

# In this issue

## Human diversity

India is one of the world's top twelve megadiversity countries. With just over 2% of the land surface, India harbours 6% of flowering plant and 13% of the bird species. India also supports a fantastic diversity of human modes of resource use. It is the only country which at once has amongst its citizens stone age hunter gatherers (Sentinelese islanders of Andaman and Nicobars), artisanal fisherfolk (such as Ambigas of Uttara Kannada district in Karnataka), shifting cultivators (such as Nagas and Mizos), subsistence agriculturists (peasant communities over most of India), nomadic herders (such as Dhangars of Maharashtra, Gujjars of Himalayas) and entertainers and traders (such as Nandivallas of Maharashtra). At the same time it has people engaged in highly productive chemicalized agriculture (as in Punjab and Krishna delta of Andhra Pradesh), modern dairying (as with the Aarey milk colony of Bombay), mechanized fishing (as with trawlers off the west coast), tapping of offshore oil and natural gas (as with the Bombay High), running atomic power plants and producing computer software.

India owes this natural and human diversity to many different factors. Its environmental regimes range over coral reef islands and high mountains, hot and cold deserts and rain forests, mangrove swamps and salt lakes. Lying at the trijunction of the Palaeartic (Europe, North and East Asia), Ethiopian (Africa and Arabia) and Oriental (South and Southeast Asia) realms of biogeography, it has derived elements of its plant and animal life from diverse origins. People, husbanded plants and animals and technologies of manipulating nature too have arrived on the Indian subcontinent from many different directions. Tool-using hominids migrating out of Africa had already rea-

ched China and Indonesia a million years ago; they must have colonized India around the same time although the oldest tools from the Indian subcontinent are dated only about 750,000 years before present. It is now debated whether these early hominids left any descendants at all, or whether *Homo sapiens sapiens* originating some 40,000 to 50,000 years ago totally replaced them. Around that point of time humans seem to have made a number of advances; they began to bury the dead, use bead ornaments, paint scenes of hunt, fashion bows and arrows. This did not involve any further increase in brain capacity, instead, it may be related to the acquisition of language. Human linguistic capabilities are at the root of the rapid cultural evolution that has largely supplanted genetic evolution as the agent of change. On this interpretation modern humans have spread over most of the earth, diversified into several races, evolved thousands of languages, fashioned an ever more complex and diverse array of artefacts and variety of cultural practices in less than 50,000 years.

Humans have grown in numbers and moved back and forth over the surface of the globe at an ever accelerating pace in this period. They have occupied a range of environments immeasurably greater than that of any other animal species. Genetic change seems to have little to do with adapting to this enormous range. Although darker skins and broader noses are more prevalent amongst people exposed to hotter environments, there are many exceptions to the rule, and it is not at all obvious that such differences have been fashioned by natural selection. It is more likely that the differences in appearance are a consequence of selection amongst different populations to look different from each other as a mark of group identity. If this

interpretation is correct then differences amongst people must be only skin deep, people must vary far less at the biochemical level. Indeed modern investigations at the protein and DNA level have revealed that most of the variation is within any population; there are far less pronounced differences between groups. Pronounced between-group differences are instead in cultural traits; language, dress, rituals and the like.

Lying at the cross-roads, India has been peopled by human groups carrying a diversity of genes and cultural traits. Amongst our tribal populations are so-called proto-Australoids who must have arrived very early from the northwest and Mongoloids arriving much later from the northeast. Sometime around eight thousand years ago arrived from middle-east people with wheat, barley, sheep and goat, very likely speaking Dravidian languages. In India other plants and animals were added to the repertoire; green gram, sesame and perhaps rice; humped cattle and perhaps chicken and water-buffalo. The horse was domesticated much later, around six thousand years ago on the steppes of East Europe-Central Asia. This conferred a major military advantage on the speakers of Proto-Indo-European who spread over large parts of Europe, west and south Asia. These included the Vedic people with their horses and chariots who came to dominate much of the west and north India. Acquiring superior horse control with bridle and stirrup, pastoral people of central Asia migrated into the northwest sometime during 4th to 6th centuries of Christian eras. These were the Hunas and Kushanas who settled in the west and northwest. They are likely to have been the progenitors, cultural if not genetic, of Rajputs who assumed chieftaincies in many parts of western and northern India. The next major migrations beginning around



a thousand years ago were those of Islamic people through the north-west, equipped with superior technologies of cavalry warfare and use of gunpowder. There have been other less spectacular migrations of Mongoloid people into the north-eastern hills and all along Himalayan ridges, and of Arab navigators onto the west coast.

