in different regions of the Old World (Fig. 1, B). Who is concerned by this second confusion seems to be inclined to make this theory completely different from the model of multiregional origin within a general human tendency to develop two diametrically opposing visions, then the alignment on one of them. The problem is that the alignment often occurs without presenting new convincing arguments as it was done by several authors towards the out of Africa hypothesis.

Avoiding all these confusions, I will present in the following a new version of the real theory of unique and recent origin of modern humans. This version, designated “Recent Out of Yemen” thesis, is drawn up from my hypotheses advanced separately (Chaabani 2002; 2008). After a revision and updating, these hypotheses are gathered with new details and argumentations in a refined grand synthesis giving shape to a reliable picture of our evolutionary history. As the determination and the definition of the modern man himself are subject of confusion and vagueness, I prefer to begin by drawing up the most accurate and reasonable definition of modern man “*Homo sapiens sapiens*”.

Figure 1. A. Diagrammatic representation of the two usual human evolution models
 B. Distortion of the theory of unique and recent origin linked up with the Out of Africa version



Vagueness linked up to the definition of modern humans

Several paleoanthropologists have used the anatomical criterion to determine and define modern humans without reaching a real success. In fact the human fossil research had been started from the 19th century, but the scarce discovered fossils were often found in incomplete states and at sparse periods. Thus, each of these incomplete fossils had been analyzed in a separated study subject to mistake and imagination leading to questionable conclusions.

In 1999, Wood and Collard have carried out a meticulous general revision of anatomical features of all available hominid fossils and they concluded that the two fossils called *Homo habilis* and *Homo rudolfensis* do not in fact belong to the genus *Homo*, but they belong to a non-human ape species. Thus, they consider that early individuals belonging to the genus *Homo* are those who emerged in sub-Saharan Africa at about 1.8 million years ago and designated *Homo erectus*. This conclusion is strongly supported otherwise by Bramble and Lieberman (2004) who have shown that *Homo erectus* is the first who have the anatomical features responsible for the possession of the endurance running ability and that of the real upright body form. This anatomical features (about 26 features), absent in all predecessors of *Homo erectus*, differentiate *Homo* peoples. Consequently, the bipedal gait restricted to walking, classically considered as a humanization criterion, would not be supported any more. In fact, this criterion could be an ancient adaptation, which probably existed even before the divergence between apes and humans at about 5 million years ago. In fact fossils of *Orrorin tugenensis* fossil, 6 million year old, and *Sahelanthropus tchadensis* (Toumai), 7 million year old, are already adapted to the bipedal gait.

According to the two rigorous studies quoted above and other recent studies such as that of Tattersall and Schwartz (2008) the post cranial morphology of *Homo erectus*, although more robust, falls within the range of that of *Homo sapiens sapiens*. On the basis of this evident recent conclusion, it is reasonable to define *Homo* peoples as follows: "Peoples belonged to the genus *Homo* are those who possess the post cranial anatomical features of contemporary humans particularly those responsible for the real upright body form associated to the endurance running ability".

Some anthropologists believe that the analyses of discrete cranial traits (DCT) could differentiate the two principal species, *erectus* and *sapiens*, of our genus. Hence they tried to define *H. sapiens* as having modern DCT in contrast with *H. erectus* having primitive DCT. But the variation of DCT during the long existence period of *Homo* peoples shows a complex continuation and it is inconceivable to set limits within this variation for classing species especially that it is not possible to know if this complex and uncertain morphological variation is within-species or among-species. The vagueness of this variation appeared in several observations such as the case of the complete *Homo erectus* fossil "Turkana Boy" found in Africa, which shows, in addition to the prevailing primitive DCT, some advanced features (Gish 1995). On the other hand human fossils considered anatomically modern, dated about 160,000 or 120,000 years ago, keep some primitive DCT (White et al. 2003; Klein 1992). Namely there is some degree of overlap in the ranges of DCT variation among species within the genus *Homo*. This degree become important among the possible closely related subspecies such as the so called archaic *H. sapiens* and *H. sapiens sapiens* to such an extent that the paleoanthropologists could not speak about subspecies within *Homo* genus: for example they use simply *H. sapiens* for the designation of modern man.

Besides, the so-called modern DCT are not especially similar from place to place and therefore its identification presents a problem (Caspari and Wolpoff 2013). Even in the same geographic area, living populations show substantial morphological differences from populations of *Homo sapiens sapiens* living >5,000 years ago (Lahr 1996). Another problem concerns the evident incompatibility between the state of these DCT and the ancient mtDNA sequences analysis (Adcock et al. 2001; Relethford, 2001). More general problem concerns the fact that the discovered fossils of a single individual are considered, without realizing, as representative of the larger population to which they belonged during the same existence period that, moreover, is often dated with wide probability for errors. In the light of all these critical observations, it seems that the anatomical criterion is evidently of limited utility in identifying the real modern humans' fossils and in reconstructing their past.

Similar conclusions were signaled by several anthropologists such as Wolpoff (1986), Brown (1990) and Kidder et al. (1992) who believe that it is probably impossible to arrive at a definition of anatomically modern humans that simultaneously includes the variation of all living people and excludes all members of archaic groups or Tattersall and Schwartz (2008) who wrote “ For a species that is both narcissistic and inquisitive, *Homo sapiens* has so far done a remarkably poor job of defining itself as a morphological entity”. Hence, we must look for an adequate criterion that permits a more adequate definition and therefore a more valid identification of modern humans. As I have noted previously (Chaabani 2008) such criterion do not need research: it is evidently present in our believe that modern humans differ from all being, including other *Homo* peoples, essentially by the superior potential cognitive abilities. Unfortunately, this criterion cannot be determined from the investigation of *Homo* fossils, but it could be determined indirectly from the vestige of their cultural products represented at least partly by the archaeological material.

