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Everest – the Man and the Mountain

The name Everest is well known to surveyors and the general public as referring to a mountain but what of the man, whose name it was? What do we know about him and his work? Until 1999 and reference [3] all that could be found were various technical papers in a wide range of sources, but almost all of them had been taken into account by Markham [1] and Phillimore [2]. Both of these but the latter in particular, is so extensive and detailed on every aspect of the Survey, that there is little of technical importance not recorded there. However when it comes to his personal life it is quite different. Here it is pertinent to quote that his niece wrote «that circumstances into which I cannot now enter, led to the destruction of nearly all written memorials of his life…» [4]. This was almost 40 years after his death so what caused such destruction? We still do not know.

Der Name Everest ist Vermessungsfachleuten und der Öffentlichkeit als Berg bekannt. Weniger bekannt ist der Mensch, der dem Berg den Namen gab. Was wissen wir über ihn und seine Arbeit? Bis 1999 existierten nur verschiedene technische Berichte von Markham [1] und Phillimore [2]. Detailliert werden die Vermessungsarbeiten beschrieben. Zur Person Everest und seinem Leben ist jedoch wenig enthalten. Seine Nichte schrieb: «Umstände, auf die ich nicht eintreten kann, führten zur Zerstörung fast aller schriftlichen Zeugnisse seines Lebens…» [4]. Das war fast 40 Jahre nach seinem Tod. Was aber verursachte diese Zerstörung? Wir wissen es noch nicht. Ein Buch des Autors [3] ging diesen Fragen nach und beleuchtet das Leben und Werk von Everest. Der Artikel ist eine Zusammenfassung.

Le Mont Everest est connu, comme montagne, des spécialistes de la mensuration et du public. Moins connu est l'homme qui a donné son nom à la montagne. Que savons-nous de lui et de son travail? Jusqu'en 1999, il n'existait que quelques rapports techniques de Markham [1] et Phillimore [2]. Dans leurs énoncés ses travaux de mensuration sont décrits. Cependant, quant à la personne Everest et à sa vie on en sait très peu. Sa nièce écrivait: «des circonstances sur lesquelles je ne peux pas entrer en matière ont conduit à la destruction de presque tous les témoins écrits de sa vie…» [4]. Cela était il y a presque 40 ans après sa mort. Mais qu'est ce qui a provoqué cette destruction? Nous le savons toujours pas. Un livre de l'auteur [3] traite de ces questions et éclaire la vie et l'œuvre d'Everest. L'article est un résumé.

J.R. Smith

George Everest was born on 4 July 1790. His father Tristram Everest was a solicitor in Greenwich as had been his father before him, but before that they were butchers. A man of some wealth and property, Tristram was born in 1747 and died in 1825. The place of birth of George is unknown although he was certainly christened in Greenwich. It could have been that he was born at Gwernvale in South Wales where his father had an estate.
By the age of 14 George was at the Royal Military Academy at Woolwich as a gentleman cadet and very quickly proved his ability. In particular, his mathematics was of such a high standard that he obtained a distinction. Courses were short, and by 1806 a certificate had been awarded and George was on his way to India with the East India Company. Such was his ability that he was qualified for a commission at an age below that at which it was legal to be so appointed.
Some years were spent in the Bengal Artillery before he had a survey role. He arrived in the East just a few years prior to the overrunning of Java by the French – an act that disturbed the East India Company because of its nearness to their interests. To redress this, a large force of mostly Madras troops captured Batavia in August 1811. In 1815 Everest completed coastal survey operations instigated after the capture of Batavia. Among his instrumentation was a double armed perambulator, a large ship's compass, a theodolite and a micrometrical telescope.
In 1817 he was laying out a 400 mile long telegraph line from Calcutta to Benares. Work took some six months because the combination of thick forest and the limited power of their telescopes reduced sights to at most 13 miles and often much less. Even then observer and target needed raising some 70 to 100 ft above the ground to get lines of sight.

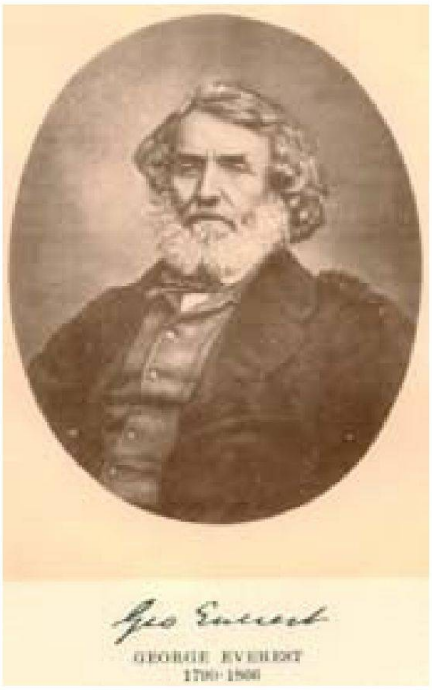

Fig. 1: Sir George Everest.