Interaction amongst these many streams of people flowing into India has a special character. In other parts of the world human groups achieving domination over others—whether this be related to techniques of cultivation or use of gunpowder—have tended to eliminate or absorb the subjugated people. In India, on the other hand, such subjugated people have instead been relegated to a low status and isolated. Their identity has therefore tended to remain intact.

Amongst small scale societies dependent on hunting gathering or primitive agriculture, human populations are made of many autonomous, non-overlapping groups—often competing with each other for territorial control. While neighbouring groups may engage in some trade, most social intercourse, including marriages, is restricted amongst members of the same group. Each group therefore tends to evolve its own distinctive language. In African and New Guinea societies at this level of organization there are around 2000 speakers of each language, suggesting that populations were divided into groups with about 2000 members each. As husbanding of plants and animals produced increasing levels of surplus, there emerged large scale societies in which boundaries between the original groups tended to be obliterated.

In India, it appears that several features of the original small scale societies persisted with the emergence of larger scale agrarian society. The larger society came to be constituted as an agglomeration of thousands of small scale social groups—the endogamous caste groups whose members governed themselves through caste councils,

who married amongst each other and tended to follow a hereditary mode of subsistence. Given the relatively simple techniques being followed it was possible to pass on the skills and tools required for subsistence through a kin group. Such groups were of course linked together in a web of mutual obligations and responsibilities, of which the jajmani system of Indian multi-caste villages is the best-documented instance.

There were many inequities in such a society and subjugated groups were assigned to a low status in the social hierarchy and had to perform less desirable menial tasks such as sweeping or leather work. Since many advanced technologies have diffused into India from outside, the earliest inhabitants came to occupy the lowest rung, and later immigrants higher strata. However, there has always been sufficient mobility so that many different groups with variable genetic backgrounds make up any given stratum. For instance, different Brahmin subcastes of Maharashtra are known to be genetically quite heterogeneous. In fact, some Brahmin subcastes are genetically closer to other local lower status non-Brahmin subcastes than to another Brahmin subcaste.

This social organization has created an extremely bumpy genetic and cultural landscape over the Indian subcontinent. Here, there are no smooth gradients as have been demonstrated in Europe where people familiar with agriculture coming out of the middle east apparently spread over the whole continent in a wave, largely replacing the earlier inhabitants. It is this intricate mosaic that has fascinated students of human genetics and culture and that is the subject matter of three papers in this issue. The first of these describes (page 5) the most ambitious attempt so far to map the human surface of our country—the People of India project. It is a major advance over earlier ethnographic investigations—be they Jatipuranas of pre-colonial times, or regional monographs in attempting to inventory and document the

status of each and every community of India. This number was fixed at 2753 after a tremendous effort; although this is certainly much smaller than the number of discrete endogamous groups which may be as large as 60,000. But these 2753 communities do represent relatively homogeneous clusters of such endogamous caste groups and their extensive documentation is a major accomplishment. The man who led this endeavour, K. S. Singh, the Director-General of Anthropological Survey of India, narrates the story in the first of the three series of papers. The rich data so generated are subjected to a quantitative analysis in a second paper (page 10) by an interdisciplinary team with expertise in quantification, ecology and anthropology. A third paper reviews (page 17) the studies so far of the biological composition of the Indian population.

These investigations come at a time when the organization of the Indian society is undergoing a rapid change. The latest wave of immigrants into India has been that of Europeans who today dominate the world as the people whose lands were the locus of the industrial revolution. While their genetic contribution to the Indian population has been negligible, they have had a profound impact on the economy, the society and the culture. This is because modern industrial production is grounded in a system that is incompatible with hereditary occupations handed down within a kin group. It is inevitable therefore that in coming decades the traditional caste society of India will be radically transformed and its culture changed beyond recognition. This process is already well under way. Understanding this unique system and its transformation is therefore a matter of great scientific interest. Evidently, now is the time to document this society and elucidate its functioning in as much depth as possible before it is swept away by the winds of change. The articles in this issue of *Current Science* contribute to this endeavour.