

*Out of Eden: The Peopling of the World*

Stephen Oppenheimer

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Stephen Oppenheimer's *Out of Eden* brings together under one cover the elaboration of several specialists' work on mitochondrial DNA in tracing back the origins of the now called modern humans. This extensive, innovative, and unifying book creates a picture of the movement of archaic human population out of the African continent and then throughout the whole world. Drawing on genetic data in combination with historical linguistic, environmental, archaeological, and biological evidence, Oppenheimer presents a contrasting view for the multiregionalist theory. The central argument of his work is that there is only one principal exodus of ancestral humans out of Africa from which all humans today descended. Furthermore, he suggests that this exodus was via a southern route opposing the eurocentrically fueled northern route. *Out of Eden* is a much-needed synthesis because its discussion is framed within the principles of biological evolution and it provides a broad perspective on recent human evolution.

Oppenheimer's syntheses on how humans spread until reaching the New World is convincing because they are interpretations of several research findings in light of genetic inquiry with contributions from climatic, archaeological, and historical linguistic analysis. Although there are some contradictions from the different disciplines, Oppenheimer offers reasons for the contrasting view without totally discounting or disarming the opposite side. This multidisciplinary approach makes his synthesis, generally, a credible one; speculative ideas in the book are nonetheless convincing and intelligible, and open more room for further hypothesis testing for human evolutionary diversity.

He recognizes that there are gaps in the knowledge and current understanding in all the tools of inquiry used for the synthesis he made. For instance, archaeological evidence are lost due to many reasons like degradation, variability in sea levels, and some materials intrinsically will simply not survive; this causes archaeological remains to be sparingly distributed in space and in time. On the other hand, genetic analysis used to account for evolution and ancient human dispersal directionality and timing still has a lot of assumptions and leaves much to be desired. Lastly, linguistics cannot be traced to its ancestral form; hence, a linguistic continuum can't be constructed. These challenges though, Oppenheimer emphasizes, are not static and can enter the realm of the knowable in the not so distant future.

The language used in his work is easy to understand and devoid of artifice that it can speak to the readers easily. This doesn't imply that his work is simplistic; it is simply that ideas and insights are well presented and it is framed within empirical substantive evidence. Besides, accounting for human evolutionary diversity and its processes is never a simple matter; it is so grand in scale and in substance that a single discipline can't hope to provide all pieces of the puzzle to create a lucid picture of the past.

Oppenheimer divides his work into seven chapters and its progression reflects the movement of our ancestors as little by little they trotted across the continents until they reached all habitable space on earth. In the first component of his work (Prologue), he poses several questions on why ancient migration and ancestry became a good subject to study and why answering questions on these can help us as a society and as biological entities. He highlights how progress on DNA technology helped in advancing understanding of the biological history of modern humans. Studies on this have been done using two genetic systems—the Adam (Non-Recombining part of the Y Chromosome) and Eve (Mitochondrial) DNA sequences, which according to him allows us to track in great detail in space and time the wanderings of ancient humans. Without putting aside progress in physical anthropology, he adds that with the help of other technological advances (i.e. computers), morphological inferences become more exacting especially in the comparative analysis of skull shape and its important indices used to infer speciation and evolution. He also adds that in the right perspective, questions about race and how much atrocities were borne from this concept can help enlighten humans on how much alike we all are considering that the original population that gave rise to all of us is possibly just one.

The first section also addresses the question on what caused hominids to develop cognition. Oppenheimer suggests that a new behavior could have developed in response to an ever-increasing climatic adversity, which later became the force in creating better brains. The needed resourcefulness and cooperation of hominids in response to the climatic condition around ~170,000ya could have allowed the birth of our species, *Homo sapiens*. But the ultimate question on what drives what, whether biology or culture, is answered by unequal evolution. It has to be understood that mechanisms behind each are totally distinct from each other, and perhaps more significantly the knowledge inferred or even derived from each does not, if not rarely, coalesce. Biology is continuous in nature, considering genetic transmission, while culture is contrary to this since it is targeted. Oppenheimer suggests that there is culture and then as generations progressed the cultural innovations became encrypted in the genes. Subsequently, depending on the environmental background, these genes became subject to selection by biological evolution, which at the late

end helped species survive. Oppenheimer then presents a melee of insights on what could have caused our ancestors to take a big step in the evolutionary ladder. Essentially, it is the glacial maximum that provided the environmental background that catalyzed the evolution of archaic humans, its diversification and subsequently the lack of it, and its dispersal out of Africa and into all the continents. In the introductory section, Oppenheimer provides his reader the necessary orientation for the full appreciation of his synthesis.