The Great Trigonometrical Survey

Everest had obviously made a good impression on these early assignments since Lambton – the Superintendent of the Great Trigonometrical Survey – requested that he be appointed as his chief assistant. He left Benares in October 1818 and took 10 weeks to reach Hyderabad – a

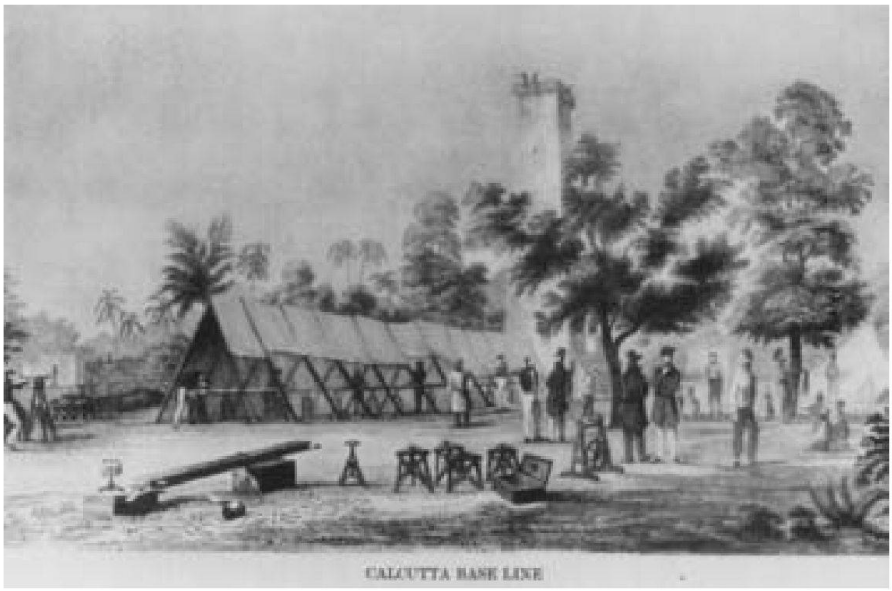

Fig. 2: Measurement of the Calcutta baseline with the Colby bar equipment.

distance of 750 miles. As they marched so he voluntarily made a route survey as he went.

Lambton had initiated and carried through for some 18 years, the idea of a systematic triangulation throughout the country. A particular part of this was to be a meridian arc measure through the centre of India from Cape Cormorin to the Himalayas some 22 degrees in extent more or less up the 78th meridian. This would be a length far in excess of any previous arc measure except for that of Struve which was concurrently underobservation. By the time Everest joined him Lambton was around 65 years old – although his date of birth is uncertain. He obviously realised that a younger man was needed to be trained up and eventually take over. He was not to be disappointed in the manner in which George Everest took on this role.

Everest was set to work on a chain of triangles running north-south between the rivers Kistna and Godavari to the east of Hyderabad. Just the sort of testing ground to either kill the new recruit or make him go on to extremes. It very nearly did the first – literally – but he survived to continue. It was exceedingly inhospitable country with rough hill terrain covered with dense jungle and containing all the ingredients of a multitude of fevers.

Before long malaria overtook not only Everest but 150 of his followers, 15 of who never made it back to Hyderabad. Not to be defeated, Everest returned to finish the chain the following year. Needless to say, fever struck once again and this time he was forced to go on sick leave and in October 1820 he embarked for Cape Colony. Little is known of his activities during the year he was away, other than that he investigated the work of La-Caille who in 1752 had surveyed an arc of meridian near Cape Town covering about a degree. When the results of this were compared with arc measures elsewhere in the world there appeared to be some unexplained discrepancy.

When a copy of Lacaille's journal reached him from France Everest set about determining where the stations used on the arc had been situated and, in particular, studied the terminal stations. These were unfortunately both so situated as to be prone to deflection of the vertical. Everest assessed the possible effects to be nearly nine seconds. This was an amount which, if applied, would put Lacaille's results in agreement with other reliable arcs and give a flattening of around 1/300. During the years 1837–1847 Thomas Maclear reobserved and extended Lacaille's arc. In doing so, he proved Everest findings to be correct.