In fact these superior cognitive abilities reflect the high degree of the complexity of the brain structure and its functional neural organization that could be due essentially to a higher number of neurons and synaptic connections and perfection at the level of functional molecular factors. I have considered that this high degree of the brain complexity has been appeared in its complete high degree even in earliest modern humans and consequently it has not been evolved in the course of time. It is the rate of know-how and knowledge that has been grown conducting, from time to time, to some improvement of the manner and the intensity of the use of the brain potential aptitude. Thus, I define the modern man, scientifically designated *Homo sapiens sapiens*, as follows: “The principal constant criterion that marks strongly the definition of modern man since his emergence is the high degree of the brain complexity responsible for the superior cognitive abilities”.

When earliest *Homo sapiens sapiens* first appeared?

From anatomical feature analyses of human fossils, the date of modern man emergence was estimated to about 100,000 – 120,000 years ago as being that of earliest fossils supposed as anatomically modern found in sub-Saharan Africa and in Levant (e. g.,

Valladas et al. 1988). But as I just present above the anatomical criterion could not permit from the few discovered human fossils to determine rigorously those of real modern humans and those of other *Homo* peoples particularly the immediate predecessors.

In 1987, Cann et al. estimated the date of modern man emergence from analyzing mtDNA to about 200,000 years ago with a surprising large interval ranges from simple to double reflecting the fact that they have used unsuitable methods criticized by several authors (e.g., Excoffier and Langaney 1989; Vigilant et al. 1991, Maddison 1991; Klyosov 2014). In fact these methods, quite sophisticated, theoretical and not sufficiently stable, include problematic assumptions such as that of the mutation rate of the human mtDNA evolution. Later, other dates have been estimated to $137,000 \pm 15,000$ years ago from autosomal marker analysis (Stoneking et al. 1997) or to 142,000 years ago from Y chromosome marker analysis (Cruciani et al. 2011). Even if the used methods are correct, they would lead to dates do not correspond necessary to that of modern man emergence but they could extend back to any point in the *Homo* evolutionary history.

On the basis of the definition of modern man presented above I have advanced a hypothetical date of his emergence deduced from a general survey of the principal cultural products carried out by *Homo* peoples from the emergence date of the earliest one, 1.8 million years ago, until nowadays (Table 1). Taking the existence length and the important cultural innovations into account one can distinct four possible periods, the last of which of 20,000 years appears strongly distinct from the precedents. In fact, since its beginning the different aspects of the real creative and innovative culture appeared suddenly together particularly the acquisition of the complex spoken language coupled to the complex society that would be considered as the principal modern behavioral capacity. This reflects the superior level of the potential cognitive aptitude of peoples who have seen life during this last period. Namely, these peoples possess the high degree of biological and physiological brain complexity that determines them as real modern humans. To these peoples, appeared at about 20,000 years ago, I keep the scientific designation of our own species and sub-species, *Homo sapiens sapiens*.

As shown in Table 1 our evolutionary history started at about 1.8 million years ago in sub-Saharan Africa with the emergence of the first people belonged to our genus *Homo*. During the earliest period between 1.8 million and 500,000 years ago, *Homo* peoples, in addition of some simple behavioral actions such as the use of fire, produced only one cultural product limited to the elaboration of bifacial stone tools (Mode 2) that could be considered as the first stone tools that require a real conceptualization. This reflects the low potential intellectual aptitude of these peoples who during a long tract of time (about 1.3 million years) had remained in a nearly stagnant situation. As they are the firsts having our principal postcranial anatomical features particularly those responsible of a real upright body form associated to the endurance running ability, I keep the designation of *erectus* as the species of these peoples. As they are the most ancient *Homo erectus* peoples I contribute to them “*primitivus*” as subspecies and therefore *Homo erectus primitivus* as a complete designation (Table 1).

During the following period 500,000 - 45,000 years ago *Homo* peoples arrived to produce a new stone technology, the large core or prepared core Mode 3, and they began to exhibit a preliminary funeral behavior (Carbonell et al. 2003). I believe that this ritual act reflects the possession of the first preliminary faculty of realizing important events such as the death. In other words, it seems that these peoples began to possess some long-term memory and to understand that one day they would die and thus they began to express some apprehension towards this event. According to this slight improvement in their mind and their behavior, it is reasonable to suppose that these peoples had carried a few minor genetic changes on brain genes that had permitted the level of cognitive development to pass from low to underneath average. As they are the first who have begun to make some disquiet towards violent passions as the death, I could consider them as belonging to a new subspecies “*inquietus*” and, therefore, they could be designated *Homo erectus inquietus*. From the latter very likely at about 300,000 years ago diverged the Neanderthal type then at about 45,000 years ago diverged our species *sapiens* (Table 1). This consideration agrees strongly with the analysis based on ancient DNA which suggests that living populations of *Homo sapiens* and Neanderthals shared a relatively recent common ancestor around 300,000-500,000 years ago (Endicott et al. 2010).

Table 1. A simplified presentation of principal stages of the human evolutionary history based on rigorous anthropological data within the *Recent Out of Yemen* thesis

Designation of <i>Homo</i> peoples and their emergence date in years BP	Principal new cultural products	Hypothetic level of cognitive development	Hypothetic phylogeny of <i>Homo</i> peoples
<p>1 800,000 <i>Homo erectus primitives</i></p>	<ul style="list-style-type: none"> - Bifacial stone tools: Mode 2 (first stone tools that require a real conceptualization) 	Low	<p><i>Homo erectus primitivus</i></p> <p><i>Homo erectus inquietus</i></p> <p><i>Homo sapiens artista</i></p> <p><i>Homo sapiens sapiens</i></p> <p><i>Neanderthal</i></p>
<p>500,000 <i>Homo erectus inquietus</i></p>	<ul style="list-style-type: none"> - Prepared core stone technique: Mode 3 - Funeral preliminary behavior 	Underneath average	
<p>45,000 <i>Homo sapiens artista</i></p>	<ul style="list-style-type: none"> - Blade-based stone technology: Mode 4 - Drawing products 	Average	
<p>20,000 <i>Homo sapiens sapiens</i></p>	<ul style="list-style-type: none"> - Rapid development of distinct technology: Microlith stone - Several artistic products - Development of a complex spoken language and a social complexity - Agriculture innovation - Copper industry - Invention of wheeled carts - Bronze then Iron industry - Writing innovation - Innumerable more recent known innovations 	Superior	