The opening chapters of Oppenheimer's work, in my mind, are very critical because it is here where he lays the foundation of the initial part of the out of Africa exodus. As mentioned earlier, there is a chapter-movement correspondence in his work, and to miss the former chapters will attenuate appreciation for the subsequent sections. Here, Oppenheimer's detailed discussions of combined mtDNA and Y-chromosomal evidence suggest an opposing view to the multiregional view of our ancestry. This is primarily because if the multiregional model were true, by implication it would mean that there should be a high degree of genetic diversity in the population of modern humans. The genetic and physical attributes of modern humans clearly suggest otherwise.

Another crucial point of this chapter is the route our ancestors used in leaving continental Africa. There were two: a northern and a southern one, and climatic conditions during that time provided the dictates. Yes, both were taken but it was the group who took the southern route who succeeded in peopling most of the continents. Those who earlier took the northern route (Sahara to Levant & Maghreb) were wiped out by the effects of glaciation. Glaciation events caused the Saharan region to become extremely arid because most water molecules are trapped in the ice sheets farther north. Another reason why the southern route is more feasible is that the northern way does not account for the arrival of humans in south Asia and Australia. Geographical and climatic barriers, to a large degree, made it impossible for our ancestors to use the northern areas as a staging point to South Asia.

Other scientists suggest that the northern route was taken and an alternative southern route was used to people the said areas. Oppenheimer uses mitochondrial DNA to counter such proposals. Mitochondrial DNA analysis tells us that both North Africa and Europe are recipients of ancient migration from farther east. Hence, the genetic line of the people in these areas came from Asia, and going to Asia was possible only through the southern route. This route is via the Gate of Grief, the southern end of the Red Sea. As mentioned earlier the glacial maximum caused an incredible decrease in the sea level because of the moisture trapped in the ice. At this point the cleft between Africa and Arabia was practically connected allowing modern Africans to use it in going to Asia. Using mitochondrial DNA, it is seen that the base of many African clans points to a single branch, which is known as the L3

branch. Recent studies indicate that this clade is under revision. This branch would soon branch out again to people Arabia, India, then Europe and East Asia. If indeed the northern route were used, genetically, Europeans should show a high degree of convergence with the North African Berbers and consequently we should expect to locate the oldest North African line deriving from the L3 branch, but this is not seen in the genetic evidence. The ramifications of the mitochondrial story are clearly seen in the figures in the first chapter of Oppenheimer's work. This decisive resolve for a single route is mainly supported by facts provided by genetic and geographical analysis.

The opening sections are readable, insightful, rich in information, and have several figures that exemplify his points quite clearly. It answers, why and when ancient humans left Africa, and how they managed to survive in the new continent. Every question that eventually comes into the reader's mind is subsequently answered in the succeeding part of his work. Oppenheimer is able to show that genetic analysis can provide a very interesting version of our past, especially about our ultimate origin/s. Truly while there is only one past, it is revealed to us in so many ways.

The second chapter of Oppenheimer's work answers when humans became truly modern. He uses the image of a Papua New Guinea man to illustrate what characteristics make up modern man. Often, judging human potentials would more likely than not lead to a mistake because of the lack of understanding on our origins. In my mind, this chapter is written to break the dichotomy of Cro-Magnon as "modern" and Neanderthals as "ancient" or primitive. This sort of labelling is still pervasive at present. In reality Oppenheimer is trying to show his readers that this has a deeper implication especially today. This chapter shows the social consideration in Oppenheimer's work. His sympathetic stance here is well-grounded and is clearly demonstrated in the analogy he used. Oppenheimer is primarily against Eurocentric tendencies of denigrating ancestries of other modern groups.

