In this issue

The Healing Woods of Dhauladhar

Medicinal plants: type and number

With their vast bounty of flora, Himalayan forests have attracted travellers and scientists from far corners of the globe. Here, the vegetation keeps changing with altitude and is among the most diverse botanical collections in existence. There are woody trees, herbs and shrubs, moss and creepers – some of which boast potent medicinal properties. These are often used by local tribes to treat common ailments. But encroaching human civilisation may offset their abundance if not their distribution.

To study how human civilisation may alter the growth patterns of medicinally important plants, Natasha Sharma and Chandra Prakash Kala from the Indian Institute of Forest Management, Bhopal surveyed the Dhauladhar forests in Kangra, Himachal Pradesh. This region, cradled by the Beas River, is home to some 1.5 lakh people – the largest population among all districts of Himachal. It also spans an area ranging from less than half a km to more than six kilometers above sea level, covering a wide range of ecological niches.

Through surveys conducted between July 2013 and December 2015, scientists identified 187 plants, of which more than two thirds were deemed medicinal. They also spotted areas rich in medicinal plants that are facing crisis. More on how human colonisation affects plant richness in a Research Article on **page 2323**.

How Birds Speak like Humans

Software tools spell it out

Throughout history, poets have been besotted with birds and their songs. But many birds, apart from screeching in their own dialect, can also match the calls of other birds and even speak words like humans. Parrots and crows are among the few who have an outstanding reputation in the imitation game. Now, in a Research Article in this issue, researchers from Kapurthala, Gurdaspur and Jammu examine the sound producing abilities of parrots and crows.

Both birds and humans produce sound in a similar manner by utilising lung, trachea, larynx, vocal chords (syrinx in birds) and mouth. Both use their tongues to produce variations in sound. However, birds also utilise their beaks to modulate pitch and amplitude.

Due to these physical similarities in sound production, scientists could use software that allows geometry reconfiguration for studying speech patterns. They fed the oral geometries of bird mouths into the COMSOL Multiphysics software package and then inspected the changes in the vocal tract and the sound pressure generated when humans and birds call out the vowels /a/, /i/ and /u/. The results are unexpected.

Turn to **page 2343**.

Predicting Dengue Outbreaks

Lessons from data mining

Via a single bite spanning a couple of moments, *Aedes aegypti* can inject the dengue virus into the body of an unsuspecting victim. These mosquitoes swamp the Indo-Gangetic plain and have led to eight major dengue outbreaks in Delhi between 1967 and 2013.

All these were reported after monsoons. This seems natural because like most tropical diseases, the transmission of dengue relies on the number of mosquitoes in an area. As temperatures in the range of 30–35 degrees and humidity present an ideal scenario for mosquito reproduction, the post-monsoon season is synonymous with disease outbreaks. However, other factors, like population density, precipitation, and changes in diurnal temperature also have a sway on infection dynamics.

Scientists from ISRO, Dehradun used data mining tools to analyse weather parameters before and during dengue outbreaks in Delhi. Using two different statistical approaches – multivariate regression and naïve Bayes approach – they attempted to estimate how weather conditions may influence, intensify or lead to a more severe outbreak and which parameters are strongly correlated with this metric. While studying transmission, they also located specific zones in the city that share a similar disease-spreading pattern. To find out how well their technique works, turn to the Research Article on **page 2281** in this issue.

Temperature Sensing Gels

Changing with the times

A new breed of hydrogels can alter their shape with fluctuation in temperature. They can expand and contract expelling the contents within. But this action is not random – it has been specifically coded into the matrix of these gels. By fine tuning the coding, scientists plan to produce smart drug coatings that can enhance drug action.

Hydrogels are gelatinous preparations that make use of either natural or synthetic gelling agents. Because they are inert and can be infused with drugs, scientists are using them to produce wound dressings and capsule coatings.

Quite recently, researchers have found ways of conferring temperature sensitivity in hydrogels. A thermosensitive coating could be designed to alter its shape if there is a change in temperature. The expansion or contraction would then be dependent on the amount of change. This would allow finer adjustment in drug release.

Because swelling and inflammation produce local temperature changes at the site of infection or injury, such designer coatings could be used to release the drug only in the vicinity of the problem area, thus producing a more targeted action.

In a Review Article on **page 2256**, researchers from the COMSATS Institute of Information Technology, Abbottabad, Pakistan, discuss the different kinds of hydrogels and how they are being modified to improve drug delivery.

Sarah Iqbal
e-mail: sarah.iqbalv@gmail.com