

New research cuts into origins of iron and steel in India

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A small but intrepid team of Exeter staff and students have returned from a six-week archaeological research expedition to a remote region of rural Andhra Pradesh in India.

The team, led by Dr Gill Juleff of the University of Exeter's Department of Archaeology, formed one half of a project to study the origins of high carbon steel-making in the southern Indian sub-continent. Funded by UK [India](#) Education and Research Initiative (UKIERI), the 'Pioneering Metallurgy' project is a joint venture between Exeter and the National Institute of Advanced Studies (NIAS), Bangalore.

Setting out at 7.00 every morning from their base camp in the small town of Dharmapuri, on the banks of the Godavari river, the team travelled hundreds of miles criss-crossing the arid landscape of Northern Telangana, a region now fighting for independent statehood within India, to explore and record archaeological sites where iron and steel were produced over the last two millennia. Over a period of six weeks the team recorded over 120 archaeological sites where iron and steel were produced.

The area is renowned for the specialised production of crucible steel, sometimes called wootz, a material used in the manufacture of the fabled swords of Damascus. Islamic merchants and European travellers of the 18th and 19th century describe the area as one of the principal sources of wootz steel.

Dr Gill Juleff said, 'While a great deal is known about wootz as a high quality material for making weapons, the underpinning indigenous metallurgical traditions and technologies from which this remarkable material emerged have not been studied'

She added, 'our aim is to try to unravel both the chronological origins of iron smelting in the region and its technological development. To do this we are examining and recording sites where iron has been smelted from local ores. This means visiting rural villages and exploring forest areas to identify heaps of slag waste left by these processes.'

The team has also interviewed traditional blacksmiths and the descendants of the last smelters of the region to record their memories.

When the field work began in mid-January the climate was mild and the nights were cold, but by late February daytime temperatures had soared to 40+°C.

Marc Cox, an Exeter graduate said of the experience, 'The contrast between student life in England and everyday rural life in India has changed my outlook on the world, it has been a huge adventure which will stay with me forever. We have been welcomed by everyone we have met. We have joined in local festivals, visited temples, bathed in the rivers and welcomed into peoples homes.'

The project co-investigators, Dr Gill Juleff and Dr Sharada Srinivasan and Professor S. Ranganathan from NIAS, share many years of experience in the field of the archaeometallurgy of South Asia. Dr Juleff's work on the monsoon wind powered furnaces of Sri Lanka and Dr Srinivasan's work on the metallurgy of Chola Bronzes is world renowned. Professor Ranganathan brought a lifetime's experience in the world of advanced modern metallurgy and its application in archaeometallurgy to the project.

As well as Dr Juleff and the UK team, there were Indian students and researchers from NIAS, Central University, Hyderabad and Dharmapuri Degree College. Also in the team were Exeter MA archaeology graduates Neogi Tathagata from Kolkata and Smirthi Haricharan from Chennai.

Also, critical to the success of the expedition was the project's local Dharmapuri research Dr S. Jaikishan, who has spent many years studying the iron-working history of the region.

The next stage of the project involves compiling and analysing data collected from the field expedition in India. Interpreting the data will take place in Exeter and experts from the Indian archaeological team will visit the UK to work together on analysing the material with their UK colleagues in a reciprocal visits planned for later this year.

Provided by University of Exeter

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