

## Unearthing the origin of the vanishing tribes

Dyuti Bhattacharya

The devastating tsunami of 26 December 2004, brought tremendous destruction and sorrow in its wake. At the same time, it brought to the fore, stories of the quiet, hidden and reclusive tribal people who inhabit the Andaman and Nicobar Islands. Although for many years scientists, anthropologists and linguists have been painstakingly trying to study these people, their culture and their unique and complex biological make-up, they were often overlooked beyond the confines of the realm of science. It took the occurrence of the disaster, for the media and laymen to realize that these people are indeed endangered and quickly dwindling in their populations. In this backdrop, the recent papers published in *Science* and *Human Genetics* by Thangaraj *et al.*, Centre for Cellular and Molecular Biology (CCMB), Hyderabad, about the origin of the tribes in the Andaman and Nicobar Islands, assume particular significance<sup>1,2</sup>. The paper<sup>2</sup> based on the comparison of different complete maternal mitochondrial DNA (mtDNA) sequences, has attracted wide response from the Indian media. Such attention to the research is welcome. This perhaps is a result of the fact that the media had been carefully following the progress of these tribes ever since the tsunami.

This paper bolsters the suggestion that modern humans travelled out of Africa around 60,000 to 70,000 years ago to South East Asia and eventually to Oceania. Thangaraj and co-workers conducted their research in the Andaman and Nicobar Islands. They studied the complete mtDNA sequences of five Onges and five Great Andamanese tribes of the Andaman Islands. They also studied five Nicobarese of the Nicobar Islands. In addition to the large-scale research performed at CCMB, which included collection of blood samples of the tribes, immortalization of cell lines, complete DNA sequencing of mtDNA, compilation of data and construction of haplogroup, the team also collaborated with Toomas Kivisild, Estonian Biocenter, Estonia, who had provided the mtDNA sequences of various tribes and caste groups from all over the world, including large amounts of unpublished data. The collaboration enabled the CCMB team to compare mtDNA sequences of the tribes that they studied with those that the Es-

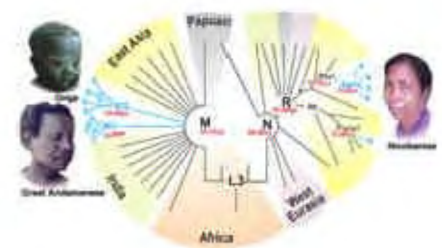
tonian Biocenter provided. Analysis of the complete mtDNA sequences of the Onge and Great Andamanese tribes revealed the existence of two previously uncharacterized clades, which the authors named M31 and M32. Furthermore, none of the coding region mutations defining these two haplogroups overlapped with known Indian or East Asian mtDNA haplogroups. As a matter of fact, none of the haplogroup M complete sequences reported so far, shared any of the mutations that define M31 and M32, suggesting that these two haplogroups are likely to have evolved *in situ* on these islands<sup>1</sup>.

In a press release issued by the CCMB group, it has been stated that there are two distinct tribes in the Andaman and Nicobar Islands. The first kind is the Negrito, who share physical features such as short stature, dark skin, peppercorn hair and scant body hair with those of African pygmies and other Asian Negrito people. The other type is the Mongoloid, whose physical features are similar to those of the Chinese, Malays and Burmese. They speak dialects related to Mon-Khmer and the languages spoken in Vietnam, Malaysia and parts of northeast India. According to Lalji Singh, CCMB, the origin of these populations is a mystery and has been a subject of speculation. The basic questions that the CCMB team has addressed include where these people come from and how long they have been on the islands. Understanding the origin and history of the people of India, and the genetic basis of complex diseases was the primary objective of this investigation.

