

## **William Smith**

### **The Founder of English Geology**

When we were students we were told about William Smith as the Founder of Geology but we had only a very vague notion of his fundamental contribution to our science. Recently, a book has appeared with the catching title “The Map that Changed the World” authored by Simon Winchester and I have just finished reading the story unravelled in the book – ‘a human tale of endurance and achievement.’ Here I would like to share some of my thoughts with you and shall narrate as briefly as possible the story of William Smith, his humble beginnings and great achievements, the refusal of an institution like the Geological Society to admit him as a member, the plagiarizing of his monumental map, his poverty, his indebtedness his humiliation at being committed to a debtors’ prison and the belated recognition of his contribution to geological science by the award of the prestigious Wollaston Gold Medal, the highest honour which the Geological Society could bestow.

#### *Self-taught Surveyor*

William Smith was born on 23 March 1769 at Churchill, a small hamlet in Oxfordshire, the son of a village blacksmith. Losing his father when he was only seven year old, he grew up as an orphan. He was educated at a village school and learned the basic principles of surveying from reading books, as university education was denied to him because of poverty. Starting from boyhood he had a passion for collecting fossils, especially of brachiopods and echinoids.

When he was seventeen he got acquainted with one Edward Webb who was a professional Surveyor, became his assistant and soon mastering the art of handling pantograph and theodolite, started surveying on his own. Warren Hastings, former Governor General of India was also born in Churchill and on his return from India bought the old family house and the 650 acres of ground surrounding it and engaged Edward Webb and his young farmer apprentice William Smith for a survey of his property. This was how Smith started his career as a surveyor.

The steam engine had not been invented and the only means available for transporting coal was through horse-drawn boats on canals. Construction of canals was therefore given a high priority and provided the opportunity for the young Smith to establish himself as official surveyor. Travelling by coach was prohibitive in cost and Smith therefore preferred to walk – a trek of fifty miles seeming to him no more than a casual stroll. Of this period in the life of Smith, his biographer states:

‘He was to remain in this part of England at first working for his patron and then later for the Somerset Coal Canal Company, for the next eight years during which he would make the discovery, come to the realization, announce the deduction and begin the hard grind – that would earn him a place in posterity.’

### *Strata Smith*

The consultancy work he had taken on hand took him to many coal mines and as he went down the shafts he was struck by the layers of rock that slipped past his eyes. The arrangement of rocks, in the form of beds, struck him as something very uncommon. It is interesting to note that Smith was the first person to use the word 'stratification' to account for the layering he had observed and as a result was generally known at that time as *Strata Smith*. The work of Smith established the science of stratigraphy.

He was soon to observe a change in the nature of rocks, and folding and was the first to recognize unconformity between two groups of strata.

His examination of a large number of coal mines and canal excavations revealed continuation of strata over long distances and regularity in their arrangement. This led him on to the discovery that each strata had its own 'fossils peculiar to itself' and he demonstrated the value of using fossils for the study of strata and decipherment of earth history. Certain fossils were unique and characteristic to a particular bed and thus to that period of time in geological history. This knowledge of the arrangement of strata enabled him to predict what to expect in a new area.

### *The First Geological Map*

Then rose the question as to how to depict all the information collected on a map. For his first experiment he chose the immediate neighbourhood of Bath for the preparation of such a map:

'He could use his skills and unusual knowledge, in other words to draw a brand new map, the likes of which had never been known. He could draw a chart of what could not be seen. And in doing so he could create what had never been created before – a true geological map.'

Smith did not stop at preparing a map of the area around Bath, this was only the start. His ambition was to prepare a geological map of Great Britain and Ireland as a whole. He therefore travelled extensively, more than 10,000 miles a year, at his own expense, and gathered a vast amount of geological data.

'It was a work of genius, and at the same time a lonely and potentially soul destroying project. It was the work of one man, with one idea, bent on the all-encompassing mission of making a geological map of England and Wales. It was unimaginably difficult, physically as well as intellectually. It required tens of thousands of miles of solitary travel, the close study of more than fifty thousand square miles of territory.'

The task was completed after fourteen years of hard and dedicated labour, the map appearing in 1815 under the title 'A delineation of the strata of England and Wales with part of Scotland.' It was a remarkably beautiful hand painted map, of great size, measuring eight feet by six and was the first true geological map of anywhere in the world, 'A map that heralded the beginning of a

whole new science.’ It was a map ‘conceived, imagined, undertaken, continued and completed against all odds by just one man.’