The third chapter is a discussion and an attempt to account for the origins of the Upper Paleolithic Culture. Similar to the arguments of some archaeologists (e.g. Kozłowski), Oppenheimer argues that the most probable source of the Upper Paleolithic would be the east. Considering technology, archeologists mainly classify the Upper Paleolithic culture into two types: the Aurignacian and Gravettian. Genetic studies indicate that the founder line of the people who produced these technological innovations ultimately point to Africa. The present day genetic character of the African population is unique in the sense that it is fragmented or diverse compared to the rest of the world, and all modern humans carry with them a subset of African genes. And this successful group may have consequently caused the development of the two Upper Paleolithic Cultures. Oppenheimer suggests that the development

of the Aurignacian culture corresponds to the opening of the Fertile Crescent and the Gravettian culture was more eastern in origin. It is probable that the former developed from the latter or that each might have been developed by different population groups that might have diverged from each other early during the expansion—a group that ultimately still came from Africa. Knowing the background that allowed the genesis of these cultures remains one of the biggest challenges in archaeology and paleoanthropology today, Oppenheimer admits.

The technical methodology of mtDNA and Y-Chromosome analysis is not elaborated in any section of Oppenheimer's work. Even though this book strikes me as something that the public with an interest in ancestry would read, it would have been better appreciated if he presented some basic concepts on how genetic analysis is used to infer information about ancient dispersal and human diversification.

The earlier chapter presented the tracks on the how, why, where, and when questions about the dispersal of our ancestors. The L3 group gave birth to two daughter lines that jointly peopled the whole planet and the fourth chapter provides the finer tracks on how our ancestors occupied Asia and Australia. In here aside from mtDNA and Y-chromosome, Oppenheimer injects some nuclear genetic information in creating his synthesis of the occupation of Asia and Australia. Again he uses other facts, especially environmental, in fine-tuning his work. A great point of interest here is his acceptance that DNA analysis can ascertain more about geographical distribution and that dates provided by such analysis are still highly approximated.

Comparative genetic data are used to show that the earliest divergence in South and West Asians is not as great as those in Africa. This tells us that there is indeed a conforming view of the single out-of-Africa exodus. How our ancestors got to Australia is of striking interest to me because Oppenheimer was able to present how our ancestors made this seemingly impossible crossing. The most convincing evidence that he presented is climatic and how this allowed geographical barriers to open. Archaeological evidence that can possibly support the manner of crossing is now lost because the area where the crossing happened (Timor) is now inundated. Furthermore, the maps presented by Oppenheimer show that there could have been two possible routes in going to Australia, and these were through Sundaland (South East Asia) and Sahulland that is now to a great extent covered by seawater. But genetic analysis for Australians shows that their divergence is least extensive with people from South Asia and extensively divergent in people from New Guinea. Therefore, the first Australian colonists might have used the very narrow window of opportunity to make the crossing, when Timor Sea receded around 70, 000ya. Likewise, the genetic markers of Australians, suggest that Australians are the products of the single out-of-Africa migration.

Not all that left Africa reached New Guinea, South Asia, and Australia stayed true to the beachcombing trail, some trailed inland following rivers going upstream. And this might possibly be why there is such a relative diversity especially in South Asia. Another important thing that Oppenheimer emphasizes is the deep genetic furrow that can be found in India. And using geological evidence, Oppenheimer provides that such genetic divergence might be caused by the nuclear winter when Toba Volcano erupted ~74,000ya. The population near the site might have been decimated and subsequently replaced by another line, this then accounts for the relative genetic diversity that can be observed in India.

