Showell Styles

The Forbidden Frontiers

The Survey of India from 1765 to 1949

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Foreword

THE FIRST maps ever recorded were made 4,500 years ago on engraved tablets of clay. They showed the estates of wealthy Babylonian merchants, and they were survey maps —the area and shape had been arrived at by measuring triangles and rectangles. In ancient Babylonia, too, the discovery was made that observation of the stars could help in map-making; certain fixed stars, observed from widely-separated places on the earth's surface, could give the position and distance apart of those places. So there were crude maps of the known world long before the coming of Christ.

The Ancient Greeks 2,000 years later deduced that the earth must be a sphere, and by 150 B.C. a Greek named Hipparchus had divided its circumference into the 360 degrees of latitude and longitude we still use today. Three hundred years later Claudius Ptolemy of Alexandria laid down for all time the system of parallels and meridians which is the basis of all map-work. Ptolemy's work was lost to Europeans for a thousand years, and it was the great voyages of discovery (in which the Spanish and Portuguese led the way) that gave the next impetus to the mapping of the world. English seamen of Elizabeth's time played their part in trans-ocean exploration and the consequent enlargement of the world map. And the English discovered something new about themselves: they were a nation of born map-makers. One of the most astonishing achievements of the Elizabethan era was the survey of England and the

publication in 1579 of a national atlas, the first in the world. In the next two hundred years Britain established herself as the foremost maker of ocean charts, and in 1791 the English Ordnance Survey was founded to map the whole of the British Isles to a standard scale. Today no other country is so well mapped as Britain.

All through the centuries the methods and instruments of map-making developed and improved. From about 1550 onwards the surveyors—the field workers who supplied all the data for the map engravers—used the triangulation method, in which the framework for an accurate sketch-map is built up of triangles, the base of the first triangle being a very carefully measured base-line laid out in some suitable place on the actual terrain to be mapped. Supposing the scale of the map is to be two inches to one mile, and a base-line exactly half-a-mile long is measured on the ground, the surveyor draws the base line one inch long on his plan. From one end of his half-mile line he takes a bearing—a line of sight—on a prominent landmark and notes its angle. Then he goes to the other end of the base line and takes a bearing of the same landmark from there. Now, using the two angles obtained, he can draw lines from each end of the base line on his plan. The point where they intersect is the position, on the map, of the landmark. His first triangle has been plotted, and from each point fixed in this way he can take bearings to other landmarks and plot other triangles until the whole area of his work is triangulated. The long and laborious business of filling in features like roads and rivers and towns comes afterwards, and still another phase is the plotting of contour lines. For triangulation, the instruments used at first were compass, quadrant, and measuring rod, but by 1800 the quadrant and its variants had been replaced by the theodolite, which is basically a telescope mounted on a frame graduated in degrees. Horizontal or vertical angles to distant objects can be measured

with great accuracy using a theodolite, and its invention removed the hit-and-miss element from triangulation. Accurate triangles meant accurate distances. Given one side of a triangle (the base line) and its three angles, the lengths of the other two sides can be calculated by trigonometry. This kind of survey was therefore called a trigonometrical survey.

A field surveyor's work involves more than this simplified account has indicated. He must allow in his calculations for errors of refraction and errors of individual instruments; he has to make route traverses, circumvent mountain barriers, and spend long periods out-of-doors in camping or rough living. But usually he can carry out his long task unhindered except by bad weather, transporting his equipment where he wishes and building his cairns or "trig. points" where they are most suitable for his triangulation scheme. So it was, no doubt, with the men of the first English Ordnance Survey in 1791. It was different for the men of the Survey of India in the nineteenth century.

England and Wales have an area of 58,340 square miles. India, the great sub-continent, has an area of 1,581,410 square miles—twenty-seven times as large. Two hundred years have gone by since the first British surveyor began the mapping of this enormous country, and thousands of British and Indians have spent their lives in the service of the Map. The Survey of India is still going on today. This book can only catch at some aspects and incidents of a vast and continuing task, a task which in its middle years was exciting and often dangerous in spite of its peaceful ends. In the same way, the personalities of a few Survey men, and their adventures, must serve here to represent hundreds of others whose stories are buried—a treasure too well hidden—in the Historical Records of the Survey of India.

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1 - *The Journey of Master Fitch*

"TRADE FOLLOWS the Flag." It is a specious proverb, much quoted in the heyday of British Imperialism. The implication is of armed forces heroically planting their standard on alien soil to claim it for their Sovereign, of peaceful merchants arriving later to pursue their trade in the wake of the advancing conquerors. But British relations with India were not like that. For two centuries the story is of an invasion of bold merchants whose single aim was to expand their country's commerce—and, of course, to enrich themselves into the bargain.

The first real contact between the English and the peoples of India was in the reign of Queen Elizabeth the First. Elizabeth came to the throne of a country that was poor, backward, and in grave danger of being swallowed up by Spain. At the same time, the inhabitants of her kingdom were experiencing an upsurge of national spirit. The very fact that the huge Catholic Empire of Spain and Portugal was threatening them stimulated this spirit, and the Pope's pronouncement that all the trade of Asia and the Americas belonged to the Empire was a provocation and a challenge. It was true that two Portuguese venturers, Bartholomew Diaz and Vasco da Gama, had been the first to find the sea route to India—round the Cape of Good Hope into the Indian Ocean—but no English seaman was going to agree that this gave them a monopoly. Hundreds of young men (Francis Drake was one of them) spoiling for adventure and

eager to prove their seamanship and their ships, clamoured for the Queen's permission to voyage to the Indies and the mysterious land of India itself. Elizabeth knew that any interference with the source of Spain's wealth could be fatal to her people; a nation only just finding its feet after the feverish horrors of Mary Tudor's reign could not stand against the onslaught of the greatest power in the world. She refused. Whereupon Drake and others, without permission, fitted out their little ships as privateers and sailed to intercept the Spanish treasure ships bringing back the wealth they felt they had a right to share. From one such piratical expedition, in a ship the size of a small schooner, Drake returned with half a million pounds' worth of loot—equal to the whole revenue of the Crown for one year.

Elizabeth had a particularly soft spot for this sort of boldness, but she remained uneasy about its consequences. Even more uneasy were the merchants of London and Bristol, who had combined themselves under the name of the Merchant Adventurers of England and wanted peaceful trade rather than piracy. They petitioned the Queen to allow them to send a trade "commission" to the far East, for the purpose of reporting on what could be bought and sold in Asia, and after some hesitation this was granted. In February 1583 Ralph Fitch of London set out for India with a party of merchant-travellers.

Trade between India and Europe had been carried on for centuries before the Portuguese discovered the sea-route to India in 1498, but only by a sort of very remote control. Silks and jewels and spices found their way out of "farthest Ind" over the passes of the north-west—the one gateway through the barrier of mountains—to Teheran and Aleppo, or by sea up the Persian Gulf to Baghdad. The vast slow-moving caravans handed over their goods to Mediterranean seafarers who distributed them among the ports of southern Europe. But little or nothing was known about

India or its people; for European venturers Aleppo was the frontier post of an unknown land, a name famous in Shakespeare's time. "Her husband's to Aleppo gone, master o' the Tiger," says the First Witch in *Macbeth*. It was to Aleppo, and in the little ship *Tiger*, that Ralph Fitch sailed with his party of commercial travellers. They could not travel to India by the sea route round the Cape, because the *Tiger* would certainly have been attacked and taken by Portuguese ships. In the division of world trade between Spain and Portugal, India had been allotted to the Portuguese, who had been established for more than half a century in their two main bases of Calicut and Goa on the south-west coast of the Peninsula. Only Spanish and Portuguese ships were allowed to enter these ports. Fitch and three companions, therefore, planned to travel overland to Basra and slip across the Arabian Sea to the coast of India. They argued that once they had arrived in Goa (which, as the centre of trade, was their objective) they would be treated as harmless travellers, having no means of taking goods away with them. But they had reckoned without the Holy Inquisition. At Goa all four of them were thrown into an underground dungeon to await trial as heretics.

Looking back from the twentieth century, we see the Inquisition as a terrible, almost incomprehensible mistake. To the Spaniards and Portuguese of the sixteenth century it was the logical development of a devout belief. Man's only hope of heaven was in membership of the Roman Catholic Church; for their own sakes, therefore, all men on earth must be brought into that Church by any and every means, if necessary by force and torture. They took this idea wherever conquest or commerce led them. When Vasco da Gama was asked by a notable of India why he had come voyaging to that coast, he replied "For Christians and spices." For him the winning of heathen souls to Mother

Church was at least as important as new discoveries and new sources of wealth. So in Goa, under the nose of the great Mogul Emperor Akbar who had granted these Europeans a trading base, the Portuguese had set up an Inquisition and a Grand Inquisitor and a Prison of the Inquisition. Fortunately for Ralph Fitch and his fellow-heretics, one of the minor inquisitors was an English Jesuit named Father Stevens. After a month, during which the four travellers had been imprisoned underground in stifling heat and without sanitation, Stevens managed to obtain their release on bail and they were able to live more comfortably in Goa (though always in terror of their lives) for five months.

About Father Stevens very little is known. Yet, almost certainly, he was the first Englishman to set foot in India. And he could conceivably have been the first surveyor of India, if that is not too grand a term; the first man to start mapping the physical features of the country round Goa. For at this time members of the Society of Jesus were—oddly enough—in the very forefront of exploration and discovery; two of them, indeed, were responsible for the first attempt to map part of the Himalaya, and another was the first European to cross the greatest mountain range in the world from India to Tibet.

In the age of the Holy Inquisition the Jesuits were the storm-troops of the campaign. Long before Ralph Fitch sailed from London on his trade mission to India the Jesuits had established a less worldly mission in distant Japan. A century later there were two Jesuit missionaries at the Court of the Emperor of China. These priests were often men of scientific attainments, imbued with curiosity about their unknown world as well as with religious fervour, and on their long pioneer journeys in search of remote peoples who had never heard of Christ they noted what they saw and brought back records of their routes. Father Regis, one of the Jesuits at the Court of the Emperor Kang-hi, began

work on a map of the Chinese Empire based on his missionary journeys, training several Chinese priests or lamas to help him in the survey. A year or two later a dispute about the borders of Tibet with China gave Kang-hi an excuse for mapping this dependency of China, and he sent his survey-trained lamas to make a map of Tibet. These men penetrated some distance into the Himalaya in search of the source of the Ganges but were prevented from completing their work by an invasion of Tartars from the north.

The maps made by such men were crude and inaccurate, useless by modern standards; but the information they gathered was all entirely new and their journeys of exploration opened the way for later surveyors. For instance, Ippolito Desideri, an Italian Jesuit, unlocked many doors to knowledge of the world when he made a great journey across the Himalayan range, starting from Lahore in India in September, 1714 and reaching Lhasa, capital of Tibet, in March, 1716. The Sanscrit compound *Himalaya* was not in use then, and Desideri thought the range was part of a mountain barrier stretching right across Asia from Europe. "The *Caucasus*," he wrote, "is a long range consisting of remarkably steep and lofty mountains. After crossing one mountain you encounter another still higher, and the farther you go the higher you climb, until you reach the highest of all, namely, *Per-Pangial*." This is the first recorded reference to a Himalayan peak. More than a hundred years later the Survey of India noted the mountain in its records as "43K, Pir Panjal; 14,154 feet". Four years after Desideri's journey a French Jesuit, Father Bouchet, sent home to Paris a very rough map of southern India with a few observed latitudes and longitudes. If Ralph Fitch was the pioneer of British influence in India, these adventurous priests were the real pioneers of the trigonometrical survey which the British were to institute in the eighteenth century.

But to return to Goa in the summer of 1584, with Master

Fitch wondering if he was ever to see London again. Father Stevens (who must have strained his religious convictions to the uttermost) could no longer protect his heretical fellow-countrymen from the Inquisition. Probably it was Stevens who sent a secret messenger to Fitch, warning him that on the morrow the four Englishmen were to be seized and given the "strappado", a torture in which the victim was hoisted by ropes tied to his wrists and then dropped so as to dislocate his arms.

In the dark hours of the next morning Fitch and his friends fled from Goa and started to travel north-eastwards across India. It was a journey of more than a thousand miles to Fatehpur Sikri, the beautiful new city of red sandstone the Emperor Akbar had built for himself. They reached the city, were kindly entertained, and saw the glittering Mogul Court at the height of its greatness; but the Great Mogul himself, the Emperor, would not give them audience, so that Master Fitch was unable to deliver the letter Queen Elizabeth had given him for Akbar.

The London merchant was not greatly put out by this. He had collected a vast amount of useful information in Goa and on his journey across India—lists of products and sources, names of likely merchants, routes and import needs and crop seasons—and he had an appetite for more. Also, it seems, he had an appetite for adventure. He knew that between India and China there lay a wealthy kingdom nearly twice the size of France, called Burma. One or two Portuguese adventurers had brought back accounts of Burma's fabulous riches but no Englishman had ever been there. Ralph Fitch resolved to be the first.

His three comrades had had enough of the heat and hazard of travel. One of them named Leeds, by trade a jeweller, was given employment at the Mogul Court on a good salary. The others started on the long journey home

to England. Fitch set off for Burma, alone, in September 1584.

What a book of travel and adventure this man could have written! He left only a brief record of his journey, which occupied eight years and covered twenty-four thousand miles by sea and land, and it survives in the collection of travellers' tales called *Purchas his Pilgrimes*, first published in 1625. He describes in it some of the strange cities he visited, and notes their merchandise and the prospects for trade there, but we learn little about Fitch himself or about the vast and varied landscape through which he travelled. Probably he knew little (and, perhaps, cared little) about India's three thousand years of history, her diversity of warrior nations, her ancient culture and her many religions. To him, as to all western Europeans of his day, Moslems were Moors and Hindus were Gentiles, while other religious sects came under the general heading of Pagans. His diagonal route across the southern peninsula of India from Goa to the mouths of the Ganges must have impressed him with the vastness of this land of hill and plain and jungle, but did he guess what greater vastness stretched far to northward? Did some chance-met Punjabi or Nepalese tell him of the river-plains as large in extent as England, of the great wall of snow and ice—fifteen hundred miles long, three hundred and fifty miles wide—that hid the uncertain frontiers of Tartary? One thing, surely, Ralph Fitch did not guess: that his journey was the seed from which would spring an Indian Empire ruled over by a Queen of England.

He travelled on, this solid London merchant with the soul of an adventurer, while the months stretched into years. For him the cry was Eastward-ho! And by river-boat and raft, horseback and weary foot-slogging, he came via Hugli and Chittagong to Pegu, capital of Burma. Here was a city much bigger than Elizabethan London—"made

square and with very faire walles, and a great ditch round about it full of water, with many crocodiles in it". He saw the four sacred white elephants, and the five hundred black elephants trained for battle (they were used like twentieth-century tanks.) He went on to Rangoon and Chiengmai and a score of other places; and at each of them he noted the chief commodities that might be bought in quantity and the foreign goods for which there was demand. At last he reckoned his mission completed and set his face for home.

Except that he escaped both shipwreck and robbery—two very common hazards of travellers at that time—Ralph Fitch says nothing of his adventures on that homeward journey of twelve thousand miles or more. By sea to Ceylon (where, of course, he gathered more trade information) and thence up the west coat of India to Cochin; Goa, entered secretly and in disguise to evade the claws of the Inquisition, held him for three days while he found a ship to take him up the Persian Gulf; and so to Basra and Baylon, Mosul and Aleppo, and "by God's assistance safely to London".

It was the year of 1591 when Master Fitch brought back his budget of prospective commerce. Great events had taken place in Europe during his absence. The might of Spain had at last struck at England and had been shattered into fragments. The Invincible Armada was gone, and the Spanish and Portuguese were in danger of losing their control of the seas. With confidence, now, English trading ships could defy the Pope's sanction and take their share of the world's commerce. The mass of first-hand information Ralph Fitch had collected was sifted and classified by the eager merchants of London, earnest application was made to the Crown, and on December 31st, 1600, Queen Elizabeth granted a charter to "The Governor and Company of Merchants of London trading into the East Indies". By this Royal Charter the right to trade in the Eastern seas was

reserved to the shareholders of the East India Company, as it was soon called. A monopoly protected by the Crown, whose representatives would be in effect ambassadors of the Queen of England, was the only way of gaining admittance to a trading region closed for so long to the English, for its emissaries would need the favour of Indian potentates as well as a prestige that would enable them to attack the old-established monopoly of the Portuguese. Here was to be no establishment of colonies, no conquest of savages as in the New World across the western ocean, but a bloodless battle for markets, with diplomacy and business acumen for weapons.

Master Ralph Fitch had the satisfaction of knowing that he had set on foot a great commercial enterprise. Before he died in 1611 (his grave is in the church of St Catherine Cree in Leadenhall Street) he saw the first ship of the newly-formed Company set sail for India. She carried gifts for Indian notables and samples of the goods that England would exchange for the silks and spices and jewels of the East. She was a very small ship, with nothing about her to suggest the enormous burdens her owners were presently to shoulder: the arming of a big fleet; the maintenance of an army; and the making of the most hazardous survey in history.

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2 - John Company

A SUB-CONTINENT 1,800 miles across in its northern sector; a peninsula 1,800 miles in length from south to north; every sort of terrain from barren rock to fever-ridden jungle, from desert to swamp, from fertile plains to snow-peaks four miles high. This was the country to which the little high-pooped English merchant-ships sailed, buffeting their way round the Cape of Good Hope against the south-easterly gales. It was a country of three hundred million people, ranging in colour from black to white; there were more than a hundred different languages and more than five hundred dialects spoken. Two-thirds of India's population were Hindus by religion and most of the rest were Moslems, members of a body which frequently warred against other religions. War had been for centuries the occupation of the wealthy ruling classes led by their various petty princelings, and only under the rule of the Mogul Emperors (which began less than a century before the East India Company received its Charter) had uneasy peace come to the central states of India.

The merchants from England were not much concerned with India's religions and wars, or with the nature of her peoples. They had no intention of exploring the country, except the bays and inlets where good anchorage might be found and trading posts established. Their aim was to win the favour of the Great Mogul and get permission to trade, placing agents in Surat, an estuary port on the west coast

400 miles north of Goa. At first they failed. Portugal was still at war with England and Portuguese influence was still strong at the Mogul Court, where the Jesuit diplomats had no difficulty in persuading the Emperor that the English were barbarians from a remote western island of no importance. Perhaps it was the news of Swally Hole that made the Great Mogul change his mind. This sea-fight took place in 1615 off Swally Hole at the mouth of the Surat estuary, when Captain Downton with a few East India Company vessels was attacked by a much larger fleet of Portuguese ships and smashed the enemy with convincing thoroughness—a small echo of the Armada victory but a resounding one.

From then onwards the Portuguese empire dwindled rapidly. The island of Ormuz at the entrance of the Persian Gulf, whence the Portuguese had harried merchant ships coming from Basra, was attacked by a combined force of English and Dutch seamen and the Portuguese were driven out. An English trading "factory" was soon doing a thriving business at Surat, and before long the Company moved its headquarters to Bombay. The resources of India's eastern coast were tapped when Francis Day, a company official, founded the city of Madras. The numbers of English merchants and clerks resident in India grew rapidly. The East India Company owned a great deal of property on Indian soil by the end of the seventeenth century. The muslins and voiles made by Indians from cotton grown on the coastal lands of the Deccan were valuable trade goods and it was inevitable that the traders from England should become increasingly interested in the cotton sources. They began to acquire land, to employ Indian labour, to make small journeys inland from the coast. Notes of routes, villages, and landmarks resulted from these journeys, and sometimes a rough survey of some cotton-growing area was made. But no one had yet thought of making a detailed map.

"I serve John Company," the Company's representative would explain to the curious Tamil or Hindu peasants; it was easier than explaining the nature of a Chartered Company. And in London, as well as in India, John Company flourished exceedingly. Its twenty-four Directors wielded increasing power. Its policy remained the same; as the President of the Court of Directors put it, "Our business is only trade and security, not conquest." *"And security"*: those two vital words were soon to invoke the use of force.

A hundred years had passed since Queen Elizabeth granted the East India Company its Royal Charter, years that had seen England ruled by a Parliament, then by the Stuarts, then by a Dutchman. William of Orange was followed by Queen Anne and her general Marlborough, and the struggle with the new Great Power began. France had taken the place of Spain as the strongest power in Europe, and France had ambitions of an Indian Empire. *La Compagnie des Indes Orientales* had been founded in 1664 and had large agencies at Chandernagore on the Hooghli and Pondicherry on the Madras coast. There was cut-throat rivalry between the French and English traders, of course, but up to the middle of the eighteenth century no throats were cut in earnest. It was the turn of events in Indian political history that caused John Company to enlist its own army.

For the power of the Moguls that had unified the many states of central India had broken at last. The great warrior race of the Marathas, seeing the weakness of the crumbling empire, seized their chance of conquest. Fierce Maratha horsemen by the hundred-thousand overran India from the south almost to the Indus, leaving a vast trail of slaughter and misery in their wake. Maratha chieftains carved kingdoms for themselves out of the conquered lands—Baroda, Gwalior, Indore—and where the invading hordes passed by the country drew defensively into small independent states.

Large numbers of Hindu merchants whose livelihood was threatened by this state of anarchy made a bargain with the only stable authority, John Company: if they were guaranteed protection, they said, they would move their families and their thriving businesses to Bombay. This acceptance of responsibility for Indian natives meant a change in the Company's policy. And it was the origin of the British Empire.

Something more was needed than the arming of the English traders in India. These warring Indian armies were not savage levies with bows and spears as their only weapons; they used fighting elephants and mounted swordsmen, but they also had modern muskets and cannon and knew how to use them. Indeed, the Nizam of Hyderbad and the Nawab of Arcot had a French general, Bussy, in command of their joint army. And General Bussy was one of many evidences of aggressive French policy in India. Like the Marathas, the French had seen their chance in the break-up of the Mogul empire. It was an opening through which they could thrust into Indian politics to side with the victors and establish their own puppet ruler over the whole country. As a beginning, they filled Pondicherry, their chief trading station, with French troops and artillery. The threat to the widely-separated Company posts was obvious.

In London the Court of Directors that governed the East India Company moved slowly, reluctant to change the system which had worked so profitably for a century and a half. They were business men with no ambitions of conquest. As Durand puts it, they were in India "from motives of clean, sheer self-interest". But something had to be done if they were not to be driven out altogether with a loss that would ruin them and their shareholders. They began to fortify their posts at Madras and Calcutta and especially at Bombay, where Christians fleeing from the Inquisition at Goa had helped to raise the population to 60,000—six times

what it was when the English took it over. They enlisted and armed native soldiers, called *sepahis* or *sepoys*, and officered them with Englishmen. Their ships already formed a navy; now there was to be an East India Company army. But the Directors organized only a minimum of defensive arming, because they did not really believe that the French would attack them. "Total war" was not a concept of the eighteenth century, and the sporadic struggle against France was seen as an affair of professional armies marching and countermarching in Flanders. As for military help from England, they did not expect it—the East India trade and its protection were their responsibility—and could not have obtained it in any case. For England was facing the possibility of another civil war.

This was the time of Prince Charles Edward's attempt to win back the English throne for the Stuarts. The London of George I was in turmoil at the news of a Stuart victory at Prestonpans and a Highland army marching on the city —they were in Derby, those savage Highlanders, and it was expected that thousands of Jacobite supporters would join them. One English army was fighting in the Netherlands and another was opposing the Prince, leaving no military force available to help a few isolated traders in faraway India. The panic in London subsided when the news of Culloden marked the end of the Stuart threat. Hardly had it done so when tidings of misfortune reached the head offices of John Company. Their station of Madras had been attacked by La Bourdonnais, governor of the French colony of Mauritius, and burned to the ground; their merchants and clerks had been carried off as prisoners to Pondicherry.

It was now clear, if it had not been before, that the India trade could not be maintained without fighting for it—against the French, and against whatever Indian allies the French proposed to use. John Company had not exactly to exchange the pen for the sword, but he had at least to pursue

his business with pen in one hand and sword in the other. Lists were opened for the enrolment of men in the fighting service of the East India Company, plans were made for recapturing Madras. Meanwhile in India the victors of the Madras expedition had lost one of their English prisoners. A nineteen-year-old clerk had escaped in disguise from Pondicherry and reached safety at a British trading post. His name was Robert Clive.

Clive's success story is an example (they are frequent in British history) of the right man appearing at the right time. He was a complete misfit as a clerk but he turned out to be a born soldier—and a soldier of the aggressive sort, which was precisely what was needed at this moment. After his escape Clive transferred to the nucleus of the Company's army that was now being formed, was commissioned lieutenant in 1749, and was soon showing the military initiative and daring that made him famous. He saw, as his employers did not, that it was futile to use a half-formed and half-trained army in trying to defend trading stations that were separated by hundreds of miles of difficult country; attack was the only hope for a successful defence. He saw too (though this was later) that if strife-torn India was not to be dominated by the French she would have to be dominated by the British. Perhaps the vision of a British Empire in India was present in young Robert Clive's mind at this time. Certainly a French Indian Empire was the aim of the man he found himself opposed to. Joseph François Dupleix, who was governor-general of the French Indies and called himself Nawab of the Indies, was a man of Napoleon Bonaparte's temperament, with Bonaparte's motto of *Toujours l'audace!* He had begun his scheme of total conquest by allying himself with the Nizam of Hyderabad and placing a creature of his own on the throne of the Carnatic, the 500-mile-long coastal territory that included Madras, taking over the East India Company's depots in all this area.

Trichinopoly, where there was one such depot, was the only place still holding out against Dupleix, and Trichinopoly was besieged by thousands of French and Indians. Clive had the task of raising the siege.

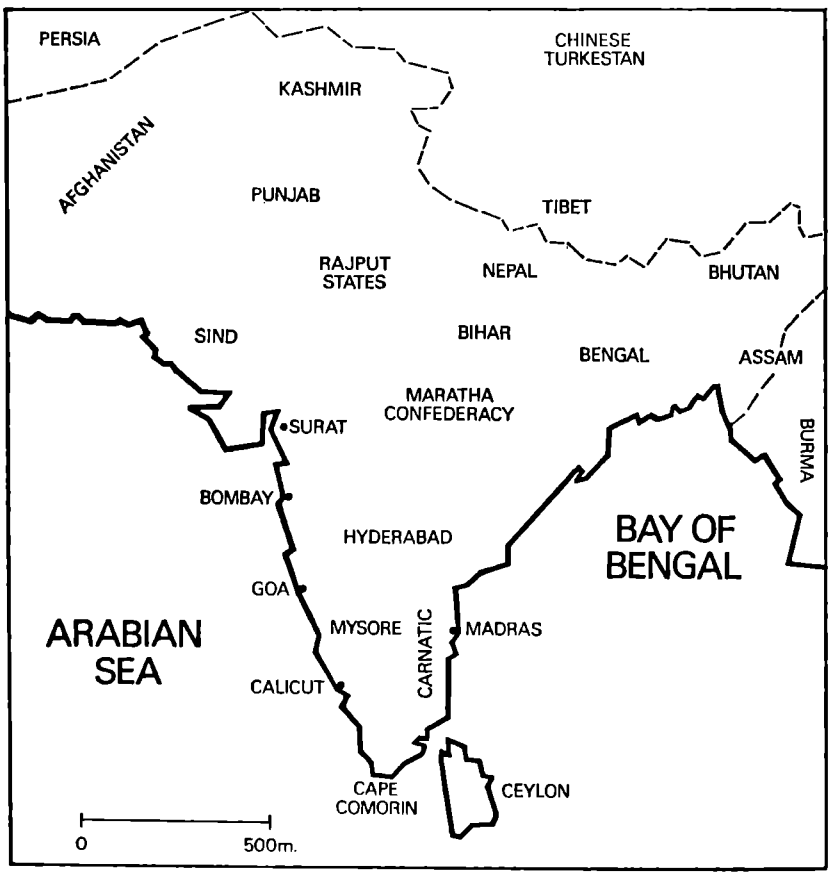
That a young clerk-turned-soldier should conduct his own independent campaigns like some *condottieri* captain of mediaeval Italy appears strange to us today; it was the result of a mediaeval situation, and it was fortunate for the future of British India that Clive had the genius of such a leader. He had a little mixed force of sepoys and English, four hundred men in all, to pit against Dupleix's thousands. Instead of destroying it in a vain attempt to relieve Trichinopoly, he marched it to Arcot, the capital of the Nawab of the Carnatic; got into the city; and held it for fifty-three days against the greatly superior force sent by the wrathful Dupleix to drive him out. This feat of arms resulted in the saving of Trichinopoly. But it had a more momentous result. It demonstrated to the warrior races who held the power in India that the British could fight.

Ironically enough, the great things that were emerging from Western culture (toleration, humanity, regard for individual liberty and happiness) commanded no respect at all in India, where all these things merely represented weakness. Nor did the British sense of order and just administration impress Indians. From first to last—to the end of the British Raj two hundred years after Clive's defence of Arcot—it was the fighting prowess of the incomers from Britain that won them alliance and allegiance. The warlike Rajputs and Marathas had not believed, until 1751, that the English traders would fight. And it was the Marathas who came to Clive's aid and drove off the forces of the Carnatic.

