

In this issue

Cytokine Storm in COVID-19

Targeting Interleukin-6

Many cytokines, molecular signals to and from the immune system, have pro-inflammatory consequences. The inflammatory response, which is necessary and useful to overcome infections, can often become uncontrolled and, therefore, harmful, as in the case of COVID-19. Deaths due to COVID-19 are thought to be primarily because of the cytokine storm set off by SARS-CoV-2 and the consequent hyper-inflammation.

A Review Article in this issue examines the role of Interleukin-6, a cytokine which seems to play a key role in the pathology produced by SARS-CoV-2. Interleukin-6 has been investigated extensively for its role in some autoimmune disorders and cancer. The suppression of the activity of the cytokine has shown benefits in many such cases. Monoclonal antibodies targeting Interleukin-6, such as tocilizumab and sirukumab, and immunomodulatory drugs, such as levilimab, capable of blocking the receptor for Interleukin-6, are under clinical trials for the treatment of COVID-19.

Though this raises hope, there are scientific issues that researchers now need to disentangle, cautions the Review Article: there are two distinct receptors for interleukin-6 and these receptors respond to six other molecular signals. There is a need to dig deeper into all the mechanisms that lead to inflammation to help us find cures, not only for COVID-19, but also for many other inflammatory diseases and conditions. Turn to **page 745** for more.

Archaeology of Caves

In Bandhavgarh National Park

The forests of the Bandhavgarh National Park and Tiger Reserve in Madhya Pradesh hide a number of caves. Many

of them are of archaeological importance. In the 1930s, a study of the inscriptions found in the caves revealed that they were created in large numbers and used in the 2nd century CE. Today, these caves are within a protected tiger reserve, and their archaeological features are almost forgotten.

Recently, researchers from the Ashoka University surveyed the caves. Using GPS and satellite imagery, with the help of a researcher from the National Institute of Advanced Studies, they located 81 caves geographically, and delved into the potential socio-historical and economic roles that the caves played in the distant past.

In a Research Article in this issue, they provide details of their methods and titillate us with their findings to provoke more studies to uncover the past that is covered by forests and removed from collective memory over time. Read on from **page 772**.

Placing Plaster in Context

Chemistry, geology and history

The Amber Fort in Jaipur, visited by tourists from all over the world, is a 16th century monument. The majestic fort is made from local sandstone blocks and fired bricks cemented with lime mortar. The decorative arts on ceilings and walls have withstood the extremely hot summers and cold winters. But the fort is not immune to time. Weather and vandalism by human beings are slowly taking a toll. Any effort to conserve this heritage will first need to be informed by an understanding of the lime plaster that holds the structural components together.

Shikha Bansal and Manager Rajdeo Singh undertook the task recently, leaving no scientific stone unturned, but with minimal harm to the edifice. In a Research Article on **page 804** in this issue, they provide the details of the geology of the source materials, the

chemistry of the lime plaster used and its physical transformations, as well as the techniques which the master craftsmen employed to apply the plaster layer by layer to make it shine.

Using Insect Pests

To carry insect-killing nematodes

The cotton leafworm, *Spodoptera litura*, wreaks havoc on many important crops. It is developing insecticide resistance and, therefore, it is imperative to develop other methods to control the menace. The nematode *Steinernema thermophilum* is a natural enemy of many leaf-eating insects. The juveniles of the species enter insects and release their symbiotic bacteria into the insect circulatory system. And the bacteria kill the insect within two to four days.

An aqueous suspension of the nematode juveniles, however, is not very effective. Releasing insects which are already infected with the juveniles seemed to be more effective. But releasing the cotton leafworm, whether infected with the nematode or not, is risky.

Researchers from the University of Delhi recently came up with a method to overcome this impasse. They irradiated freshly moulted sixth instar larvae of the pest. Seventy Gy of ionising radiation from cobalt-60 was adequate to sterilise them such that they were unable to reproduce later. And, what is more, infecting such larvae with the juveniles of the nematode seemed to make them more potent – they could kill insects more effectively.

So why not use radio-sterilised insects to transport the entomopathogenic nematode into agricultural fields, ask the researchers in a Research Article on **page 791** in this issue.

K. P. Madhu
Science Writing Consultant
scienceandmediaworkshops@gmail.com