During the next relatively short time between 45,000 and 20,000 years, *Homo* peoples produced a new stone tool technology, Blade-based stone technology Mode 4, and exhibited their first artistic expressions. These peoples would diverge from *Homo erectus inquietus* after new genetic changes responsible for the brain development moving up its cognitive development level from underneath average to average. This consideration is similar to the view that modern neural organization is the result of a relatively sudden genetic mutation that took place in populations at about 50,000 years ago (Klein & Edgar 2002). Besides, I consider that such genetic changes would mark a new species corresponding to our species known by its designation “*sapiens*” (Latin word literally means wise man). As these peoples are the firsts who have begun to express the art such as that of painting I consider them belonging to a sub-species “*artista*”. Cro-Magnon type, appeared at about 30,000 years ago in Europe, could be considered as a regional group of these *Homo sapiens artista* peoples (Table 1). My consideration that *H. Sapiens* would be a daughter species of *H. erectus* is widely recognized (for review see Jurmain et al. 2011).

As noted above at about 20,000 years ago the real modern man *Homo sapiens sapiens* emerged. He diverged very likely from their immediate predecessors, *Homo sapiens artista* people, belonging to the same species (Table 1). At the anatomical level, this divergence involved only slight change in bodily physique. In fact, since the end of Pleistocene, corresponding to the present proposed date of *Homo sapiens sapiens* emergence, the fossil investigation showed that humans were smaller than their immediate ancestors and they presented a difference in size between males and females significantly reduced in comparison with that of earlier humans (Foley 1988). Besides, this divergence must be associated to important genetic changes on brain genes responsible to elevate the cognitive development level from average to superior. Geneticists have begun to identify some of these brain genes such as the RNA gene HAR1F that express during the cortical development and has evolved rapidly in humans (Pollard et al. 2006) and the transcription factor *FOXP2* that has been suggested to play a role in the development of language and speech in humans (Fisher and Marcus 2006).

According to my hypothesis, the radiation of modern man towards the different world continents came off by population replacement. I consider that modern man emerged just at the end of an extinction period of almost all his predecessors. This extinction period, so proposed, coincides with the most terrible episode, between about 22,000 and 20,000 years ago, of the last glacial period (Pons et al. 1991; Lowell et al. 1995). In fact, this relatively long episode with the maximum extend of glaciations coupled to dramatic, arid and cold climate is certainly the essential cause accountable for an important extinction of *Homo* peoples. At the end of this most terrible episode, the climate has begun to be relatively less cold at the closest regions to the equator where in one of them *Homo sapiens sapiens* would be emerged with his superior cognitive abilities that give him the power to be the dominant on this earth.

The dates and periods relating to the majority of cultural products presented in Table 1 are generally accepted (e. g. see Lewin 1993), while those corresponding to the development of complex spoken language and social complexity needs some justification that I will present below. The simplified hypothetic *Homo* people classification and the timing of modern man emergence, proposed above, sometimes go beyond what one can deduce from a so simple analysis of cultural products supported by some published rigorous data. Thus in the following I will present several additional solid arguments that have simultaneously influenced and guided my reasoning during the construction of my thesis.

Additional genetic arguments

As I have noted above my estimation of about 20,000 years ago represents a really recent date of modern man emergence which agrees strongly with rigorous genetic results, which showed a surprisingly small amount of genetic variation noted throughout all present-day human populations (e.g., Denaro et al. 1981; Barbujani et al. 1997). Besides, it agrees with rigorous specific genetic data that I can quote as follows:

- The results of analyses of human fossil ancient mtDNA from Neanderthal specimens (Ovchinnikov et al. 2000; Caramelli et al. 2003) show that Neanderthals fall outside the range of living human genetic diversity. This agrees with my thesis in which I consider that Neanderthals do not belong to our own species, *sapiens* (Table 1). In addition, my thesis

solves the disquieting question: how Neanderthals and modern humans lived together in the same regions and at the same period without mixture and how modern humans had got rid of Neanderthals and replaced them? According to my thesis the real modern man, *Homo sapiens sapiens*, emerged at about 20,000 years ago at the end of an extinction period of almost all his predecessors included Neanderthals who lived only until about 30,000 years ago.

- The results of mtDNA analysis of Australian fossils (Adcock et al. 2001) show that Lake Mungo 3 fossil, 60,000 year old, although anatomically similar to living humans had divergent mtDNA sequences. These results agree with my thesis that considers fossils of 60,000 year old do not belong to *Homo sapiens sapiens*, but belonged to *Homo erectus inquietus*. My thesis agrees also with results of ancient mtDNA, which show that the anatomically modern European fossils, 24,000 year old, fall well within the range of variation of today's humans (Caramelli et al. 2003). In fact, according to my thesis these fossils belonged to *Homo sapiens artista* or even to *Homo sapiens sapiens* if the age of these fossils so estimated is slightly higher than the real one. In the coming years, other possible ancient DNA analyses relating to several nucleic sequences and carried out on more important number of specimens with different ages will provide more satisfactory tests that will complete and check the cultural product analysis for recounting together the true human evolutionary history.
- The estimation average age of *Alu* insertions divergence of between 30,000 and 55,000 years that provides further support for a recent worldwide human replacement (Knight et al. 1996).
- The individual whole genome sequences analysis that shows considerable genetic exchanges may still have occurred until 20,000 – 40,000 years ago (Li and Dubin 2011).
- The genomic surveys in humans identify a large amount of recent positive selection (e.g. Voight et al. 2006). Besides, Wang et al. (2006) suggest that events of this evident positive selection likely occurred in the last 10,000 – 40,000 years. Similar conclusion was found by Hawks et al. (2007) who showed that selection has accelerated greatly during the last 40,000 years. These results are in favor of my proposed dates of 45,000 and 20,000 years ago for the emergence of our species and subspecies respectively. In fact, the positive selection promotes the emergence of new phenotypes and can leave a set of telltale signatures in the genes under its influence, such as the rapid divergence of functional sites between species and the depression of polymorphism within species (Kreitman 2000;

Bamshad and Wooding 2003). In addition, authors of these works showed a category of genes for which positive selection appears to have operated more intensely in the lineage leading to humans than in other lineages. These genes, often associated with behavior and brain development, are particularly relevant to understanding the evolution of biological traits as advanced cognitive abilities that distinguish our species and sub-species *sapiens sapiens* (Vallender and Lahn 2004).