Clive, however, was only at the beginning of his work. Stinted of men and arms by the Company, who still hoped to maintain their trade by peaceful means, he prepared for

the final reckoning with the French which he knew must come. It came in 1757. Instigated by the French, the Nawab of Bengal, Siraj-ud-daula, attacked and burned Calcutta. This was the occasion of the notorious "Black Hole of Calcutta". *The black hole* was soldiers' slang for "prison", and it was probably negligence rather than intentional cruelty that led to forty-three of the fifty-four people confined in a small cell dying of suffocation; nevertheless, the news of the occurrence made a great stir when it reached England. The general public received the impression that peaceful Englishmen were being oppressed and tortured by heathen Indians, and any action taken by way of revenge was sure of their approval. Calcutta was retaken without much difficulty a few months later, but Siraj-ud-daula gathered a great army (with French aid) to settle the matter once for all. The battle of Plassey which followed can hardly be called a battle, yet it takes its place with the decisive conflicts of the world.

Clive marched from Madras to capture the French base at Chandernagore, then turned to face his main opponent. He commanded 800 Europeans and 2,000 native troops; Siraj-ud-daula had 50,000 men—35,000 infantry and 15,000 cavalry. Clive had ten guns; his enemy had fifty-three guns, and these were manned by French gunners. It is said that the English commander retired to a mango grove for an hour's solitary meditation before deciding to attack this enormous army, sixteen times as big as his own, and he must have known that if he failed he would be adjudged guilty of the wildest imprudence. Indeed, no one has ever explained satisfactorily why he succeeded. The guns opened fire in the morning, until they were put out of action by torrential rain. In the afternoon the British and sepoys charged and the hordes of Siraj-ud-daula incontinently broke and fled. Twenty-three of Clive's men were killed. And the East India Company were the rulers of Bengal.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For that is what it amounted to. The British found a puppet ruler, Mir Jafar, to put in Siraj-ud-daula's place, and Mir Jafar paid Clive £160,000 for assisting him to the throne. But the Company had to provide an administration for Bengal, and became the *zamindars* or landlords of nearly nine hundred square miles of territory yielding substantial rents. This unlooked-for responsibility was to involve John Company in thirty years of intrigue and fighting, and within a century its administration was to spread over all India. For the present, however, it needed a governor for Bengal, and Clive—colonel of the Company's 2nd Regiment of Foot when he won Plassey—was given the post. He was also created Baron Clive of Plassey, K.C.B., which showed that King George and his government recognized the importance to Britain of this new acquisition.

It was in 1765 that Lord Clive, returning from England to resume his governorship, heard of a sea-captain who had been plotting the navigable channels of the Ganges and making accurate maps of their shores. This appeared to be the very man to take charge of a scheme the Governor had in mind, a scheme he considered essential to full control of his great province. He sent for Captain James Rennell, and was confronted with a slight and sinewy man, brown-faced and hook-nosed.

"Mr Rennell," said Lord Clive, "from this moment you are relieved of your present duties. You will start at once upon a general survey of Bengal."

This was the beginning of the Survey of India.

* * *

3 - *The Birth of a Map*

ON THE morning of March 29th, 1930, some visitors to Westminster Abbey saw a group of distinguished gentlemen, gathered in the nave, lay a wreath on a stone slab near the grave of David Livingstone. The slab bore the simple initials "J. R.". When the visitors were told that this was the President and Council of the Royal Geographical Society honouring the centenary of the death of James Rennell they were little the wiser. Who was this James Rennell?

In 1758, at any rate, James Rennell was a sixteen-year-old midshipman in H.M. frigate *America*. He had a passion for maps and plans, and in his sea-chest were a quadrant and drawing materials. He had written home to his parents: "There is a gentleman sent on board who is a compleat draughtsman and will teach it to me." Evidently young Mr Rennell had other ambitions than fighting the French, though he had his share of fighting when the *America* won a hammer-and-tongs fight with a French frigate off the Brittany coast. He was later transferred to H.M.S. *Grafton*, bound for the East Indies, and when the *Grafton* visited Trincomalee Captain Hyde Parker used the young officer's special skill in making a survey of the harbour. This Hyde Parker was a man of kindness and understanding; as an Admiral forty years later he was to make the signal, off Copenhagen, which Nelson pretended not to see. He knew that for James Rennell there was no real future in the Navy, and recommended him to transfer to the East India Com-

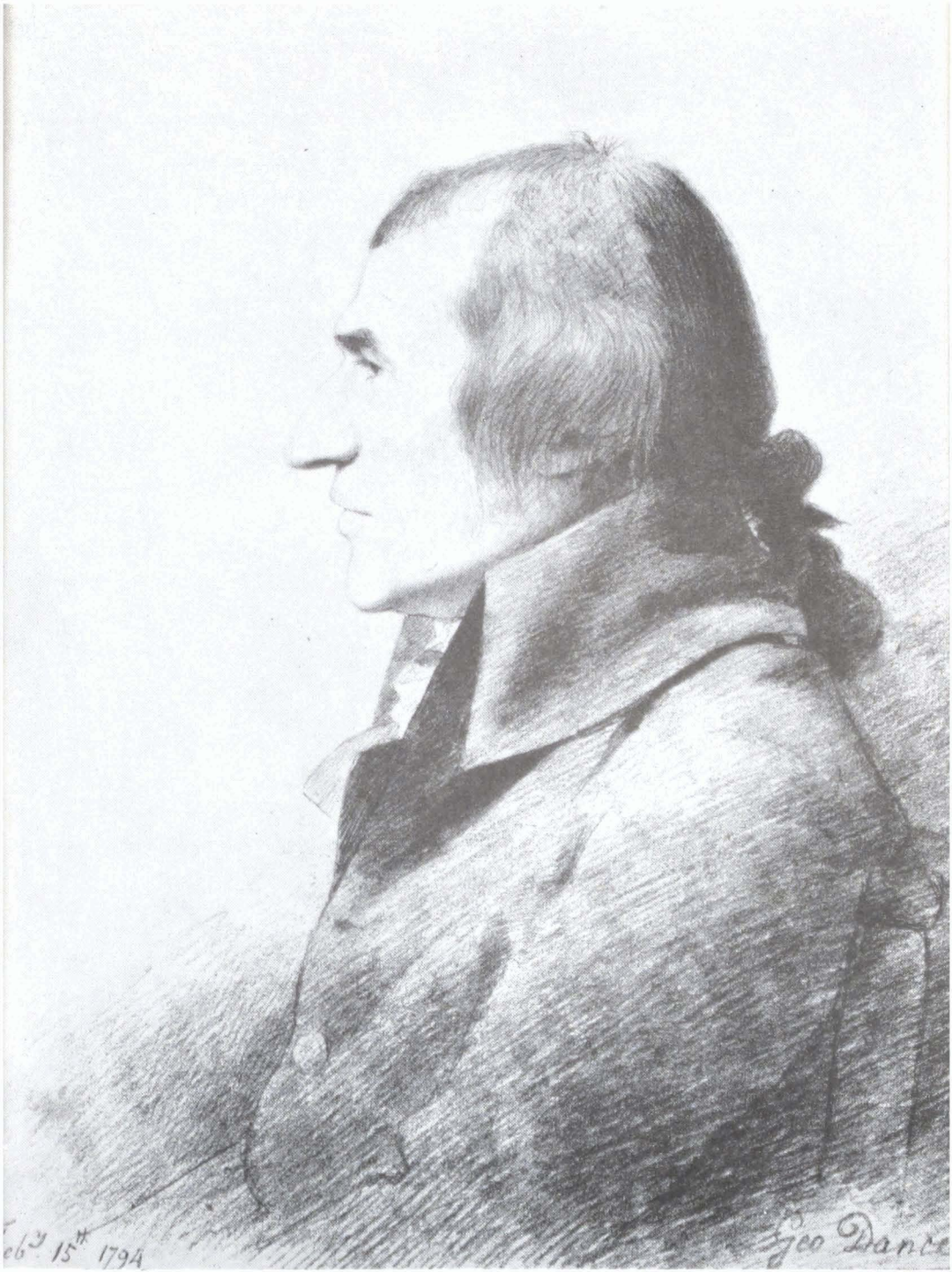
pany. As a result, James Rennell, now aged 21, was given command of the East India Company's vessel *Neptune*, trading along the coast of India between Point Calimere and Tondi. He used his quadrant to good purpose as he voyaged up and down, producing accurate delineations of the coastline. And two years later, when Lord Clive appeared on the scene to change the course of Rennell's career, he had been given the job of surveying the Ganges channels.

For the "general survey" of Bengal Rennell was given one English assistant named Richards and fifteen sepoys for escort. The kind of map he had to produce was not so much a topographical map as an accurate plan of all the productive land in Clive's governorate, but Rennell was too dedicated a surveyor to limit himself to that and resolved to fix every topographical point he could on his first journey —something like 400 miles—across Bengal from south to north. He fixed his position at intervals by astronomical observation, as he had been accustomed to do at sea, and used his quadrant for bearings and distances of landmarks. The quadrant, later to be superseded by the sextant, was a brass-mounted instrument representing the 90-degree arc of a circle, with which the observer could measure the angle between two lines-of-sight—vertically between the horizon and the sun, or horizontally between two landmarks.

The work was neither easy nor safe. In some places, as in the swampy jungles between the paddy-fields of the rice cultivators, the threat of deadly fever hung over Rennell and Richards every step of the way. There were poisonous snakes in the dry scrub, and tigers lurked in the tall elephant-grass through which the narrow path sometimes wound its way. One evening when the party was pitching its tents in a clearing a leopard sprang from a low bough and mauled five of the sepoys before they had recovered from the shock of its attack. Rennell seized a bayonet and thrust it into the beast's opened mouth as it leapt snarling

upon him. But a graver danger, because it was less predictable, came from the Indian natives themselves; and this danger was increased by the fact that the English had just acquired a reputation as fighting-men.

It is difficult to imagine a greater contrast than the one between eighteenth-century England and eighteenth-century India. In London it was the age of Samuel Johnson and Henry Fielding, of William Wilberforce and Edmund Burke, the era of a great upsurge of humanitarian feeling; there was no humanitarian impulse anywhere in India. If Doctor Johnson (say) had been transported back a thousand years into the time of the Vikings he would have found himself more at home with the bloodthirsty sea-rovers than in the India of his own day. The contrast was not so much of environment as of traditional outlook. For ten centuries the English had accepted the ten laws of Moses as their basic moral code, whether they kept them or not, but the Ten Commandments meant less than nothing to the three hundred millions in India. They had their own codes, but these differed in every possible way from the European code. For example, it was forbidden to a Hindu prince to kill a cow, but there was no moral or religious reason why he should not stab his brother in the back if it profited him to do so; indeed, the history of India is so crammed with aristocratic fratricide that it has the appearance of a normal custom. There was no "sanctity of human life" anywhere between Cape Comorin and the Himalaya—especially, no sanctity of female human life. A woman or a girl child was merely a chattel, of less value than a bag of salt, and could be slaughtered in wartime pillage or local raiding with no thought of wrong-doing in the mind of the killer. It is true that Europe in the eighteenth century knew wartime atrocities, but whereas these could shock Europeans they would have appeared normal, even admirable, to Indians. And while a neutral civilian could travel right across war-



JAMES RENNELL
SURVEYOR GENERAL OF BENGAL 1767-1777

MOORCROFT AND HEARSEY ON THE ROAD TO LAKE MANSAROWAR

torn Europe without being molested, any party of strangers travelling in India could expect to be treated as a marauding enemy force. This may help to explain Captain Rennell's armed escort.

Often Rennell must have wished he had a hundred sepoys instead of fifteen. His little survey party, arriving at some remote village, would find itself opposed by the *zamindar* and the full strength of his male villagers, armed with sticks and muskets and resolved to fight to the death. It might take hours, even days, to persuade the embattled community that the strangers from the south had reasons for their journey that had nothing to do with robbery and murder. These peasants, who throughout India formed a vast majority of oppressed and helpless people, had been accustomed for generations to living on the very margin of existence. Their wealthy overlords took a third—sometimes half—of all they managed to produce. The robber bands which descended on them as regularly as the rains took most of the rest. From the robbers they would fly, to hide in the jungle, and those who survived would creep back to rebuild their devastated village; but they had some hope of beating back a small party like Rennell's. This inbred antagonism to all strangers lasted a long time and was to prove one of the greatest obstacles to the Survey of India.

The peasants and their overlords accepted the attacks of the robber gangs as something normal and traditional, to be endured like the hot weather or the heavy rains. Not so the East India Company. For one thing, the Company was now part-owner of the produce of the Bengal rice fields and jute plantations; for another, it assumed responsibility for the safety of its tenants. Robber bands had no place in the British system of law and order, and they were not going to be allowed in Bengal, where an especially virulent horde of freebooters, called Sanyasi, had been accustomed to terrorize the villages. These Sanyasi were a strange mixture of fakir

and gangster. They demanded huge tributes from the peasants on the score of their alleged holiness, and if the villages could not or would not pay, the Sanyasi descended on them with fire and sword. Rennell had come upon ugly traces of their work during his northward journey, and soon he was to have proof that the new government of Bengal was taking the offensive against them.

Taking bearings, establishing positions, filling memorandum books with notes about this hitherto unrecorded country, the survey party pushed close to the eastern borders of Bihar. Here, to his surprise and pleasure, Rennell encountered an old shipmate, Lieutenant Dennis Morrison. Morrison had been sent post-haste from Calcutta with a party of 90 sepoys to deal with a small army of Sanyasi who were laying waste the villages in those parts, and information had that day reached him that the raiders, 700 strong and 150 of them armed with English muskets, were threatening the village of Deenhotta. Rennell joined his little force to Morrison's and they headed for Deenhotta. Marching all day through the broiling heat, they reached the village at nightfall and found it still unharmed. The Sanyasi were close at hand, however, and in the steamy mists of next morning they attacked. There was a short but bloody fight —the din and smoke of musket-fire and then the clash of sword and sabre. Rennell was in the thick of it, sword in hand. The Sanyasi broke and fled, leaving half their number lying dead or wounded. But Rennell was down, with terrible sabre-cuts in head, arm, and shoulder. Morrison brought him safely back to Calcutta, but it was nine months before he was able to rise from his bed. Almost at once he was back at his work for the general survey.

In 1767 Lord Clive wrote to the Court of Directors of the East India Company in London: "We have appointed Captain Rennell, a young man of distinguished merit in this branch, to be Surveyor-General, and directed him to

form one general chart from those already made. This though attended with great labour does not prevent him from prosecuting his own surveys, the fatigue of which with the desperate wounds he has lately received in one of them, have already left him but a shattered constitution." So James Rennell was the first to receive the title of Surveyor-General. His rank of Captain was now in the Engineers, from which service in the years to come the men of the Survey were to be drawn. His constitution was indeed shattered, by recurrent fever as well as by the effects of his wounds, and when he was 35 he had to return to England for good. This was after seven years spent continuously in active survey, the last part of which had brought him to the frontiers of a new and wilder land.

Across the jungle-clad hills of Assam the surveyors pushed, northward still through the fever-swamps of the great Brahmaputra river that rises among snow-mountains untrodden to the present day, until they saw from barer foothills a great rank of glittering ice-peaks standing across the sky—the Himalaya, the "Abode of Snow". Rennell could only guess at what lay beyond that enormous barrier of mountains, the real frontier of India; the 500,000 square miles of unmapped, unexplored Tibet formed part of what he would call "Tartary". But he considered it his duty to get as far as the mountain frontier, if he could, and started towards the distant snows. Almost at once he was stopped. The gorges leading into the mountains were guarded by fierce tribesmen, men who were different from the Aryan types of India. These mountaineers were short and stocky, broadfaced and slit-eyed, Mongols who had long ago crossed the passes from the north and settled in the valleys of Bhutan. They forbade all passage to strangers and there was no getting past them. James Rennell had to turn back; less reluctantly, perhaps, because what he had seen of the snow-peaks had convinced him that a survey there was impossible.

Rennell died in London at the age of 88. He was greatly respected as "the Father of Indian Geography" and had published a celebrated *Bengal Atlas*. He proposed the formation of a Geographical Society in London, though he died before its foundation. But he was wedded to the old methods of land survey, and strongly opposed the idea of a triangulation of all India when it was put forward. Perhaps he remembered the vision of that forbidden frontier of Bhutan. Such a survey, he declared, was totally impossible in the northern parts of India—"nature forbids the approach". One man, at least, did not agree. This was William Lambton, who was to become Surveyor-General of Madras in 1800. But between Rennell's surveys and Lambton's the affairs of John Company—and of India—had undergone great and swift changes.

The Company's attempts to support first one puppet ruler and then another in their widening possessions had led to more wars instead of the peace they had hoped for. The Indian web of intrigue was too complicated for the foreigners from the west to understand, and they were continually being surprised and bewildered. Clive had brought peace to Bengal, but the Company's other territories in the east and south and west were in trouble. The Marathas, beaten back from an attempt to conquer the north-west provinces, came ravaging down on Bombay, and to oppose them Warren Hastings—the new governor of Bengal—marched an army right across India. In the south-east the Nizam of Hyderabad was an ally of the British and so was the Sultan of Mysore, but the Sultan's son Tipu was engaged in ravaging the neighbourhood of Madras, while Muhammad Ali, another of the Company's protégés, was gathering an army to assist him to the thrones of the Nizam *and* the Sultan. There was one occasion when a British force, whose commander thought he was supporting the Nizam, found himself actually fighting the united armies of the Nizam and

the Sultan. The British won the battle, but that did not make matters any clearer. To make them worse, the French made an alliance with the Sultan of Mysore and supported him when he descended on the Madras territories with ninety thousand men and a hundred guns, burning and pillaging wherever he went. An army under Sir Eyre Coote defeated the Sultan in a great battle; but the effort represented almost the last of the East India Company's resources. This "Company of Merchants of London trading into the East Indies" was faced with a task which was too hard for them, and far too expensive. They appealed to the British Government for a loan of one million pounds.

All this marching and countermarching, the battles and treaties and concessions, had brought vast new areas under Company control. John Company had overreached itself in this, and also in the system by which it rewarded its servants. Company agents were paid a very small salary, but it was clearly understood that they could make as much money as they were able by private methods. When Parliament appointed a Committee of Investigation to go into the matter of the million-pound-loan, it revealed not only the enormous wealth acquired by some Company employees but also the overwhelming burden of responsibility they were assuming. The result was William Pitt's India Bill, which set up a Government Board to control Indian affairs and placed a royal governor-general over the governors of Madras and Bombay. This was in 1784. Three years earlier, when Cornwallis surrendered his army to the American "rebels" at Yorktown, Britain had lost her American colonies; now she had gained an Indian Empire.

Among the thousands of British soldiers captured at Yorktown was an Ensign of the 33rd Regiment of Foot, a heavily-built and reflective young man named Lambton. William Lambton employed the years of waiting for repatriation in studying mathematics in relation to ground

measurement and made himself proficient in this science. Not until 1796 did he manage to rejoin the 33rd Foot, and by that time the regiment was in India with its colonel, Arthur Wellesley (later to become Duke of Wellington), who put Lambton's skill to use at once and made him Brigade-Major of Engineers. It was the time of final reckoning with the State of Mysore, which had refused to abandon its alliance with Britain's arch-enemy, France. Tipu the Sultan—famous as "the Tiger of Mysore"—was besieged in the fortified city of Seringapatam. Lambton, with his trained eye for the lie of land, played a great part in the attack, and when the final assault took place, led it himself. Seringapatam was taken and the Tiger of Mysore died sword in hand on the ramparts.

As for Lambton, he seized the opportunity of comparative peace to apply for a more peaceful job. He was 44 years old when he submitted to the Council of the Madras Presidency a plan to make "a mathematical and topographical survey of the greatest accuracy" from Madras westward through Seringapatam across India. His estimates of its cost dismayed the "nabobs" of the Madras Council. "If any traveller wishes to proceed from here to Seringapatam," objected one of them, "he need only say so to his head palanquin bearer and he'll get there, without recourse to Colonel Lambton's map." But Wellesley and the Board in England supported Lambton, and he went ahead with his plans.

The survey was to be a line of triangulations, as strictly accurate as skill and hard work could make them. Lambton saw it as a basis for a far greater survey—a map of the whole of India—which might be made in later years. To do the work he needed the most perfect surveying instruments he could get, among them a theodolite, which had recently taken the place of the quadrant for surveying. The theodolites of this date were fairly primitive instruments,

arrangements whereby a pivoted telescope could be used in conjunction with a dialled compass to take bearings, and their potential accuracy was marred (in Lambton's opinion) by their small size. Resolving to do away with this defect, he ordered a special theodolite to be made in London. It was a monster instrument that weighed half-a-ton and had a horizontal dial three feet across, and it was to have many adventures. The ship bringing it out from England was captured by the French and taken to Mauritius; but war was then a more gentlemanly business than it is now, and the chivalrous enemy sent the theodolite to the Madras Council with a complimentary letter. Later, when the enormous thing was being hoisted to the top of a tower so that bearings could be taken across a forested area, a rope broke and it crashed down, so badly damaged that it was considered quite beyond repair. Resolution seems to have been the first requisite of a surveyor in India, and Lambton had plenty of it. He shut himself in a tent with the broken theodolite and one or two chosen artificers, and they worked on it for six weeks, pausing only for food and sleep. At the end of that time the Great Theodolite was perfectly repaired and ready to continue its task.

When that line of triangulations was completed (it revealed that the peninsula was 40 miles narrower than shown on existing maps) Lambton carried his survey southward to Cape Comorin, at the southern tip of India, and then started northward along the 78th meridian of longitude, towards that far northern frontier—1,800 miles away—which James Rennell had tried to reach thirty-five years earlier. No survey of this sort had been attempted elsewhere and Lambton's work attracted the interest of European geographers. When it became known that he was proposing to measure a Great Arc of the Meridian the interest redoubled.

Since the days of the Greek astronomers it had been sus-

pected by geodesists, pursuing the study of the shape of their world, that the earth was not a true sphere. Its real shape, or geometrical figure, could only be discovered by measuring the meridians of longitude which run from north pole to south pole. There were no land surfaces where this could be done, but measurement of an arc 1,800 miles long could give a very good indication of the shape of the earth on that particular meridian—whether it bulged more, or less, than a perfect sphere. On the huge peninsula of India it could be done, though it would take many years and the difficulties were great, and William Lambton intended at least to start it. Other meridian lines had been measured, but this would be by far the longest. Lambton was to spend the last seventeen years of his life working on it, and when he died in 1823 (of tuberculosis, in a survey tent) it had reached Central India. Five years earlier the Government of India had taken over the responsibility for the work from the Madras Council and had designated Lambton Superintendent of the Great Trigonometrical Survey.

There is an element of greatness in the latter part of William Lambton's career which is echoed in the names given to his pet schemes. There was the Great Arc of the Meridian, Lambton's Great Theodolite (as it was always called) and now the Great Trigonometrical Survey, which—as was to be expected—soon became known as "the G.T.S." It was characteristic of the man that when he learned that he had only a year or two to live he at once set about finding and training a successor to carry on his work after his death.

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4 - *The Adventurers*

SIX YEARS after his India Bill had established British rule in India, William Pitt wrote: "The age of chivalry is gone. That of sophisters, economists, and calculators has succeeded." But there are exceptions to every dogmatic statement, and in all ages of civilization there have been men who would have been more at home in the age preceding it—who were born, as we put it, too late. Perhaps the first surveyors in India are to be classed among Pitt's "calculators"; they looked forward to an era of world-wide commerce, when maps would be the first necessity in the development of trade routes and communications. In the making of the Survey they found adventure in plenty, but it was a by-product of the job to which they gave all their enthusiasm. There were other men, left-overs (as it were), from the Elizabethan age, whose prime enthusiasm was for adventure. In newly-opened but still mysterious India a few of these adventurers found the sort of life they craved.

In 1800 George the Third was still king of England, but already the country was moving towards the humdrum industrialism of the Victorian era. Iron and coal and cotton were the growing sinews of Britain. Gentlemen no longer wore swords and highwaymen had ceased to harass travellers. It was a dull place for a man who longed for the glitter and danger of Elizabeth's time. But in the India of the rajahs and sultans, by all reports, it was still the Age of Chivalry—not the gentle chivalry of Malory's Arthurian

knights but the barbaric sort wherein swift sword and quick wits were the means of advancement, and bravery was rewarded with gold and jewels instead of a medal. English soldiers of fortune—and Frenchmen and Italians too—made their way to India and took service with one or other of the ever-warring princes. Few of them were concerned to leave any record of their adventures, but one or two of these romantics sought adventure by way of perilous journeys which earned them a niche in the history of the Indian Survey. One such adventurer was Captain Hearsey.

Very little is known about Hyder Young Hearsey. He first appears as a captain of cavalry serving Daulat Rao, chief of the Marathas, and since the Marathas boasted the finest horsemen and the deadliest swordsmen in India he must have been a tremendous warrior. Daulat Rao, who was never happy unless he was fighting, went to war with the native state of Indore in 1802, and as Indore was close to the Company's territories of Bombay he soon found himself opposed by the British. Probably Hearsey disliked fighting against men of his own blood, for some time later he left his Maratha command and became captain of irregular cavalry in a Company regiment, which he led against the Marathas with the same reckless daring he had shown on the opposing side. Such a man was sure to know all there was to be known about horses, and almost certainly this was how he became associated with an adventurer of quite different tastes—Doctor William Moorcroft.

Moorcroft had been a professor at the Royal College of Veterinary Surgeons in London, and a very good one. It can only have been from love of adventure that he took the post of superintendent of stud in Bengal. There was a famous stud of horses at Pusa near Calcutta, once a royal appurtenance but now maintained by the East India Company who were Doctor Moorcroft's employers. The veterinary surgeon suggested to the Company that the stud could

be improved by the introduction of some of the near-fabulous Turkoman horses from the Asian deserts north of the Himalaya, and proposed that he should make a journey there and bring some back. This must have seemed utterly impossible to the Company, who refused. Moorcroft thereupon submitted another plan: he would go on the same journey, but to bring back some of the "shawl-goats" which alone could produce the fine *pashmina* wool used for making the much-prized Kashmir shawls; these goats thrived only in the bleak conditions of the high Asian plateau. It is plain that Moorcroft was ready to bring back almost anything so long as he could make the journey on which he had set his heart. And a tremendous journey it would be.

The Governor-General (it was Lord Moira at this time) could look up the valley of the Ganges from Fort William in Calcutta, and visualize his territories extending right to Delhi, where the last of the Moguls, old and blind, was a puppet ruler supported by the British. But that was as far as the Company's writ would run. Beyond Delhi lay, not nation-states, but formidable fighting clans with whom no treaty could be made. The Marathas were on the war trail again in Central India, the Punjab was seething with internal warfare which forbade all thoroughfare, and beyond the Punjabis were the Afghan tribes holding the north-west frontier. Raiding parties of Gurkhas and Bhotias were continuously threatening the plains from their strongholds in the north-eastern foothills of the Himalaya. Lambton might be busily triangulating the country round Madras, but all this vast northern land was mapless, totally untravelled except by savage hillmen. The vague knowledge of what lay beyond the mountain barrier was still based on Marco Polo's travels there and the doubtful reports of Jesuit missionaries. Small wonder that in 1812, when Doctor Moorcroft proposed to cross this *terra incognita* twice in order to bring back some horses (or, alternatively, goats) the

Company boggled at the idea. Possibly the shawl-goat proposition struck some members of the Council as a likely commercial scheme; at any rate, Moorcroft's second suggestion was not immediately refused. The doctor enlisted the aid of Captain Hearsey at this point and began to make his arrangements. Then the rumour came to his ears that the Council was going to refuse again. "My obstinacy," Moorcroft once wrote of himself, "is almost equal to my enthusiasm"— and he showed that this was indeed the case. He and Hearsey set off at once, secretly and without the approval of the Governor-General, and reached Ramnager at the beginning of the Himalayan foothills without being stopped.

Ahead of them now stretched absolute uncertainty. As white men, they had not the slightest hope of getting past the hill tribes; if they succeeded in crossing the great range they did not know what hostile authorities they would have to face, for only twenty years earlier the forces of the Manchu Emperor had helped the Tibetans to repel a Gurkha invasion and might still be guarding the passes. Obviously, they would have to go in disguise, and by far the safest disguise was that of pilgrims. Pilgrimage, especially to the holy places high in the mountains where the Ganges flowed from the snows, was an accepted way of acquiring merit for Hindus, and hundreds of thousands of men toiled up the perilous tracks to Joshimath and Kedarnath. "I am on pilgrimage" was sufficient explanation for any Indian traveller waylaid by suspicious local authorities. To have two genuine Hindus with them would be another safeguard. So at Ramnagar Moorcroft and Hearsey disguised themselves as Hindus, and obtained the services of two Hindu "pundits". The term *pundit* implies a man of intelligence and learning, versed in the intricacies of Hindu religion. Such men were capable of helping the sahibs in their strange and secret work, and one of the Kumaon pun-

dits hired by Moorcroft was given the task of counting his paces every step of the way.

For Moorcroft intended to bring back a map of his route. His real ambition, which he disclosed to Hearsey, was to find a way through the Himalaya that could be opened to link India with the age-old trade routes of Central Asia. Hearsey was as enthusiastic as his companion. This swashbuckling cavalry captain had already tasted the excitement of exploration, journeying with two surveyors to the East India Company, Webb and Raper, to look for the sources of the Ganges. It is safe to say that without him Moorcroft could not have made his great journey, for Hearsey could pass anywhere as a native and had travelled the first part of their route.

They measured carefully the average pace of Harbeh Dev, the pundit who was to "stride the road", and found that two of his paces equalled four feet. Then, in May 1812, they set forth in their turbans and linen robes, taking the long, rough pilgrim trail to Joshimath.