Everest was back in India at the end of 1821 and this time went west of Hyderabad. He was carrying a chain from the central meridian arc towards Poona and Bombay – the Bombay Longitudinal Series. The ultimate goal of this chain was the connection of the observatories at Madras and Bombay. The country was open, no jungle, fever, roaring rivers or other obstacles and the people were among the kindest in India. Difficulties there were, not least of which was the problems created by haze and refraction. There was one instance where towers of over 20 ft were built at each end of a line

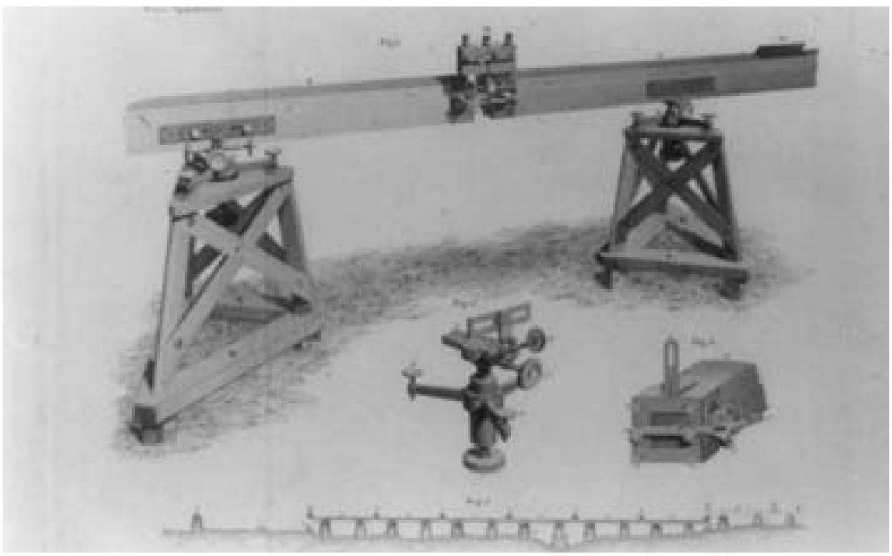

Fig. 3: The Colby bar apparatus.

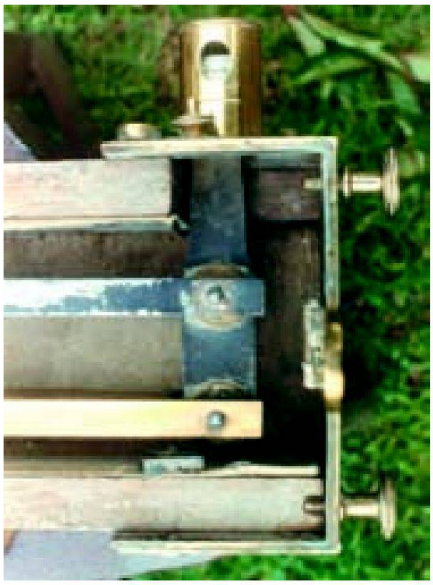

Fig. 4: The end of a Colby bar showing the two bars of different metal joined together in the arrangement to reduce the effect of temperature.

to overcome an intervening range of hills. Then, when a clear day presented itself, not only the distant tower but the whole range on which it stood was clearly visible above the obstructive range.

It was on this chain that Everest had to improvise beacon lamps in the form of an earthen vessel filled with oil-soaked cotton seeds as fuel. They worked well over long distances. This resulted in his adoption of night observations – that could be achieved in the seasons of better weather – instead of entirely daytime observation, which were limited to the worst seasons of the year.

Everest was halfway in this operation when news reached him that Col Lambton had died on 20 January 1823. All work on the chain ceased and Everest returned to Hyderabad to take charge of the Great Trigonometrical Survey, although it was 7 March before he was officially appointed as Superintendent.

Everest resolved to continue where Lambton had finished but fever overtook him yet again in August 1823. Among the cures was one involving the taking of mercury pills and the recommendation to go riding regularly. It was after one such ride in a heavy storm that even more violent pains occurred with the fever and for six months he was wracked with aching bones and convulsions and had considerable discomfort in sleeping.

But the surveyors of that century were made of stern stuff. As soon as he could bear the irregular movements of his palanquin it was back to the meridian chain. His ambition was to see the completion of the Great Arc and fever or pain was not going to stop him. To observe with the zenith sector he had to be lifted in and out of his seat and for the large theodolite his arm had to be supported in order to manipulate the vertical circle. Much of the time he could not stand unaided.