Additional archeological arguments

As noted above my hypothetical emergence dates of our species and subspecies are deduced from a general survey relating to cultural products, and therefore they are completely in agreement with the general archaeological context. Besides, specific archeological and cultural data come to support strongly these dates:

- Several data have shown that the boundary, at about 45,000 years ago, between the Middle and Upper Palaeolithic is often taken as marking the transition to modern human culture (Lewin 1993; Prat et al. 2011). In other words the emergence of the Upper Paleolithic is traditionally envisioned in terms of a clear rupture with the Middle Paleolithic (Teyssandier 2008). Although these observations concern mainly Europe, recent studies show that even in Africa, at Border Cave in South Africa, the emergence of modern human culture is appeared at a similar date of about 44,000 years ago (Villa et al. 2012; D'Errico et al. 2012). All these data agree with my thesis that considers the divergence of the first people belonged to our species '*Homo sapiens artista*' occurred at about 45 000 from *Homo erectus inquietus* in possible several places of the Old World. In addition, my thesis comes to resolve the disquieting puzzle of evident uncoupling of modern morphology from modern behavior when one considers *Homo* fossils of about 120,000 year old as those of modern humans.
- My thesis takes off another enigma, that of the transitional period between the Solutrean and the Magdalenian or between their equivalents outside Europe. In fact, in caves where the Palaeolithic is relatively quite presented, a layer with lack of human tools has been found. It was dated of about 17,500 years ago in Shanidar Cave in Iraq (Solecki 1955) and about 18,000 years ago in Abri Fritsch Caves in France (Allain 1984). The meticulous study of the latter revealed a sudden and definitive disappearance of the refined Solutrean industry followed by an appearance of another industry completely different and much less developed (Allain 1984). Namely a great bound backwards between Solutrean and initial

Magdalenian or Badegoulian, appeared at about 17,500 years ago in Europe. According to my thesis, this period came quite after the period that I have considered as a human extinction period, 22,000 – 20,000 years ago, and just before the arrival of the real modern humans to southern Europe very likely at about 17,000 years ago from a region nearer to the equator where they had emerged at about 20,000 years ago. Consequently, this great bound backwards could be explained by the fact that *Homo sapiens sapiens* expanded across the Earth just after extinction of nearly all his predecessors and at his arrival to southern Europe he did not received any technological know-how from his predecessors. Namely, he produced stone tools with a sudden return to a general simplification. In addition, all these considerations on the Solutrean-Magdalenian transition are already noted by Breuil since the beginning of the last century with details in evident agreement with my thesis. In fact, this great French archaeologist did not hesitate to declare: “if there is an event that would be certain in prehistory, it is the fact that the first Magdalenian humans are not evolved from Solutrean humans: they were newcomers arrived at these places, as much they were unskillful in the art of hew and readjust flint as their predecessors excelled in it” (Breuil 1937). In fact, reaching southern Europe, modern humans have started from scratch for developing rapidly during only about 5,000 years, a technology more advanced than that of their predecessors. This is evident through the novel distinct technology "microlith" of the Magdalenian period that I consider as the first cultural period of modern man in Europe. Just before this Magdalenian period, at about 18,000 years ago, appeared in Levant a new culture distinct from that of the Paleolithic and designated Kebaran. It is characterized by microlithic tools and exhibits a remarkable degree of cultural change over a small period. Thus, it is reasonable to consider this kebaran culture as that of modern humans who had very likely reached Levant before southern Europe.

Finally I can show how my thesis could take off any other enigma already appeared or will emerge in the future by giving another enigmatic example that of Australia. In fact it is now accepted that Australia was colonized by at least 50,000 years ago (e. g., Gillespie 2002). As obtained fossils are anatomically modern (Foley and Lahr 1997; Stringer 2001) several anthropologists believe that these earlier colonizers were also behaviorally modern. But others (e. g., Allen and O’Connell 1995; Brumm and Moore 2005) demonstrated that a strict analysis would suggest that the first colonizers of Australia were not behaviorally modern until relatively recently, perhaps only the last 7000 or 6000 years. Hence, they noted an evidence for symbolic activity in the Australian Pleistocene most closely

resembles the Europeans and African Lower and Middle Paleolithic. These data together appear somewhat strange, but within my thesis there is no problem and an evident explanation could be proposed as follows: as the first *Homo* people reached Australia from about 50, 000 years ago, they are *Homo erectus inquietus* people or *Homo sapiens artista* if they are among arrivals after about 45, 000 years ago. Thus *Homo erectus inquietus* and even *Homo sapiens artista* were not yet able to exhibit the full behaviorally modern culture specific to *Homo sapiens sapiens* who, very likely, reached Australia at an exceptionally recent date from about 6000 years ago.

Other Additional arguments

In addition to these genetic and archaeological arguments presented above others could be gathered from the history of the development of social structure and spoken language. The timing of the acquisition of complex spoken language could be estimated indirectly from that of the social complexity appearance, which could not come off without the development of a complex spoken language and vice versa. The development of sedentary agricultural community appeared at about 10 000 years ago, has been preceded by that of the sedentary hunter-gatherer community. The site of Abu Hureyra in northern Syria occupied from 11,500 years ago gives a good example of sedentary hunter-gatherer community. In fact this community, composed of between 50 and 300 individuals, presents a fully social complexity absent in previous small nomadic hunter-gatherer bands (Legg and Rowley-Conwy 1987). Therefore, the appearance of such development of complex extended social networks, from about 12,000 years ago, reflects a so recent complex spoken language development. This is in agreement with my thesis in which I consider the acquisition of the complex spoken language as a recent principal modern behavioral capacity specific to modern man who emerged at about 20.000 years ago.

