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Romans, genes and geography

Genes are proving to be reliable markers to identify populations and their distribution, says S.Ananthanaryanan.

Local populations do not just share common language and customs, they also have common ancestry and share genetic heritage. Modern techniques of DNA analysis permit sensitive comparison of individual genetic features and the mapping the movement of local populations from one region to another.

The journal, ***Nature*** in Aug 2008 reported a study by scientists in USA and in Switzerland, of the genetic similarities of the populations of Europe. The scientists used a sample of 3,192 persons of origin from parts of Europe and finally studied the DNA of 1,387 selected persons of whom the preliminary results showed clear European origin. This selection was as to eliminate distortions due to immigrants, etc.

The DNA

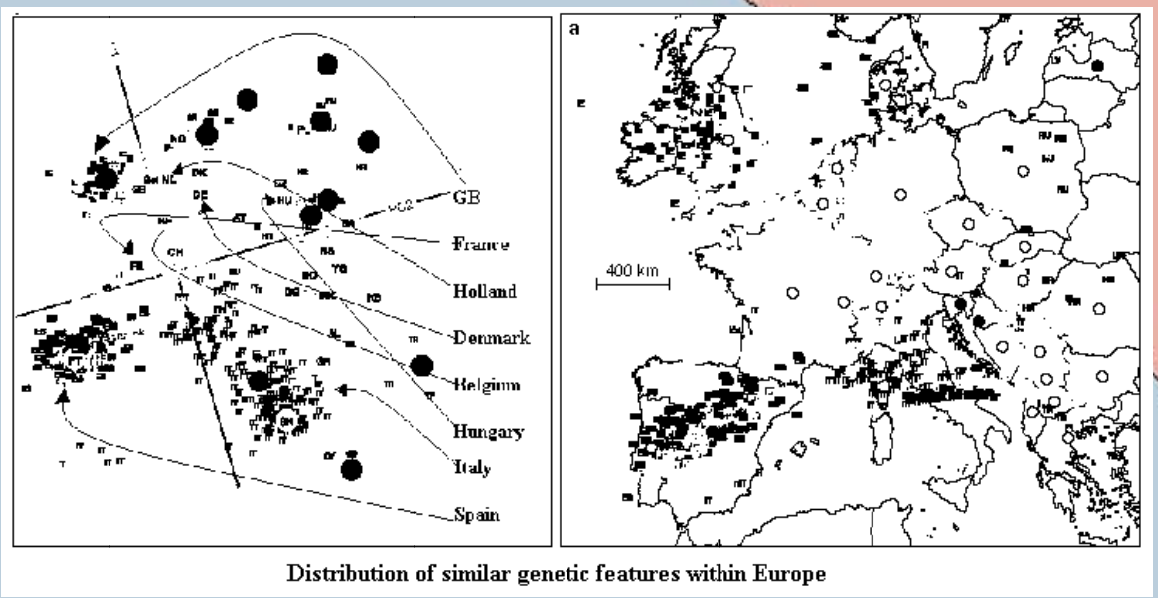
The genetic blueprint of each one of us, or any living being, in fact, is determined by the code contained in the DNA molecules contained in the nucleus of each of our cells. It is the DNA which regulate how each cell will behave, what proteins (like enzymes) it will produce and hence how the body will grow and look. Each parent contributes one half of the genetic make-up of the child and hence, over time, a population in a particular area is likely to have many common genetic features.

The structure of the DNA molecule is a series of combination of any of four different chemical groups with either of a pair of other of the same four types. The combination is known as ***base pairs*** and triplets of pairs like this, in succession allows for 64 distinct kinds of grouping of 'base pairs'. Each such group of three base pairs is a formula for the synthesis of a separate ***amino acid***, which is a building block of proteins. After providing for redundancy for important amino acids and also codes for the start and the end of 'base pair group' ***sentence***, there are 20 different amino acids and with combination of amino acids, there are millions and millions of proteins. The number of base pairs are estimated at 6 billion!

The method used by the scientists was to analyse the DNA of the persons in the sample at 500,568 places along its length and to see whether the pattern of base pairs was the same or not. After analysis of the results, to eliminate readings that may be spurious, findings were based on 197,146 places in the DNA of 1,387 individuals. The findings may not be different from those with all the positions in the DNA, but the limited number has been taken for high confidence in the results.

The findings showed a remarkable clustering of similar DNA structures, and when the DNA structures were plotted according to their place of origin on a map of Europe, it was found that

the clusters formed clear national and linguistic borders! The results were marked that the DNA of a true-blue European could fix her origin to within a few hundred kilometers.



Distribution of similar genetic features within Europe

Europeans generally have a similar genetic heritage. Given this, for the low level of variations to fall along clear outlines of the map of Europe is remarkable.

Genetic footprints

While the clustering of DNA structures shows the areas where communities settled and established, the presence of patches of genetic similarity in other areas indicates the migration of communities. Genetic mapping thus provides a reliable tool to plot and verify the movement of populations.

In addition, the results of the study highlight the need to account for the regional similarity of DNA while trying to associate genetic features with specific disease incidence. A variation of this feature of genetic tracking has also been demonstrated in an independent study reported just a week after the ***Nature*** report.

Romans and HIV

The ***New Scientist*** has reported a study of the incidence of a feature of **HIV** resistance, unique to European populations. It has been known that certain persons are resistant to **HIV**, to varying degrees, some to the infection itself, others to the speed with which **AIDS** develops. By and large, this immunity is found in Europe and in West Asia. But, the patches in this area where the immunity is less than in the rest of the area are where the Romans had established colonies!

The cause is found to be a part, called CCR5, of the human cells. This is the place where the shape of the cell is just right for the HIV virus to attach and make its entry. But in a few individuals, CCR5 occurs as a variation, called CCR5-δ32 (delta 32), which has a difference in

the vital part of its shape. The virus is then unable to enter and persons with this kind of genetic feature enjoy immunity to HIV. It is Europe and West Asia that people often have CCR5- δ32.

But how did the Romans manage to introduce this protective feature in places where they settled? Romans did not inter-marry to any appreciable extant and hence could not have themselves have been responsible. A theory that the Vikings may have been responsible is shot down because the distribution of low HIV resistance does not correspond to the areas where the Vikings were present. A third theory is that epidemics of plague or smallpox may occur with reduced intensity in populations with the resistant CCR5 gene. But here also, the distribution of the genetic feature does not match the places where the diseases were prevalent.

The only explanation seems to be that the Romans brought with them some disease to which persons with CCR5 were more prone. These persons died in large numbers, leaving less of their kind where the Romans had gone. It was the Romans that brought cats and donkeys to Europe. The animals may have been the carriers of the killer disease.

It is interesting that the Romans also brought disease carrying mosquitoes to Europe, but it is the surviving population in Europe that is more prone to mosquito-borne disease than the CCR5 population that was reduced in number by the coming of the Romans!

The Romans left long lasting footprints in Europe. They built roads and viaducts and planted hedges that survive to this day in England. They have left their mark in the fields of law, warfare, art, literature, architecture, technology and languageApart from cats and donkeys, the Romans brought a short hunting dog from Spain to France. The French word for 'Spanish' is ***Spagnol***. The dog was hence called the **Spaniel**. The Romans later took the dog to England, where it was bred and used to hunt the woodcock. The dog then became the **English Cocker Spaniel**