It was the period when he was on the Takarkhera base that he took 372 star observations for azimuth and zenith distance. His approach was that he would tolerate no inferiority in execution and if there was any reason to suspect a defect or imprecision of any sort that could not be accounted for the whole set was rejected and an entirely new set of observations taken. His instructions for observing were given in the minutest detail and no deviation from them was allowed.

Everest struggled on but in September 1824 he was writing of the previous four months of illness and how he had an abscess on his hip, another on his neck, from both of which fragments of decayed bone had been repeatedly extracted, and that he had various other unpleasant operations performed on him.

He measured a baseline at Sironj and completed the necessary astronomical observations at Kalianpur in early 1825 before

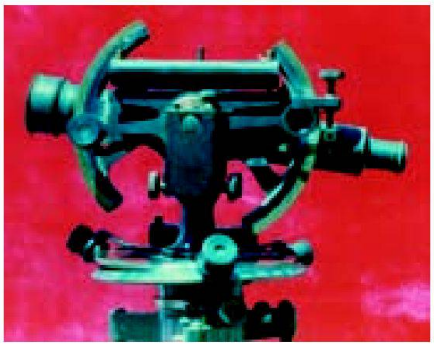

Fig. 5: Everest pattern theodolite designed by for use on revenue surveys.

Fig. 6: 24 inch diameter theodolite used in India.

finally succumbing. This baseline was measured on coffers and Everest insisted on personally seeing to every detail, including the driving in of aligning stakes. The length of this base was 38 413 ft and that at Takarkhera about 37 900 ft, both measured by steel chain.

His sick leave was spent in England and lasted for almost five years. But he was not idle. He was determined that when he returned to India he would have the best available equipment. A large part of his leave was spent trying out the latest instruments in England, Ireland and Europe. Then he designed and supervised the building of new pieces especially for India. In particular he felt that the use of chains was not the most accurate means for measuring base lines. At the time Col Colby was using in Ireland a technique that he had designed himself and Everest made a special journey to see it in operation.

He would have scrutinised it in the minutest detail, and he determined to take a set back with him. The equipment consisted of bars so arranged as to compensate for some of the sources of error that occur in the highest orders of measurement. In addition he arranged the construction of a new theodolite with 36 in diameter circle and other instruments.

Fig. 7: The 36 inch diameter theodolite now at the Headquarters of the Survey of India in Dehra Dun.

Surveyor General of India

Even this did not fill all his time for he compiled a large volume on the results of the measurement of a six degree section of the arc. It was in this that he derived his figure of the earth as 20 922 932 ft for the semi-major axis and l/300.80 for the flattening. By June 1830 he departed again for India where he was to be not only Superintendent of the Great Survey, as before, but in addition was appointed Surveyor General of India. It was a dual role that was really far too much for one individual, but Everest's single-mindedness carried him through another 13 years. A year after arriving back in India he had his first opportunity to use the Colby bar system on a baseline at Calcutta that was some 34 000 ft long. Everest was so impressed by the results that no more bases in India were measured by chain.

He then recommenced work on the meridional series, but had severe staffing problems. There was literally no-one to whom he could entrust the work, so a comprehensive training programme was required. This he did himself in addition to transacting the extensive business of Surveyor General. It took a man of rare quality to survive and come out on top.

When it came to carrying the triangulation across the Ganges plain the poor visibility in the low lying areas necessitated the construction of 14 huge masonry towers up to 60 ft high to raise the line of sight sufficiently. For observing, the instrument had to be winched up – a procedure which on an occasion in Lambton's time had resulted in a snapped rope, damage to the theodolite and many weeks spent in repair in the middle of nowhere with little or nothing to work with nor even any staff with experience.

For targets we again find Everest in an innovative mood. Whereas Lambton had always observed main lines during the very inhospitable wet season so as to get good daytime visibility, Everest devised a form of blue light that could be readily seen at night in the dry season. These supplemented the reverberating argand lamps and the use of heliostats.

In 1832 Everest was in a position to recommence observations on the Great Arc after an interval of seven years. The fieldwork was to last a further nine years before being completed with the measurement of the Bedar base in 1841. Towards the end of 1832 Everest moved his office from Calcutta into the hill region around Mussourie – some 800 miles away but nearer the Great Arc area and in a better climatic zone. He purchased an estate called the Park House near the peak of Hathipaon, at the terminal of the arc but Government regulations would not permit him to use it for his office. Hence the move for official business a few miles south to Dehra Dun. The estate was of considerable extent, well wooded, and at over 6000 ft elevation.