Moorcroft had heard that a sparse trade—salt and borax, sheep and goats—came over the Himalaya by a very high pass leading out of the wild mountains of Garhwal. This was what he was aiming for. He would cross the western Himalaya between Nepal and Kashmir and perhaps reach the fabled lake Mansarowar of which the Jesuit Desideri had written a hundred years earlier. Joshimath, the pilgrims' goal, would be a good starting-point for the Niti La, as the hillmen called the pass. But even to reach Joshimath was a tough undertaking. Hundreds of pilgrims died every year in trying to follow the precipitous tracks that led up the Himalayan gorges—a terrible journey which, if they accomplished it, would ensure them eternal happiness after death. For days that lengthened into weeks the four men toiled through what must be the most beautiful and spectacular country in the world. First through primeval forests,

then over wooded ridges bright with gentian and primula and peony, then by hazardous zigzags up bare rocky gullies where fantastic crags towered overhead. Once they narrowly escaped being swept away by an avalanche of stones, dislodged by some bears crossing the slope above them; once Moorcroft slipped on the verge of a sheer precipice and was only saved by Hearsey's quick action. But they gained the snowdrifts of the first pass, the Kuari, and had their first breathtaking view of the mountains they intended to cross, an apparently unscalable barrier of gleaming snow and ice. They did not know their names, but the highest of them was Kamet, which, many years later, was to be the first Himalayan peak over 25,000 feet to be climbed. The Niti Pass crosses the Himalaya just to the east of Kamet. It took Moorcroft and Hearsey another month to reach it.

The Kuari Pass, 12,000 feet high, gives access to the gigantic ravine of the Rishi river, which runs into the Alaknanda whose deep gorges hold the track to Joshimath. At Joshimath the travellers rested for a day or two and then set off up the gorges of the Dhauli river. There was still a path of sorts here, for the hamlet of Niti lay two or three days' journey upstream, but it was a way where the traveller needed good luck as well as a steady head. From jutting crags, literally thousands of feet overhead, rocks and stones came screaming and thundering down as the sun's warmth loosened the frost that held them. Sometimes the track clung to the face of a sheer rock-wall with the grey-green glacier torrent a hundred feet beneath, a trembling gangway made by driving wooden stakes into cracks and laying branches between them. Sometimes the roaring river had to be crossed by a sagging rope bridge, the "rope" being made of creepers twisted together. But they came safely to Niti, a few stone huts in a widening of the deep valley. They were right under the greatest mountain barrier in the world, which Moorcroft thought of as "the true

frontiers of Hindustan". The pass leading to the forbidden country of Tibet rose six thousand feet above them, awaiting its first crossing by Europeans.

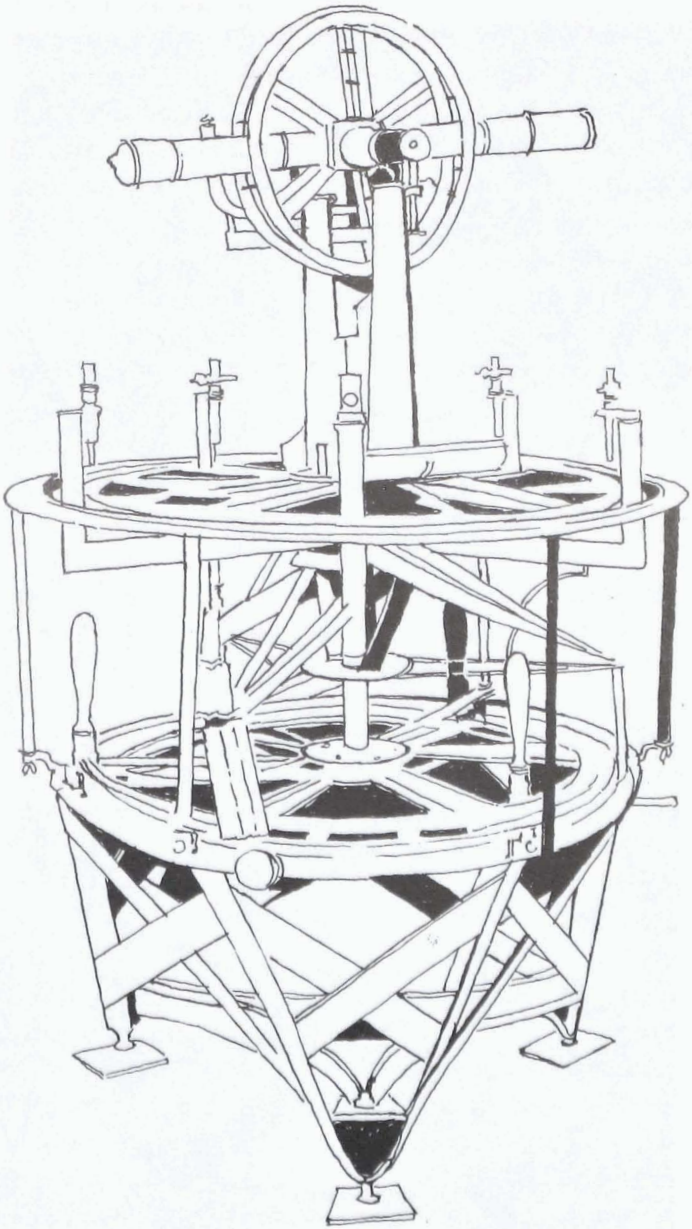
So far their journey had been successful. Week after week they had toiled and scrambled without hindrance; Harbeh Dev, in front with Moorcroft, had kept his monotonous count of paces while Hearsey, bringing up the rear with the other Pundit, used a compass to record their direction. The two Englishmen (they called themselves Mayapori and Hargiri) had triumphantly sustained their disguise as pilgrims. At one mountain village, indeed, Mayapori—or Moorcroft—had won the devotion of the headman by using his veterinary skill on the headman's little son: he "tapped" him for dropsy. But while the route as far as Joshimath was used by all sorts and conditions of pilgrims, the onward route to the Niti Pass was not. The fierce villagers of Niti, guardians of the pass and suspicious of all strangers, held them there for three weeks while messages were sent down the gorges asking their chieftain what was to be done with the four travellers. At the end of that time it was decided to let them go on, in company with a party of hardy traders who were crossing the pass into Tibet with yaks. Presumably the Pundits had to struggle up the steep snowslopes on foot—Harbeh Dev still counting his paces—but Moorcroft and Hearsey rode some of the way on the shaggy, stumpy beasts which could live where all other load-carrying cattle would die. They crossed the Niti La (it is 16,628 feet high) and made their bivouac that night among great rocks inside the borders of Tibet. Moorcroft noted the irregular heartbeats, sickness, and difficulty in breathing which we now know to be caused by high altitude. Some days later, as they travelled down the wild valleys into Tibet, they encountered two Chinese horsemen and journeyed with them; Moorcroft, who was something of an artist, made a sketch of their little company.

On August 6th, three months after leaving the northern uplands of India, the forbidden frontier was far behind them and they saw the vast waters of Lake Mansarowar. This great lake, nearly 15,000 feet above sea-level, is 600 miles from Lhasa, the Tibetan capital, cradled between the lofty snows of Gurla Mandhata on the south and Kailas on the north. Moorcroft and Hearsey were the first Englishmen to set eyes on Kailas, in Tibetan lore the sacred throne of Siva and the centre of the universe; but they were more interested in Mansarowar.

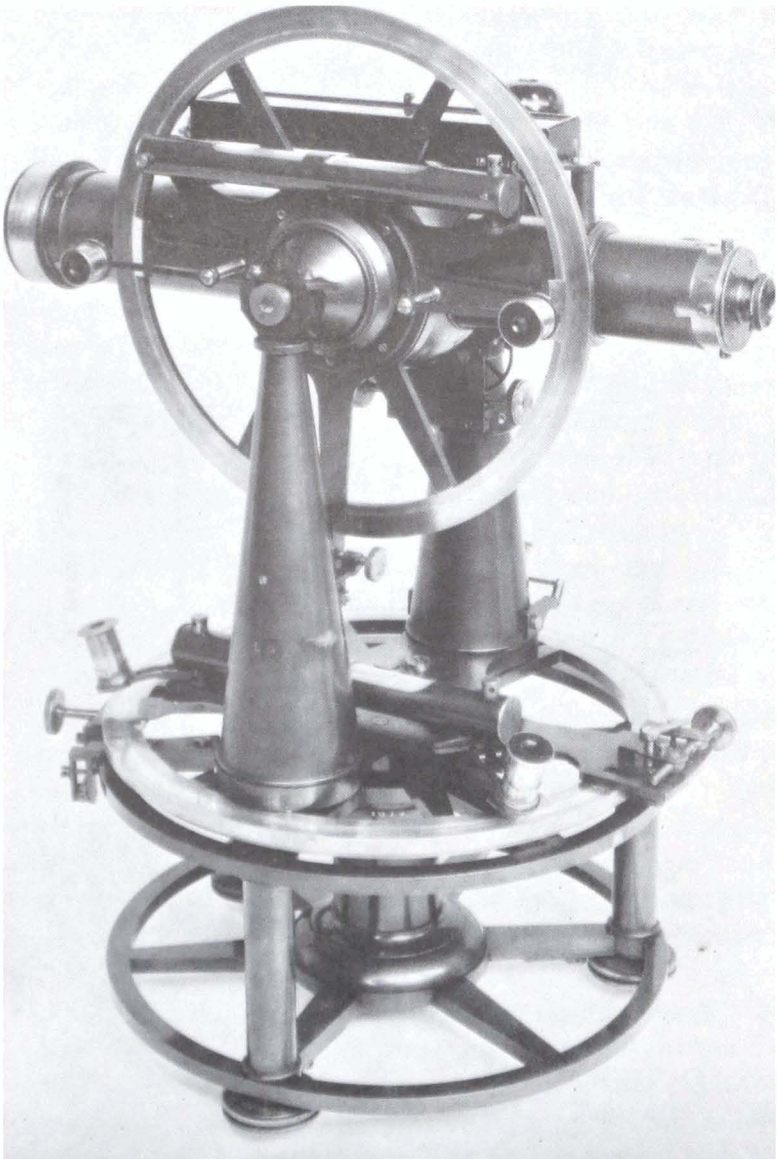
It was thought that the Ganges had its source in this lake and flowed through underground caverns beneath the Himalaya to emerge on the south of the range. The two explorers spent some days in making a circuit of the lake and proved that no rivers issued from it. A great river did have its source, however, in another big lake to the west of Mansarowar, called Rakas Tal, and they thought this was probably the Sutlej. They were exploring down its course when they were captured by the Tibetans and told that they must go back whence they came. Moorcroft, who had hoped to return over some other Himalayan pass and thus extend his explorations, was made to promise that he would cross the Niti La into Hindustan, and this promise he kept though it meant giving up the plan to take back some wild Turkoman horses.

He was not the man to go back empty-handed, especially when he had to satisfy the East India Company that his journey had been commercially useful, and he succeeded in buying fifty Tibetan "shawl-goats" and getting them over the Niti Pass.

Below Niti the two men found themselves in trouble. Though this part of the Himalayan valley-maze was supposed to be ruled by the Gurkhas of Nepal, parties of Gurkha raiders were attacking the isolated villages and holding them to ransom. Twice Moorcroft and Hearsey were sur-



LAMBTON'S GREAT THEODOLITE



THEODOLITE, NINETEENTH-CENTURY MODEL

rounded by fierce hillmen and threatened with capture or death, and twice they bluffed their way past their assailants. But on October 16th, when they were opposed by another party of armed freebooters who had occupied a village, their show of force resulted in instant capture and imprisonment. They were shut in a stone hut and allowed no communication with the outside world. Since the Gurkhas loved to slice off heads with one stroke of their *kukris*, and would as willingly slice off a stranger's head as a sheep's, their chances of returning to Calcutta alive seemed small. But—as in some moral fairytale—a kindness done by Moorcroft three months ago brought its reward and saved them.

It was the headman of this village whose son the doctor had cured of dropsy. He managed to communicate with the prisoners, who begged him to send a messenger to the English sahibs at Delhi telling of their plight. This the headman did. And nineteen days after their capture the travellers were released by special order of the King of Nepal. In November they were back, shawl-goats and all, in Calcutta.

"This fine journey," wrote Lord Moira, "was undertaken from motives of publick zeal, to open to *Great Britain* means of obtaining the finest woollen fabric." Sad to relate, however, only four of the shawl-goats survived the voyage to England, and these four died shortly after being landed.

Moorcroft's real contribution was to the map of India. Aided by Hearsey's compass work and Harbeh Dev's indefatigable pacing, he produced a route survey on a scale of ten miles to the inch which—though it was not wholly accurate—paved the way, in that part of northern India, for the greater Survey that was to follow. Whether "from motives of publick zeal" or not, Moorcroft made several other long journeys through unmapped country in the Himalayan zone. He established the map position of other high passes by which the great range could be crossed, notably the

Karakoram and Saltoro passes; and in 1824, with George Rebeck, he found a route over the Hindu Kush mountains (the western continuation of the Himalaya) right through to Bokhara, on the ancient silk-trade route from China to Europe. It was the fulfilment of Moorcroft's dream and it was his last expedition. On the return journey he and his companion both died, or (some say) were killed by marauders.

One wonders whether Moorcroft was tempted, when he first crossed the Himalaya, to make for Lhasa. This fabled capital of a land ten times as big as England had never (so far as he knew) been reached by an Englishman, and its position was not yet fixed on the map of the world. It would have been a feather in Doctor Moorcroft's turban to have brought back a description of Lhasa and its latitude and longitude. If he had got there, however, he would have found that an Englishman had been there before him, in that very same year. This man was Doctor Manning.

Manning is one of the oddest figures in the history of adventurous travel. Tall, bearded, and spectacled, he was a friend of Charles Lamb at Cambridge; cherished a fierce repugnance towards oaths and swearing; and wished above all things to visit the Chinese Empire. Having resolved to get to China somehow, Manning first studied the Chinese language and then betook himself to India, where he pestered the East India Company Officials and the native rulers until he obtained permission to leave India for China, accompanied by one Chinese servant. No one would help him or recognize him as an accredited traveller. He set off by way of Bhutan (of his adventures on the way there is no record) and crossed an unnamed pass into Tibet. Here, at Phari, he crossed the route that was to be taken by the early Everest Expeditions a century later; and at Phari he met and argued with a Chinese Mandarin. The Chinese, he noted in his memorandum book, were "lording it in Tibet

as the English did in India". Perhaps because of his undoubted eccentricity, Manning made a great impression on the Mandarin, who arranged for him to travel on to Lhasa, which would at any rate be another 200 miles on the route to Peking, 2,000-odd miles away. Manning reached the Tibetan capital in December 1811. And there he had to stay for many months while messengers crossed the vast Central Asian deserts to ask the Emperor's permission for his journey.

Characteristically, Manning was not much interested in Lhasa, or in being the first Englishman to reach the city. His expressed aim was to gain "a moral view of China", and he was impatient to get there. Still, he could discover the moral views of the Grand Lama while he waited, and during the Spring of 1812 (when Moorcroft and Hearsey were preparing for their great journey) this odd Cambridge don was debating high matters with the reincarnation of a god, using his Chinese servant as an interpreter. At last the messenger returned, and with bad news: the white foreigner was refused permission to cross into China. Manning was furious, but he had to go back to India. His journey, never before made by a European, caused some interest and added a little more to the slow-growing stock of topographical knowledge. More useful were the sparse records kept by a very different sort of adventurer, who was fighting and journeying in the western Himalaya twenty years later.

One who knew Alexander Gardner wrote of him: "He sought first for a position in the Russian service, and, when he failed to get it, crossed the Caspian Sea and entered on a career of adventure in Central Asia. It led him from Kokan across the Hindu Caucasus to Herat, amidst ambuscades, fierce reprisals, hairbreadth escapes, alternations between brief plenty and long fasting—amidst episodes sometimes of brutality and cruelty well-nigh inconceivable, at other times of charity and fidelity unto death." It is probably a

fair summary of the life of this nineteenth-century soldier of fortune, who like so many others of his kind was too busy living dangerously to find time for writing about himself.

Gardner always claimed, proudly, to be an American. His father had emigrated from Scotland to the new colony and became a friend of George Washington, taking the side of the colonists in the War of American Independence. Alexander was nothing if not independent. Impatient of all settled occupations, resentful of any authority but his own, he longed to travel the world in search of adventure. As a youth he longed in vain, for world travel was impossible for Americans. It was the time when the long struggle between Britain and France was drawing towards its climax, with British warships ceaselessly patrolling the oceans in a desperate resolve to prevent sea-borne supplies from reaching Napoleon Bonaparte. British interference with the vessels of neutral America had led to a declaration of war by the United States, and a stern blockade of the American coast prevented travellers from getting to Europe. Then, in 1814, came peace between the two English-speaking nations and the following year the final crushing of Bonaparte at Waterloo. Alexander Gardner, now 30 years old, was free to start on his travels. That he should choose to journey halfway round the world to find employment in Russia shows that he intended to spread his wings to the uttermost, but in fact he did not get very far into Russia. Somewhere in the wild Steppes where the Kirghiz nomads wander he fell in with a caravan bound for Kokand on the fringes of the Pamirs, and joined himself to it. Kokand is within 200 miles of the frontiers of Afghanistan, on the stormy North-West Frontier of India, and to Afghanistan, after some years of wandering and wild living, Gardner came about the year 1823. The next we hear of him is as commandant of horse in the service of an Afghan chieftain.

Nowhere in the nineteenth-century world was there such

a country of warriors as in Afghanistan. Forty thousand square miles of snow-peaked and craggy defile, from which the Bolan Pass and the Khyber Pass—the only real trade-routes—crossed into India, it was split into hundreds of ill-defined states and chieftainates, all perpetually at war with each other. War, one might say, was the Afghan way of life. And here Alexander Gardner found the men and the life that suited him best; for a time. Gardner became an Afghan fighting-man in everything except his secret thoughts, which were different because he had the urge to explore, to solve mysteries of topography. Like all his fierce Mohammedan comrades he carried the sacred Koran with him, slung round his neck in a leather bag; but Gardner's leather bag also contained a tattered notebook in which he jotted down details of routes and rivers and mountains, and sometimes his own thoughts. For years he spoke nothing but Pushtu or Mongolian, and this may have been his way of keeping in touch with his native tongue. He spent his prime in raiding and fighting, hunting and feasting; became the blood-brother of more than one Afghan ruler; and married an Afghan girl of royal blood. A sentence from his notebook shows how he relished this sort of existence: "With women, wine, good horses, good guns, good dogs, good falcons, and with a *castello* on the top of a crag in Yagistan, all that life could offer was at our feet."

There came a day when Gardner was on the losing side. Enemy horsemen rode through his chieftain's camp killing men and women and children. Gardner's wife and baby were killed, his "tribe" almost annihilated. After some weeks of hiding in the mountains he joined a band of Pathans, a sort of Free Company who lived by raiding; and it was with these freebooters that he became involved in a much larger warfare than the murderous squabbles of petty chiefs.

Three hundred miles to the southward, in the hill-fringed plains of the Punjab in India, a new nation had arisen—it

was, indeed, causing the East India Company a great deal of anxiety. This was the nation of the Sikhs. A weak and scattered religious sect, basically Hindu but rejecting the caste system and worshipping one god only, had been unified into something like an empire by the genius of a great ruler, Ranjit Singh. *Singh*, the distinctive Sikh name, means "lion," and the Sikh men—tall, bearded, almost white-skinned—were known by the "five k's": *kesh* (uncut hair), *kacch* (short drawers), *kara* (iron bangle), *kanga* (comb) and *kirpin* (dagger). Ranjit Singh's ambition was to weld Punjab and Kashmir into one great Sikh state, with his capital at Lahore. The warrior clans of the North-West Frontier, Mohammedans to a man, saw with mingled fear and anger this new power pushing right up to their southern and western borders. To them the Sikhs were infidels to be severely chastened by the followers of the Prophet. A holy war was declared, the tribes united in the common cause, and Gardner's Pathan robbers joined the Moslem forces in a furious descent from the mountain valleys. In the decisive battle of the brief struggle that followed, the Sikhs (who had centuries of Moslem oppression to avenge) won a great victory and drove the invaders back inside their frontiers. Gardner escaped with his life and went into hiding in the hills. When he emerged it was to enter the service of Ranjit Singh.

The Sikh conqueror—the most remarkable Indian of his day—had achieved his ambition. He was ruler of a kingdom nearly as large as France, leader of an army 20,000 strong. His only rival in India was the slowly increasing power of Britain and Ranjit Singh was wise enough not to try conclusions with that. He signed a treaty with the British, which he kept, and sought for European officers to train his army to greater efficiency. Two of these were ex-generals of Napoleon Bonaparte, the Chevalier Allard and the Chevalier Ventura. Alexander Gardner became Colonel of the Sikh artillery.

Now, for the first time in ten years, Gardner made contact with men of his own race, British representatives at the court of Ranjit Singh. He had high rank and a settled occupation. But the peaceful years that followed the Sikh victory were not to his taste, and his wanderlust drove him to seek what lay beyond the snowy ranges on Kashmir's northern frontiers. With his unique experience and knowledge of languages he could pass anywhere, as Afghan or Punjabi, Hindu or Moslem. And perhaps his talks with British officers had shown him how important to British knowledge of India journeys of exploration could be. His first great journey took him a thousand miles or so, through the vast Pamir ranges to Yarkand in Sinkiang, land of the Chinese Tartars.

Roaming southward with a band of nomads, he saw the ice-peaks of the north-western Himalaya, the Karakoram, barring his way. Though he did not know it, one of them—K2—was the second highest mountain in the world. Gardner resolved to cross the Karakoram back to Kashmir. The pass he crossed by, the Kadpo Ngonpo La, was more than 16,000 feet high and he was the first European to cross it.

Another of his journeys was from Srinagar in Kashmir across the Great Himalaya to Gilgit in the valleys beneath the Hindu Kush, by way of the Burzil Pass which, a hundred years later, was to be the approach used by British and German mountaineers in their attempts to climb the giant peaks of Rakaposhi and Nanga Parbat. The rough notes of his routes were always kept in the leather bag, slung round his neck, that contained the Koran. Eventually they found their way into the hands of the Company's survey officers, to add one or two more tiny lines or marks on the map of northern India, where so much was still left blank. And so this extraordinary figure—American, Afghan, Sikh, or just world adventurer—played his small but important part in the history of the Survey of India.

Gardner remained in the service of the Sikh rulers for the rest of his life, through the many changes of policy and alliance. He must have known the great administrators John and Henry Lawrence, who were chiefly responsible for the friendship between Sikhs and British which has persisted ever since, but he would be too old to take part in the putting-down of the Indian Mutiny, for which service thousands of Sikhs volunteered on the British side. He died in 1877 at the age of 92.

There exists an old and blurred photograph of Alexander Gardner which shows him, in old age, exactly as one would expect him to be. Lean, grizzled, fiercely-moustachioed, he wears the big Sikh turban and a military uniform (was it of his own devising?) of Scottish tartan. Even the century-old photograph shows the brilliance of those keen old eyes, which had seen so much bloodshed in his prime and had gazed, in later life, at mountains and frontiers which no man of his race had seen before.

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5 - *Soldiers and Perambulators*

AS THE foundations of a house are to the completed dwelling, so were the pioneer journeys of the adventurers to the Survey of India. From the routes and observations of Moorcroft and Gardner and others a bare outline of northern India's topography could be laid down, but it was to be very many years before skilled surveyors could follow in their footsteps making the detailed map. Meanwhile, the survey and mapping of the East India Company's territories in the more accessible country to the south went steadily on, though it could hardly keep pace with the acquisition of new territories.

The establishment of a royal governor-general who had control over Company matters had naturally influenced the course of history in India. Successive governor-generals had different ideas about policy, but they all saw India in terms of new possessions for Britain rather than as a source of wealth for a few Company shareholders. The days of John Company's lordship were numbered. This extraordinary association of business-men, which had supported an army and navy of its own, initiated a Survey, and provided amenities, laws, judges and police for millions of dark-skinned people, was soon to revert to its status of an ordinary commercial undertaking. When its Royal Charter came before Parliament for periodical renewal in 1813 it was only renewed for twenty years, and the trading monopoly it had hitherto granted was cancelled. But the Company had been

much more than a money-making concern. It had clearly recognized that its responsibility involved not only protection for the Indians of its territories but also sympathy, understanding, and good government. There was no "grab-and-get-out" where the Company was concerned. Some of its officials made fortunes out of India, some (like Jos Sedley in *Vanity Fair*) were spoiled by authority and a multitude of admirable native servants; but they put into India something more valuable than what they took out of it—security of life and possessions for the common people in their lands. Many of them made India their home, adjusting themselves to alien temperatures and alien ways, learning the languages, studying the religions and the social problems.

Their own problem was finding wives to share their new life, for there were few white women in India and marriage between the two races was frowned upon. By 1840 a swarm of unmarried young ladies in England (and their anxious mothers) had discovered possibilities in a new quarter, and Thomas Hood versified the thoughts of one of them:

By Pa and Ma I'm daily told
To marry's now my time,
For though I'm very far from old
I'm rather in my prime.
They say while we have any sun
We ought to make our hay—
And India has so hot a one
I'm going to Bombay.

This was the beginning of that strange tribe the "Anglo-Indians," who lived or were born in India and only saw England on "furlough". Later they were to be satirized and sneered at because they came to believe—or at least to feel a subconscious certainty—that they were appointed by God

to rule over all India. In 1813, however, when Lord Hastings became governor-general, Indians and Britons still looked on each other as equals, whether in war or trade.

Lord Hastings was full of zeal for the upholding of the Company's admirable policies: increased productivity, improvement of the peasants' lot, new roads and bridges and so on. But he went further. He wanted to see these benefits extended to less fortunate parts of India, if necessary by force. Hastings was a remarkable man. He looked even beyond the Indian Empire he was aiming at, for he was one of the first Englishmen to declare that England's mission was to prepare India to govern herself. To his mind the immediate necessity was to impose British control over the whole country; and fair excuses for the use of force were ready to his hand.

The irrepressible Gurkhas were still raiding into Company territory and had to be taught a lesson. The lesson—a war with Nepal and a quick victory—brought a lasting treaty with Nepal and a subsequent gain of splendid Gurkha fighting-men for the British Army, but no territorial additions for the Company. Nepal remained an independent state. But very large gains were to result from a graver struggle. Some 10,000 square miles in Central India, bordering on the Bombay and Madras territories, were being converted into a desert by numerous little armies of Pindaris, roving freebooters who considered the thriving Company lands a heaven-sent opportunity for robbery and murder. Hastings collected a vast force to deal with the Pindaris once and for all, surrounded them in a ring of converging armies at Malwa, and practically exterminated them.

Now the Pindaris claimed some sort of allegiance to the Maratha Peshwa, and the Marathas—freebooters on the grand scale themselves—considered this a piece of unwarrantable interference with normal custom. They joined with the Rajah of Nagpur in attacking the British forces, and

were soundly defeated at the battle of Kirkee.

It was the end of Maratha power. The whole of the Deccan lands of Central India were annexed, and the Peshwa was banished to Cawnpore with a generous pension. Thirty years later the Sikhs, deprived of the leadership of the great Ranjit Singh (who had died in 1839) decided they were strong enough to drive the British from the north. The long and bloody struggle ended in Sikh defeat and the annexation of the Punjab.

In these wars and skirmishes, with their difficult marches through unfamiliar country, the first need of the Army was a reliable map. Company surveyors held rank in the Royal Engineers, and it was they who went ahead to make the rough but trustworthy maps by which the campaigns were fought. When the warfare ended and a proper survey of the new territories was required it was still Army captains and lieutenants who conducted it. This was unfortunate; it meant that the advent of a Survey party anywhere in India would always be associated with armed force, and therefore regarded with suspicion if not with open hostility. Moreover, nothing would ever persuade the natives of the independent states that a survey of their territories was not the preliminary to an invasion. On Company land the officers of the Indian Survey had not only to be skilful but also tactful, courageous, and sometimes secret; elsewhere in India they could not go at all without special permission.

Ten years before the final settlement with the Gurkhas there had been a treaty with the King of Nepal (it lasted three years) by which a British Resident was allowed to live in Katmandu, capital of Nepal, with a British escort. The captain of the escort, Charles Crawford, was able to make a large-scale survey of the Katmandu valley in its enclosing cirque of hill-ridges, and from the crests of the ridges took bearings of the great Himalayan peaks that stood in rank against the northern sky, a hundred miles of snow and ice

stretching from the Ganesh Himal to the region of Everest. Crawford did not know their names and could not calculate their heights; he could only sketch that distant outline. But he must have seen the high snows of Gosainthan and Langtang Lirung, and perhaps—an insignificant point far away—Everest itself. He reported his opinion that these "Indian Caucasus" must be among the highest summits in the world. And that was as far as the map-makers got on that occasion. The Gurkha War broke out, and the Nepalese withdrew behind their extremely formidable defences.

Anyone who has taken an expedition into the Himalaya by way of Nepal (as the present writer has done) must marvel that any army could invade it—and that a map could ever be made of so wild a tangle of ridges and ravines and peaks. Even in 1954, when that expedition took place, the innermost maze of high mountains near the Tibetan frontier had not been fully explored, and no white man had been within thirty miles of the mountain it was proposed to climb. The difficulties, little changed in more than a century, are characteristic of what the men of the Survey had to grapple with all the way along the 1,500 miles of the Himalayan range.

