In this issue

Megalithic Iron Smelting
Science of ancient technology

There are evidences of ancient iron-smelting in the Vidarbha region of Maharashtra. Metallographic studies comparing wrought iron samples from various sites have shown that the thermal and mechanical processes for making and hardening steel were well established in the Vidarbha region approximately 2900 years ago.

A General Article now examines the furnace at Naikund, a megalithic site 42 kilometres northeast of Nagpur, to unravel the thermochemical aspects of ancient iron smelting. From the structure of the furnace, including the tuyere, the tube through which air is pumped in using bellows, with the help of modern knowledge about metallurgical principles, the authors deduce the temperatures reached inside the furnace, the chemical reactions that separate the metal from the ore, and even calculate the amount of charcoal needed to produce one tonne of iron.

Flip to **page 1310** to read the article that takes you on a journey through time.

Freshwater Springs
Managing threats

The hills and mountains of India are dotted with freshwater springs. Tectonic activity that changes the course of groundwater flows and the unplanned development of the hills are leading to the drying up of many springs and transforming perennial springs into seasonal ones. Since an estimated 15 per cent of the population depends on springs for water, it is time to examine the threat, analyse the roots of the problem and to take management actions to ensure the sustainability of springs.

Turn to **page 1316** for a Review Article that does just that.

Coronagraph Aboard ADITYA-L1
Design and construction

India's first solar mission ADITYA-L1 carries a visible emission line coronagraph to study the corona extending from a little outside the solar disc to about a distance of three solar radii from the sun. A parabolic mirror with a diameter of about 20 centimetres reflects the light to a spherical mirror with a hole such that the light from the solar disc passes through, but reflects the light from the corona to a dichroic beam splitter for imaging and spectroscopic analysis. The beam that passes through the hole is reflected out of the instrument by yet another mirror. This mirror that reflects the electromagnetic radiations from the solar disc can get very hot. So the material of the mirror has to withstand the heat and should be able to dissipate it.

The team that designed and constructed the visible emission line coronagraph provides a fascinating, blow by blow account of the material and processes used for the purpose. Don't let go of this issue of the journal till you read the Research Article on **page 1323**.

Agasthyamalai Biosphere Reserve
Climate adaptation strategies

The Agasthyamalai Biosphere Reserve covers an area of more than 3500 square kilometres – partly in Tamil Nadu and partly in Kerala. About 3000 people, mostly from indigenous tribal communities, live within the Reserve, depending on farming, fishing, livestock and forest produce for their livelihood. When the climate changes, their livelihoods will be challenged. How can we prepare them for the eventuality and make them more resilient?

A Research Article in this issue uses the analytical hierarchy process to unravel, categorise and prioritise the actions that need to be taken to make the community adapt to climate change. Most of the recommendations may be applicable to communities living in other forested areas of the Western Ghats also. Read on from **page 1354**.

Amalgamating Algae
Into ice cream cones

A red alga, *Gracilaria edulis*, and a green alga, *Ulva lactuca*, are not only edible, but have high nutraceutical values. They are now cultivated along parts of Indian coasts. Though considered superfoods, these seaweeds have not yet become a part of the Indian cuisine.

Researchers from the Jayalalithaa Fisheries University, Thoothukudi came up with an idea to make the seaweed acceptable as a dietary constituent: incorporate it into ice cream cones. Ice cream cones are usually primarily made of refined wheat flour, with minor quantities of sugar, salt, emulsifier, preservatives and so on. But wheat flour is low in essential amino acids. To improve nutrition, the researchers optimised a combination of wheat flour, pearl millet flour and seaweed flour to make ice cream cones. Tests of sensory parameters like appearance, colour, flavour, texture and taste found the optimised combination acceptable.

But what the ice cream cone and waffle producers will find attractive is that the ice cream cones made with the combination do not need preservatives. And they retain ice cream longer than the ones that are commercially made today. Turn to the Research Article on **page 1381** in this issue for details.

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