Mountains of East and South-East Tibet

An introduction

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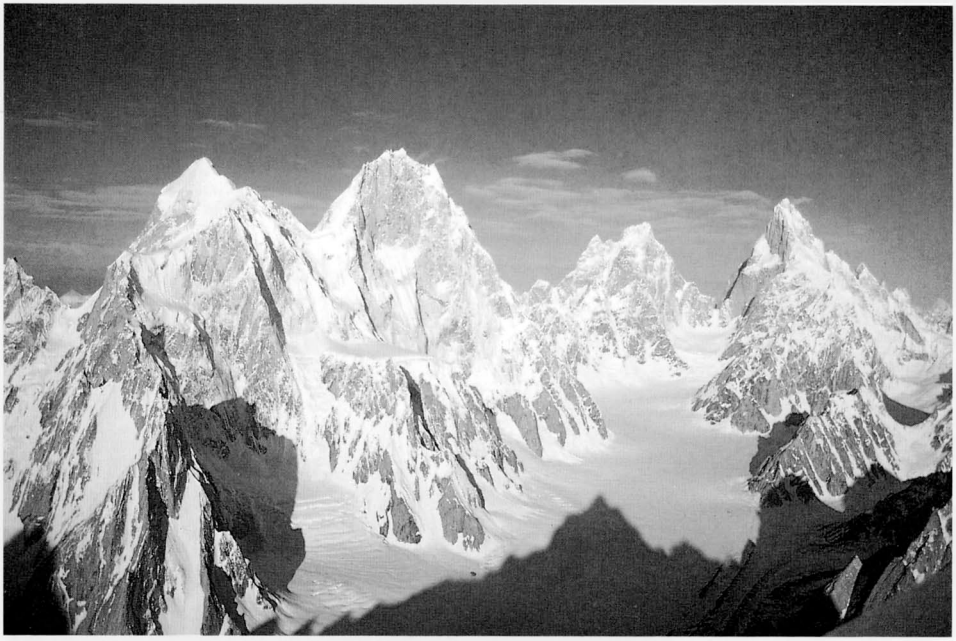
(Plates 12–14)

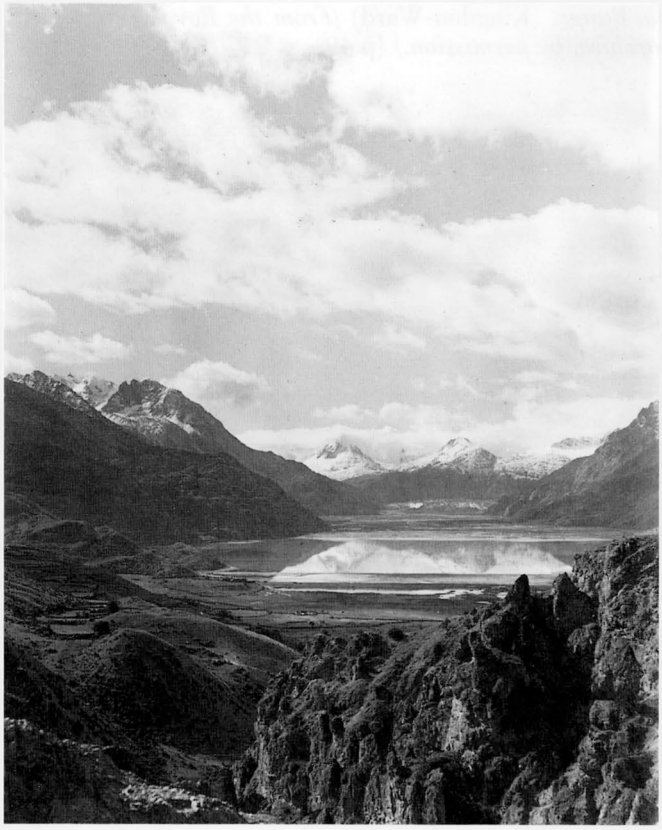
Topography

Tibet is a pear-shaped plateau, at an altitude of 4000–5000m, its narrow western end being surrounded by the peaks of the Karakoram, Pamir and West Kun Lun, whilst the broad eastern base faces China. The plateau consists of two parts, the Central Changthang and the Outer Rim. On the Changthang, much of it over 4500m, there is internal drainage, and short rivers end in salty or brackish lakes with no outlet. The climate is severe, being cold and very windy even in summer, and there is little vegetation. Temperatures vary between 15°C in summer and -35°C in winter, with a yearly rainfall between 15 and 20cm. Snow falls throughout the year, with hailstorms common in summer, but it evaporates rather than lies, and permafrost is normal. From the Outer Rim, by contrast, the rivers run peripherally, eventually reaching the sea except in the north where they end in the sands of the Tarim Basin.