From the end of the trail on the hot and dusty plains the way enters the first barrier, the broad strip of marshy jungle called the *terai* which curls like a dark-green hem on the bright-green skirts of the foothills. Here the leafy gloom is alive with danger: snakes, tigers, and—most dangerous of all in the nineteenth century—the malarial mosquito. Nowadays a lovable narrow-gauge railway takes the traveller through the *terai* at a steady six miles an hour, passing clearings where elephants are at work handling (or, more accurately, trunking) the massive timber of felled trees. But the invading columns, and later the survey parties, would have to march by jungle tracks with a native guide. They would have to bivouac in the jungle at least once, for the

terai is some 30 miles wide. It terminates in a rising terrain where the snow-fed rivers have carved great gorges on their way out of the foothills. And these foothills are no Cotswolds or Cheviots. They rise steeply and craggily to 6,000 feet, and because the river-gorges are impassable they have to be crossed by difficult mountain tracks. Their rugged sides are clothed with intermittent jungle, but here it is the pleasanter jungle of giant rhododendrons, with purple and red and saffron blossoms.

A two-day journey, over two passes, brings one to Katmandu, capital of a kingdom as big as England, with its rose-red roofs and gilt temple-domes set in a wide oval plain amid the mountains. But these are still not the real mountains. There must be at least another week of difficult travel on foot, along knife-edged ridges and down precipitous faces, fording waist-deep glacier torrents and scrambling up rocky gorges, before the first snow-crests glitter high among the clouds overhead. The whole vast mountain frontier is a maze of such ridges and rivers and gorges. It has been said that if a man started, as soon as he was able to walk, to traverse all the valleys of the Himalaya, he would die of old age before the task was completed; and it could well be true. Into a section of this maze thrust the redcoats, sepoys of the Indian Army and their British officers, to put an end to the nuisance of the Gurkha raids.

Four "columns" advanced through the fever-marshes and into the foothills. Without the rough maps made by Webb and Crawford they would not have been able to advance at all. Fever killed many of them, the fierce little Gurkhas killed more, and they were driven back defeated. Two years later two famous soldiers led the redcoats to victory against the Gurkhas. General Robert Gillespie, "the bravest man who ever wore the King's uniform", was killed in the storming of a Gurkha stronghold; but his fellow-officer David Ochterlony thrust on to within 20 miles of the chief Gurkha

city and compelled the stubborn tribesmen to an armistice. Ochterlony, who was American by birth and hailed from Boston, Massachussetts, was greatly loved by his Indian soldiers, who called him "Lonyockty Sahib."

Lord Hastings' despatch reporting this victory to the Government in London opened a new phase in the Survey of India:

> "A favourable opportunity now offers for making a correct survey of the lately liberated provinces of Garawal [Garhwal], Sirmoor, and Hindoor, as well as of the country to the north . . . reaching to the Himalehah, a tract which comprises the source of the Ganges, Jumna, Tonse (hitherto unknown though larger than the Jumna) and Sutledge rivers, and which is bounded by some of the noblest mountains in the world . . . The prospect of a speedy end to the present war with Nepaul, and the little probability there is that Captain Hodgson would ever be allowed to enter that country in time of peace for making a leisurely and extensive survey, induced the Commander-in-Chief to think he might be more advantageously employed in making the survey above described. Captain Hodgson proposes to measure a long base on the plains of the upper part of the dooab or Rohilcund, and then proceed with a series of grand triangles, in which the highest and most remarkable mountains would form stations, whence every peak and range visible may be laid down with the greatest accuracy."

In passing, one may note the use of the word *liberated*, so hackneyed a euphemism nowadays in describing the swallowing-up of a small state by a large one. But British India did not swallow up Nepal. Hastings' despatch shows that his policy was decided before the war was finally won, and that he was ready to yield to the King of Nepal's demand

that the newly-defined frontier of the country should be closed henceforth to all foreigners. Hence his wish to get Captain Hodgson started on his survey before the treaty was signed.

The treaty was duly signed at the end of the war in 1816, agreeing to the closed frontier but stipulating that a British Resident should be allowed to stay in Katmandu. It was scrupulously kept to the very end of the British Raj, and it was the reason why the Everest Expeditions more than a hundred years later had to journey through Sikkim and attack Everest from the north instead of going by the much shorter route up the Nepal valleys. It is strange to think that George Mallory, hero of the Everest attempts in the nineteen-twenties, might never have died on the North Ridge if that long-ago treaty had not been so justly observed. But before the signing of the treaty Captain Hodgson and his assistants had got in much useful work.

The first surveys of the Nepal Himalaya were a case of the Map following the Flag. With the attacking columns there were of course officers of the Royal Engineers, whose essential job was the finding of a way by which the soldiers and their baggage and their field artillery and ammunition could be got up the gorges and over the mountainsides.

Two at least of these were skilled surveyors in the map-making sense: Captain Webb, who as a lieutenant had earlier traced the Ganges to its source in company with Raper and Hearsey; and Captain John Anthony Hodgson, the man referred to in the despatch of Lord Hastings. (The elusive Hearsey, incidentally, was in command of "irregulars" on the Gurkha campaign, and was wounded and taken prisoner.) Hodgson was officially named Surveyor of the North-West Mountain Provinces and chose a young officer named James Herbert to assist him. With a party of Indian helpers, they measured their base line on the *doab*, as the plain at the base of the foothills between the Jumna and the

Ganges was called, with staves made from the hard wood of the deodar, the Himalayan cedar tree, and fixed the positions of the "stations" at each end of the line by astronomical observations. Latitudes were fixed by the zenith distances of stars: the angle between the line-of-sight to a fixed star and the vertical line to the zenith directly overhead was measured, and since this is different at every point on a given meridian of longitude they were able to establish their exact latitude. The longitude of their positions was obtained by somewhat more complicated calculations based on observations of Jupiter's satellites.

Now, with an exactly-measured base line and the positions of stations A and B at each end known, they could select a prominent point on the foothills that rose in the north, call it station C, and use it to complete the first of their "series of grand triangles". A line of bearing from A to C, a line from B to C, and where those two lines intersected must be the map position of the foothill point. Other bearings, of other distant points, would be taken ready for the checking of the calculations. And those points might become Stations D and E and F, the lines between them base lines for new triangles reaching farther and ever farther towards the distant snows. But the work accomplished was little more than an incomplete framework for a map. Hodgson's labours in the *terai* had left him a victim of malaria and rheumatism, and he had to resign the direction of it to his younger companion. Long before the triangulation had reached the eternal snows the treaty was signed and the frontiers of Nepal forbidden. More than a hundred years were to pass before another survey party was allowed to enter the country.

One reason has already been given for the Indians' objection to British map-making: a survey party was always suspected of preparing the way for hostile forces. When they came to the mountain lands in the north, the surveyors

met with an additional obstruction even more difficult to overcome. To men of the plains as to men of the hills, the Himalayan territory was holy ground. Gods and goddesses dwelt on the icy summits, sacred rivers had their sources in the snows. Attempts by unbelievers to penetrate these sanctuaries or to interfere with them in any way were sure to bring down the wrath of the gods, which would take the too-familiar form of flood or storm or famine. Those who read the stories of Himalayan mountaineering will remember how the early Everest expeditions had to placate the Dalai Lama before they won qualified approval for their attempts; and how, in 1954, the second Japanese expedition to Manaslu had to retreat before a crowd of armed villagers, who declared that their previous attempts to climb the great mountain had brought ruinous storms to the villages. The Japanese climbers did not try to force their way through, though they had travelled half round the world at enormous expense with the sole object of climbing that particular mountain. They realized, as the British had been forced to realize in their gradual conquest of India, that men will fight to the death for religious beliefs which to a foreigner seem the crudest of superstitions.

Because it was so vast an obstruction to the things the British thought necessary to India's progress, which included the making of a Great Trigonometrical Survey, the influence of religion is worth a brief consideration.

The invaders from the west had distilled from their religion a practical code of behaviour, on which they based their morals and their laws. Everything they did in India—organizing trade, road-making, pacification by armed force, doctoring, education—could be proved to be right from this code, as if it had been decreed by the Almighty Himself. The religions of India were quite different. They dealt in enormous abstractions that had little or nothing to do with earthly existence, yet their festivals and rituals permeated all

the life of India. To the British the commonplaces of Indian religion, such as burning women alive and venerating a cow as sacred, seemed horrible or ridiculous. To the Indians, the British conviction that such things were "wrong" was incomprehensible. Their own gods had never shown disapproval of the selling of little girls as slaves by the wagonload, or of the setting apart of millions of their fellow-men as "untouchables", unfit for human contact. Why, then, should they accept new rulings on what was right and what was wrong from an English god, who knew nothing of India and had no throne in the Himalaya? Moreover, such things as life and death, good crops or murderous floods, were in the hands of the gods; Man's salvation from calamity lay in prayer and strict observance of ritual. So at first, and for many years, the practical good the British were accomplishing in India impressed the Indians rather as defiance of the gods than as improvement. The making of a map was part of these dubious activities, and more likely than the rest to incur the wrath of Vishnu.

The change from this attitude of mind to the partial acceptance of a British scale of values is the most extraordinary episode in the history of British India, perhaps in the history of the world. For good or ill, voluntarily or by moral suasion, this Oriental country with ten times the population of England was converted to something approaching the British way of life and thought. Before the end of the nineteenth century this was to develop into a slavish admiration of British culture, which was by no means wholly admirable. But the first link, the first jumping across of the spark of understanding, came through comradeship in service.

The words *service* and *servant* have lost most of their meaning nowadays, having somehow got associated with an ugly and quite different word, *servile*. They survive in their old and prouder meanings in phrases like "the Fighting Ser-

vices". To be a servant a hundred years ago involved difficult virtues like loyalty and devotion to duty, without detracting in any way from the servant's stature as a man. When it was learned that these white soldiers and surveyors and administrators all claimed to be servants of a hazy abstraction called "my country"—or, later on, "the Queen" —they became much more comprehensible. The sacredness of devotion to an idea had long been understood in India; it was why pilgrims were considered holier than other men. There was very great merit in undertaking a service, or a duty, and devoting oneself to it until it was performed—or until death put an end to the task. The strange devotion of the surveyors had some meaning now. They were loyal servants dedicated to an idea called the Survey, and the fact that they dared perils and suffered great hardships because of their dedication increased the merit of their service. So Indians were not unwilling to become servants of the Map, and many of them devoted themselves to the task with at least as much zeal as their leaders. Some were trained in the basic methods of observation and triangulation, others —the *khalassis* of the Survey—were content to carry the measuring staves and build the stone cairns that marked the stations.

There was perhaps one other circumstance which helped to strengthen the unlikely link between the men of East and West. Wherever the English went they took with them the peculiarly English conception of "sport"; the conception that turns a pastime into something like a religion, and can also make work into sport if it is difficult and dangerous enough. That this odd notion, and its odder corollary that a game can become sacred, appealed to Indians is evident throughout the history of British India. (In the early twentieth century an Indian, Ranjitsinhji, besides being one of the greatest cricketers ever seen in England, was also a serious writer on this most English of games.) The sporting nature

of the surveyor's task, the flame of enthusiasm that burned higher when the job became dangerous as well as difficult—thus being changed into a "sport"—struck answering fires from the native Servants of the Map. Within a few decades of Captain Hodgson's abortive survey in Nepal, Indian surveyors were to journey secretly to the sacred mountains where white men might not go, to take bearings of the very thrones of the gods themselves.

But in 1821 there was more than enough for the surveyors to do without lifting their eyes to the great hills. Hodgson, who had been appointed Surveyor-General of India, was recruiting more *khalassis* and was busily training the more intelligent of them to help with the huge amount of work that now confronted him. There were three distinct sorts of survey in progress.

First there was the Revenue Survey. This was given priority because upon it depended the administration of the new territories acquired by the East India Company. The Company, a power dependent on productivity and commerce, was still the executive organization in India, even though it was controlled from England through the royal Governor-General. The innumerable small landowners who had previously paid taxes to their often tyrannical local rulers were now tenants of the Company; their rents had to be fairly assessed and this meant accurate measurement of their fields and plantations. This plotting of agricultural lands was mainly a job for the trained *khalassis* with a British officer supervising. The established British linear measurements were used—the iron-linked chain of 22 yards, the "pole" (a long deodar stave) of 16½ feet. One pictures the scene at a rice plantation: the shimmering haze, the heat and the flies, the *zamindar* or chief landowner and his villagers watching the survey party at work; *khalassis* in turban and loincloth chattering noisily as they lay the deodar staves along a straight section of the bank rimming the

paddy-fields; the sweating surveyor peering through his theodolite and shouting at a distant helper to hold his pole upright; other *khalassis* laying out the chain on a curving section of the boundary. It was unrewarding, unadventurous work but in due course it would fit into the huge framework of the Great Trigonometrical Survey.

William Lambton and his chief assistant, a young lieutenant of artillery named George Everest, regarded the G.T.S. as by far the most important part of the Indian Survey. To them, the slow but steady extension of the network of "grand triangles" up the sub-continent from the Central Provinces was making a vital addition to Man's knowledge of his world. To the authorities in London and Calcutta, however, it was a technical exercise, to be given a low priority. The zealous mapmakers were starved of officers and funds and unable to obtain all the survey instruments they needed. But they pushed on the work with the devotion of missionaries, meeting and overcoming difficulties in the Deccan gorges or the blistering heat of the Thar Desert, building their little cairns on desolate summits or taking bearings from the tower of some ruined fortress in the wastelands. London instrument-makers had improved the design of theodolites and Lambton's "Giant" was outmoded when one or two of these precious instruments reached India. More important, perhaps, was the advent of the prismatic compass, invented by Henry Kater who had been one of Lambton's assistants. This made it possible to take accurate compass-bearings quickly and easily, and its smallness and lightness made it particularly useful to surveyors in the rough hill country that covers so much of India. The case of the prismatic compass is only a few inches square, and by means of its prism reflection the observer can sight across the floating dial of the compass directly to a distant object, with a magnification of the scale on the rim of the card that enables him to take an exact bearing.

The plane table, which came into use early in the nineteenth century, was another great aid to the progress of the G.T.S. It is essentially an adjustable drawing-board mounted on an adjustable tripod, and its invention made possible the drawing-in of detail on the spot—or "in the field", as surveyors say—instead of noting down all the observations in a memorandum-book to be drawn on paper many days, perhaps weeks, later. The table is carried and set up at an already triangulated station and levelled with a spirit-level. The sheet of drawing-paper on it has several fixed points marked, and the table can be rotated about its vertical axis until the plotted points on the paper are in their correct position relative to the actual points in the landscape. This is done by sighting on the points with an alidade, which is rather like a long ruler fitted with telescopic sights. With the plane table screwed tightly in its correct position, the alidade can now be used to "sight on" other distant points and draw rays on the paper to them from the observer's point. In this way a map of considerable accuracy can be drawn by eye, as it were. Later the Indian clinometer was devised, another sighting instrument with which the angle to the summit of a distant peak could be measured and the tangent of the angle—from which the height would be determined—read off direct.

From time to time the surveyors determined their latitude and longitude on the earth's surface by astronomical observations. These always required the measurement of the angle, at a given exact time, between the line-of-sight to the sun (or a fixed star) and the line-of-sight to a clear and level horizon. At sea the level horizon was of course usually present, but in hill country it was not. Even in the dead levels of the Ganges plain the horizon was generally obscured by haze. The method of dealing with this problem had been found before the Indian Survey began. Surveyors had long used an "artificial horizon", which was simply a

plate of black glass mounted on adjustable legs so that it could be levelled exactly. Suppose a surveyor wishing to establish the latitude of his position by measuring the angle of the sun at noon precisely. Sextant in hand and with his chronometer ready, he places himself so that he can see both the sun and its reflection in the glass of the artificial horizon. As the hand of the chronometer ticks on to twelve noon he sights through the telescope of his sextant and moves the radial arm until the image of the sun coincides with its reflection on the black glass. The radial arm has moved against a brass arc, one-sixth of a circle, on which degrees and minutes are marked; so the surveyor can now read off the angle he has measured, and consultation of his tables of dates and angles will give him his latitude.

In all these forms of observation there was much calculation to be done after the accurate taking of sights. For instance, there was the refraction of the atmosphere to be allowed for, which varied from place to place and from hilltop to valley. And when the G.T.S. had finally plotted its new triangle and was ready to move on to the next, there was still a great mass of detail—river-courses, tracks, villages —to be filled in. This was mainly the task of the surveyors' third force, the Route Survey.

In the minds of authority the Route Surveys were nearly as important as the Revenue Surveys. It was vital to the maintenance of law and order in these new territories that men and equipment could be moved swiftly across country to quell disturbances or crush outbreaks of armed robbery, and for such movement good maps were the first essential. So a considerable section of the Survey's limited strength was engaged on this simple but arduous work. Usually the Route Survey was done by a young subaltern of Engineers with half-a-dozen *khalassis* and perhaps a section of sepoys. It was in effect a road map rather like the linear surveys of English roads made by John Speed in the seventeenth cen-

tury, except that in India at this time there were no roads in the English sense. There were tracks, or routes, connecting towns and villages, normally passable by men and beasts of burden and sometimes by ox-wagons. In the hill country the "road" would often be a rocky ledge on the side of a river gorge. The twists and corners of the track, the windings of the river, could be plotted with the aid of compass and theodolite. Distances on the track were measured by perambulator.

A perambulator had been used in India soon after Clive ordered Rennell to begin his general survey of Bengal. It was a large wooden wheel of known circumference, with a mark on its perimeter so that its revolutions could be counted as it was pushed along a track. Later the first real Surveyor's Perambulator was produced—the "Madras pattern" 8-mile perambulator which operated something like the cyclometer on a bicycle's front wheel, the axle turning an endless screw geared to two circular metal plates recording miles and furlongs. It was twenty feet in circumference and took two men to push it. When George Everest, now a captain, was supervising route surveys he became impatient with this cumbrous apparatus and had one made to his own specification, a lighter and handier affair with a diameter of 107.39 inches and an improved "cyclometer" attachment. Everest's perambulator measured distances up to six miles and could be pushed with shafts, like a wheelbarrow, by one man.

From 1812, when Moorcroft and Hearsey were making their great journey across the Himalaya, until several decades later, soldiers and perambulators were hard at work on the paths of southern and central India. They were scarcely a common sight, for there were very few men or instruments for the work; but some time or other every valley and jungle trail was sure to see the passing of the Route Survey party. There would be the sepoys—bare-

footed, turbaned, red-coated—under their *naik* or corporal, armed with muskets to deal with *dacoits* (brigands) or wild beasts; the perambulator-wallahs, two half-naked Indians taking turns at pushing the recording-wheel, escorted by a senior Indian to check their progress and re-set the cyclometer as required; some coolies with tents and sacks of supplies; and the young officer of Engineers hurrying to overtake them after stopping to take a compass-bearing, at his heels the bearers carrying theodolite and knapsack.

It was sure to be very hot and the subaltern was sure to be sweating heartily. He would be in full uniform, for in those days there were no concessions to comfort, or to common sense; not until the Mutiny of 1848, when the 93rd Highlanders wore brown canvas jackets, did the redcoats in India modify their terribly unsuitable clothing. Probably he would be just recovering from, or just starting, a bout of fever. Certainly he would be suffering from thirst, flies, and the bites of skin-burrowing insects. He was five thousand miles away from his home in England, days or weeks away from the nearest men of his own race, living chiefly on boiled rice and lukewarm water rationed by the spoonful. Yet his heart would be in the Job, and (if the recorded sentiments of other Survey men are anything to go by) he was quite likely to lose his heart to it.

The Route Surveys were paving the way for the first road, which was constructed in 1830 from Bombay to Poona, and for the beginning ten years later of the famous Grand Trunk Road right across India from Calcutta to Delhi. It was a later, anonymous, devotee whose lines try to express the inexpressible attraction of India, but one of his verses will serve to epitomize the feelings of the men of the Survey:

The wheeling months go round
And back I come again

To the baked and blistered ground
And the dust-encumbered plain
And the bare hot-weather trees
And the Trunk Road's aching white;
Oh, land of little ease!
Oh, land of strange delight!

In that year of 1830, the year of the first Indian road, William IV succeeded George IV on the throne of England. The novels of Walter Scott had just made their impact on the reading public of Britain. An Anglican Bishop had been sent out to India and William Cobbett was criticizing the East India Company "nabobs" for "cooking and devouring the wretched people both of England and India". In England the politicians were looking uneasily towards Russia, who had turned the tide in the struggle against Bonaparte's empire but was now suspected of planning a world empire of her own. In India Major George Everest was appointed to be Surveyor-General.

Fourteen years earlier a bold officer of the Engineers had made a series of survey forays into a section of the Himalaya which was not, at that time, a forbidden frontier. This was Captain Webb, who as a lieutenant had led the first exploration to the source of the Ganges. The treaty with Nepal had fixed the Kali river as the western boundary of the country; beyond the Kali was a wild land called Kumaon, bordered on the north by the main Himalayan chain of peaks. Hodgson, just appointed Surveyor-General of the North-west Mountain Provinces, lost no time in sending Webb into Kumaon. The report Webb brought back in 1816 told of gigantic ice-mountains observed and a high pass—the Lipu La, 17,890 feet—crossed. One peak, whose position Webb gave precisely as "latitude 30° 21′ 51″ north, longitude 79° 48′ 39·6″ east," was given a height of 25,669 feet. The position identifies this mountain for us as Nanda Devi,

whose height is nowadays calculated as 25,645 feet—Webb was only 24 feet out. But so great a height was considered an impossibility in 1816. Geographers in Europe refused to credit the report and for many years the unfortunate captain was widely believed to have made a shocking mess of his calculations.

By attracting European notice Webb's report called the attention of a great and interested power to what was going on in northern Hindustan. A Russian newspaper, *Le Conservateur Impartial*, which was published in St Petersburg in French, printed the following paragraph on 11 March, 1817: "The English captain, Webb, who travels through (*parcourt*) the north of Asia, has, it is said, traversed enormous chains of snow-covered mountains regarded as inaccessible, through which a route could be opened through Tartary to Russia."

This was the earliest sign of that strange interlude of secret agents and spies in the Himalaya, which was to be called "the Great Game".

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6 - *Everest of the G.T.S.*

THERE ARE at least fifty peaks over 25,000 feet high in the Himalaya, and innumerable summits higher than 20,000 feet. Only one of these giants—the highest mountain in the world—bears the name of an Englishman, Everest; and the man singled out for this distinction was not the "discoverer" of the mountain, nor did he know of its existence until many years after his retirement from Indian affairs. Why, then, "Mount Everest"?

George Everest was born in 1790, one of five sons of a London solicitor. The family pronounced their name "*Eve*-rest," and Sir George (as he was to become) would certainly have been furious at the worldwide mispronunciation of the present day, for he was not only a stickler for accuracy but also a man of violent temper. An Army career was decided upon when he was 14, and at seventeen years old he was a lieutenant in the Bengal Artillery, an East India Company regiment, taking part in the operations against Bonaparte's Dutch allies in Java. He became assistant to Colonel Lambton, Superintendent of the Great Trigonometrical Survey, a year later, and found in this work the vocation to which he was to devote the rest of his life.

Young Everest conceived a great admiration for his indomitable chief, that tough veteran of the American War and hero of the siege of Seringapatam. Lambton was 70 and still doing survey work when he died. Everest wrote of him

as "This great and extraordinary man, who when he aroused himself for the purpose of adjusting the great theodolite, seemed like Ulysses shaking off his rags; his native energy appeared to rise superior to all infirmities, his eyes shone with the lustre and his limbs moved with the full vigour of manhood."

William Lambton, it seems, was responsible for the tradition of the Survey of India which has persisted to this day —that the Map must go ever forward, no matter what obstacles and hazards its servants may encounter. George Everest was a worthy successor. He had adopted wholeheartedly Lambton's belief in the prime importance of the Great Trigonometrical Survey, and when he succeeded to the post of Superintendent of the G.T.S. in 1823 his first act was to demand more funds and men for the work.

The British-controlled parts of India were still ruled by the East India Company, whose funds were limited. In that very year the Court of Directors was proposing cuts in their Survey expenditure, especially on the scientific side of the work which showed no immediate profits. Fortunately for Everest, the Surveyor-General at this time, Colonel Blacker, shared Lambton's view of the value to Britain, and to the world, of the Map. He and Everest between them pestered the Directors until they won for the G.T.S. the priority they considered it deserved. And the work went on.

Blacker had suggested to the Company that much time and money could be saved by abandoning Lambton's system of working a network of triangulations over India northward, and concentrating instead on running series of triangles along meridians of longitude, connected by cross links along parallels of latitude. This, the "gridiron" system, was adopted and remains in use today. Its adoption gave George Everest the chance to push forward his old chief's cherished ambition, the measurement of the Great Meridional Arc.

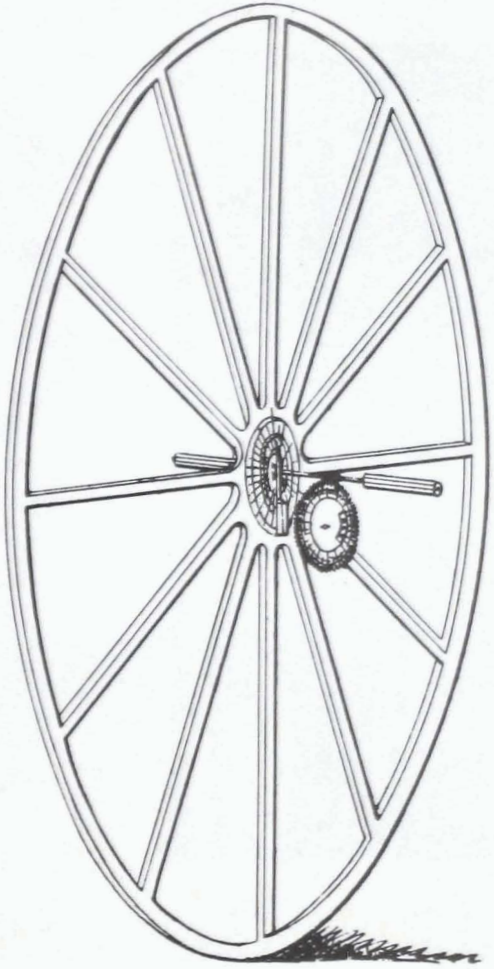
It will be remembered that Lambton had begun this very difficult task (with the aid of his Great Theodolite) some six years after making his survey across India from Madras. When he died seventeen years later rather less than half the length of the Great Arc had been surveyed. The 78th Parallel runs from just east of Cape Comorin at the extreme southern tip of India, northward through the mountains of Mysore and the lofty plateaus of Hyderabad and then across the tip of the Ganges plain to the snow-peaks of Kashmir and Jammu. This gives a total straight-line distance of about 1,840 miles. But the Great Arc would have to end before it reached the snow-peaks, at the most northerly place where it was possible to measure the long final base-line; it would have a length of just over 1,500 miles. The measurement of its exact length would be of great value to geodesists trying to establish the real shape of the Earth.

Calculation of the linear distance between the latitudes of the starting and finishing base-lines, by astronomical observation, would give the result as it would be if the Earth was a true sphere. The difference between this result and the figure obtained by actual measurement on the ground would show just how the Earth's shape differed from the spherical in this part of it. Everest had a scientific mind; he was far more interested in seeking new knowledge than in Revenue Surveys, or even in topographical map-making. In the first two years of his superintendency he extended the Great Arc northward to Kalianpur in central India. Then he became so ill that he was sent back to England and prolonged hospital treatment. Unlike Lambton, who seemed impervious to fever and used to go on surveying in jungle country all through the year, Everest was not a physical superman. For the vast majority of Englishmen it would have been suicidal to spend the rains out in the jungle and he was no exception. It was five years before he was fit enough to return to India.

If Everest's body was far from strong, his spirit was triple-strong by way of compensation. It was an exceedingly fiery spirit. He was a man who could not suffer fools gladly, and since he always said exactly what he thought no one was left in doubt of the fact when Everest considered him a fool. He was as blisteringly forthright to his superiors as to those who worked under him; but while his subordinates loved as well as feared him—because he never spared himself in hard or dangerous work—his chiefs in London had come to dislike him heartily. The Court Directors knew his sarcastic and demanding letters only too well. They refused to keep his appointment open while he was ill, in spite of the fact that no one could be found to replace him. And this was just as well. For as soon as he could get about Everest went to see them, and continued to argue his case for more Survey funds and instruments until he won it. The Directors were so impressed by his tremendous energy and personality that on his return to India in 1830 they appointed him Surveyor-General as well as Superintendent of the Great Trigonometrical Survey.

The years of sick leave before he went back were busy ones. If he could move, Everest had to work. He went all over the United Kingdom visiting surveyors working in the field and taking part in their work. He spent his sedentary hours producing a new figure of the Earth from all the geodetic evidence to hand, a figure which has been used in the Survey of India ever since. He made designs, and supervised the manufacture, of scientific apparatus suitable for Indian conditions. And finally he persuaded the Court of Directors that they must give priority, in the Survey Department, to the extension of the Great Arc right to the base of the Himalaya.