The fifth chapter of his work is a detailed synthesis about the occupation of Asia, and how on several occasions its population got isolated causing again genetic divergence and physical variation among the people occupying the area. Once more, Oppenheimer notes how these physical differences caused several conflicts, and the greatest crimes against humanity. In here, he explicitly denounces racism and the classifying of human groups into different races using the variable character of our phenotype. He argues these physical differences equip humans better to live in their physical environment. Having darker skin is appropriate for subtropical and tropical conditions because it filters harmful rays from the sunlight and fair skin allows less filtration to happen since sunlight in the high latitudes is meager. Having it the other way around would have dire consequences because rickets and skin cancer would certainly affect the population. Apart from this example, Oppenheimer also explains the necessity of having a gracile body structure and neotonic features for the survival of ancient people who ventured deeper into the Asian continent. In addition, the sinodonty type of dentition represents the greatest divergence from the out-of-Africa beachcombers and this feature increases in frequency towards the north and extends to include the Americas. At first Oppenheimer said that this character is the result of selection, but in the latter end he attributes this physical difference to genetic drift instead of selection.

In the last parts of Oppenheimer's work, Chapters 6 and 7, he discusses how the last glacial maximum (LGM) ~20,000ya, allowed and limited the migration towards North Asia and to America through the now lost continent of Beringia. He also highlights that Southeast Asia by far gained most from the LGM, since it opened land bridges for human colonization farther away from the mainland. He offers views that contrast the one-off Mongoloid replacement of hunter-gatherers (Australomelanesian) in island Southeast Asia. Non-mongoloid populations (Negritos, Semang, etc.) were earlier populations who reached island Southeast Asia before the Mongoloid population expanded. Chapter 7 details how ancient humans from Asia reached Beringia and finally occupied the New World

The argument in Chapter 7 is between the Clovis-first theory and the

possibility of Pleistocene occupation of the New World. Primarily there are four proposed theories on how the New World was occupied. These are the ice corridor routes from the Beringian continent, the coastal route theory, the Solutrean hypothesis, and lastly, the Pacific-crossing theory. Generally Oppenheimer believes that there is no substantive evidence to support that America was first colonized after the last ice age; likewise archaeological evidence supports the argument that it was occupied before the LGM.

On the whole, Oppenheimer's work is readable, extensive, rich in information, and timely. It leaves a clear impression of his views on how ancient humans moved from the eastern region of Africa to South Asia and North Asia and finally Europe then the Americas. The book is a rich source of information for those who plan to undertake research in human evolution and diversity. It generally highlights that archaeological evidence, although patchy in character, provides some general but important insights. First, as ancient humans dispersed on several occasions, changes in technology, cognition, and the social environment of humans also occurred. Second, the Eurocentrically associated Northern route is fueled by the rich amount of archaeological evidence found in the Middle East and Europe and the scarcity or lack of it in Asia. This is simply explained by the resource availability and the general climatic condition in the areas considering the degree to which it allows preservation of archaeological remains. Genetics on the other hand, though helpful in the elucidation of this matter, still has a lot of things to resolve within its own discipline. The message of Oppenheimer is clear—he warns against the pronouncements of specialists made purely within their own discipline; he suggests that dialogue between disciplines must be present if we ever hope to at all create a clear understanding of our past, especially for topics accounting for human evolutionary diversity and its pattern of dispersal.

## References

- Lahr, Marta Mirazon. 2004. "Human evolutionary diversity: Implications for Historical Linguistics," in *Traces of ancestry: Studies in honour of Colin Renfrew*. Edited by M. Jones (McDonald Institute Monographs), pp. 11–29. Cambridge: McDonald Institute for Archaeological Research.
- Cavalli-Sforza, Luca. 2004. "Archaeology, genes and languages," in *Traces of ancestry: studies in honour of Colin Renfrew*. Edited by M. Jones (McDonald Institute Monographs), pp. 3–10. Cambridge: McDonald Institute for Archaeological Research.

- Horai, S., K. Hayasaka, R. Kondo, K. Tsunage & N. Takahata. 1995. Recent African origin of modern humans revealed by complete sequences of hominoid mitochondrial DNAs. *PNAS* 92(2):532-6.
- Gagneux, P., C. Wills, U. Gerloff, D. Tautz, P.A. Morin, C. Boesch, B. Fruth, G. Hohmann, O.A. Ryder & D.S. Woddruff. 1999. Mitochondrial sequences show diverse evolutionary histories of African hominoids. *PNAS* 96(9):5077-82.