Another paper on a related subject, by Macaulay and co-workers<sup>3</sup>, University of Glasgow, also appeared in the same issue of *Science*. This paper dealt with the analysis of the complete mtDNA sequences of the Orang Asli tribe, the aboriginal inhabitants of Malaysia. The results of this paper redefine the traditional 'Out of Africa' theory that explains the exodus of modern human beings (*Homo sapiens*) from Africa. Macaulay *et al.* state in their paper, 'The traditional "out of Africa" model for modern human origin posits an ancestry in sub-Saharan Africa, followed by a dispersal via the Levant ~45,000 years ago. However, the suggestion of an earlier "southern route" dispersal from the Horn

of Africa ~60,000 to 75,000 years ago, along the tropical coast of the Indian Ocean to South East Asia and Australasia has recently gained ground. Part of its rationale has been the presence of a number of relict populations in southern India and South East Asia; it has been suggested that these populations might be the descendants of such an earlier dispersal, along with Papuans and aboriginal Australians<sup>3</sup>. Taken together, the conclusions of these two papers are bold, in that they challenge traditionally accepted theories about the origin of modern human beings, their exodus from Africa, and how they eventually spread across the world. Such theories sometimes translate into contentious social issues, such as racial superiority. It is a well-known fact, that as a subject of study, anthropology has long been trying to grapple with the fact that conclusions of scientific studies can be tweaked and misused to further ethnocentrism.

Apart from the impact these studies will have on the 'Out of Africa' theory, and the general debate on the spread of modern humans across the world, the findings of Thangaraj *et al.* and Macaulay *et al.* also have social importance. In the opinion of Singh, it is important to study genetic diversity in tribal populations to understand the genetic basis of complex diseases in both tribal and non-tribal people. The factor that needs to be determined is whether or not common diseases



A tree showing the phylogenetic position of the complete mtDNA sequences of Andaman and Nicobar islanders. O, G, and N represent Onges, Great Andamanese and Nicobarese lineages, respectively; kya, thousands of years ago. Coalescent times of haplogroups M, N and R were obtained from Mishmar *et al.*, a mutation rate of  $1.26 \times 10^{-6}$  was used for other haplogroups estimated from the present data. [Reprinted with permission from Thangaraj, K., *et al.*, *Science*, 2005, **308**, 996. © 2005, AAAS.]

are caused by common susceptibility alleles that are likely to be old and therefore, present in tribal populations. If instead, population-specific alleles are the ones that predispose populations to diseases, it would be useful to examine possible susceptibility alleles in different populations. According to Singh, 'The demographic history and genetic diversity in Indian populations, make tribal studies particularly informative for the fine mapping of complex genetic diseases. Furthermore, many of the environmental risk factors that may be responsible for triggering certain complex diseases may not be common among tribals; thus, in such cases, it would be more feasible to differentiate genetic factors from environmental risk factors for these diseases. As environmental factors are known to be associated and are prevalent with urban and more sedentary lifestyles, it is imperative that we study the genetic diversity among Indian tribal populations, particularly the primitive ones. Since these tribes live with nature, they are most suited for the study of general environmental interaction'.

When asked about the fact that these populations are fast reducing in size and the possible causes for this unfortunate phenomenon, Singh responded by explaining that one cause may be the destruction of their natural habitat, which leaves them with little area to survive. As hunter-gatherers, the tribes need vast expanses of forested area to survive. Due to the recent settlement of people from the mainland in the Andaman and Nicobar Islands, their natural habitat is being drastically reduced, forcing them to the interior of the forest, to a limited area. There were ten Negrito tribes under Great Andamanese: Cari, Kora, Bo, Jeru, Kede, Kol, Juwoi, Pucikwar, Bale and Ben. Unfortunately all of them, except Bo and Jeru (presently known as Great Andamanese), have disappeared. This trend is extremely alarming. The study led by CCMB has further shown that the tribes are highly inbred, showing reduced genetic variability. They realized that some males of the Onge tribe have a deletion in the long arm of the Y-chromosome, leading to sterility. There are no convincing data available about their rate of birth and the extent of infant mortality.