The India to which Major Everest, the new Surveyor-General, returned in 1830 was a comparatively peaceful country and he was able to go ahead unhindered with the



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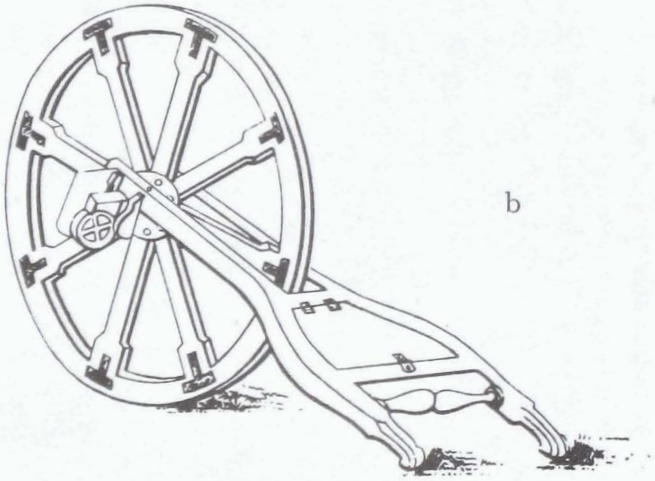


b

SURVEY PERAMBULATORS

(a) MADRAS PATTERN 8-MILE PERAMBULATOR 1780

(b) EVEREST PATTERN 6-MILE PERAMBULATOR 1832-1836

MAJOR GEORGE EVEREST, 1843

work he considered so important. There were no wars going on between the independent states, raiding over the northern frontiers was not unduly troublesome, and the dark-skinned millions in the Company's territories were growing accustomed to the presence of their red-coated overlords. There was as yet little uneasiness concerning the great Power in the north and its intentions—real or imagined—of secretly establishing "spheres of influence" south of the Himalayan passes.

Only beneath the surface of the teeming life of India did the first germs of a new trouble move and grow. It was a trouble inevitable and predictable, hinted at when Lord Hastings declared twenty years earlier that the mission of the British was to prepare India to govern herself. The unification of a large part of India under Company rule, casual and almost accidental though it had been, was beginning to spread the sense of unity which makes a nation, giving for the first time to this immense diversity of colour and religion and caste, and even race, the idea that it was one homogeneous mass—the natives of India.

Just as inevitably grew the feeling that it was wrong for this emergent nation to be governed by people of an alien race and religion; especially when the aliens were beginning to interfere more forcibly with such aspects of native religion as displeased them. For the growth of new national feeling—hardly discernible as yet—coincided with the reforms of a new Governor-General, Lord William Bentinck.

Bentinck was a supporter of the demands of Evangelicals and humanitarians in England, who (quite reasonably) refused to look on in silence while the law-givers from Britain allowed child-murder, slavery, and human sacrifice in the lands they had undertaken to govern. The East India Company's policy had always been one of non-interference; they had thought it wisest to discourage missionaries and resist reform. Wisest it probably was, but it was the reverse of

Christian or humanitarian in the opinion of Englishmen. Government pressure was brought to bear on the Company, and Lord William Bentinck was instructed to introduce legislation against these revolting practices—"as his superior means of estimating consequences may suggest". He was particularly instructed to put down *Suttee* and *Thuggee*.

Suttee (an Anglo-Indian spelling of the native term *sati*) was the custom, sanctioned by Hindu religion, of wives and slaves being burned alive on the funeral pyre of their lord and master. In 1780, for instance, when the body of the deceased Rajah of Marwar was burned, his sixty-four wives were burned alive with him; and at about the same time a Sikh prince of the Punjab was joined on his funeral pyre by ten wives and no less than three hundred concubines. The women were supposed to die voluntarily, but often they tried to avoid the terrible death and were dragged back by the bystanders (with complete religious propriety) to be thrown on the flames.

Thuggee was more of an old custom sanctioned by a religious legend. The goddess Kali once battled with a great demon, vainly because each drop of his blood that fell as she cut at him turned into another demon. To save herself she created two men from the sweat of her armpits, gave them each a square of cloth, and told them to kill the demons without shedding blood. This they achieved by strangling the demons. The grateful Kali told them to keep the cloths in remembrance of her and use them as tools of a profitable trade. For more than five hundred years the sect known as the Thugs, claiming descent from these men, had lived by murder and robbery, always strangling their victims. In 1830 they were a powerful confederacy operating over all northern India.

Bentinck was an earnest Christian and prompt in action. He appointed a Commissioner for the Suppression of Thuggee and Dacoity, one William Sleeman, and the round-

up of fanatical murderers began. The Thugs were not hard to find and arrest, though sometimes they were protected by landowners or local rajahs who took a percentage of their gains. The difficulty was to obtain conclusive evidence of murder in each case. This had to be done; every Thug must be properly tried and convicted by the Criminal Law which the British had brought to India. Sleeman went at it with single-minded energy and evidence was obtained to convict more than three thousand Thugs, who were duly hanged, between 1831 and 1837. None of the condemned men showed any remorse for their deeds. But one of them admitted regret. He was sorry, he told a British officer, that he was to die with only seven hundred and nineteen killings to his credit; he had set himself a target of a thousand. It was small wonder that some of the British in India concluded that the only way to uphold a humane Law in this country was for them to impose it by force, and for ever.

The complete suppression of *Thuggee* (for that was what it amounted to) met with small opposition from the Indian people. Even those who had condoned it as initiated by the goddess Kali admitted that they were better without it. *Suttee* was a different matter. Though Indian Moslems regarded it with disgust, the practice was deeply rooted in the religious life of the Hindus. It was not a universal Hindu practice, yet when it was decided upon, any interference was considered sinful and against the will of the gods. Bentinck had *Suttee* declared illegal in the Bengal Presidency and soon afterwards in Madras. He met with great opposition and hostile demonstrations, and a petition from influential Hindus begging for the continuance of *Suttee* was sent to His Majesty's Privy Council in London. The law was passed, however, and became effective in Bombay soon afterwards. Thirty years later the princely states of the Punjab and Rajputana adopted it. How firmly the custom was established is shown by the fact that as recently as 1932 there was

an attempt at *Suttee* in India, the widow being saved from the fire by police action. In the 1830's resentment smouldered sullenly among two hundred millions of Hindu people; a resentment that was to burst into terrible flame three decades later as the Indian Mutiny.

Thus, although the Surveyor-General could pass where he pleased to push forward his Great Trigonometrical Survey, and his Great Meridional Arc, there was always before him this intangible, passive human resistance. He and his Map were part of the pressure-system which was dimly felt to be forcing Indians into an alien way of life. It was not the sort of resistance to have any effect on the fiery George Everest. If an Indian elected to serve the Map he was pushed hard at the work; if he did not, he was pushed out of the way. In any case, Everest was now encountering physical obstacles that demanded all his energy.

He had spent some time in Calcutta, headquarters of the Company and the Survey, recruiting more staff and training them for the G.T.S. Now he and his assistants had transferred themselves to a new base at Mussoorie, 7,000 feet up in the Himalayan foothills and nearly on the 78th Meridian. This was to be the terminal point of the Great Arc, and here he was determined to stay until the job was done.

There were never any half measures with George Everest. The Great Arc had been given priority and priority it would have, for him and everyone round him. Since the Trigonometrical Survey was linked with the measurement of the Arc, that could go on under his supervision, but other forms of survey would have to get along without him. The Governors of the various states, unable to obtain their much-needed maps because Everest had all the competent surveyors with him in the north, started to employ half-trained men; Everest wrote to the Directors in London and had the practice stopped. As Surveyor-General he was supposed to be

in his office at Calcutta, superintending (among other things) the Revenue Survey and being accessible for consultation by the Government; he was nine hundred miles away at Mussoorie. Indeed, urgent messages to Mussoorie reached him only after long delays, for he was generally a week's journey away in some remote survey camp. He spent most of his time in the field personally supervising the work and doing much of the observing himself. This naturally exasperated his superiors, and their exasperation was not lessened by Everest's curt letters reminding them that he was a surveyor, not a Government clerk. But he was in the right place, for the field work needed a resolute and ingenious leader.

The Arc, with its attendant triangulations for the G.T.S., had crept onward in laborious measurement over the rugged plateaus of Nagpur and the forested hills of Bihar and reached the Chambal river. Two hundred and fifty miles away, beyond arid flats and forested plains, were the foothills of the Himalaya. The crossing of that comparatively level 250 miles was the most difficult part of the Arc, for heat-haze and dust—not to mention dense forests—made it next to impossible to take bearings of stations even a short distance away. Everest dealt with the forest difficulty by felling trees and leaving an isolated tree or clump in which he constructed a "tree-station" high among the branches. The native owners were compensated for all productive trees felled but they naturally objected to this arbitrary destruction of their property and sometimes revenged themselves by surreptitiously removing Everest's landmarks or demolishing cairns. Where tree-felling was not possible the surveyors built stone towers sixty feet high, constructed so that the theodolite on top could be centred exactly over a mark-stone buried in the ground. The dust and haze of the upper Ganges plains seemed an insoluble problem, but Everest solved it—by surveying at night instead of by day. Blue lights were burned on top of tall poles at the various

stations, and bearings taken on these. Mile by mile the Great Arc crawled northward, flogged on, as it were, by George Everest's restless energy.

He was at this time in his early 40's, a lean wiry man of middle height with a wild thatch of greying hair and an aggressive bristle of moustache and sidewhisker; from beneath lowering brows his eyes, bright and deeply sunken, burned with a flame that was always ready to blaze into anger. He had no toleration for the slightest inaccuracy or muddle, and no one was spared the lash of his tongue. On one occasion when some blue lights had been mislaid by someone in the party of his ablest assistant, Joseph Olliver, he scrawled a blistering message to Olliver: ". . . I suppose the only way is for me to go quietly into Meerut Cantonments and leave you to recover the use of your senses! It seems you will not abide by my orders but—pell-mell, helter-skelter, foul or fair—away go to damnation and destruction the only means we have of getting through our work . . . You all seem to me to be right stark, staring mad . . ."

Yet every man who served under Everest was devoted to him. He did not spare them, but he certainly did not spare himself. As the years went by, with their rains and their torrid heats, and the work progressed until a rank of white clouds very high in the northern sky revealed themselves as the Himalaya, they came to love their explosive leader. Every year he was laid low several times by recurrent fever, but he was back on the job as soon as he could walk again. In 1835 the fever struck him so severely that it seemed he would have to retire; but he recovered sufficiently to continue his supervision, though everyone knew it was only his determination to finish the work before leaving India that kept him going. And his temper never lost its violence.

In the final part of the survey he was using heliotropes, very useful station markers but tricky to handle. The helio-

trope was a circular mirror 8 inches across with a hole one-tenth of an inch in diameter in its centre, mounted so that it could be turned in any direction. A staff with a brass ring on top having crosswires to mark the centre of the ring was set up in line between the heliotrope and the distant station, where a surveyor with a theodolite was ready to sight on the flash of reflected sunlight from the mirror. The flash was aimed by looking through the hole in the mirror and directing the reflected ray on to the crosswires. It needed a very steady hand to achieve this under the fierce downbeat of an Indian sun, but if Everest's assistants failed to do it perfectly they were apt to receive sarcastic notes by runner from the distant theodolite station where their chief was fuming.

It took six years to complete the field observations for the Great Arc. By 1834 the survey party was in sight of the main Himalayan chain; and in that year the traveller Godfrey Vigne was beginning a journey through the Ladakh Himalaya which was to add a little more to the knowledge of geographers. Vigne was one of the very few outsiders to visit Major Everest in the field. The Surveyor-General and his men were in the high foothills, encamped at 12,000 feet close to the summit of a mountain called Chaur. Vigne describes the scene:

> "The camp of our host was placed as near as possible on the very top, and our chief object was to keep ourselves warm. The tent in which we dined was furnished with a stove and the entrance carefully closed against air, whilst we drank our wine, and talked to a late hour above the clouds. On the huge granite rocks that formed the very apex of that mountain, the labourers in attendance had formed a platform of loose stones, and in the centre they had planted a mast as a mark for the survey. Several that they had previously raised on other summits were visible

only by the aid of the theodolite. A powerful heliotrope, in use at Saharanpur on the plains, reflected the sun's light towards us from a distance of sixty miles. I can never forget the glorious view of the snowy range, some sixty or seventy miles from us, as the morning broke over the sacred peaks of Jumnotri and Gangotri. The entire range of the Himalaya—upon whose elevated pinnacles the rose-coloured light seemed to pause before it ventured into the yet gloomy atmosphere to the south of it—was extended from west to east as far as the eye could reach, rearing itself high and magnificently above the great valleys at its base like the turbulent billows of an inland sea."

Godfrey Vigne's phrase "the entire range of the Himalaya" was highly inaccurate. To say that he could see one-tenth of the entire range would have been an exaggeration. And though his flowery description shows that he was impressed we could have spared it if he had told us, instead, what George Everest thought about those "elevated pinnacles". Did the Surveyor-General feel the urge to explore and map that huge territory of snow and ice, most of it unvisited since the world began? Or did he look on the great peaks merely as useful points for fixing his final positions on the way along the Great Arc of the Meridian? Not until another eighteen years had passed was a certain Peak XV, six hundred miles to eastward of Everest's camp on Chaur, discovered by calculation to be the highest mountain on earth; and Everest himself was out of the Survey, in retirement in England, when it was named after him.

In 1843, when he retired, Everest's great work was completed. Perhaps only the geodesists of the world could fully appreciate the value of his measurement of the Great Arc, but his achievement was acknowledged in his own country when he received a knighthood and a C.B. General Sir

George Everest died in 1866, aged 76.

The "discovery" of the highest mountain in the world was the result of computation from figures brought in by surveyors, which gave for the remote and unapproachable Peak XV the height of 29,002 feet. Checks and comparisons proved that it was indeed the highest. When it came to naming this very important peak there were difficulties. There were several different native names, in various languages, but some of them referred to subordinate peaks of the great mountain and others were attached to the whole massif of Peak XV and its neighbours. Tibetan scholars named it *Mi-ti Gu-ti Cha-pu Long-nga*, which means "You cannot see the summit from near it but you can see the summit from nine directions and a bird that flies as high as the summit goes blind". There was good excuse for Sir Andrew Waugh when he suggested that it should be named after his great predecessor. So Mount Everest (or, by today's usage, just "Everest") it became.

* * *

7 - *The Riddle of the Snows*

IN ONE respect the name of the great Surveyor-General was not an apt one for the highest peak in the world, the mountain that was to typify, for millions of people, the awesomeness and the attraction of the Himalaya: during the twenty years of his rule over the Survey, George Everest made little or no contribution to Himalayan discovery. It appears from his record that he was without the special feeling for mountains which characterizes the mountaineer and the mountain explorer.

Many nineteenth-century Englishmen had received the gospel of the Lake Poets and were ready to see beauty in the high hills that had until recently been regarded as ugly and terrible. But for the English who lived and worked in India it was more fashionable to praise the beauty of the country's architecture or its treasures of craftsmanship than to enthuse about its mountain scenery; and those who ventured among mountains and glaciers—even in the Alps—were still regarded as eccentrics.

Everest, then, felt no urge to penetrate the mountain mysteries. And he had excellent reasons for not doing so. For one thing, his hands were full with the double task he had set himself, the measurement of the Great Arc and the important Trigonometrical Survey. For another, it had become even more difficult to get a survey party near the Great Himalayan Range. In extending their control over

the northern provinces the British had learned a lesson—that it was terribly costly, in men's lives and in resources, to try to subdue the mountain states along the southern fringes of the Himalaya. The thing had been attempted too often, and too often the story was the same: the punitive column, sent to chastise some unruly tribal chieftain, ambushed in the mountain gorges and shot to pieces; the tribesmen vanishing into their fastnesses of rock and snow until reprisal was no longer probable.

The British solution was a treaty of the sort they had concluded with Nepal seven years before Everest's appointment as Surveyor-General. Basically, a treaty with the hill states was a bargain. The British on their side undertook to guarantee the integrity of the southern frontier, facing the Indian plain, while the hillmen undertook to refrain from raiding across that frontier and also to guard the passes that led from their country across the Himalaya to the unsettled territories in the north. The effect, as in the case of Nepal, was to seal off the mountain borderlands from British interference, survey parties included.

In spite of this, two or three men did make journeys of exploration through the unknown mountains during Everest's time in India. One was the adventurer Alexander Gardner, who (as we have seen) crossed the Himalaya by the Kadpo Ngonpo La in 1830. Another was G. W. Traill, the first deputy commissioner of the Kumaon territory west of the Nepal boundary. Traill, a born explorer and mountain-lover, made the most of his opportunities in this totally mountainous region, which contains dozens of peaks over 20,000 feet high as well as the giants Nanda Devi, Kamet, and Dunagiri—mountains whose names, well-known to all readers of mountaineering books today, were mostly unknown in the 1800's. He was not a climber (more than thirty years were to go by before the first Alpine Club was founded) but the pass by which he crossed the Great Himalayan axis

between Nanda Devi and Nanda Kot, in 1830, was a mountaineering feat; "Traill's Pass" is 17,700 feet high and is still reckoned a difficult climb.

The actual crossing of a snow-pass in the main Himalayan range—a gateway hung in the sky between pillars of glittering ice—was only the chief difficulty of a long and difficult journey. Between the last secure community on the south and the first food and shelter on the north of the range there lay many days, perhaps weeks, of hazardous travel, along sheer-walled gorges, across avalanche slopes, over minor passes. For this wall of snow and rock was broad as well as long. If four Englands were laid end to end they would represent roughly the length of the Himalaya, and to walk across England from coast to coast might represent the crossing-distance—but one would have to imagine an England upheaved and riven, a chaos of ravine and precipice and glacier, where white peaks as high as fifteen Empire State buildings on top of each other peered down through the clouds overhead at every turn of the way. From the east where it merged into the 20,000-foot ranges of China to the tangle of lower mountains at its western end, where the Khyber Pass twisted through, there was no break in this barrier where a man might safely pass. And west of the Khyber was the sprawling mountain-mass of Afghanistan, as impassable as the Great Himalayan Range itself.

The journeys of Traill and Gardner and one or two others made the merest hair-lines across the enormous blanks of the map of northern India. Only a very few of the secrets of the inner Himalaya had so far been discovered and there were innumerable problems for explorers and surveyors to solve. Some, though by no means all, of the higher peaks had been placed on the map and their heights calculated from the theodolite observations at distant survey stations; but almost nothing was known of their surroundings —the hidden valleys below them, the huge glaciers curling

down their flanks, the ridges that might or might not connect them with other mountain massifs. Much of this knowledge, indeed, would only be gained when men had developed the craft of mountaineering and applied it to Himalayan conditions, which would not be for another half-century. Some of it still awaits discovery today.

When Sir George Everest retired in 1843 Victoria had been queen of England for six years. Sir Andrew Waugh, Everest's successor, set about connecting the northern ends of the G.T.S. with a series of triangulations running from east to west, and pushed two further series north-eastward to the Bhutan and Nepal frontiers and north-westward to Kashmir. From the highest north-eastern stations the heights of seventy-nine great peaks, many of them in forbidden Nepal, were fixed by precise measurements with the great theodolites. Among them was "Peak XV", later to be named Mount Everest, which in 1852 took the place of Dhaulagiri (Peak XLII) and Kangchenjunga (Peak VIII) as the highest known mountain in the world. In the north-west Waugh had the opportunity of penetrating the one area of the Himalaya that was not forbidden, and he seized it. The result was a triumph of achievement, and of courage, on the part of British and Indian surveyors.

It will be remembered that the Sikh rulers of Kashmir had rashly attacked the British as soon as their wise leader, Ranjit Singh, was dead. After their defeat and the annexation of the Punjab the great mountain state of Kashmir was granted to the Rajah of Jammu, the Himalayan principality bordering Kashmir on the south-east. Gulab Singh, who now became Maharajah of Kashmir and Jammu, was an ambitious and progressive chieftain of the Dogra race who had long ago perceived that the British were the growing power in India and had resolved to maintain friendship with them. He did not object to a first political mission entering his territories to fix their boundary with the British possessions,

or to a second mission which explored right across Kashmir northwards, through Ladakh, to determine his outer frontiers with Tibet and Sinkiang. Both these missions brought back sketch-maps of the vast mountain-ranges they had seen. When the Surveyor-General suggested a complete survey of his wild domain Gulab Singh gave his cordial assent. Captain T. G. Montgomerie of the Engineers was appointed leader of the survey party with William Johnson, an Englishman born in India, as his chief assistant.

Montgomerie had joined the G.T.S. in 1852. He was in the prime of youth and strength, lean and stringy, a man of exceptional endurance. Johnson had already acquired a reputation for daring bordering on rashness; he revelled in hazardous climbs and preferred hardship to comfort. He and his party of signalmen and *khalassis* had just spent six years surveying the mountainous area between Garhwal and Chamba, running chains of triangles through the deep Sutlej gorges and across the great ranges into Kulu and Lahaul. They were to find this experience, and their superlative fitness, very necessary in the Kashmir Himalaya. They marched up from Dehra Dun, headquarters of the north-western survey, and joined Montgomerie at Amritsar in the northern Punjab in February 1855. The task was begun at once—a task that was to take them ten years to complete.

The area they had undertaken to survey was about 100,000 square miles, all of it mountainous and much of its high ground snow-covered for nine months of the year. The "monsoon" weather of India was less troublesome here in the western Himalaya than in the eastern ranges that include Everest and Kangchenjunga. The three well-marked seasons of northern India—the cold weather from October to February, the hot weather from March to June, and "the rains" from June to September—followed their regular course in the lowlands but had a different effect in the

mountains, where the sweltering heat of early summer could be avoided but the rains took the form of heavy snow. Through March and April the surveyors worked in winter conditions, often camping for weeks on summits from which an Alpine mountaineer would have been glad to hurry down before the onset of night and snowstorm.

Montgomerie had to start his series of triangles from the limit reached by the G.T.S., which was twenty miles east of Jammu, Gulab Singh's capital, and work it across the outer range of the Pir Panjal to the Kashmir valley. The peaks of the Pir Panjal rise to around 15,000 feet and were all crowned with deep snow at this time of year. If one of these peaks, as high as or higher than the Matterhorn, was the ideal summit for a triangulation post, then it had to be climbed. These men were not climbers in the modern sense; they had no ice-axes or other mountaineering equipment, and the use of the climbing-rope was unknown to them. Such things as lightweight mountain tents, windproof fabric, and downfilled sleeping-bags were not yet invented, and in addition to their food and fuel they had to carry up the heavy surveying equipment to every high station. Since accurate observation across miles of country was the purpose of the ascent, they had to be prepared to wait up there for clear weather, enduring the blizzards and intense cold. They built solid platforms for theodolite and heliotrope, and masonry pillars—"trig points"—to mark the summit for later checkings and resections from other stations. It was a slow business, demanding method, patience, and resolution.

Montgomerie quickly discovered that the cumbrous two-foot theodolite was no use for this work; the willing *khalassis* were unable to carry it up narrow rock ridges or steep snow-faces. He worked with a reliable 14-inch theodolite instead, and his results were models of accuracy. With his assistant, Douglas, he would establish himself on a snowy mountain-top and take observations to heliotropes worked by Johnson

and his signal squads encamped on the surrounding peaks. It was a tremendous thrill, he wrote in his diary, to spot "the bright point of light shining from the apex of a noble snowy cone". When clouds prevented the use of the heliotrope by day, observations were made to lamps at night.

Munt Mal, 14,386 feet above the sea, was one of the key stations. Johnson was instructed to establish a party on the summit, and he led a dozen Indians up the peak, climbing 7,000 feet in one day through heavy snow. Most of them suffered from snowblindness, for they had no dark glasses and used fir-tree twigs to shade their eyes. On the mountain's crest they found snow so deep that two hours' digging did not bring them to rock; but on a slightly lower point they found rock eleven feet below the snow surface and were able to build their platform and pillar, using melted snow for mixing the lime mortar.

The weather turned against them. Electric storms assailed the peak, making their damp clothing crackle loudly and setting a ring of sparks dancing on their hair and beards. Moli, the Indian *daffadar* or senior officer of *khalassis*, had his hair set alight, and the lightning struck a lamp box and tore it open. Working between the thunderstorms and snowstorms, Johnson got his station properly established—and it took him two weeks to do it. There was a stone shelter for the signallers as well as the living tent and the observatory tent, and a gallant party had been down and up again to bring wood for the small iron stove. So narrow was the crest of the mountain that there was no room for the living tent on the pinnacles where the observatory platform was built, and to get from tent to platform it was necessary to cross a narrow neck of snow with fearsome precipices on either side. This was particularly hazardous at night, when the glimmering knife-edge was frozen hard. When the spell of bad weather cleared Johnson left Daffadar Moli and four signalmen in charge to work heliotrope and lamp; and the

RAI BAHADUR KISHEN SINGH (AK)

THE EXPLORER KINTHUP

daffadar worked so efficiently by day and night, through the succeeding weeks, that the peak was named Moli on all the charts.

Montgomerie and Douglas, who were with their *khalassis* on another summit thirty miles away, had experienced even worse electric storms. Montgomerie had lessened the danger from these by constructing a lightning-conductor with iron crowbars and tripod-legs. Having finished their observations *to* Peak Moli, they now had to journey across the intervening gorges and ascend Moli to observe *from* it—Johnson having by this time got his masonry pillar erected on yet another summit far to the northward. Moli proved to give exceptionally fine views of the greater Himalayan peaks 100 miles away, including one whose name was known to them—Nanga Parbat.

Earlier travellers and geographers had put Nanga Parbat's height at about 20,000 feet. Montgomerie was amazed to find, from his theodolite angles, that its height was 26,700 feet. (Eighty-eight years later that distant summit was to be reached, after repeated attempts involving the deaths of thirty-one men, by the lone Austrian mountaineer Hermann Buhl.) On the 1934 map of the Survey of India Nanga Parbat is shown as 26,660 feet; taking into consideration his old-fashioned instruments, Montgomerie's calculation was remarkably near the truth. From Moli summit, too, they could just make out the city of Srinagar in its distant valley. By the middle of July, after more than four months in the mountains, the surveyors were observing a triangle across the waterways and slums of Kashmir's summer capital.

They took three weeks' rest at Srinagar and then started off again. There had been a remarkable transformation when the leader of the expedition became the guest of Kashmiri princes: the hairy, sun-blackened, fur-clad man of the snows changed into Captain Montgomerie of the Engineers, superb in a scarlet uniform lavishly ornamented with

gold lace, plumed hat under arm and whiskers trimmed and curled in correct Early Victorian style. After the squalor of tent life at 15,000 feet and meagre rations whose sole merit lay in their nutrition, it must have been like a dream or a fairy-tale to be entertained in a palace of Kashmir. But Montgomerie was a servant of the Map, which meant that he abstained from work no longer than he had to.

North of Srinagar the wilderness of snow-peaks stretched for 300 miles (or farther than that, for all he knew) unknown and unexplored; beyond the mountains was the even vaster breadth of the steppes, Chinese Turkestan, on which as Montgomerie had heard Imperial Russia was beginning to cast covetous eyes. The two months that were left to him were insufficient for mounting a full-scale survey into the maze of Himalayan glaciers, but he could send a flying squad of surveyors on a reconnaissance survey into the Himalaya while he brought his triangulations round Srinagar to a state of utmost readiness for the northward advance next year. This was done. "The rains" were in full swing, but Montgomerie and Douglas pushed on to their new stations in the surrounding hills and stayed there until visibility was good enough for their observations. Johnson, leading the "flying squad" on a minor series of triangles up the snowy gorges of the Lidar river, did much the same; but for him it was not rain but snow. He climbed week by week above the deodar forests into the treeless barrens of rock and ice, where the glaciers crawl with their loads of shale and there is no life of man or beast. Characteristically, he adventured his little party on the crossing of a snow pass and brought them back down the gorges of another river, the Sind, continuing his triangulations all the way. Montgomerie—also characteristically—filled in the time while he was awaiting Johnson's return by exploring the route down the Jhelum river in preparation for a later survey.

October had brought the beginning of the cold season

when the whole survey party was reunited and left Srinagar for the long march back to Dehra Dun. There could be no mountain survey until the Himalayan winter was past; the intense cold and terrible snowstorms, not to mention the ever-present danger of avalanches, made it totally impossible. So back they went to their base amid the tea plantations of Dehra Dun, to spend the cold months on computations and sketch maps and in preparation for the coming season. To Montgomerie and Johnson and their men it was a waste of opportunity to get home by the easiest route. They explored new passes across the Pir Panjal range on their way to Dehra Dun, taking observations as they went. They were servants of the Map.

This first year of the Kashmir and Jammu Survey was typical of the nine succeeding years as far as the surveyors' way of life is concerned, but less exciting than some of the others. In the next season, of 1856, Montgomerie climbed to the ridge of Haramukh (16,872 feet) and saw, more than 100 miles away, a range of white peaks hanging across the north-eastern sky like a long and jagged cloud. He could not name them, and did not know whether or not they were in Kashmir; but he guessed they must be the mountains which were called the Karakoram from the pass of that name (the word means "grey shale") said to have been used by Genghis Khan when he pursued his Mohammedan foes into India. His first observation told him that some of those far summits were as lofty as those of the Great Himalaya. He went to work with his theodolite, recording each peak under K for "Karakoram" and giving it a number—K1, K2, and so on up to K32. When his observations were computed in 1858, K2 was found to be 28,250 feet—the second highest mountain known. It still holds that position today.

In 1857 Montgomerie had seven new assistants, three of them military officers, appointed to assist him in his mountain work. But the young soldiers were not with him

for long. It was the year of the Indian Mutiny, which broke out at Meerut in May and was not finally quelled until 1858, and the army needed all its men to relieve besieged Delhi. Montgomerie was ordered to carry on with the survey, partly in order to show Gulab Singh that the British were confident (which they were not) of emerging victorious. But Gulab Singh was old and dying; his son, Ranbir Singh, would succeed him as Maharajah and might conceivably decide to hurl the Kashmiri forces against the British. Montgomerie had to stay in Srinagar and do what he could to influence the old man's heir towards maintaining the British alliance, and for four months this surveyor-turned-diplomat held the fate of an Empire in his hands—not, one imagines, with any enjoyment of the responsibility. All went well. When Gulab Singh died in August Ranbir Singh had been won over, largely through Montgomerie's personal influence. And the survey could go on.