It so happened that this map instead of ensuring good financial return to Smith ‘was stolen, copied, pirated and resulted in his financial ruin. The newly formed Geological Society too ignored him altogether and failed to admit him as a member because he was the son of a farmer and uneducated. Apart from showing no interest in the map of Smith, the Geological Society also decided to create a new geological map of its own and make it the official definitive geological portrait of the nation. It ignored the claims of the rustic who had been ‘so impertinent as to dare make one first.’

At this time Smith was overwhelmed with domestic and financial difficulties and was bankrupt. The map that he had prepared with so much labour and expense did not bring him any revenue; ‘All that he owned was confiscated and he was compelled to live as a homeless man without recognition.’ He had no job on hand and was forced to sell his fossil collection to the government. After prolonged correspondence, government came forward to buy the fossils and offered a niggardly sum of just five hundred pounds, that too to be paid in five instalments. Further humiliations were in store for Smith. He had to see his magnificent collection of fossils, arranged by him in appropriate geological successions dumped along with piles of junk in a store room. Tax collectors were also demanding. Rent was in arrears.

‘After the publication of the geological map by rights he should have been showered with dignities and rewards. Instead he had to suffer his greatest humiliation by being forced to spend ten weeks in a debtors’ prison. Creditors seized his London property and on his release from prison he had no place to stay in London and had to fly to Yorkshire.’

### *Belated Recognition*

The value of Smith’s work came to be appreciated only slowly. A glowing assessment of his work first appeared in *Edinburgh Review* which was ‘one of the country’s most respected journals of the day.’ This proved the turning point in his career. No longer active in the field he retired to the sea-side town of Scarborough where a circle of admiring and intellectual friends made his life pleasant. The old guard at the Geological Society had given place to a younger influential scientific group headed by Murchison, Sedgwick and Buckland.

William Hyde Wollaston had in the meanwhile requested the Geological Society to institute an award each year to one individual for research into the mineral structure of the earth. The first recipient of this medal in 1831 was Smith. The Geological Society which had denied him a fellowship now requested him to get back to London to receive the highest honour which it could bestow. Sedgwick in making the award said:

“.... I would appeal to those intelligent men who form the strength and ornament of the Society, whether there was any place for doubt or hesitation? Whether we were not compelled, by every motive which the judgement can approve, and the heart can sanction, to perform this act of filial duty, before we

thought of the claims of any other man, and to place our first honour on the brow of the Father of English Geology ....”

William Smith, now sixty-two years old, was overwhelmed at this belated recognition and sat beaming throughout the function. The father of English Geology was at long last able to rest on his laurels and begin the final chapter of his life as a revered elder statesman, accorded his due, and given the respect that his hitherto unsung achievements deserved.’

He died in 1839 on his way to a British Association meeting in Birmingham.

William Smith, nearly 200 years ago formulated the two fundamental principles of geological science, the order of superposition of strata and the fact that different rock layers contain different fossils which are characteristic of that particular strata and on this basis was able to trace strata over hundreds of miles. A whole new science emerged on the basis of the above generalizations and the techniques he used for mapping remain valid even to this day. The best tribute that we can pay to this great master is to restore the sagging interest in field geology and the preparation of geological maps. In the words of Dewey ‘Field observations and geological mapping are the most difficult and intellectual part of our science should be encouraged as a discipline that is central to the economic and social welfare of mankind.’

B.P. RADHAKRISHNA

### **Honour Your Heroes**

How mindful the English people are of the memories of their great dead! In his own lifetime Shakespeare was not the towering and immortal figure that he now is. Yet how scrupulously and reverentially the memorials of Shakespeare were preserved by his contemporaries. How different is all this in India! We worship our Gods of clay and stone in the firm faith that the divine spirit dwell therein; but the living Gods who move about us and amongst us doing, daring, dying for the country, are nowhere in our estimation. .... The great Ram Mohan Roy was banished by our ancestors; and it was only when death had obliterated personal jealousies and bitterness and when we could view the range of his work in the cool, colourless atmosphere of reason and solid achievement that we realised his worth and hastened to raise a memorial in his honour in the place of his birth. A nation that does not know how to honour its heroes does not deserve to have them and will not have them.

SURENDRANATH BANERJEE  
‘A Nation in the Making’