The area required a base line and a site in the Doon was decided upon. It was measured in 1834-5 as 39 183.783 ft. Prior to measurement 50 comparisons were made between the standard bar and the compensating bars, then a further 61 comparisons after the first measure of the base and 66 after the return measure. The area had a plentiful supply of tigers and very long grass so transport here was by elephant.

When observing at the stations in the Jumna-Ganges doab to connect the Dehra Dun base to that at Seronj he wrote: «It was unquestionably the most harassing duty I had to perform, and I had to bear nearly the whole burden of the arduous task myself, for there was at that time no person at my disposal to whom I could depute any portion of the work, except under my own immediate supervision and control. Day and night at all hours from the 13th December… till 4th May – I was perpetually in a state of excitement and anxiety.»

Fig. 8: Painting of Everest's Park Estate House as seen from the nearby mountain of Hathipaon.

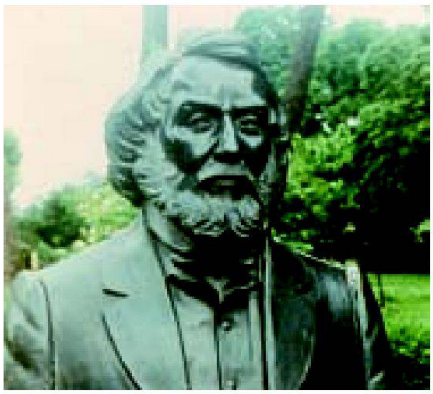

Fig. 9: Bust of Sir George Everest unveiled in Dehra Dun at the bicentenary celebrations.

For most of 1835 and particularly for the period from May to October he was confined to bed and often on the verge of death. No wonder when he was bled to fainting by 1000 leeches, suffered 30 or 40 cupping glasses and numerous doses of nauseating medicine. A «cupping glass» was a cup-shaped glass, heated and applied to the skin to draw more blood to that area. In all he had four attacks during the year, each more severe than the previous.

These and further alarming attacks were disturbing to the Directors of the East India Company so much so that in September 1837 they appointed Thomas Jervis as Provisional Surveyor General to succeed «upon the death or resignation of Lt Col Everest». Now this was either misinterpreted by Jervis or went to his head somewhat for it soon caused a furore. Not only did Everest not approve of the standard of work produced by Jervis but he had no qualifications that were appropriate. Whilst he could not easily disapprove because of the condition placed on the appointment, what really stirred him to fire was when Jervis sent him a copy of a paper he had presented in 1838 to the British Association. It resulted in a series of heated letters to the Duke of Sussex, as President of The Royal Society, and the publication of them all by Everest in 1839. In the end Jervis retired from India before Everest.

1841 saw completion of the field work on the Great Arc with a base at Bedar of 41578.536ft and astronomical observations at Kalianpur – these were the last field observations by Everest. He had seen much of India covered with triangulation but more important to him was completion, against all odds, of the measure of a meridian arc of over 20°. A further two years were required to write up all the reports, complete the computations, and endeavour to safeguard the future of the Survey of India after his departure.

Back to England

He left his Park Estate in September 1843 and sailed to retirement in England. Among the comments on his achievements we read an expression from the Directors of the East India Company of their high regard for his scientific achievements and of the ability and zeal he displayed. The able manner in which he conducted the important scientific work cannot fail to cause his name to be conspicuously and intimately associated with the progress of scientific enquiry. Markham wrote that he completed one of the most stupendous works in the whole history of science. No scientific man ever had a grander monument to his memory than the Great Meridional Arc of India.

He married in 1846 and had six children. The last of these died in 1935 and neither of the two grandsons survived to marry.

He played an active roll in the Royal Society, The Royal Geographical Society, Royal Astronomical Society and the Royal Institution. In 1861 he was awarded a CB and knighted.

What of the mountain? Sir George really played no part in that. He never saw the mountain, took no measurements to it, and did not provide it with a name. This all took place under his successor, Andrew Waugh. It was not until 1849–50 that observations were taken to numerous peaks in the Himalayas where the highest peak lies. By 1852 computations were indicating a peak of considerable elevation and every effort was made to find a local name for it but to no avail – although controversy was to continue for 100 years.

Waugh decided to name it Mount Everest «after my illustrious predecessor». This, together with a height value of 29 002 ft, was announced in 1856 by Major Thuillier to the Asiatic Society of Bengal.

Fig. 10: Everest's Coat of Arms. A painting presented to the Surveyor General of India in 1990 at bicentenary celebrations of the death of Sir George Everest.

Whilst Sir George was not very enthusiastic over this recognition he did not violently object. It was a fitting end to his long career. He died in London on 1 December 1866 and is buried in Hove.

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