Other sources reveal that another reason why these populations may be dwindling is the fact that their cultural practices are often incompatible with the exploits of outsiders, who are fast colonizing the islands. Apparently, being able to hunt

wild pigs is essential to the Onge, as according to their custom, men cannot marry until they have killed one pig. Now, however, the Onge complain that outsiders are hunting all their pigs; this is contributing to an already low birth rate among the Onge. Survival is campaigning for their land to be protected from outsiders<sup>4</sup>.

It is gratifying to note that a lot of anthropological research is currently being pursued in India. CCMB, in collaboration with the Anthropological Survey of India has undertaken the study of human genetic diversity in the tribal and caste populations of India. Yet, Singh explains how this is an incredibly daunting task. There are 4635 anthropologically well-defined human populations in India. The programme entails the study of primitive tribes in the mainland (about 72) and the hunter-gatherers (about 36). After completing this task, they will undertake a study of all the tribal populations in India (about 532). According to Singh, 'It would be a massive task but we have started in a systematic manner by creating their representative cell lines and DNA bank. We already have about 8000 DNA samples of various tribal and caste populations of India in our DNA bank'.

Although attempts are being made to salvage the grim situation and restore these populations, time is running out. In this context, such studies will help in creating a valuable database on archaeological research performed in such regions. External human contact, such as colonization by the British, and post-independent migration of people from the mainland, led to a virtual genocide of some tribes due to conflict and disease. In the absence of this human contact, these tribes have the inherent ability to survive well. They are adept at reading the signs of nature and exploiting them to their own benefit. After the tsunami, the media carried remarkable stories about how almost all the existing tribes on the island escaped unhurt because they had keenly observed changes in the behaviour of the surrounding wildlife. Samir Acharya, INTAC, Port Blair, explained how they accomplished this. According to him, the Great Andamanese, who are now located on Strait Island, ran to higher ground, to protect themselves. The Onge and Jarawa, both of whom reside on coastal areas, moved away from the shore. This helped them escape, while other inhabitants and tourists were swept away by the gigantic waves. This exemplifies the inherent understanding these people possess, of their

surroundings. Unfortunately, the Nicobarese tribes did not possess this foresight. What was grossly disadvantageous for them was their location; Car Nicobar had been much closer to the epicentre of the earthquake than the Andaman Islands. Worse still was the fact that the island of Nicobar has a flat terrain, which allowed the tsunami to sweep right across, smiting the population of the island.

While the Jarawas did not need to be rehabilitated, and the Onge were helped by the local administration, in rebuilding their huts. The most reclusive and aggressive tribe in the island, the Sentinelese, was not particularly affected by the tsunami. Though their aggressive nature prevented authorities from exactly determining their status, they were seen and counted aerially from helicopters. But one can never be sure about the safety and future well-being of the tribe. According to Acharya, 'One way the Sentinelese could have been affected is due to the change in their island geology. The North Sentinel Island has risen on its northwestern end and dipped down in the southeastern end. This may have resulted in loss of resource collection sites for the Sentinelese, who during low tide, collect molluscs and shells from the shore and keep their outrigger canoes used for fishing on the beaches. With the coral bed having risen, they have now lost this place to keep their canoes, thus losing their access to the sea'.

In spite of several self-derived survival tactics, these people are today called 'the vanishing tribes'. This is extremely unfortunate and rather ironic. Both nature, upon which the tribes are largely dependent and human colonization are leaving an indelible mark on these populations. These people were among the first to inhabit the south Asian subcontinent several thousand years ago. Sadly, they are losing out to the rest of us who came along and took over their rights to survival.

1. Thangaraj, K. *et al.*, *Science*, 2005, **308**, 996.
2. Thangaraj, K. *et al.*, *Hum. Genet.*, 2005, **116**, 507-517.
3. Macaulay, V. *et al.*, *Science*, 2005, **308**, 1034-1036.
4. [http://survival-international.org/related\\_material.php?id=92](http://survival-international.org/related_material.php?id=92)

*Dyuti Bhattacharya is in the Barnard College, Columbia University, Broadway #6243, New York, NY 10027-6903, USA. e-mail: db2210@columbia.edu*