The Mutiny, with its savage battles and terrible massacres, must have seemed very remote to the band of comrades moving their laborious "series" into the labyrinth of ice and snow, where life and death take on new meaning for men. When it was over a new assistant, an officer of the 24th Foot Regiment who had been aide-de-camp to General Reed in Peshawar, joined the survey of Kashmir. He was a skinny but very tough young man named Godwin-Austen, and his one desire in life was to explore among high mountains. Montgomerie, whose triangulation was now nearing the Karakoram, sent him off in charge of a plane-table survey of the western part of the great range, a job which was to occupy two years. Godwin-Austen brought back more than a completed survey. He had found and explored several immense glaciers, one of them—the Baltoro glacier—thirty-six miles long and another, the Biafo, combining with the Hispar glacier to form one long passage of ice extending for seventy-six miles.

No glaciers approaching this size had ever been seen before. Moreover, by way of the Biafo glacier Godwin-Austen had climbed into the upper ice-world immediately under K2 and sketched the topography of the great mountain; he had crossed several 16,000-foot passes, discovered and mapped new glacier regions, and climbed a number of lesser but difficult peaks to take his observations. This and his later explorations were to make him widely known as a great explorer and climber. He was not (as we shall see) the first mountaineer to climb in the Himalaya—indeed, he had no knowledge of Alpine techniques—but he has been called the greatest mountaineer of his day. Twenty years after his Karakoram exploration it was proposed at a meeting of the Royal Geographical Society in London that the second highest mountain in the world should be named after him; though the proposal was turned down, K2 is still sometimes called Mount Godwin-Austen.

With the end of the Mutiny more surveyor officers could be spared for work in the mountains, and in 1860 Montgomerie had fourteen assistants in addition to his devoted little army of *khalassis*. Six of the British surveyors were used for triangulation, the rest for plane-tabling. The triangulators operated as the spearhead of the advance, pushing forward into the unexplored ranges to select their stations, building cairns on crest and summit, taking theodolite observations, and preparing the outline sketch which the plane-tablers would use. The latter, a second wave of attack, took their plane tables to the stations and filled in detail with "rays" to as many landmarks as they could see.

As many as they could see—those were words of great moment to the surveyors. They were working on the unmapped mountain frontiers between Baltistan and Chinese Turkestan on the north and between Ladakh and Tibet on the east, where the weather at high altitudes could produce impenetrable cloud for days on end. Often they camped for

a week on the snow of a summit higher than Mont Blanc, with heavy snow falling; only the packing of the snow round their little tent, almost burying it, kept them from freezing to death. Another time it might be a rock peak that had to be climbed to their chosen station, its cliffs and screes quivering in blazing sunlight; they might have to hew a track out of a shale precipice so that the heavy theodolite, slung from a pole between two *khalassis*, could be carried to the top. On the Ladakh border there was a change from mountaineering, for here—though they were still more than 12,000 feet above the sea—they were on the northern fringes of the Himalaya where huge barren valleys held lakes hitherto unseen by explorers, and the camping places of nomad tribes made them feel in touch with human life again.

Montgomerie, making a tour of many weeks to inspect his triangulators at work, found a party of them in the Rupshu mountains, by a newly-discovered lake. "The Cho Morari lake," he wrote, "is a splendid sheet of water twenty miles long. Rupshu consists of a series of lakes, which have become more or less salt. Fuel gets scarcer and scarcer towards the Chinese frontier, and near the frontier nothing except cow-dung was to be had. The greatest care was necessary to select a place for encampment where Tartars had formerly been."

The survey parties, having no flocks and herds with them, had to disobey a great unwritten law of the high deserts, for throughout a vast area as big as Europe the sole fuel for cooking and heating was dried animal-dung, and it was understood that at each established camping-place a wandering party would leave behind as much fuel as they burned. Doubtless the surveyors were very glad to get back into the forested mountain-glens where their cooking-fires could burn with the sweet scent of pine or deodar wood instead of the pungent, eye-watering smoke of the desert fires.

Beverley, Scott, and Neuville, Ryall and Melville, were the names of these adventurers; forgotten now except in the dusty records of the Survey. They lived a life as hard and exciting as that of any Antarctic explorer or famous mountaineer, and more varied. One month they might be shivering on a snow-ridge 18,000 feet above sea-level, the next sweltering in the flowery thickets of a river gorge, the next gazing across limitless brown deserts from a camp by a great salt lake. And the blank spaces of the Map were slowly but surely filling with significant lines and colours.

While Godwin-Austen was exploring the Karakoram glaciers and the triangulators and plane-tablers were busy in Ladakh and Baltistan, the indefatigable Johnson—the D'Artagnan of the Survey—had not been idle. Johnson was a surveyor first and all the time; but it seems impossible to doubt that the excitement of mountain-climbing had gripped him by the time the Kashmir survey was half completed. Twice, on his survey of the mighty snow-crests bordering the Spiti valley, he observed from a height of 19,900 feet, and in 1861 he set up his theodolite more than 20,000 feet above the sea. In the following year he climbed seven times above 20,000 feet. Yet it was one of his Indian assistants who went highest of all. This man, a *khalassi* employed by the Survey at a salary of six rupees (about twelve shillings) a month, carried a signal pole to the summit of the Shilla peak, 23,050 feet. He did not know how high he had climbed, and his name is not recorded; but for twenty years that *khalassi* held the world's altitude record. Oddly enough, Johnson himself was to claim, erroneously, to have reached a higher summit on the adventure that ended his career as a surveyor. But that was five years later, when the Kashmir survey was finished.

Meanwhile, Johnson's surveys had reached the Bara triangulations in 1851. Now, after many years of work Lacha La, the Himalayan pass that marked the limit of

covering hundreds of miles of the most difficult country in the world, two sets of calculations touched each other and the proof of their accuracy could be made. The result was little short of miraculous. The discrepancy in latitude calculation between the two was 0.63 of an inch—64 feet of actual ground—while the difference in calculation of the height where the two systems met was one foot. It was a triumph for Johnson and his comrades.

There were still, however, two last frontier areas to be surveyed before Montgomerie could announce the completion of his task: the north-western mountains bordering on Gilgit, and the north-eastern frontier, with the desert land of Khotan in Chinese Turkestan, beyond the Karakoram. Both frontiers were closed to British surveyors. Ranbir Singh, the Maharajah, had been engaged in a minor war against the wild tribesmen of Hunza and Nagar in Gilgit, and now, though his troops were in occupation, he refused to allow ingress to the British; a small party of foreigners wandering about in those savage lands risked capture and death. The Khotan frontier was trebly forbidden. Khotan was a state whose Khan was continually at war with his neighbours; China had an eye on this distant dependency; and Russia was watching with increasing jealousy over British activities along the northern Himalayan borderlands. While a survey party worked up to the Gilgit frontier, Montgomerie sent Johnson with an assistant, Clarke, to fill in the north-eastern blank. "You will cover," ran his orders, "all the Maharajah's territories east of longitude 78° and north of latitude 33°45′, and fix as many points as possible in Chinese Tartary towards Ilchi, the capital of Khotan. You must be careful to prevent all collision with the Chinese Tartars on the common boundary."

This expedition was Johnson's introduction to the great mountains of the Kunlun, a range stretching for a thousand miles from the Pamirs eastward to the Tsaidam De-

pression of the desert plateaus. Through this range, or series of snowy crests, ran the forbidden frontier. Johnson took his theodolite to many high points, the average height of his stations being 19,800 feet, and fixed the height of one of the Kunlun peaks as 23,890 feet. Very likely he longed to climb that glittering pinnacle of snow—to go higher than he had ever gone before. But it rose beyond the frontier; and he was a surveyor under strict orders.

With the results of the two final expeditions in his hands, Montgomerie could announce in November 1864 the completion of "all survey of the dominions of His Highness the Maharajah of Kashmir and Jammu". But Johnson's report of the huge Kunlun range had aroused his interest. It should be possible, he thought, to observe more of the peaks and ridges of the Kunlun from stations on the Kashmir side of the frontier, and so add yet a little more to the Map. He asked the Surveyor-General that Johnson should be allowed to travel again to the frontier for the purpose of fixing points and sketching detail in "that vast terra incognita". Permission was given—subject, of course, to the firm proviso that the frontier was not to be crossed—and Johnson set forth with a few native assistants in July 1865. In Leh, on his way to the frontier, he found an emissary from the Khan of Khotan awaiting him. The Khan had learned of the British surveyor's journey and invited him to visit Ilchi, capital of his domains. The emissary and his escort would guide him safely through the Kunlun range to Ilchi.

There was no time to ask permission to accept this invitation; in any case, as Johnson well knew, it was certain to be refused. A British "agent" crossing into Khotan might easily lead to trouble with China or Russia or both. Moreover, the ruler of Khotan was a rebel against the feudatory power of Imperial China. In spite of all this, the chance of crossing the Kunlun, taking new observations of peaks and perhaps climbing some of them, impelled Johnson to disobey stand-

ing orders. He accepted the Khan's invitation and crossed the frontier into Khotan. When he got back to Leh in December after five months' travelling he had completed a remarkable journey, nearly all of it through wholly unknown country. In addition, he had climbed, and fixed the heights of, two hitherto undiscovered Kunlun peaks, charted as E57, 21,757 feet, and E58, 21,971 feet. Also—and herein lay the seeds of long controversy—he claimed to have ascended the big peak he had seen three years earlier. E61, 23,890 feet, would have been the highest summit ever reached by man, if Johnson had indeed climbed it. Unhappily, an examination of his survey work at Dehra Dun showed that this part of his map was wrongly plotted, throwing out all his positions and heights; whatever peak he had climbed, it was not as high as 23,000 feet.

Nor was this Johnson's only disappointment. He had expected (rather optimistically, one feels) to receive some sort of official reward for his great journey of exploration back and forth across the Himalaya through unknown territory. Instead he received an official rebuke. Mountaineers in England supported his claim to have ascended E61, the Royal Geographical Society gave unstinted praise to his courage as an explorer, but these counted as nothing in Johnson's view beside the fact that his own Survey had—as it were—disowned him. He resigned from the G.T.S., and accepted Ranbir Singh's offer of the governorship of the Maharajah's province of Ladakh, with a salary three times the amount of his surveyor's pay. A few years later William Johnson, Governor of Ladakh, died by the knife of an assassin.

Captain Montgomerie must have lamented the loss of his skilled and daring assistant. The quarter-inch map of *Jammu, Kashmir, and Adjacent Countries* was completed at Dehra Dun, lithographed in London, and admired by geographers all over Europe. But Montgomerie was far from content. The Kashmir Survey had put only one-third of the

Himalayan barrier "on the map", and the huge blank spaces of the other two-thirds behind the inviolable mountain-mazes of Nepal and Bhutan challenged and tormented him. Johnson was the sort of man who might have jumped at the chance of secret journeys into these forbidden lands. And though Montgomerie could not have given him official sanction or protection he would no doubt have connived at such journeys, for both he and Johnson saw no valid reason to leave the riddle of the snows unsolved merely because the snows happened to be on the other side of a man-made frontier.

Fortunately for Montgomerie's illicit ambitions, the Superintendent of the Great Trigonometrical Survey in 1865 was of the same way of thinking. General J. T. Walker (whose influence had saved Johnson from Government wrath) was a man who saw the word *UNMAPPED* on the charts as a challenge that must be accepted at all costs. He and Montgomerie conferred together and agreed that there was only one way of getting what they wanted. They sought out a certain Major E. Smyth, who was the British Education Officer in Kumaon.

* * *

8 - *The Pundits*

MAJOR SMYTH of Kumaon, one of a number of Education Officers in British India, was a symbolic figure. He symbolized a failure; it would be only fair to call it a gallant failure. The British idealists (and there were many concerned with Indian affairs in the 1850's) had thought to unify British and Indian ways of thought by means of education in English language, literature, and science. Long before the Mutiny in 1857 a start had been made with the help of large government grants. In the Bombay Presidency alone there were ten government schools; universities were established in Calcutta and Madras, village schools—at the other end of the scale—were being provided with English-speaking native teachers, who generally bore the title of *Pandit*, pronounced (and anglicized) as Pundit. The majority of middle-class and upper-class Indians were strongly in favour of this all-English education, perhaps because they foresaw its immense commercial advantages. On the other hand, the missionaries, whose schools had 30,000 pupils by 1854, saw it as a means through which "Indians now engaged in the degrading and polluting worship of idols shall be brought to the knowledge of the true God," as their statement declared. The government looked askance at the missionaries, for its own policy was one of non-interference with Indian religions. All the same, the British opinion was that only a western education was needed to convince both Hindus and Moslems that their religions were false and de-

graded; an opinion exemplified by the great educationist T. B. Macaulay when he wrote that in thirty years' time there would not remain a single idolator among the respectable classes in Bengal.

This attitude displayed an unpardonable blindness to the central fact of Indian life: its permeation, in every aspect, by the native religions. The result was that although Indians welcomed the educational and other social services developed by their new overlords, they increasingly feared and hated the undermining of their religion which inevitably accompanied these benefits.

In a sense, the altruistic rulers of British India before the Empire were striving—like the men of the Survey—towards a forbidden frontier, the frontier where the minds of Indian and Englishmen would be as one mind. They thought, mistakenly, that the only barrier to be overcome was Ignorance. When they had begun to cross that barrier they perceived, with a terrible shock, that the hoped-for frontier was out of reach; and from that time forward there was an end of trust between the two races and the beginning of a new relationship—servant and Sahib. The shock was the Indian Mutiny.

The spread of western method and organization was continually coming up against native religious observances. The complicated business of *caste*, in particular, must have appeared both ridiculous and infuriating to English officers and officials, and no doubt they displayed their dislike of it. To a Hindu, the breaking of caste dooms him to a far worse Hell than any Old Testament *gehenna*. A widespread rumour was current among the sepoys that their leaders were determined to get rid of the caste system.

It was the issue of Enfield rifles (in place of the old Brown Bess muskets) that carried the seeds of open revolt. The cartridges for these rifles had greased ends which the soldier had to bite off before they were loaded; one consignment of ammunition, to the Bengal army, was suspected (possibly

with justification) to be greased with pig or cow fat—the cow being sacred to Hindus, the pig unclean to Mohammedans. The consignment was at once withdrawn, but it was too late. The Bengal army mutinied and killed their British officers and the officers' wives and children. Other regiments mutinied in sympathy, and were backed by all the discontented elements in India—dispossessed princes, traditionalists who wanted the old anarchy back again, mobs whose only aim was loot and killing. Sikhs, Punjabis, and Pathans stood by the British. The fighting continued in siege and massacre for two years. And when it ended with a general amnesty the British emerged as conquerors instead of what they had fondly hoped to be—founders and helpers of an Indian nation. In the following year the East India Company was at last relieved of its responsibilities and the Crown, represented by a Secretary of State in London, took over the rule of India.

The red record of the Mutiny and its postscript of changed relationships did not greatly disturb some of the British activities. The Great Trigonometrical Survey, as has been noted, went on pushing its bold explorations into the snowy ranges until the map of Kashmir was complete. In the British-administered provinces the Education Officers pursued their tours of duty. In Kumaon, the Himalayan province west of Nepal, Major Smyth was known as the "father" of many tiny schools in the remote mountain villages. He was a great traveller, and admired the fine qualities of the Kumaon Bhotias, a race of Mongol origin who had long ago crossed the Himalaya. When he was approached by Montgomerie and Walker of the G.T.S. Major Smyth gave enthusiastic support to their project. He had the very man for them—Nain Singh, a young schoolmaster of Milam village. This young Bhotia, first and greatest of the pundit explorers, jumped at the chance of adventure when it was offered him. He was to exchange the dull routine of

schoolmastering for the life of a secret agent for whom discovery of his purpose meant death.

The transfrontier maps—central Asia north of the Himalaya—were almost complete blanks. Within the frontier there were other blanks: Gilgit and Chitral in the Hindu Kush region, much of Himalayan Nepal and Bhutan. Except for a few past journeys, Central Tibet was entirely unknown and unmapped. The courses of the great Asiatic rivers had still to be discovered, thousands of miles of mountain ranges awaited survey, and the locations of important places such as Lhasa, Yarkand, and Kashgar, were known only to within the nearest 200 miles.

The Government of India had repeated its strict order that the frontiers of independent states were not to be crossed by British surveyors, and the 1,500-mile mountain frontier with Tibet was closed by standing order of the Emperor of China —"no Moghul, Hindustani, Pathan or Feringhi shall be admitted into Tibet on pain of death". Montgomerie's plan to overcome these obstacles was to train Indians as surveyors and send them, in disguise, on survey journeys into the unknown lands. Their purpose and their connection with the British would have to be kept absolutely secret, not only beyond the forbidden frontiers but also in their own country. For "the Great Game" was on. Russia, perhaps seeing her opportunity in the Mutiny, had her own secret agents among the frontier peoples and her disguised explorers probing the Himalayan passes. Russian expansion southward into Central Asia could conceivably be the initial move towards invasion of India, and the British army commanders received their information of the latest Russian movements through native traders who could pass freely and unsuspected across the frontiers. An Indian discovered to be acting for the British Government, though he claimed to be merely an explorer, would certainly be considered a spy and treated as such.

This was the era and the setting of Rudyard Kipling's *Kim*. It will be remembered that the Pathan horse-dealer Mahbub Ali, in the book was a secret agent for the British. Kipling's character Hurree Babu, the fat Bengali adventurer, was based on a real Pundit explorer named Sarat Chandra Das who worked for the Survey of India. But Sarat Chandra Das—"S.C.D." of the Survey records—did not operate until fifteen years after Nain Singh's first secret journey.

Nain Singh's cousin Mani Singh was recruited with him and the two men were brought to Survey headquarters at Dehra Dun for training. They spent nearly two years here learning practical reconnaissance and route survey—how to use sextant and pocket compass, how to recognize the stars and observe them, how to take heights by thermometer and how to keep records. The later Pundit explorers were trained in the same way. Montgomerie had arranged for them to be paid from 16 to 20 rupees a month, with a final reward depending on the success of their work. They were to choose their own disguise, and would be supplied with merchandise or medicines according to the character they decided to assume. Their instructions were to be interpreted broadly and carried out according to the circumstances in which they were placed. Nain Singh was referred to in the Survey records as "Number One", or simply "the Pundit", and Mani Singh was known as "G-M".

Montgomerie thought the most fruitful journey would be a route survey through Nepal right to Lhasa in Tibet, and in 1865 the two cousins set out to make this journey. They had agreed to use two "cover stories": the first, to enlist the sympathy of the Nepalese, was that they were travelling to Lhasa to recover money for some Bhotias of Kumaon who had recently been robbed while on Chinese territory; the second, for use in Tibet, was the more risky tale that they were Tibetan lamas on pilgrimage. Quite early in their

adventure the two became separated, and Mani Singh was unsuccessful in his several attempts to cross into central Tibet. Instead—and this was typical of the devotion of the Pundit explorers—he carried out, on his own initiative, a route traverse to Gartok in western Tibet and back.

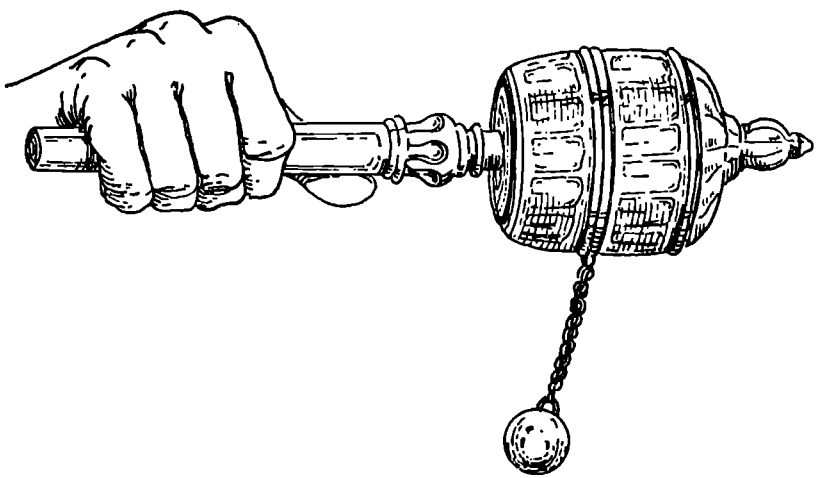
Meanwhile Nain Singh had approached the Nepalese frontier below the Gya La, a high pass over the Himalaya. At the last village below the pass a party of traders was gathering to cross with pack animals and loads of merchandise, and the leaders agreed to include him in the caravan and provide him with food in return for most of Nain Singh's slender funds, which were duly handed over. The headman of the village, however, refused to let the Pundit pass when he heard that he was making for the forbidden city of Lhasa; perhaps he feared Tibetan reprisals for allowing one who was not a native of Nepal to cross the frontier. In the end, he let Nain Singh go—but only after making him sign an agreement that should he be found to have visited Lhasa his life would be forfeited. So over the high bleak snows of the Gya La plodded "Number One" in the wake of the stumbling, shouting file of men and yaks and ponies. And all the way he counted his paces and surreptitiously kept the record in his Field Book.

Very soon after the crossing of the Gya La the traders managed to give Nain Singh the slip and vanished into the tortuous valleys with his money. Fortunately they did not steal the box he was carrying with him. This box had a false bottom, beneath which were concealed the instruments essential to his work—sextant, thermometer, prismatic compass, and pocket chronometer. There were also some sealed cowrie shells containing mercury; these were to be of special value when he reached Lhasa, as will be seen. He still retained the appurtenances of a Tibetan lama, which was the disguise he now adopted. Prayer-wheel, rosary, and hardwood begging-bowl were all that was necessary, for it was

midwinter on the Tibetan plateau and bulky sheepskins clothed every man who wished to avoid death from the bitter cold, whether he was a Nepalese trader or a pilgrim lama.

Nain Singh traced the high caravan route through the snowy wastes towards Lhasa, barely keeping himself alive and existing for many days on the scraps placed in his begging-bowl by the rare parties of travellers he met. At length he fell in with a caravan of merchants from Ladakh who were going to Lhasa by way of Lake Mansarowar, a long way round which had been enforced (they told him) because the direct route to Lhasa was forbidden. Nain Singh was determined to stick to the course he had been told to follow. After a day or two with the Ladakhi men he feigned sickness and was left behind, so that he could diverge from their track and hold on straight for Lhasa, tramping alone across the treeless deserts 15,000 feet above sea-level.

As he tramped, Nain Singh "told the beads" of his rosary, as a good Buddhist monk should do. It was a special rosary. Instead of the 108 red beads of the usual Buddhist rosary there were 100, and every tenth bead was slightly larger than the others. By dropping a bead on the string at every 100 paces counted, he measured 1,000 paces with the dropping of each large bead. At Dehra Dun the Pundit had practised assiduously until he walked a mile in 2,000 paces, a pace of about 31½ inches; on rough steep ground he could maintain a pace of 31 inches, which lengthened to 33 inches on the rare stretches of perfectly flat ground, and the bead-pace method proved amazingly accurate. When he was walking with the Ladakh caravan he usually twirled his prayer-wheel continuously in his right hand while fingering his rosary with his left—a normal custom of lamas on pilgrimage. Since everyone understood that a lama was engaged in prayer when his wheel was revolving, this enabled him to avoid conversation with his fellow-travellers and concentrate on pace-counting.



The prayer-wheel was about ten inches long overall, a hollow drum revolving on a carved wooden handle. Inside the drum, which was some three inches in diameter and made of ivory set with turquoises, there was normally a slip of parchment bearing the words *OM MANE PADME HUM*—the sacred Buddhist prayer "Hail, Jewel in the Lotus-flower." A small lead weight on a chain helped the drum to be spun continuously with a slight motion of the wrist, the prayer ascending to Buddha at each revolution. Nain Singh's prayer-wheel, however, was what might be called "G.T.S. pattern." The drum contained the coiled paper slips for his records of bearings and distances, and in the demountable top of the wheel was a compass. What would have appeared as blasphemy to a Buddhist was of no moment to the Pundit, who was a Hindu.

On January 10, 1866, after climbing over the high Karo Pass, crossing several frozen rivers, and narrowly escaping capture by bandits, Nain Singh reached Lhasa, where he was to stay for more than three months. No crowded *caravanserai* would serve for the secret work he had to do here, and he had no money to buy the privacy he required. Seeking out the chief merchants of Lhasa, he undertook to teach them the improved methods of keeping accounts practised by the Hindu traders; and with the fees paid for this teaching he was at length able to hire two small rooms at a better-class inn. It was at this time that he chanced to witness the public beheading of a Chinese traveller, and learned that the man had been convicted of arriving in Lhasa without permission.

Nain Singh went coolly on with his present task of placing Lhasa on the map of Asia. He used a succession of astronomical observations, which he took at night and in secret. The contents of the sealed cowrie shells could at last be used, in conjunction with the hardwood begging-bowl which—like the prayer-wheel—had more purposes than one.

Since it was impossible to transport the plate of black glass for an artificial horizon on such a journey, Nain Singh used as an alternative a bowl of mercury. In the begging-bowl, whose deep sides prevented interference from the wind, the mercury from the cowrie shells made a perfectly level reflecting surface. He would climb out of his window on a clear starlit night with bowl and sextant and select the appropriate stars, observing their altitudes in the same way as the sun's altitude is taken with a black-glass horizon.* His chronometer gave him the precise time of the observation. With his thermometer and a stove for boiling water he could make a near calculation of his height above sea-level. When the results of his work were computed a year later the geographical position of Lhasa was fixed exactly for the Survey. Its height above the sea, which Nain Singh's boiling-point method gave as 11,400 feet, is today known as 11,800 feet.

This task accomplished, the Pundit had to make his way back to base on the other side of the Himalaya—a journey of something like eleven hundred miles. At the outset he was lucky. The Ladakh caravan he had previously encountered on the Mansarowar route was preparing to depart after finishing its business in Lhasa. Nain Singh left with it on April 21st, still in his character as Tibetan lama. For two months they travelled westward through the barrens, following about 500 miles of the course of the great Tibetan river Tsangpo, until the snow-peaks of the Nepal Himalaya rose nearer in the south-west.

Nain Singh (who had of course said nothing of his real destination) left the caravan secretly at night and began his lone climb towards the frontier. Not daring to cross it by the Gya La—on the south side of which his life might be claimed as forfeit—he crossed a snow pass whose name was unknown to him and got safely down into Nepal. At the first village he was seized and imprisoned as a suspicious

* See page 72.

character, a Tibetan making illegal entry. But the villagers were Bhotias like himself, and when he had persuaded them of his real identity he was able to travel on to Katmandu. Here he was joined by Mani Singh, who had waited for him after completing his Gartok route survey, and together the two cousins finished their travels, arriving at Survey headquarters on October 27th. They had been absent for twenty-one months.

Nain Singh's journey had been triumphantly successful. In addition to establishing the position of Lhasa he had made a detailed survey of 1,200 miles including the trans-Himalayan trade route from Nepal, recorded 31 observed latitudes at fixed points, calculated 33 heights, and traced the course of the Tsangpo river for nearly 600 miles.

The Government of India willingly agreed to the training and employment of other Pundits, and for the next twenty years a dozen or more Indian explorers, hardy and courageous men who always volunteered for their tasks, were engaged in secret surveys on both sides of the Himalayan frontiers. Nain Singh himself made several more fine journeys, on the last of which he traversed the whole length of Tibet and discovered a vast snowy range (the Nyenchindangla Mountains) north of the Tsangpo river.

By the time he retired the name of Nain Singh—no longer "Number One"—was known to all European geographers. He received a gold watch from the Geographical Society of Paris and the Gold Medal of the Royal Geographical Society, being described in the proposal for the latter as "a man who has added a greater amount of positive knowledge to the map of Asia than any individual of our time".

If Nain Singh was the most notable of the Pundit explorers, the example and preceptor for those that followed, it was Kishen Singh who performed the most notable journey of all. Kishen Singh was another of "Number One's"

cousins. Known as "A-K" in the records of the Survey of India, and using the pseudonym "Krishna", this bold explorer made several survey journeys in Tibet and Chinese Turkestan, the most famous of which was the last. He set forth in April 1878 with two assistants to reach Lhasa and make a route survey northward across Tibet to China. This route took him through the wildest country imaginable, still stated in modern encyclopaedias to be "largely unexplored": across the 20,000-foot range of the Nyenchindangla discovered by Nain Singh twelve years earlier, over the vast plains—nowhere less than 16,000 feet above the sea—where the Tengri Nor lake spreads its 950 square miles of water; country where there was no law except the law of the sword.

"A-K" and his party vanished into these wastes. Two years passed without any news of them. When three years had gone by and they had not come back all hope of their return was abandoned. But in early 1884 Kishen Singh arrived in India again, after nearly six years' absence, with his task—and more than his task—accomplished. He was so emaciated that he had to have prolonged hospital treatment. After suffering unprecedented hardships and privations, he had been robbed by a band of nomad thieves and deserted by one of his assistants who absconded with everything the robbers had left, including the baggage animals. Kishen Singh still had his concealed survey instruments and one faithful assistant, Chumbel. He and Chumbel pushed on across those endless wastes, somehow keeping themselves alive in conditions that would have killed any European. They reached Shachow on the north-west confines of China and returned through unexplored territory on the China-Tibet border, bringing back a wealth of accurate information based on careful sextant latitudes and compass traverses.