The timing of the acquisition of complex spoken could be also estimated indirectly from linguistic studies by the estimation of the date of development of the first complex spoken languages. Analyzing the relationships within the Afro-asiatic language family, Fleming (1976) and Ehret (1979) have suggested independently that the seniority of the protovocabulary of this language family dated back to about 15,000 years ago. A similar date, 14,000 years ago, was proposed as the time at which another protolanguage, Sino-Caucasian, was developed and spoken (Starostine, 1989). Three Russian linguists also argues for a recent origin of complex spoken language, they have estimated independently the date of about 15,000 years ago at which has been developed and spoken an ancestral

Nostratic tongue. Hence the construction of a first ancestral tongue could not be started before 20,000 years ago (Shevoroskin 1989; Dolgopolsky 1988; Illich-Svitych 1984). All these data, in fully agreement with my thesis, are inconsistent with the consideration of 120,000 years ago as the date of modern man emergence. In other words, if the fossils with so called modern morphology of about 120, 000 years old are that of modern humans why social complexity and complex spoken language and other superior cognitive abilities, have taken about 100,000 years for appearing suddenly and together in their behavior?

Where earliest *Homo sapiens sapiens* first emerged?

From analyses of genetic data several authors suggested that, as the case of the earliest *Homo* peoples (*Homo erectus*), modern humans were also emerged in sub-Saharan Africa. Their suggestion was based on two principal questionable considerations. First, often they provide phylogenetical reconstruction with unreal root; even if they localize the root it is not possible to determine objectively the common ancestral population (Nei and Takezaki 1996). Second, they noted greater genetic diversity in African populations (e. g., Caan et al. 1967; Vigilant et al. 1991) and they considered that such greater African diversity reflects a greater antiquity of African populations and, hence, an African origin of modern humans. But other authors have pointed out that this greater African diversity could instead reflect a larger effective size for African populations (e. g., Tishkoff et al. 1996; Stoneking et al. 1997). Thus, a greater genetic diversity in African populations does not necessarily imply an African origin of modern humans. Moreover, Harpending et al. (1996) have equated the hypothesis of an African origin of modern humans with a demographic scenario in which the ancestors of African populations expanded earlier than the ancestors of non-African populations. This is partly in agreement with my corresponding explanation that I will present within a general scenario at the end of this paper.

In my previous genetic study (Chaabani 2002), the most probable place of the emergence of modern humans and their first major expansions were discussed using worldwide analyses of the genetic variation of the immunoglobulin GM system known by its unparalleled ability, of a single system, to study the human evolutionary relationships. The confrontation of the distribution of GM haplotype frequencies in current human populations and the phylogeny of the evolution of the GM haplotypes themselves has permitted with the support of historic data to suggest Yemen as the most probable place of the emergence of a first common ancestral population of modern humans showing the

major directions of its spread in the Old World. The broad outline of this consideration was summarized in Figure 2. In the following, I show how analyses of other genetic markers come to support not only this scenario of the emergence place of modern man and his expansion but at once the corresponding date of this great event. As Y chromosomal phylogeny and mitochondrial DNA (mtDNA) variation have become a powerful resource for reconstructing past human demographic events, I present two examples of overall basic data from each of these uni-parental systems.

