ON A LITTLE KNOWN THERMAL SPRING FROM NEAR PUTTUR, MYSORE STATE, INDIA

B. P. RADHAKRISHNA
Department of Mines and Geology, Bangalore

We owe our knowledge of the thermal springs of India to that veteran geologist T. Oldham who as early as 1882 catalogued almost all the known hot springs of this continent. So thorough has been his compilation that the occurrence of a thermal spring in a remote inaccessible part of Puttur taluk in South Kanara District had not escaped his attention. The following reference appears on page 51 of the catalogue (Oldham, 1882 p. 51).

> 242. IRADE. Lat 12°43'; Long 75°13'; Elev: Temp. 99°-102°, six miles from Pootoor; Water pure and preferred by men and cattle to that of the river close by—*Official Records.*

The attention of the author was first drawn to this occurrence from a reference made to it in the u. s. G. s. publication ' Thermal springs of the United States and other countries of the World' (Waring, 1965 p. 185). The occurrence was interesting since the temperature of water was recorded as 102°F and no such thermal spring had been noticed south of ihe 16th parallel. At about the same time the author came across a novel—*Karulina Kare*—by the noted Kannada writer Shivaram Karanth who had woven a beautiful story around the thermal spring of Irade. It was obvious that the spring was locally well known; but because of inaccessibility its existence was not recognised outside its immediate vicinity. The long projected visit to this spring did not materialise until May of this year when the author was able to make a few observations on the geology of the area and the character of the thermal water.

Since this spring at Irade happens to be the only one of its kind in Mysore State, a brief description of the thermal spring and the chemical composition of its water would prove to be of more than local interest.

The location of the thermal spring is not indicated in the Survey of India topc-sheet 48 P/2. The name Irade shown on the sheet applies to a number of hamlets which are spread over an area of more than a square mile. The spring is located on the south bank of the Badantadka river, a little after the confluence of Balakku and Ermati rivers. It is about a km from the cross road branching off from the 8th mile on the Puttur-Panaje road. The elevation is 66 m above MSL. The spring is located in the areca garden belonging to Dr. Ravindra Bhandari of Puttur and is enclosed by a rectangular wall built of laterite blocks. The structure measures 8 m * 4 m and was constructed about 40 years ago. There are two outlets provided, one at the floor and the other a little higher up. When the holes are plugged, water collects in the pond waist high and people take a comfortable bath in the warm water. At the time of the visit a considerable quantity of silt had accumulated and had to be cleared before making observations. The floor of the pond was found to be uneven and showed a banded gneiss traversed by joints. The gneissic rock is charged with pyrites and the water had a faint sulphurous smell.

The temperature of the water was found to be steady at 39°C (102°F). Oldham too has mentioned the temperature as 102° and it would appear that the temperature has remained constant without much variation during the last 100 years. Gas is seen escaping in the form of bubbles at three or four locations in the pond. In some,

bubbles issue continuously and in others at intervals of 5 to 10 seconds. It was not possible to collect a sample of the gas.

The discharge from the spring was measured and found to be about 300 gallons per hour. A sample of the water was collected and analysed with the following result. Values given are in parts per million.

Silica	470
Iron (Fe)	0.06
Calcium (Ca)	14
Magnesium (Mg)	4
Sodium (Na)	130
Potassium (K)	9
Carbonate (CO_s)	0
Bicarbonate (HCO_s)	260
Sulphate (SO_t)	53
Chloride (CI)	57
Nitrate ($NO_„$)	—
Total dissolved solids	470
Hardness as (CaCOs)	51
pH	8.3

pH was determined on a sample analysed at the Bangalore laboratory after the lapse of a few days and may not, therefore, represent the true pH of the water at site. The high silica content in the water can be accounted for by the increased solubility of silica at higher temperature. Otherwise the water does not show any abnormalities except a slightly higher percentage of sulphate.

The weakly mineralised character discounts a magmatic origin for the water. The hot water is probably only groundwater which has infiltrated deep along certain weak zones, got heated up and ascended to the surface under pressure along a fault or a zone of fracture. A test drill hole to a depth of 70 metres at the site may intersect water at higher pressure and probably higher temperature. If the local people have no objection, it seems advisable to put a test drill hole to know more about the subsurface geology and the reason behind the thermal character of the spring water.

Little is known of the geology of the neighbourhood and of the existence of any major fault or fracture or crushed zone. The region merits a careful study. The flow of the Batanadka stream in a straight stretch is suggestive of its flow over a structurally weak zone. The rocks in the neighbourhood appear sheared and brecciated.

Oldham in the paper earlier referred to has this to say about the thermal springs along the West Coast: ' At intervals along the base of the great range of cliffs known as the Western Ghats, which stretch almost continuously along the western coast of the Peninsula from Surat, north of Bombay to Belgaum, and are continued further to the south, though in a more broken range of high ground, a large number of copious hot springs rise in the comparatively flat ground, known as the Konkan or Kokan, which forms a narrow belt between the ghats and the sea. Generally speaking these springs He about 20 miles (from 12 to 24) from the coast and a little further from the hills which rise to the east. They occur both as single isolated springs, and in groups of springs, where several issue within a circle of small radius.'

The most southerly known spring which Oldham described was that of Rajapur (16°38' : 73°36'). Other springs falling in this group traced northwards are Mat

(16°57' : 73°33') Sangameshwar (17°11' : 73°39') Rajwari (17°15' : 73°37') Aranli (17°19' : 73°36') Uneri (17°35' : 73°24') Khed (17°43' : 73°27') Savi (18°6' : 73°24') Vajrabhavi (19°29' : 73°6').

These springs more or less fall along a straight line aligned north-south between the coast and the precipitous edge of the ghats. There is a gap of nearly 430 km between the southernmost spring at Rajapur and Irade. It is possible that there are springs along the line connecting the two places. The area not having been closely surveyed geologically, the existence of such springs is not known. Detailed study may bring to light several more springs between the edge of the ghats and the coast.

Many of the springs in Mysore are designated by the term *Vajra* (e.g. *Vajra* in Tumkur District, *Rameshwara Vajra* in Honnali taluk of Shimoga District). The thermal spring near Bombay is called as *Vajrabhavi*. The Sanskrit word *Vajra* means diamond and has no connection with either spring or well. The real origin of this word appears to be the Kannada word *Ojjara* which according to Kittel's Kannada-English dictionary means a spring or fountain. In Tulu, a spring is termed *Uja* or *Uje*.

REFERENCES

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