In this issue

Breaching Blood–Brain Barrier
Pollution triggers stroke

WHO estimates show that air pollution caused seven million premature deaths in 2012. These statistics show that air pollution poses a huge threat to human health. Apart from the direct toxic effect on organs, many pollutants – sulphur dioxide, carbon monoxide and nitric oxide – are also greenhouse gases and can raise the temperature of the atmosphere. This, in turn, has serious implications for biological processes.

When the ambient temperature rises beyond 47 degrees, it can affect metabolism by altering the activity of enzymes. The toxic effect of gases and increase in temperature could also precipitate health complications like blood clotting, blood pressure fluctuations, etc.

WHO statistics show that the major cause for air pollution triggered deaths was either stroke or ischaemic heart disease. In a General Article on **page 2034**, a team of scientists from the Institute of Pharmaceutical Research, GLA University, Mathura has compiled a list of common pollutants that can influence the chances of developing a brain stroke. They discuss the common causes of this condition and elucidate how environmental pollutants may trigger haemorrhage.

Spotting *Entamoeba histolytica*
Chronicles of an elusive parasite

A warm climate and open defecation continue to foster the growth and spread of *Entamoeba histolytica* in India. This microbe causes amoebiasis which is the third leading cause of mortality due to a parasitic disease (after malaria and schistosomiasis). Only 10–20% of the people infected with this parasite ultimately become sick from infection. But it is very difficult to confirm a positive infection with *E. histolytica*.

In most cases, as is the case with low resource settings, pathologists use microscopy to screen the microbe. However, two other non-pathogenic forms of this parasite – *E. dispar* and *E. moshkovskii* – cannot be differentiated using this technique and this may lead to an incorrect positive diagnosis.

While other methods have been developed to improve the diagnosis of amoebiasis, almost all of them suffer from low sensitivity. Presently, polymerase chain reaction technology is used in association with other techniques to improve the sensitivity of these tests. This method is more selective as it is used to detect certain regions of the microbe's genetic material to identify the disease-causing pathogen. However, this technique is cost intensive and cannot be used for mass screening.

Almost 15% of India's population suffers from amoebiasis. On **page 2045**, scientists from Silchar, New Delhi, Karimganj and Nadia review the diagnostic methods used to identify *E. histolytica* in India and examine their pros, cons and usage in the country.

Satellite Image Processing
Aligning the frames

For the last few decades, satellites have been capturing images of the earth. The same satellite covers more or less the same area in each pass. Different satellites using different sensors often capture some parts of the area from another angle. If we can register these images and align the images, we can observe the changes happening on land as a time lapse video. But then, registering and aligning so many images manually is not an easy task.

Scientists use automated image processing techniques to align multiple images taken by satellites during their trajectory around the earth. Because the satellites are in continuous motion, the images taken at different times often have a different view, rotation, skew or angle. Image registration consists of estimating these deformations and iteratively adjusting the images to produce a composite image set.

There are two different methods to tackle the problem, both based on stochastic techniques for optimisation – stochastic adaptive gradient descent and simultaneous perturbation stochastic approximation. Which is the better technique?

In a Research Article in this issue, scientists from the Space Applications Centre, ISRO, Ahmedabad and the SRM University, Kattankulathur compare and contrast the techniques by testing them on image datasets taken from the Resourcesat-2 LISS-4 MX sensor.

They used different regions – urban, land and sea, mountainous terrain and areas covered with cloud and snow – for registering satellite images. Then they compared and contrasted images registered by two image optimisation schemes. Based on the results, they discuss the advantages of each technique. More on **page 2072**.

Life Beyond Dachigam
Notes for hangul conservation

Many prominent water bodies are part of the narrative on ancient human settlements. This is because water is an indispensable resource for life. For the same reason, waterholes and jungle streams also attract large hoards of animals. Now a group of researchers from Uttar Pradesh and Jammu and Kashmir has used this premise to look for signs of the critically endangered Kashmir Stag or Hangul in the mountain ranges of the Kashmir valley beyond the Dachigam National Park.

Hangul or the wild red deer once roamed the valley in large numbers, but now their population is largely confined to the Dachigam National Park. However, some animals have been sighted beyond the park. Identifying areas where these animals can live naturally is important for the long term survival of this species.

To delineate a suitable habitat for hangul, scientists looked for marks of hangul presence around six water catchments beyond Dachigam. They scanned for hoof prints, signs of feeding, of antler rubbing on trees and faecal pellets to confirm the presence of Hangul in these regions. They consolidated this fresh data with animal presence records from previous studies. The authors report their findings in a Research Article on **page 2123**.

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