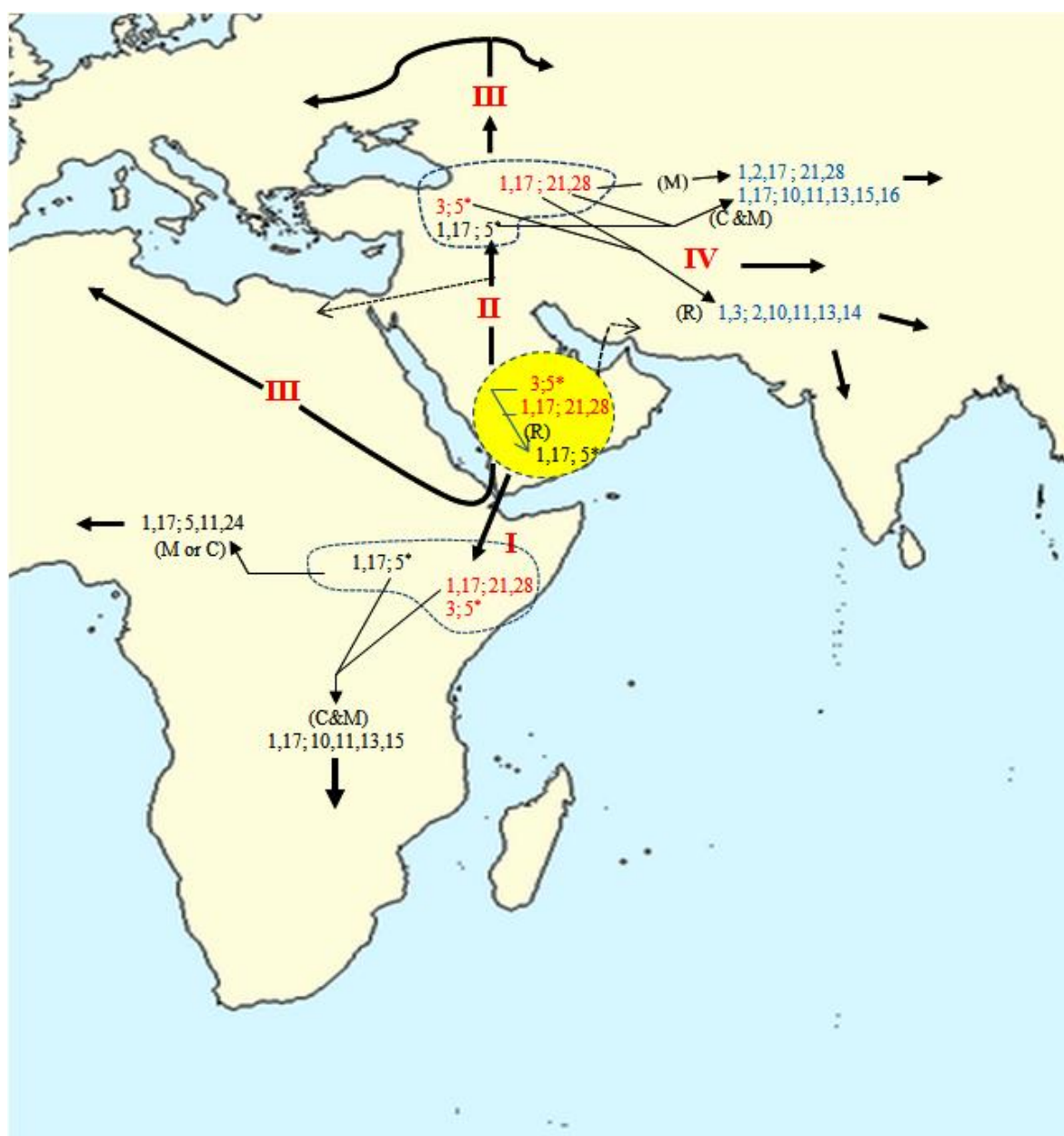


Figure 2. Phylogeny of the principal GM haplotypes from the two ancestral ones (GM 3; 5* and GM 1,17; 21,28) and reconstruction of the emergence and the expansion of modern humans (according to Chaabani 2002).

(*: 10,11,13,14 M: mutation R: recombination, C: gene conversion)

The first example concerns the Y DNA haplogroup J-P209 (or simply designated J) represented by its two subclades J-M267 (or J1) and J-M172 (or J2). Its frequency peaked in Southern Arabian Peninsula (82.1 percent) and decreased with some harmony with geographic distance toward all directions (see Fig. 3). Thus the place of origin of this haplogroup J would be the southern Arabian Peninsula and its distribution agrees with the first major expansions proposed from GM marker analysis (Fig. 2). According to Semino et al. (2004) this haplogroup J arisen roughly $31,700 \pm 12,800$ years ago. This date would coincide with my proposed date of modern man emergence estimated to about 20,000 years ago: namely the haplogroup J had very likely arisen with the emergence of modern man and consequently by the analysis of its geographic distribution we could reconstruct the first major stages of the modern human expansion (Fig. 3).

The frequencies of the two subclades (J1 and J2) representatives of this haplogroup suggest that the mutation leading to the subclade J1 occurred very likely in the place of origin Yemen (J1 frequency is 72.5 percent versus 9.6 percent for J2); while that of its second subclade J2 had been happened very likely out Yemen during or after the expansion in other Old World regions particularly those toward the North such as Syria (33.6 percent for J1 versus 20 percent for J2), Turkey (9.1 percent versus 24.2 percent) or Greece (1.9 percent versus 18.1) (corresponding references are indicated in the legend of Figure 3).

The second example concerns analyses of mitochondrial DNA (mtDNA) variation. Cerny et al. (2011) showed that particular mtDNA haplogroup R0a provide evidence for a deep genetic root in southern Arabia. They found the highest frequencies of the haplogroup R0a, mainly present in Yemen, decrease in all directions particularly toward the North of the Arabian Peninsula and toward Africa via Bab-el-Mandeb Strait (see Fig. 4). This suggests people movements in agreement with those proposed by the analysis of GM haplotypes and that of the Y-chromosome haplogroup J. The date of these ancient people movements is quite estimated from the coalescent age of the haplogroup R0a with the involvement of archaeological and paleoclimatic data from about 20,000 years ago (Cerny et al. 2011). Hence the emergence of the mtDNA haplogroup R0a would be coupled to that of modern man and therefore the analysis of its geographic distribution could permit the reconstruction of the first major stages of the expansion of modern man (Fig. 4).

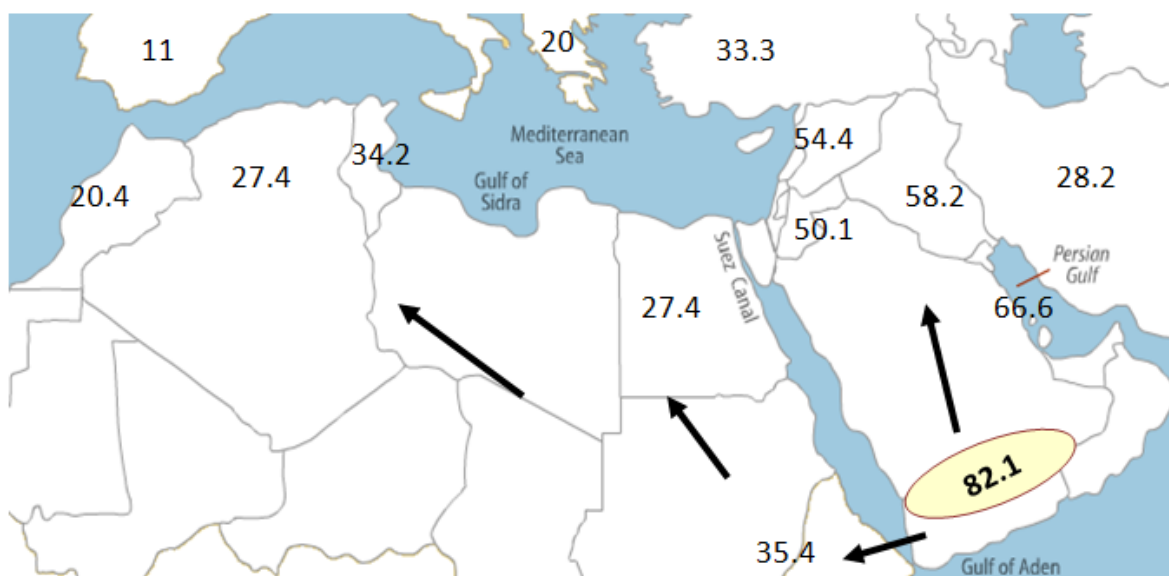


Figure 3.