Hari Ram—"M-H" or "Number 9"—was an explorer whose work was concentrated on the Everest region of the

Nepal Himalaya. At a second attempt (the first ended in his ignominious expulsion by suspicious Nepalese) he made a year-long journey circling right round the Mount Everest group of peaks and establishing the positions of many ridges and glaciers. Hari Ram was so hemmed in at all times by giant peaks, however, that he did not see Everest itself at close quarters. Not until the first climbing expeditions approached Everest was the route to the great mountain explored. There were other notable Hindu explorers, among them Lala (L) and Nem Singh (G-M-N). But though all these Indian adventurers were called Pundits, a term strictly applicable to Hindus only, some of them were Mohammedans.

The Mohammedan Pundits were no less brave and skilful than their Hindu comrades, but they were naturally used in explorations of the North-West Frontier lands, where they could pass as traders or mullahs (holy men) among men of their own religion. The same mystery did not attach to Afghanistan and Chitral as to Tibet and Chinese Turkestan, but results of great geographical importance were achieved, often at grave personal risk. One of the best men, Mirza Shuja ("the Mirza") was murdered by his guides during his second survey expedition towards Bokhara. Another, Ata Mahomed or "the Mullah", became famous beyond the confines of India when he traced the unknown course of the River Oxus in 1878. His work was in fact a continuation of the first exploration by a subordinate explorer named Abdul Subhan, widely known as "the Munshi", who made—alone —a great journey down the Oxus, following it through the totally unknown districts of Shighnan and Roshan to its confluence with the Murghab river in the wild hills of Badakshan.

These Pundits, Hindu or Moslem, were literate men of the highest intelligence. Humbler assistants played their part in the exciting work, and with equal devotion. No

service can produce a finer tale of loyalty and devotion to duty than the story of Kinthup.

It was in 1880 that Captain H. J. Harman of the Survey of India resolved to try and solve a great geographical problem. Data brought back by Nain Singh from his Tibetan journey of 1865-6 had hinted that the Tsangpo, the great river that flows for 1,000 miles along the northern flanks of the Himalaya, might just possibly be the same stream as the 800-mile-long Brahmaputra that traverses the Indian plain to the Ganges delta. If so, the Tsangpo must cut clean through the Himalaya by a series of the mightiest gorges in the world, more than a hundred miles of them. The gorges would be inaccessible, but proof could be obtained if something identifiable could be sent downstream to emerge in the Brahmaputra. Captain Harman trained a Chinese lama living in Darjeeling for this task. The lama was to get into Tibet, follow the Tsangpo downstream as far as possible, and then throw into it five hundred logs, each one foot long, at the rate of fifty a day for ten days. A watch would be kept where the Brahmaputra made its first emergence from the mountains. As servant the lama was given a Sikkimese named Kinthup employed by the Survey, who could neither read nor write.

Master and servant set off on their long journey. It was soon evident to Kinthup that Captain Harman had made a grave mistake in selecting the lama, who lingered all along the route to enjoy himself at Government expense and took eight months to reach the northern side of the frontier. Also he treated his servant with brutality and neglect. But the man served him loyally. Years afterwards Kinthup made a verbal report which was translated into English by a *babu* of the Survey. Here is an extract from it:

"March 1881. Travelling onward to Bumkingyog they counted there ten houses and spent two days collecting provisions; after which they returned to Thun Tsung where

they stayed for four months. The detention was owing to the Lama falling in love with his host's wife. Finally the state of affairs between the wife and the Lama became known to the host and the Lama had to pay Rs. 25 in compensation, an arrangement which was effected by Kinthup with great difficulty. They started from Thun Tsung on March 6th, 1881 and after travelling about twelve miles they slept the night on the banks of the Tsangpo."

This very unpriestlike lama was accustomed to get drunk whenever *chang* or *rakshi* was to be had, and he ended his disgraceful treatment of Kinthup by selling him as a slave to the *djongpen* or headman of a Tibetan village. He then vanished from the ken of all concerned, taking with him the instruments belonging to the Survey.

Kinthup did hard and menial work as the *djongpen*'s slave for nearly eleven months—from May 24th, 1881 to March 7th, 1882, as his phenomenal memory recorded—and then made his escape. The village of his slavery was in the foothills where the Tsangpo river approached the Himalayan barrier, and when he was clear of the village he hastened on downstream. For Kinthup knew the purpose of this journey. In his simple view, the defection of the lama had shifted the responsibility for achieving that purpose to his own shoulders. He was going to throw those five hundred logs into the Tsangpo if it was humanly possible to do it.

The *djongpen* was a thrifty man who had paid good money for his slave, and he did not intend to lose him. With some of his villagers, he gave chase. Kinthup was in sight of the monastery of Marpung when he heard the pursuit behind him, and he reached the gates of the monastery with the *djongpen* almost on his heels. He had just time to surrender himself to the Grand Lama of Marpung, a good soul who took pity on him and paid the *djongpen* fifty rupees for Kinthup.

So Kinthup became for a time a novice monk, doing the

humbler services of Marpung monastery. At the end of four months he asked leave to go on a pilgrimage, and it was granted. But he spent his "pilgrimage" in cutting the five hundred one-foot logs according to Captain Harman's orders and carrying them to a deep cave above the Tsangpo. Then he returned to Marpung and served for another two months before asking once more for leave to go on pilgrimage—to Lhasa, this time. Again it was granted. And Kinthup journeyed to Lhasa, where his one object was to find a professional letter-writer. For Lhasa was the only place from which a message might possibly be sent across the passes into India.

It was many months before Kinthup's letter, addressed to the Chief of the Survey of India, was delivered to the Survey interpreter at Darjeeling and by him translated into English:

"Sir: The Lama who was sent with me sold me to a Djongpen as a slave and himself fled away with the Government things that were in his charge. On account of which the journey proved a bad one; however, I, Kinthup, have prepared the 500 logs according to the order of Captain Harman, and am prepared to throw 50 logs per day into the Tsangpo from Bipung in Pemako, from the fifth to the fifteenth day of the tenth Tibetan month of the year called Chhuluk, of the Tibetan calculation."

As he had written, so Kinthup did. But his letter arrived too late. For two years a watch had been kept below the Brahmaputra gorge, but more than two years had gone by since the departure of the lama and his servant and Kinthup's five hundred logs came unobserved through the hundred miles of mountain barrier. For, as was afterwards proved, the Tsangpo was indeed the upper course of the Brahmaputra. Kinthup crossed the range back into India in November 1884, reaching Darjeeling four years after he had left it. His story was told and believed. And a little later

he was taken by the Surveyor-General himself to Simla, where the Viceroy of India honoured and rewarded him for his devotion.

The era of the Pundit explorers was at an end; and the new era in India had already begun. Nain Singh had been made a Companion of the Indian Empire after his Survey adventures were over, for this was now part of an Empire ruled over by a Queen-Empress, Victoria, who had been on the throne of England since 1837.

* * *

9 - *Mountaineer Explorers*

INDIA IN the last decade of the nineteenth century was very different from the India of James Rennell's day or even of Sir George Everest's. Instead of the barbaric and almost legendary land Rennell had seen there was now a fast-growing commercial power on the Western model; instead of the three-months' voyage that brought Everest from London to Bombay it was now only three weeks to India via the Suez Canal. India was a colourful appanage of Britain. So crowded and continuous was the passenger traffic to and from England by steamer that the regular booking of the wealthier Anglo-Indians—Port Out, Starboard Home—enriched the language with a new descriptive word, *POSH*. In one hundred years India had undergone a great social revolution, imposed from above (as it were) by the British Raj.

The Mid-Victorian era saw Britain reach the height of her power and prestige. In world politics she was chief arbiter. At home a flood of new invention and scientific discovery poured in, rising too swiftly for the Government to cope with the social problems it brought with it. The benefits of western progress were eagerly passed on to India, now part of the Empire, a British possession. The first Indian railway was opened (with a Royal salute) only twenty years after George Stephenson's Stockton-to-Darlington line carried its first steam-drawn passenger carriages, and by 1869—the year in

which the Suez Canal was opened—four thousand miles of track had been laid. Railways speeded-up the development of India's cotton and jute industries, aided by telegraph and postal systems; the building of new ports expanded overseas trade.

British engineers were everywhere building roads and bridges and a mighty irrigation system changed the Punjab deserts into a vast grain-producing area. If the wealth of India was being extracted, by far the greater part of it was going back to benefit the Indian people, and not always with a money-making purpose. The framing of the Famine Code in 1883, for instance, required the building of thousands of miles of railway which could never show a profit, intended solely for the swift movement of supplies to relieve the perennial threat of famine. Hospitals were being established in the remotest quarters, where for centuries it had been the custom to drag the incurably sick to the nearest stream or irrigation channel and leave them there to die. Throughout three-fifths of India these and many other benefits were extended with extraordinary energy. The other two-fifths, which were not within the Dominion of the Raj, consisted of 562 "princely states" whose frontiers were fixed and whose rulers could admit British reforms and activities or not, as they pleased. In general, the far northern states—those which included the Himalayan barrier—preferred to keep out all foreigners including the British. Thus the Survey of India, thirsting to solve the last problems of the snows for its Map, seemed likely to be frustrated indefinitely. That it was not was due, in some degree at least, to the emergence among the British of a new sport.

It has been noted that the conception of sport as a challenge—the pushing-through of a human idea against Nature's odds—was one British conception which Indians found comprehensible, particularly if they were natives of the mountain territories in the north. In the ordinary com-

petitive sports of the northern frontier states young British army officers had long ago become proficient. Contests of "pig-sticking" or tent-pegging with the lance, or marksmanship with the rifle, were common ground for the two races; in wrestling there was no Indian champion so famous as Lieutenant Charles Bruce (later to lead an Everest expedition) who once threw three Gurkha opponents simultaneously. As for *pulu*, the Tibetan name for a game that originated in Persia in 500 B.C., the westerners took it up with such enthusiasm that it spread through all India and became the favourite sport of English royalty. "With the advent of the British Subaltern," wrote Algernon Durand in 1899, "the polo rules of the Hindu Kush have undergone revision and improvement." There was hardly a *shikari* of Hunza or Kashmir who had not climbed high above some Himalayan glacier to shoot ibex or markhor with a British companion. The universal British zeal for sport prepared Indian minds for the novel idea of climbing high mountains for sport, and often—though not always—unlocked the forbidden frontiers that would have been barred to avowed surveyors.

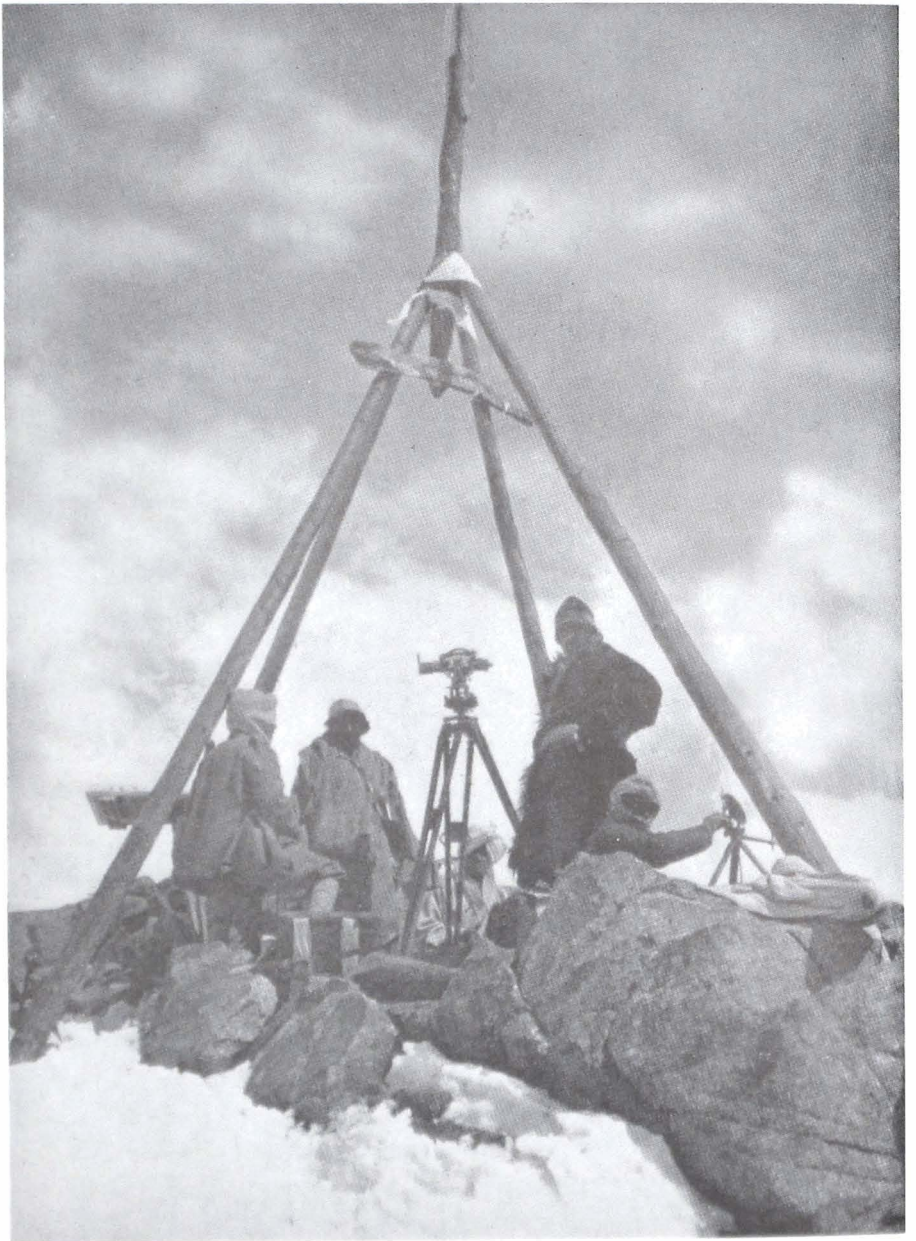
The Alpine Club, formed in London in 1854, had marked the arrival of the men who "knew what was what in the way of a recreation". These first mountaineers were either professional men with long vacations or possessed inherited wealth and unlimited leisure. Since (as the great climber A. F. Mummery pointed out) the desire to travel and explore is at the springs of the mountaineering impulse, the leisured climbers began to look further afield when all the major Alpine summits had been climbed; to the Caucasus first, where Douglas Freshfield made pioneer ascents as early as 1868, and then to the highest mountains in the world—the Himalaya. W. W. Graham was the first man to come out from England with the main object of climbing mountains "more for sport and adventures than for the advancement

of scientific knowledge", as he told the Royal Geographical Society in his 1884 lecture. Indeed, this pioneer Himalayan climber was almost alone in adding little or nothing of value to the Map. The enormous difference between Alpine climbing and Himalayan mountaineering was not understood in 1883, and Graham, in common with other British mountaineers, thought of the Himalaya as Alps on a rather larger scale. He did not realize that although many peaks were marked on the map with names and heights some survey work, if only of the sketchiest sort, was necessary in order to get to close quarters with them. He carried no instruments and made no observations for position; and as a consequence even his daring ascents were not the triumphs they should have been.

Graham was an Alpine climber of some note. He had been the first to climb to the higher summit of the Aiguille du Géant and had accomplished many of the classic "courses", as the major Alpine ascents were called. As was then customary, he climbed with two professional guides, and when he penetrated into the Kumaon Himalaya he had with him the Swiss guides Emil Boss and Ulrich Kauffmann. Kumaon, being British-administered, was accessible without trouble and 1883 was a propitious year politically; the tension of the Great Game was temporarily slackened now that British influence was predominant in Afghanistan, and across the Kumaon frontiers Tibet was not unfriendly.

Graham had for his objective nothing less than the highest mountain in the British Empire, Nanda Devi (25,645 feet). If he and his guides had succeeded in getting on the mountain they would probably have died, equipped as they were in the normal style of the nineteenth-century Alpine mountaineers. As it was, they were confronted by the terrific gorge of the Rishi Ganga, the only entrance to the high "sanctuary" where Nanda Devi stands in a circle of inaccessible ridges; and though they made a gallant attempt to get up the

PORTERS IN THE HIMALAYAS



INDO-RUSSIAN JUNCTION STATION,
SAR-BULAK, TAGHDUMBASH PAMIR, 1913

gorge they were quickly defeated. Not until half-a-century later and after several other failures was the Rishi Ganga climbed (by Eric Shipton and H. W. Tilman) and the summit of Nanda Devi reached.

Graham next made an attempt to climb Dunagiri, and estimated he reached a height of 22,700 feet on it, which was only 400 feet below the summit; but his altitudes were mere guesses, and his account of the rest of his eight-month Himalayan campaign was so full of errors as to cast doubt on all his claims. His "first ascents" of Changabang and of Kabru (24,002 feet, Sikkim Himalaya) were both proved conclusively to have been made on other and lower peaks. It was sufficiently obvious that future Himalayan climbers would need to survey their way, so to speak, to their chosen peak, and to take accurate observations of the mountain in order to be sure they had picked the right one.

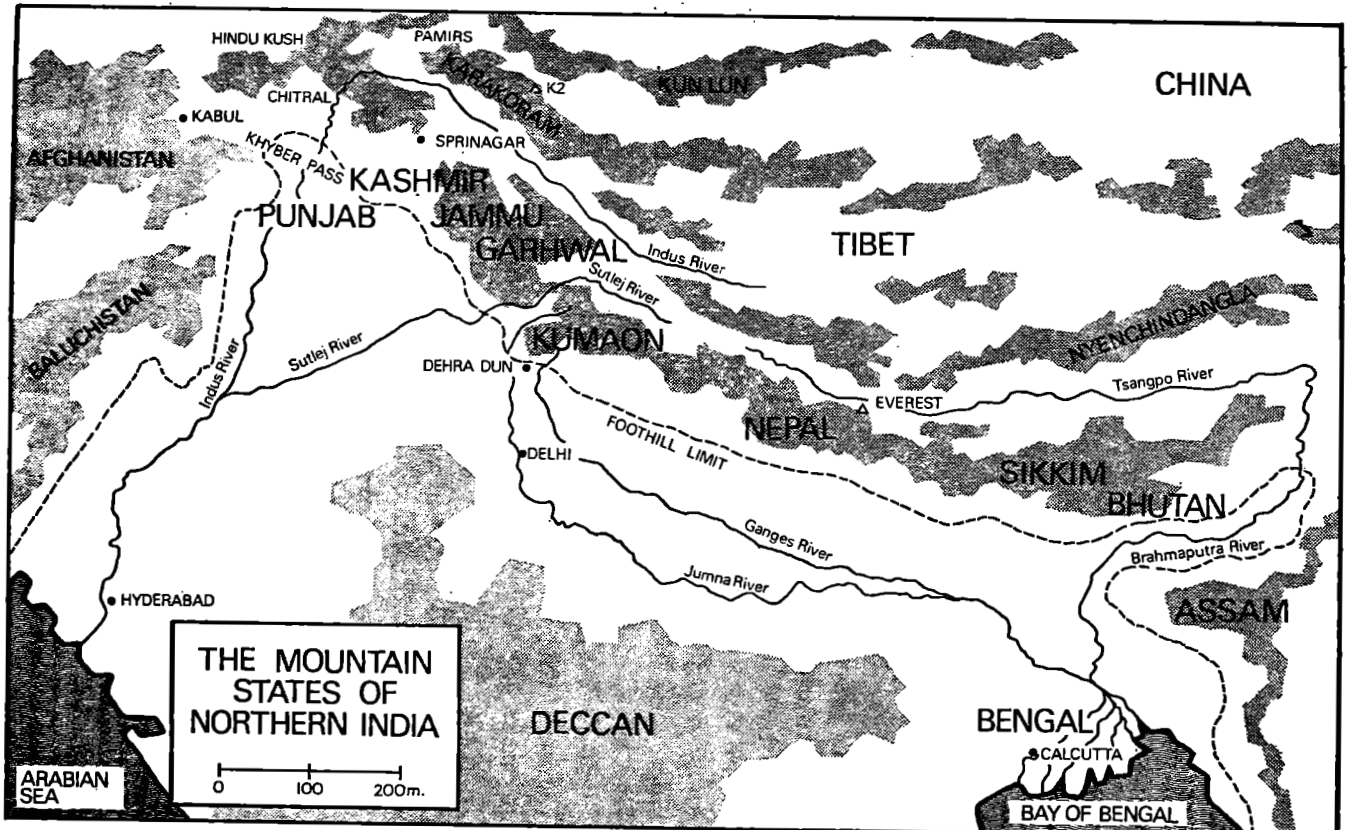
There was no immediate rush of British mountaineers following Graham's adventurous visit, though many devotees of Alpine climbing were stirred by his accounts of the stupendous Himalayan peaks. The Great Game was once again being played among the hidden valleys of the northwest. The swift expansion of the Russian Empire southward and eastward had brought its territories right to the fringes of the Hindu Kush, and the Afghan wars of 1840 and 1880 had been the direct result of the Afghan rulers' readiness to allow Russian penetration on the vital North-West Frontier. Native agents in the Great Game were continually sending information of Russian "explorers"—even of Cossack squadrons—prowling round the northern approaches to the Himalayan passes. This increased the suspicion that the great Eastern Power, Britain's rival and enemy since the Crimean War, was contemplating an invasion of India across the Himalaya. Except for the Afghanistan frontier, which had been defined by an Anglo-Russian Commission in 1885, the mountain frontiers were still de-

batable. A party of climbers intent on peaks rather than politics, making topographical errors like Graham's, could easily provoke an "incident" and lead to that war with Russia which the British government was so anxious to avoid. The need for a well-defined frontier along the whole 1,500 miles of the Himalaya was obvious. But how could a frontier be delineated when large portions of the dividing range were still unmapped?

The rigid British policy of not violating the southern frontiers of its girdle of mountain states frustrated the surveyors, but need not frustrate military missions. There was more than enough excuse for Francis Younghusband's missions of 1889 and 1890.

Lieutenant Younghusband of the King's Dragoon Guards was 24 when he made a great journey across Manchuria from Peking to Yarkand and ended it by crossing the Muztagh Pass over the Karakoram into Kashmir. The Muztagh Pass, 18,000 feet high, was a fine mountaineering feat for a young man who (like Godwin-Austen) was a born mountain traveller with little knowledge of climbing technique. Two years later, in 1887, Younghusband was chosen to lead a mission to pacify the frontier states of Hunza and Nagir, whose rulers had been raiding far and wide in every direction, robbing caravans crossing the main Karakoram Pass and capturing men and women of Kashmir for slaves. It was typical of the British Raj and its prestige that Younghusband was given only sixteen soldiers to form his "army" —six Gurkhas and ten Kashmiris. The chief culprits in the record of robbery and murder were a Hunza tribe called the Kanjutis, who had a reputedly impregnable stronghold, Darwazi, at the foot of the Himalayan passes, and to Darwazi Younghusband went, making a difficult journey of many weeks through unmapped mountains.

The stronghold was a grim and romantic fortress. Along the rim of a cliff jutting into a gorge between two precipices


HINDU KUSH
PAMIRS
KARAKORAM
K2
KUN LUN
CHINA
CHITRAL
KABUL
SPRINAGAR
KHYBER PASS
AFGHANISTAN
KASHMIR
JAMMU
PUNJAB
GARHWAL
Indus River
TIBET
Sutlej River
BALUCHISTAN
KUMAON
NYENCHINDANGLA
Indus River
Sutlej River
DEHRA DUN
EVEREST
Tsangpo River
NEPAL
FOOTHILL LIMIT
DELHI
SIKKIM
BHUTAN
Ganges River
Brahmaputra River
Jumna River
HYDERABAD
ASSAM
THE MOUNTAIN STATES OF NORTHERN INDIA
0 100 200m.
DECCAN
BENGAL
CALCUTTA
ARABIAN SEA
BAY OF BENGAL

was a loopholed wall with a tower at each end; Kanjuti muskets threatened from the loopholes and towers, commanding the narrow zigzags of the path up the cliff face. Disregarding the shouted warning that the first man up the path would be shot, Younghusband and his men climbed steadily to the iron-studded door in the middle of the wall and demanded admittance. Their boldness had won the day and they were admitted for a parley.

In his book *The Heart of a Continent*—one of the finest true adventure stories ever written—Younghusband describes the scene, which must typify many such occasions in the days when law and order were being brought to the unruly North-West Frontier: "We stood together for a long time round the fire, a curious group—the rough, hard, determined-looking Kanjutis, in long loose woollen robes, round cloth caps, long curls hanging down their ears, matchlocks slung over their backs, and swords bound to their sides; the timid, red-faced Kirghiz; the Tartar-featured Ladakhis; the patient, long-suffering Baltis; the sturdy, jovial little Gurkhas; the grave Pathan; and a solitary Englishman; met together here, in the very heart of the Himalayas, in the robbers' stronghold." Younghusband promised help and advice from the British Raj in return for a cessation of the attacks on peaceful traders; but it was undoubtedly his personal influence that swayed the balance towards agreement. Muskets were stowed away, food and drink were brought, and eventually he was provided with a guide to help him in the second part of his task.

For though the restraining of the robbers was an important purpose (the "red-faced Kirghiz" represented the traders who had appealed to the British for help) Younghusband's other purpose was equally important to the security of India. The Kirghiz were natives of the mountain territories known as the Pamirs—now the Kirghiz Socialist Soviet Republic—on the north of the Himalaya, and the

passes by which they crossed in summer with their herds of sheep and goats and horses for trading were unknown to the British. With Russian army patrols reported in the Pamirs, it was urgently necessary to discover the whereabouts of these possible invasion routes and the nature of the country near them.

Younghusband did all this and more. He explored glaciers and probed approaches to passes right through to the Yarkand river, where he encountered an exploring party of Cossack soldiers led by Captain Grombchevsky—the first meeting of Russian and English representatives on the frontiers of India. The two officers, potential antagonists on some future battlefield, camped and ate together in friendly fashion, carefully avoiding discussion of whose territory they were on. A year later, when Younghusband was further exploring the same area after a final mission of pacification to Hunza, he was politely ordered off by Colonel Yonoff, a Russian cavalry officer. Since Younghusband had no soldiers with him and Yonoff was escorted by thirty Cossacks, he obeyed the order. It was becoming increasingly evident that a map and a frontier line were urgently necessary.

The impatient map-makers of the Survey of India quickly benefited from the reconnaissance surveys of Francis Younghusband and his establishment of comparative peace on the Karakoram frontiers. Survey parties were allowed in Hunza and Nagir to fill in map detail, and Lieutenant George Cockerill of the Engineers was entrusted with a preliminary survey of the western Karakoram and eastern Hindu Kush, an area of about 12,000 square miles of the most difficult mountain country in the world. A second mountaineering expedition, seizing its opportunity in this part of the Himalaya, also contributed to the Map.

Martin Conway, a noted mountaineer who brought a party out from England nine years after Graham's visit, included surveyors, an artist, a medical officer, and an orni-

thologist in his expedition, and it was the first to receive financial support from the Royal Society and the Royal Geographical Society. Lieutenant Charles Bruce joined them, with four Gurkhas of the 5th Gurkha Regiment. Younghusband had noted the toughness of his Gurkhas during his glacier explorations, but Conway's expedition was the first on which Himalayan natives proved their mettle in Himalayan climbing. Two of the Gurkhas, Harkbir and Karbir, reached the summit of Pioneer Peak (22,600 feet) with Conway and Bruce. Conway was so impressed with their prowess that he brought Karbir to Europe two years later, to accompany him on the famous traverse described in his book *The Alps from End to End.*

This Karakoram expedition of 1892 used Godwin-Austen's Survey explorations of thirty years earlier as a basis for further exploration of the great Karakoram glaciers, the Hispar and the Biafo. Besides the first ascent of a second peak of 19,400 feet ("Crystal Peak") and the first crossings of two high passes, they completed a detailed reconnaissance map on the scale of one inch to two miles, which was of great value to the Survey of India and was published by the Royal Geographical Society. Most useful of all to future mountaineer-explorers were Conway's detailed notes on the special technique of Himalayan climbing. He had noted the effects of altitude and diet, the rates of pulse-beats, the use of crampons (iceclaws) on snow above 20,000 feet, the efficiency or otherwise of tents and equipment. He was the first to camp high in specially designed mountain tents ("Whymper" and "Mummery" tents) and he emphasized the vital importance of born load-carriers like the Gurkhas in any attempt on a big Himalayan peak, an importance which Charles Bruce also realized.

Bruce was then a young officer of 28, large, uproarious, friend and comrade to every Himalayan tribesman. He spoke their languages fluently, knew their jokes and customs,

excelled in their primitive sports. A year later he was to plan with Lieutenant Francis Younghusband to cross Tibet and attack Mount Everest from the north. The project fell through, but a time was to come when Bruce would lead three successive expeditions, making use of the invaluable Sherpas whose fine qualities he had discovered.

But Mount Everest was still too remote and unexplored for mountaineering attempts in 1895, when A. F. Mummery, G. Hastings, and Professor Norman Collie—probably the finest amateur Alpine climbers of their day—came out to reconnoitre and if possible climb Nanga Parbat. They were unaware that this mountain of the Punjab Himalaya (the area of Johnson's daring surveys in 1857) has a good claim to be the most difficult mountain in the world; and they could not guess that thirty-one men were to be killed on the mountain before it was finally climbed in 1953.

