

In this issue

History, Legends and Mythology *Population genetics clarifies*

In India, as elsewhere, history, legends and mythology form a continuum; in popular minds, there is a lack of clear distinctions between these categories. History is formulated (and reformulated) by rulers and their scribes. Legends are often embellished by the populace and mythology is modified and adapted by cultures. This leads to conflicts in belief systems. Palaeontology and archaeology have, earlier, stepped in to resolve such problems related to the past. Now it is the turn of Population Genetics.

The broad story of modern humans arising out of Africa and migrating in waves to colonise the earth is increasingly corroborated by the three disciplines. But the issue in India is Aryan migration – an issue that impinges on the sense of identity of the people, and is, thus, very sensitive.

Partha P. Majumder, a Population Geneticist, unravels the scope and limitations of the present state of art of the discipline, to delineate and disentangle the different threads of the recent debate on the subject. Turn to the General Article on **page 971** in this issue.

Climate Change and Forests

As per the IPCC report, annual temperatures in India in the 2030s may see an increase of about two degrees compared to temperatures in the 1970s. Even an increase by one degree can impact forest ecosystems. While in some places deciduous forests may turn evergreen due to increased precipitation, in some places desertification can increase. In the management of forests, it is important to foresee the changes for adaptation and mitigation.

However, global climate models need to be downscaled to regional climate models of higher resolution to understand possible local changes. Thankfully, the recent years have seen the development of such re-

gional models that can go down to a resolution of the order of a few tens of kilometres.

What remain to be tackled are the limitations of the climate models and the vegetation models. And this can be overcome only by grounding the models in observed data. For this, the data from remote sensing satellites come in handy.

On **page 987** in this issue, scientists from space research, remote sensing, climate change, environment and forest management now come together to give you a Review Article that looks at the present understanding of the subject.

Microbes in the Kotumsar Cave *Metabolism and minerals*

The Kotumsar cave, in the Kanger Valley National Park in the Bastar district, Chhattisgarh is a tourist attraction. 330 m long, with many chambers and passages, the cave has stalactites growing from the roof and dripping water, wet cave walls, and stalagmites and springs sprouting out of the ground... All these have the makings of an adventure.

Researchers from the Guru Jambheshwar University of Science and Technology, Hisar and IGNOU, New Delhi collaborated for an intellectual adventure in the cave. They collected samples for geological and microbiological analysis, to examine the microbial diversity in the cave and to identify bacteria capable of biomineralisation. Out of the 14 strains that could be cultured, they homed in on one – a *Rhodococcus* species.

Biomineralisation by *Rhodococcus* from Indian caves has not been reported earlier. So the researchers took a detailed look into the process of biomineralisation. And the pictures of the biominerals formed *in vitro*, on the surface of the bacteria, give us an understanding of microbial metabolism and mineralisation in nature.

Besides use in bioremediation, the bacteria may have industrial applications in synthesising surfactants,

flocculants and other useful chemicals, say the researchers in the Research Article on **page 1063**.

Shifts in Shifting Cultivation

On the hill slopes of the north eastern parts of India, in November, people clear small patches of forests by slashing. They wait for the green matter to dry. Before the monsoon sets in, they set fire to the biomass. And when the rains come, they cultivate the land. Within a few years, erosion takes its toll and the land loses its fertility. It is now the turn of another patch of forest to be slashed and burned. While the old patches regain fertility through the encroachment of the surrounding forests.

Shifting cultivation, *jhum*, as it is called locally, has had its critics and defenders. While one sees the destruction of forests, the other sees sustainable livelihood for the poor. Yet, like all practices, shifting cultivation, too, evolves. How has it changed from 2005 to 2011 in the Mokokchung, Tuensang and Wokha districts of Nagaland?

Jenita Mary Nongkynrih and her team from the North Eastern Space Applications Centre, explore the question by examining remote sensing data.

From satellite imagery, it is easy to identify newly cleared areas for farming and areas that are rejuvenating. Besides quantifying the changes that have happened in six years, the team identifies the shifts in direction of the slopes being used – after all, the area is located about 25 degrees north of the Equator and never gets the sun overhead, limiting sunlight on the northern slopes.

The researchers also document the shifts in the altitudes of shifting cultivation. Turn to the Research Communication on **page 1094** in this issue.

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