Geographic distribution of Y-DNA haplogroup J frequencies

Indicated frequencies are in percent found in Algeria 'Oran' (Robino 2008), Yemen, Qatar (Cadenas et al. 2008), Ethiopia, Tunisia (Semino et al. 2004), Egypt, Jordan, Syria, Iran, (El Sibai et al. 2009), Spain 'Sevilla' (Flores et al. 2004), Morocco (Cruciani et al. 2002), Turkey (Cinnioglu et al. 2004), Iraq (Al-Zahery et al. 2003), and Greece (Di Giacomo et al. 2003) (The references of the last three studies are quoted in El Sibai et al. 2009; arrows indicate hypothetical direction of modern man expansion)

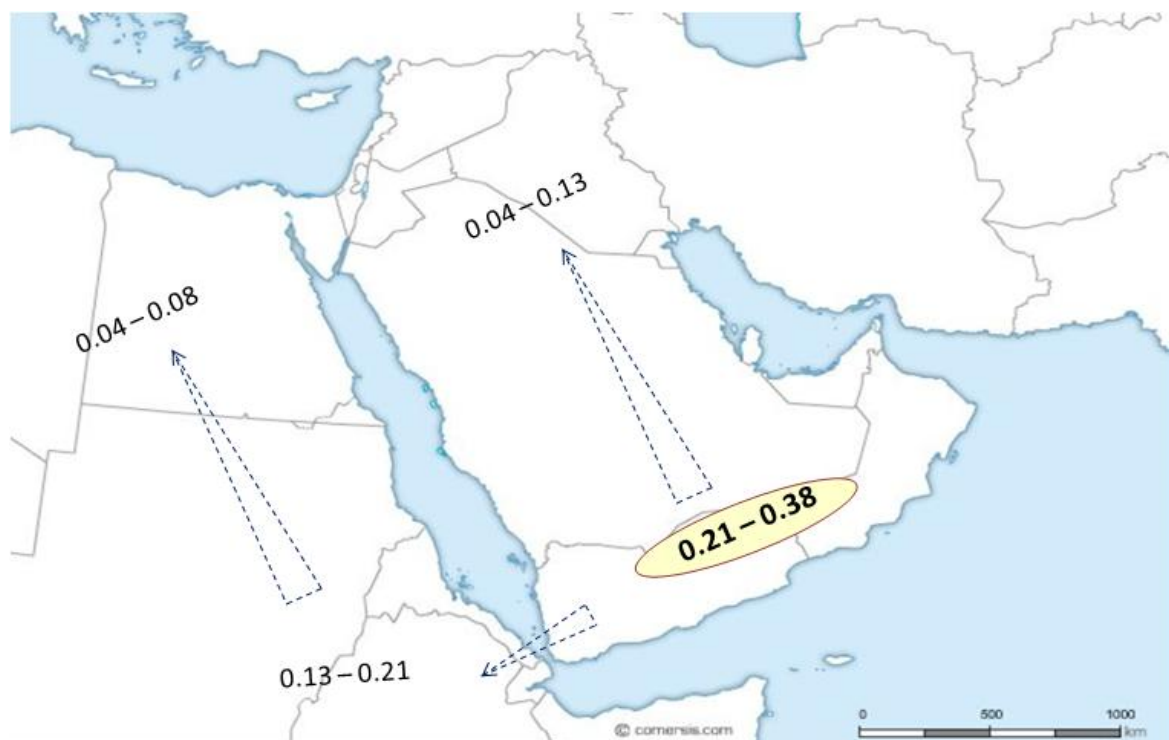


Figure 4.

Geographic distribution of mitochondrial haplogroup ROa frequencies at Arabian Peninsula and neighboring regions

(Interval variation of frequencies are according to Cerny et al. 2011; arrows indicate hypothetical direction of modern man expansion)

General scenario of the “Recent out of Yemen” Thesis

In conclusion, I can note that my thesis ‘recent out of Yemen’ is entirely consistent with the general theory of the recent single origin of modern humans (Fig. 5) while offering well-argued proposals regarding the location and the time of the emergence of modern humans. The principal elements of my thesis could be summarized in the brief following coherent picture. The human evolutionary history would be started by the emergence of the first *Homo* peoples (*Homo erectus*) in sub-Saharan Africa at about

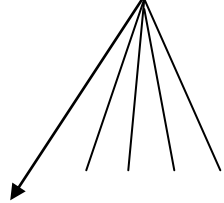
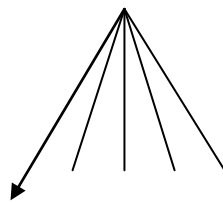
1.8 million years ago. During their expansion across the Old World, these *Homo* peoples had undergone successive evolutionary divergences the principal of which are proposed in the Table 1. These divergences could be happened in several geographic world regions except for the last divergence of *Homo sapiens sapiens* from *Homo sapiens artista* that occurred in a unique place very likely in southern Arabian Peninsula at about 20,000 years ago. As showed in Figure 6, from Yemen major stages of modern humans' expansion occurred successively:

- First stage (I) of modern man expansion at about 20,000 years ago: under climate influence some of the first modern human group had chosen to travel from Yemen to the south going through the Bab-el-Mandeb Strait to extreme east Africa and gave the sub-Saharan African ancestors. Hence, the current higher diversity of sub-Saharan populations could be explained by the fact that their ancestors were the first diverged from the common ancestral population, very likely in small groups because they meted the obstacle of the Bab-el-Mandeb Strait and then they spread in the enormously vast sub-Saharan African forests by splitting up in smaller groups, which after this important founder effect and during relatively long isolation, were submitted to selection and genetic drift. On the basis of the GM system analysis two principal directions from the extreme Africa would be followed one toward the west and the second toward the south (Fig. 2). During the past 20,000 of modern man existence, the obstacle of Bab-el-Mandeb Strait has very likely intervened to keep a relatively important genetic distance between Yemenites and their neighboring extreme east sub-Saharan Africans in spite of their geographic closeness (Chaabani et al. 2000).
- Second major expansion (II) at about 18,500 years ago: at this second stage modern humans migrated from Yemen to the north for reaching Levant at about 18,000 years ago where they founded the Kebaran culture.
- Third major expansion (III) at about 17,500 years ago: at this stage modern human groups left Levant for arriving, at about 17,000 years ago, in southern Europe where they founded the Magdalenian culture. During the same stage, modern humans left Yemen for reaching, at about 16,500 years ago, North Africa where they founded the Oranean culture. The genetic affinity noted between current Yemenites and North Africans (Chaabani et al. 2000; Badro et al. 2013) would reflect that the migrations from Yemen to North Africa occurred in large groups without any serious climatic obstacle at a period in which the present Saharan regions had another aspect (Pons et al. 1991).