How greatly even Mummery, with his experienced Alpinist's eye, underestimated the peak can be gathered from one of his letters home: "We have discovered an absolutely safe way up Nanga—an easy glacier up which coolies can carry our camp, and thence onward a broad snow and rock ridge right up to the top." The party reconnoitred, tried, and failed tragically. Mummery, with one Gurkha companion, had climbed to 20,000 feet on the great Diamirai face of the mountain before being defeated by foul weather, the mysterious effects of "altitude", and the illness of the Gurkha. Five days later he started out with two porters to explore another possible route and vanished for ever, probably overwhelmed by an avalanche. He was the first of many fine mountaineers who were to die in the Himalaya as a result of their—to some people—inexplicable passion for mountain-climbing.

Four years after Mummery's death came Douglas Freshfield, to advance into the eastern Himalaya through the British-protected state of Sikkim. He had with him Profes-

sor Garwood and a Pundit of the Survey named Rinzin Namgyal (R-N), and Garwood's map of their two-months' mountaineering, wherein they climbed no big peak but made a complete circuit round Kangchenjunga, amended the older route surveys and filled in much new detail. Freshfield explored up the Kangchenjunga glacier and recorded his opinion that it offered the only practicable approach to the third highest mountain in the world, drawing special attention to the great ice terrace lying at 27,000 feet directly under the highest point; this was the route by which Kangchenjunga (28,146 feet) was climbed by Doctor—now Sir—Charles Evans's expedition in 1955, when the phenomenal rock-climber Joe Brown reached the summit with George Band.

In spite of Freshfield's discoveries, the early attempts on the mountain tackled it by other routes, a mistake which resulted in the deaths of ten men. By contrast, the attempts to climb K2—the second highest—and its final ascent were made by the Abruzzi Ridge, discovered and reconnoitred by the great Italian expedition led by the Duke of the Abruzzi in 1909. This expedition, a small army, had skilled surveyors and artists and photographers as well as seven Italian guides from Courmayeur, and it expanded the reconnaissance surveys of Godwin-Austen and Conway into a full-scale survey of every side of the mountain. The Duke's climbing team reached 22,000 feet on the south (Abruzzi) ridge; forty-four years later another Italian expedition led by Professor Ardito Desio was to climb it to the summit.

In the same year as the Abruzzi expedition Doctor Longstaff, with the Neve brothers and A. M. Slingsby, was climbing and exploring in the southern and eastern Karakoram, bringing back from his adventures a vast amount of new and exciting information; exciting, at any rate, to the Survey of India. It included news of the discovery of a big group of mountains over 24,000 feet high named Teram Kangri,

which necessitated a special survey in the course of which the leading surveyor, V. D. B. Collins, climbed sixteen peaks over 19,000 feet high to take his observations. Conspicuous in the later exploration of these parts were the American couple, Mrs Bullock Workman and her husband Dr Hunter Workman, who visited the Karakoram no less than seven times between 1898 and 1912. Travellers and mountaineers, they took with them in 1911 the surveyors Grant Peterkin and Surjan Singh, the latter loaned by the Survey of India to map the detail, and completed Collins's work by fixing the heights and positions of every peak along the frontier watershed in this section.

This period of the Survey, which was soon to end with the upheaval of the First World War, was one of increasing progress and unity. On the British-Indian side professional surveyors and sporting mountaineers were working hand in hand. Only a party trained in the Alpine craft could climb to the "stations" where the last secrets of the Himalaya could be discovered; only a mountaineer trained in accurate surveying could bring the map-makers the exact observations they needed. In many cases climbers and surveyors in the Himalaya were almost indistinguishable, as when Eric Shipton's party made their great climb up the Rishi Ganga gorge in 1934 and spent six weeks mapping the "sanctuary" of the Nanda Devi basin. And on the international side, too, unity had been achieved. A sudden massing of Russian troops in the Pamirs in 1885, strategically countered by the British, had come to nothing; with the withdrawal of the invasion threat came the end of the Great Game with its secret journeys and disguised agents. At the International Union of Geodesy in 1908 it was proposed that "in the interests of science the triangulation of India and that of Russia in Asia should be joined together", and London and St Petersburg approved the proposal.

So, as the Great Trigonometrical Survey approached its

last high frontiers, the Russian surveyors were bringing their own triangulation southward across the Pamirs from a measured base-line at Osh. In the western half of India's great mountain barrier the work of the G.T.S. was nearing its climax; and at the far eastern end, where the penetration of Sikkim and Bhutan had been permitted, it was well advanced. But there was a vast area in the centre where hardly any progress had been possible. Nepal's closed frontier guarded a 500-mile-long section of the Himalaya which was largely unexplored and only fractionally surveyed.

The Nepal Himalaya contains seven out of the twelve highest peaks in the world, including Mount Everest. Captain Henry Wood of the Survey of India had been allowed to enter Nepal in 1903 for the purpose of observing the principal peaks and discovering their names; in 1907 a single Indian surveyor had been allowed in—unaccompanied by a European—to make a very hurried sketch-plan of the southern approaches to Everest. That was all. Not until 1949 was Nepal to open its frontiers to scientific and climbing expeditions, and today—more than twenty years later—there is here a great deal still to be done by surveyors as well as many virgin peaks for climbers.

In the years before the 1914-1918 war Mount Everest was of prime interest both to surveyors and to mountaineers. The greatest of the world's mountains, on the unexplored frontier of Tibet, had been seen only from hundreds of miles away and never approached; nothing was known about it except its height and its position on the map. To the men of the Survey of India this was a challenge—and they were unable to accept it. The challenge to the mountaineers was a double one. There was the approach and the climbing route to be discovered on an entirely unknown mountain, and there was the persistent doubt that it could ever be climbed at all. Many scientists of the day believed that

men could not live at heights over 26,000 feet. It was known that high altitudes induced sickness and lack of breath, and that these effects got worse as the climber went higher; but the highest a man had yet climbed was 24,600 feet (the Duke of the Abruzzi and two guides in 1909) and what would happen 5,000 feet higher was matter for grim speculation.

Two things were certain: Nepal could not be persuaded to allow entry to any kind of expedition, British or Indian; and Tibet, in whose territories Everest's northern flanks lay, would refuse absolutely to allow a party from the Survey of India inside her borders. The only possibility—and it was a remote one—was that the Dalai Lama might be cajoled into letting a party of mountaineers journey through his country to see, and perhaps to climb, the great mountain. It looked as though the surveyors would have to depend on the climbers for the solution of their biggest problem.

* * *

10 - *The Last High Frontier*

IN 1913 the Great Trigonometrical Survey of India, founded by William Lambton almost a century earlier, ended the most important chapter of its history.

Colonel Kenneth Mason* was in charge of the Survey in the northern section of the Himalaya when the great moment arrived. With his assistants Collins and McInnes and six Gurkha signalmen, he was at work on the high Kashmir frontiers early in May. Northward from the frozen snows of his stations rolled the white ridges of the Pamirs to vanish in the purple haze that hid the Central Asian wastes. The glittering domes of the nearer Pamir summits were no longer spotless. The telescope of Mason's theodolite showed the skeletal pole-pyramids, supporting a vertical mast, of the Russian survey stations.

When the survey parties met, the men from Imperial Russia and Imperial Britain, there was no fuss about international frontiers. Later, no doubt, there would be passports and Customs posts and armed frontier guards, but these were for such lesser men as politicians to bother about. To surveyors, intent on extending Man's accurate knowledge of his world, frontiers were artificialities and could be disregarded. There were cheery Anglo-Russian suppers in the survey camps, earnest conferences about the method of

* Better known as Professor Mason, author of *Abode of Snow* (the definitive history of Himalayan exploration).

effecting the junction between the two surveys.

The Russians had placed stations on two summits on their border with Chinese territory in the Taghdumbash Pamirs, and measured the exact distance between them by observations from the fixed points of their final triangulations. This measured line between Kukhtek (17,031 feet) and Sar-bulak (17,284 feet) was selected as the junction line. While the Russians used high British stations to amplify their observations, Mason went northward through Russian territory to the summits on the Chinese frontier, his plan being to work his triangulations southward and link them to the G.T.S.; this would produce a G.T.S.-based computation of the distance between the Kukhtek and Sar-bulak stations—which were rather more than 4½ miles apart—to compare with the Russian computation.

The work took two months. It was in the nature of a mountaineering expedition, though Mason had only Captain R. W. G. Hingston, an Army medical officer, with him besides his little party of Gurkha signalmen. They lived all the time between 15,000 and 18,000 feet above the sea and spent nearly all day climbing, for they were traversing the breadth of the Taghdumbash Pamir from north to south. In good weather the party would climb to their new station, pitch camp below the chosen snow-crest or rocky ridge, and stay there until their observations were finished; sometimes this entailed waiting in the high camp for several days until a period of bad weather came to an end. Then they would pack, climb down, and march fifteen or twenty rough miles to climb again.

The fierce and bitter wind that rushes across the Asian steppes never stopped. If bad weather held them for a day in some barren valley between the mountains, a band of nomads always appeared as if by magic to ask the help of the Doctor Sahib for one of their number who was sick. Usually the healthy received medical treatment too, much

to their dismay; for Hingston—a small but incredibly tough man who was to join an Everest expedition eleven years later—liked to take samples of their blood for microscopic examination. He was making one of the first attempts to find out how the human body "acclimatized" itself to high altitudes. He tapped Pearson's blood every day in order to count the red corpuscles, and silenced his leader's grumbling with the assurance that he was helping the men who would one day climb Mount Everest.

Pearson's triangulations, moving ever southward across the Pamirs, were complete by the end of August, and the test of accuracy could be made. It was a more momentous test than Johnson's of half-a-century before, for now two big and entirely independent systems of triangulation were meeting. And the result was an even greater triumph. The Russians had computed the distance between the Kukhtek and Sar-bulak stations as 7134.9 metres; the British figure was 7133.4—a discrepancy of only a metre and a half. Even on a scale of six inches to a mile (if so large a scale could ever be used in the Himalaya) an error of five feet would have made no discernible difference.

This successful "buttoning-up" was an event of historic importance to geographers all over the world. In a hundred thousand schools and libraries the atlases would need new maps of Asia, and places hitherto as remote and dubious as Ultima Thule would soon become real and familiar, fixed as they now were in their true positions on the coloured charts of the world. Inevitably, the filling-in of the blank space awakened a wider curiosity about unmapped Nepal, and especially about Mount Everest.

The closing years of Queen Victoria's reign had witnessed the first decline of British Imperial greatness in the muddled policies and inefficient conduct of the Boer War. In India there had been internal peace since the Mutiny, but it was a peace maintained by iron control and increasingly dis-

turbed by a rising Indian nationalism—a demand for the independence Britain had herself intended to create but was now unready to grant. The short reign of Edward VII and the first years of George V seemed to confirm the sinking of British world prestige, challenged now by the German Empire. Americans had been the first to fly in a heavier-than-air machine, a Frenchman had made the first cross-Channel flight, an Italian had sent the first message by wireless telegraphy. Both the Poles had been reached by explorers, but it was the American Robert Peary (with one companion, a Negro) who first stood at the North Pole; and Amundsen, a Norwegian, had forestalled Captain Scott by a month in a dramatic race for the South Pole. To many people in Britain the highest point on the earth's surface appeared as a third Pole. In the comparatively new skills of mountain-climbing, at least, the British were still unsurpassed, and a feeling began to grow that British climbers must be the first to reach the summit of Mount Everest.

In 1913 Everest was a mystery mountain, unknown, unapproached, unseen except from a hundred miles away. Apart from its challenge to the Survey of India, it posed problems for mountaineers and physiologists. Could it be climbed? Could men remain alive at such great heights? The acceptance of the challenge, the solution of the problems, were denied by the forbidden frontiers of Tibet and Nepal that formed a barrier more impenetrable than the unexplored mountains. Short of a broken treaty and an unjustifiable war, there appeared to be no chance of getting to grips with this final mystery. Yet a solitary British explorer had made a gallant attempt to reach Everest, in the same year that the G.T.S. made its triumphant junction with the Russian survey.

The journey of Captain J. B. L. Noel is the last of the romantic journeys-in-disguise which figure so prominently in Himalayan exploration. Noel was a young Indian Army

officer who spent all his leaves travelling among the hill tribes of the inner Himalaya and learning their languages and customs. In 1913 he resolved "to seek out the passes that led to Everest and if possible to come to close quarters with the mountain". He could not hope to get across the southern frontier of Nepal undetected, but an Indian native might succeed in entering Tibet over the passes from Sikkim even though he was likely to be expelled on discovery. Noel disguised himself as a Mohammedan by darkening his skin and dyeing his hair, and set off with three companions, a Bhotia, a Sherpa, and a Garhwali, crossing the high passes out of Sikkim (one of them over 16,000 feet) to the Tibetan plateau and then heading westward along the northern skirts of the Himalaya. In doing so he was pioneering the route which was to be followed by six Everest expeditions. Noel and his men probed various passes, discovered a new range of mountains 23,000 feet high, and met some Nepalese traders who told them of a lonely monastery in the deep recesses of the glacier valleys whence the highest peak in the world—they called it Kangchen Lemboo Geudyong—could be seen near at hand.

The explorers were making for this remote monastery when they were intercepted by an armed patrol of Tibetans whose captain ordered them to leave the country by the way they had come. Noel tried to bluff his way through. There was a scuffle in which the pseudo-Mohammedan was struck across the face with a whip, and Tibetan muskets were fired to speed his departure. With imprisonment and possible execution as the only alternative, Noel had no choice but to get out of Tibet as quickly as possible. He brought back with him to the civilized world the first real confirmation that Mount Everest was accessible from the north.

But the civilized world was on the brink of a four-year conflict, the greatest war it had ever known. Captain Noel was not able to tell his story until 1919, when his lecture to

MOUNT EVEREST: THE NORTH FACE, 1933

R.A.F. WAPITIS
ON THE FIRST FLIGHT ACROSS THE HIMALAYAS

the Royal Geographical Society (whose President was Sir Francis Younghusband) inspired the formation of an Everest Committee including members of the R.G.S. and the Alpine Club. The Committee's aim was to send a reconnaissance party to Mount Everest one year and a party to climb the mountain the next—a simple plan to which there were many known obstacles and more that were as yet unknown. First the approval of the Indian Government had to be gained, and with it the cooperation of the Survey of India. Then the estimated £10,000 that the expeditions would cost had to be found—more than half of it came from members of the Alpine Club and the Royal Geographical Society—and lastly the most difficult essential of all, Tibetan permission for the project, had to be obtained.

It was fortunate indeed that Charles Bell, the Political Agent in Sikkim and a great Tibetan scholar, had formed a personal friendship with the Dalai Lama, the "god-king" of Tibet. Bell's influence procured a passport giving an invitation and safe-conduct under the Great Red Seal of the Holy Rulers of Tibet: *"Be it known to Officers and Headmen of Phari-jong, Khampa, Tin-ki and Shekar, that a party of Sahibs will come to the Sacred Mountain . . . You shall render all help and safeguard them . . . We have requested the Sahibs to keep the laws of the country when they visit the Sacred Mountain and not to kill Birds and Animals . . . His Holiness the Dalai Lama is now on great friendly terms with the Government of India . . . Despatched on the seventeenth day of the eleventh month of the Iron Bird year."* In the spring of 1921 the first reconnaissance expedition set out for Everest.

The story of the attempts to climb Everest and its final ascent in 1953 has been told many times. Not always has full credit been given to the explorers and surveyors who opened the way for the climbers. It was Eric Shipton, for instance—surveyor as much as climber—who explored and

mapped the Khumbu approaches by which, in 1952, the Swiss made their nearly successful attempt and in the following year John Hunt led his party to victory. The first four parties to tackle Everest from the north all took surveyors with them. Major Morshead, who joined the 1921 and 1922 expeditions as a surveyor, climbed above the North Col to 25,000 feet. But in 1921 nothing at all was known about the physical features of the mountain or the courses of its surrounding glaciers, and the surveyors were all-important. It was a surveyor who discovered the glacier up which, for the next seventeen years, all the hopeful and sometimes tragic attempts via the North Col were to be made.

The first expedition was avowedly a reconnaissance; but it included George Mallory, which meant that reconnaissance would be turned into resolute attack if there was the least chance of doing so. Mallory's name is linked forever with the name of Everest the mountain. He had some of the characteristics of Everest the man—a fiery impatience, a spirit that could rise above bodily discomforts, a burning zeal to finish the job in hand. He was reckoned the best climber of his day, and his comrades of the four-man climbing team were G. H. Bullock and the veterans Harold Raeburn and Dr A. M. Kellas. Colonel Howard-Bury, a non-climber experienced in eastern diplomacy, led the expedition and A. F. R. Wollaston was its naturalist and medical officer. Naturally enough, the Survey of India was interested not so much in climbing Everest as in the opportunity of surveying the unexplored country round it. Here was an area of about 13,000 square miles, unknown to the map-makers except from two route-sketches made by Hari Ram ("M-H" of the Survey) on his journeys in 1872 and 1885, and the Surveyor-General intended to make the most of his chance. He could not, of course, send a full-scale Survey party into Tibet—the Tibetan permit was specifically for

"a party of Sahibs" travelling to "the Sacred Mountain"—but he appointed a team of six: Major H. T. Morshead as its leader, Captain E. O. Wheeler to assist him, three skilled Indian surveyors, and an Indian photographer.

The four Indians left Darjeeling in April 1921 to work northwards towards the Tibetan border making a re-survey of Sikkim; a fact significant of the high responsibilities Indian natives were now taking in the Survey of India. Two months later they had journeyed to unite with the rest of the expedition at Kampa Dzong, a Tibetan fortress past which Noel and his men had crept secretly eight years previously. Here Dr Kellas, who had climbed and explored in the Himalaya since 1907, died of enteritis. Raeburn fell ill, and the "climbing party" was reduced to two men.

On the way across southern Tibet from Kampa Dzong the surveyors were continuously active. The rivers, ridges and glaciers on the left hand of their slow journey all came down from the northern flank of Everest, and from the fortress village of Tingri a number of very rewarding forays with theodolite and survey camera were made resulting in a preliminary map of the wild country north and east of Everest. Mallory and Bullock accompanied the survey parties but usually left them to climb to some higher crest or col. From one such height they saw what they were looking for, the sight Noel had coveted and failed to get. Forty miles away the upper part of Mount Everest rose magnificently above its neighbouring summits, "a prodigious white fang excrescent from the jaw of the world", as Mallory described it. And from local hillmen they had confirmation of Noel's lonely monastery in a valley close to the peak.

Rongbuk Monastery and its saintly Grand Lama were to figure prominently in the epic of Mount Everest, and photographs and accounts of it were to appear in the world's newspapers during the next seventeen years, but in 1921 it was scarcely known even to the dwellers in the hamlets of the

Everest region. Mallory and Bullock took sixteen Sherpa and Bhotia porters and started out to explore their way to it. About the same time the surveyor Wheeler, with a few porters to carry his tents and instruments, was beginning a photographic survey from the Kyetrak glacier on the west, moving towards Rongbuk and Everest.

Two days after leaving Tingri the climbers were toiling up the bare brown desolation of the Rongbuk valley. They topped a slight rise, and found themselves confronting the most dramatic view ever seen by mountaineers. A glacier ten miles long ascended from them into a huge bay of snow and ice walled by precipices ten thousand feet high; the highest wall, facing them, was Everest's northern face, cliff upon cliff of rock and ice rising to a pyramidal white summit from which a long plume of ice-particles blew out like a banner. They were the first men to see what the highest mountain on earth really looked like—and from this viewpoint, at least, it looked quite unclimbable. No mountaineer could hope to get up that terrific North Face. There was a chance, however, that a way could be found to the crest above it by the ridges on either hand.

They pushed on towards the heart of the mystery. The Rongbuk glacier offered them no easy highway as an Alpine glacier might have done; it was a procession of ice pinnacles forty and fifty feet high. They took to the piled boulders of the lateral moraine, passing at a little distance the solitary building where the Rongbuk Lama and his few monks lived in utter seclusion, and found a camp-site near the glacier at 16,500 feet. This was to be their base for four weeks. From June 27 to July 25, generally in bad weather, Mallory and Bullock explored the great glacier-bay below the North Face. They climbed several times to more than 20,000 feet on the enclosing ridges, and from one col on the west ridge looked down through the clouds into Nepal and

saw an enormous snowy trough which Mallory called "the western cwm".

At the end of their long and hazardous reconnaissance they had found only one possible climbing route, and that was obviously so dangerous that Mallory decided it should not be attempted except as a last resort. Where the north ridge, on the left of the bay as they faced Everest, mounted to join the summit crest there was a col only 3,000 feet above the level of the glacier; once on that North Col—so Mallory believed—the ridge could be followed to the crest and the crest to the summit without great difficulty. But the 3,000-foot drop from the col was an ice-wall, no place for files of laden porters carrying up the tents and provisions needed for a determined assault. Could the col be gained from its farther side, the hidden eastern flank of the ridge? To answer that question they would have to go back down the Rongbuk valley and skirt right round the fringes of Everest until a way into the glacier-maze from the north-east could be found. This they resolved to do. As they retreated down the glacier they passed an insignificant-looking gully in the mountain-wall on their right hand, with a sizeable stream coming down it. In early August they rejoined the main party (including Morshead and his men, who had been busy on a wide-ranging survey) and shifted their base of operations eastward into the Kharta valley for a fresh start on the problem of Everest.

Had either of the surveyors, with their Himalayan experience, accompanied the two climbers the right inference would have been made from the sizeable stream in that insignificant-looking gully: that it was fed by a glacier. And a journey of less than ten miles up that glacier would have brought them to the farther side of the North Col. This, the route by which all Everest attempts up to 1938 were to be made, was discovered by Captain Wheeler.

Wheeler, a tough Canadian who had joined the Survey

of India immediately after the Great War, brought his photographic survey into the Rongbuk valley after Mallory and Bullock had retreated. Methodically plotting his stations and angles, he made a thorough survey of the great bay under the North Face. As a matter of course, he explored up the gully the climbers had ignored, and found—as he had expected—that its stream came from a large glacier, which he named the East Rongbuk glacier. This ice-stream ran parallel with the Rongbuk glacier on the other side of the long north ridge to end close under the eastern wall of the North Col, which was in fact a narrow "ice watershed" linking the two glaciers. Wheeler noted that the wall of snow on this side of the Col looked much easier to climb than its western wall. He recorded this and the other features of the East Rongbuk glacier on the sketch-map he was making in conjunction with his photographic survey and went on with his work, which he did not finish until the middle of August.

Meanwhile the main expedition had been devoting all its energies to a probe towards Everest from the north-east. For many days the climbers had struggled up high glens and ridges, only to retreat again frustrated. By mid-August they had discovered a long glacier which—they thought—must lead them direct to the unknown side of the North Col, but Bullock's reconnaissance revealed that it ended in a very high ridge barring the way to the foot of Everest. By now the long sojourn at high altitudes was taking effect on Mallory and Bullock. Acclimatization, it appeared did not mean that they would be able to breathe normally at heights above 20,000 feet; every upward step required two or three breaths in order to extract sufficient oxygen from the thin cold air. Mallory was ill with fever and exhaustion. Nevertheless, an assault was planned on the barrier ridge, beyond which—as they deduced from Morshead's surveys—there should be a last unexplored glacier with the North Col above it. It was now that Wheeler, with his photographic

survey complete, arrived at the Kharta base camp. His report and sketch-map showed clearly that the way to the accessible side of the North Col was via Tingri and the Rongbuk valley after all.

It was too late in the season to shift the expedition's base back again to Tingri. In intense cold and blinding snowstorms, which delayed them far into September, they climbed across the barrier ridge by a pass 22,350 feet high, called the Lhakpa La, and saw the east flank of the North Col beyond the upper basin of Wheeler's East Rongbuk glacier. The Canadian surveyor was with Mallory and Bullock when they climbed with three Sherpas—the only three, out of twenty-six, who were fit enough after the Lhakpa La crossing—up steep but not difficult snow to gain at long last the windswept ice of the North Col, 23,000 feet above sea-level. The terrible blizzard blowing across the Col, and the utter exhaustion of everyone in the party, ended Mallory's secret hope of climbing Everest that year. But on this day, September 24th, 1921, he was certain that the way had been found. He did not realize—no one could have realized then—that with only perfected equipment and oxygen apparatus could men hope to climb to the ultimate summit of the world.

The attempts to climb Everest by the northern route in 1922 and 1924 enabled the Survey of India to complete its survey in this area. The subsequent expeditions up to 1938 belong to mountaineering history. It was in 1924 that Mallory and Andrew Irvine started out from a tent at 27,000 feet on the north ridge to go for the summit, and were never seen again; no surveyor could have told them, as Sir Edmund Hillary told Hugh Ruttledge after his 1953 triumph, that the last 900 feet of the northern route could be considered unclimbable. The problem of the physiologists was solved to some extent on the 1933 expedition, when Wyn Harris and L. R. Wager spent the night in a tent at

27,400 feet. Nine years previously Colonel Norton had climbed to over 28,000 feet. It seemed at least probable that a man could remain alive at 29,000 feet on the top of the earth's "third Pole". On May 29th, 1953 two men reached that summit, a New Zealander and a Sherpa.

In the conquest of Mount Everest the Survey of India played its important part, but it was only a part of its own continuing work. New methods, improved instruments, were coming into use between the two world wars. Wheeler's photographic survey of 1921 was the forerunner of the later photogrammetric surveys, and cameras were soon to help surveyors from a fresh angle—the air. In 1931 a flight of five R.A.F. Wapiti aircraft made the first air crossing of the Himalaya, making a circuit of Nanga Parbat on the same occasion; the pilots looked down on passes first seen by Alexander Gardner more than a century before, and skimmed past the great Diamirai face where Mummery made his last climb in 1895. It was many years, however, before the elaborate stereoscopic air cameras were developed, and even with such ingenuities as the stereoplanigraph and anaglyphic projection air surveys are still only supplementary to the triangulation method. Up to 1947 the survey and exploration of the Himalaya continued to expand, helped considerably by the work of climbing expeditions. Tibet remained friendly, the states of the north-west frontier and the mountain states in the east made no difficulty about access. Nepal alone kept her southern borders closed, until an unexpected change of policy in 1949 allowed foreign expeditions to enter—for the first time in more than a century—and resulted in important additions to the map as well as in the successful British expedition to Everest.

But 1947 marked the return of the forbidden frontiers. In that year the overwhelming pressure of Indian nationalism at last forced the British Raj to end its rule and India became self-governing. Of all the legacies left behind by the

departing British the most valuable was Indian political unity. But this had only been achieved by forcible restraint of the rival races and their warring religions, and independence put an end to that restraint. A period of riots and massacres was terminated at last by the division of the subcontinent into two nations, India and Pakistan, with a new frontier between them. Older frontiers were closed. Tibet, part of the People's Republic of China, became even more inaccessible than it had been in the nineteenth century; Bhutan was, and is, closed to all travel. An "Inner Line" south of the main Himalayan chain forbids explorers to reach those secret gorges and high passes where the Great Game was played a hundred years ago, and if a European tried to reach the North Col of Everest today he would be arrested by Chinese frontier guards.

For the Servants of the Map there is bitter irony in the fact that now, when all physical barriers may be considered passable and all mountains climbable, the frontiers erected by Man are still forbidden to them.

* * *

But the Survey of India goes on.

A national survey can never be finished. At intervals the existing maps must be revised, to include such new man-made additions as roads and bridges. Physical features may alter, too, especially in the Himalaya where landslides and glacier action and the eroding force of the great rivers are continually changing the forms of "the unchanging hills". Then there is the need for more detailed maps, requiring a survey on a larger scale, to keep pace with the growing social and commercial life of the country.

When India was partitioned the personnel of the Survey of India was divided between India and Pakistan, the latter State taking over about one-fifth of the previous Survey

area. Today the Surveyor-General and his departmental chiefs are Indians, but there has been no break in the work which has been going on for more than two hundred years. One of the Survey's many current tasks is the production of an English edition of the Indian National Atlas; a mark, perhaps, of the enduring link between the two nations. But sixty to seventy per cent of its personnel are always engaged on topographical survey, most of them working "in the field" as in the days of Lambton and George Everest. The biggest task on hand is a survey of the whole country on a scale of 1/25,000—about 2½ inches to 1 mile—and when that long-term work is completed it may be that the Survey of India will seriously consider beginning a One-Inch map like the British Ordnance Survey.

As for the Great Himalayan Range, where the men of the Survey faced their biggest obstacles and showed their highest courage, the mapping of that complex of peaks and glaciers is proceeding steadily in one section at least; the Nepal Himalaya. By the provisions of the Colombo Plan, India is enabled to send survey parties into Nepal; and that once impenetrable country is now so progressive that in 1969 its government agreed to the construction of a hotel at the 13,000-foot level on Mount Everest, with an airstrip nearby.

The forbidden frontiers that persist in other parts of the Himalaya are a present frustration to the Survey of India, but may be a cause for future rejoicing among climbers and surveyors. Some Mallory as yet unborn will surely be glad that so many fine mountains were left virgin for him to climb; and a new Johnson or Montgomerie will thank his lucky stars in years to come when he searches the records and finds, against some unfamiliar name, the comment *Blank on the Map.*

* * *

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The following books were consulted in writing this outline sketch of the Survey of India and are recommended for reading in a fuller study of the subject:

Historical Records of the Survey of India Vols. 3 and 4, by R. H. Phillimore
The Making of a Frontier, by A. G. Durand
The Epic of Mount Everest, by Francis Younghusband
George Mallory, by David Robertson
The Heart of a Continent, by Francis Younghusband
Raj, by Michael Edwardes
British Adventure, edited by W. J. Turner
Kim, by Rudyard Kipling
Asiatic Researches (1816) Vol. 12
Himalayan Journal Vol. 22
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The Alpine Journal Vol. 19

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