- Forth major expansion (IV) at about 14,000 years ago: at this stage Asians diverged mainly from ancestors of European populations and those of the ancient Mesopotamia. GM system analysis suggests two principal directions one toward the Asia centre and the second toward the southern Asia (Fig. 2). Mitochondrial DNA analysis supports also this expansion to East Asia that carried among others the prominent A and B haplogroups (Maca-Meyer et al. 2001).
- Fifth major expansion (V) at about 11,500 years ago: it concerns the arrival of modern humans to American continent. Molecular markers analyses (e. g., Merriwether et al. 1996; Novick et al. 1998) supported this arrival by suggesting an Asian origin of the New World populations. On the basis of archeological data (Gary H 2002), I consider that the first modern human group arrived in America from East Asia via Bering Strait had founded the Clovis culture emerged at about 11,500 years ago. This agrees with linguistic data showing that some ancestors of Amerind languages came to North America some 12,000 years ago, while others came later at about 5,000 years ago (Shevoroshkin 2008).
- A possible last major expansion, last stage (VI) concerns the arrival of modern humans to Australia. As I have explained above from the basic obtained data (for review see Brumm, and Moore 2005) I consider that predecessors of modern humans had well reached Australia from about 50, 000 years ago, while the first real modern human groups would arrive to Australia from about 7000-5000 years ago exhibiting the full modern behavior.

Finally I note that on the basis of my definition to the modern man the “Out of Africa” version does not concern modern man, it concerns his predecessors. Thus the primordial cause of the controversy in this subject is the definition of modern man himself and not the date or the place of his emergence. The principal aim of this article was to provide explanations on many questionable and vague points regarding our origin and to open a new track of research on this subject rather than presenting a new thesis.

Fig. 5 Diagrammatic representation of the recent out of Yemen thesis within the real theory of unique and recent origin

Theory of the unique and recent origin	Recent out of Yemen thesis
<p>Emergence of <i>Homo erectus</i> in sub-Saharan Africa at about 1 800 000 years ago</p> <p>↓</p> <p>Dispersion and evolution in the Old World</p>  <p>Emergence of modern man in a single region</p>	<p>Emergence of <i>Homo erectus</i> in sub-Saharan Africa at about 1 800 000 years ago</p> <p>↓</p> <p>Dispersion and evolution in the Old World</p>  <p>Emergence of modern man in a single region (very likely in Yemen at about 20,000 years ago).</p>

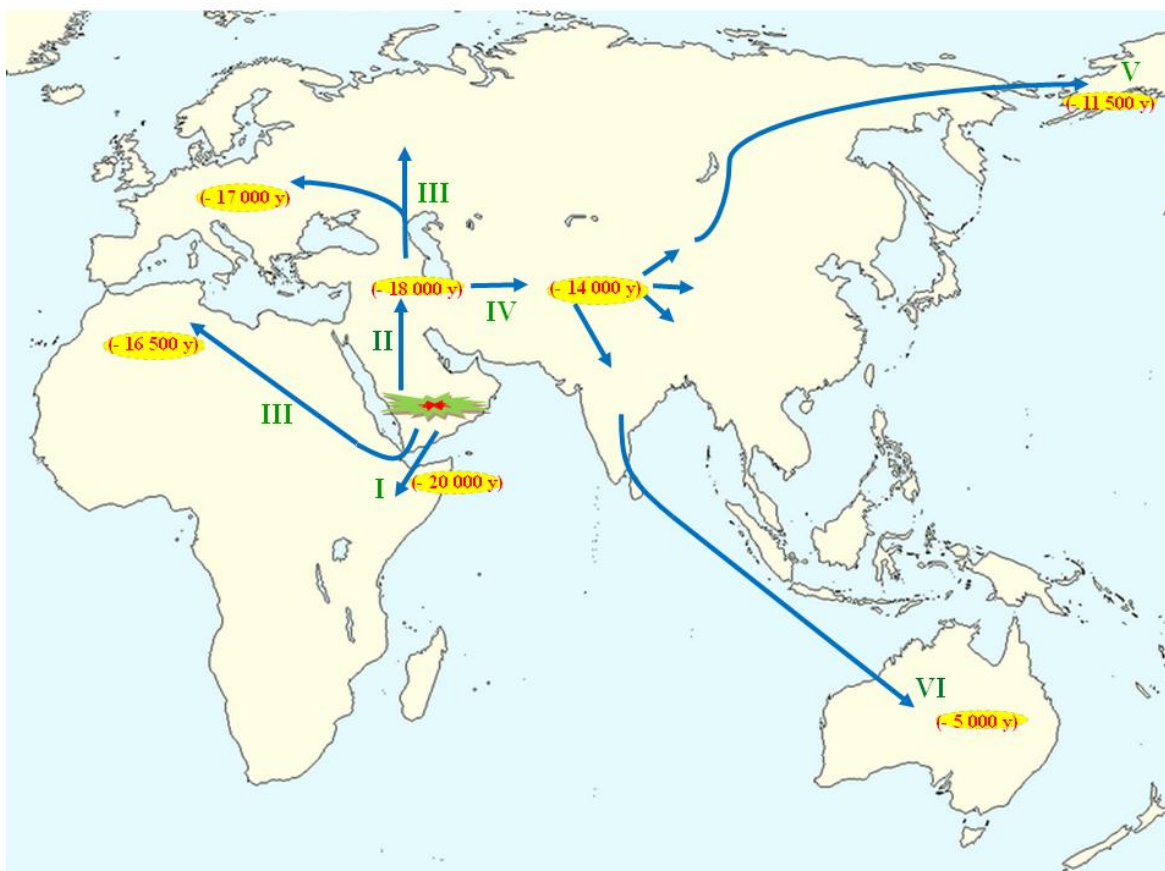


Figure 6. Simplified scenario of the Recent out of Yemen thesis

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