In the eastern part of the Changthang there is an ill-defined watershed between the internal and external drainage systems, approximately the line of the centuries-old track from the Tsaidam to South Tibet, which is now the Golmud–Lhasa road. In the south the rivers generally drain to the Tsangpo–Indus river system. Vegetation occurs where streams are large and most of the towns, Lhasa, Shigatse and Gyantse are in this southern part of the outer plateau. The climate is milder, with temperatures between 27°C in summer and -15°C in winter, whilst the yearly rainfall is 45cm. There are no forests and trees are confined to watercourses. In favoured ecological niches, however, fruit may be grown, and in Lhasa in the 18th century Jesuits cultivated grapes for communion wine.

The plateau is constrained by two of the world's greatest mountain ranges, the Himalaya to the south and the Kun Lun to the north. Between the eastern extremities of these two ranges lie the Marches of Tibet, a series of river gorges and mountain peaks turning gradually south until they lie at right angles to the general east–west line of the peaks of the plateau. The rivers of the northern section are tributaries of the Hwang Ho which curves north and east around the southern end of the Àmne Machen range and then swings through northern China to the Pacific. Through the southern gap, between the Yunnan plateau and the peaks of the eastern Himalaya that end in Namcha Barwa, run the Yangtze Kiang and its many tributaries, the Salween, Mekong, Irrawaddy



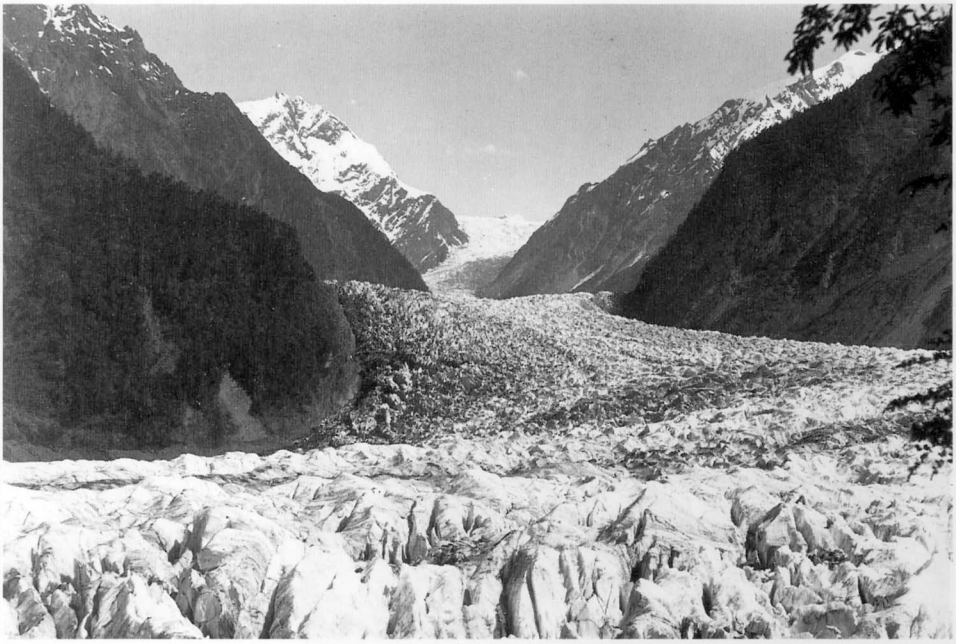


11. *View from Hanipispur down Choktoi glacier to Hushe peaks.* (Sandy Allan) (p 43)

12. *The lake, Shugden Gompa.* (Kingdon-Ward) *(From the Royal Geographical Society archive, by permission.)* (p 49)



13. Glaciers of Great Snow Range. (Kingdon-Ward) *(From the Royal Geographical Society archive, by permission.)* (p 49)



14. Glacier near Shugden Gompa. (Kingdon-Ward) *(From the Royal Geographical Society archive, by permission.)* (p 49)

and Tsangpo rivers, the last four in one place being squeezed into a span of 120km. This gap in the wall of peaks allows the monsoon wind and rain from South-East Asia to blow north up the river gorges to the plateau of Tibet, drenching the south-facing slopes, whilst behind the ranges, in Tibet, it is semi-desert, due to the combination of wind, drought and low temperature. This gap is the 'Gorge Country' of South-East Tibet, a land of precipitous valleys and dark forests, small meadows and snow-capped peaks, of massive scree chutes and flower-covered slopes, of plunging glaciers and calm mountain lakes, and of tempestuous rivers erupting through narrow rock clefts with titanic force. Lonely monasteries and solitary houses are plastered to the sides of cliffs like swallows' nests, and dzongs are perched on spires and rock bluffs overshadowing the villages at their feet. Covering an area the size of France, the region contains some of the world's most beautiful and varied flowers, trees and shrubs, where arctic flora rubs shoulders with tropical. It is also the most difficult of all mountain countries in which to travel and will always be associated with the plant-hunter and geographer, Frank Kingdon-Ward.

Political Background[1]

General

British involvement in the mountains of Central Asia, and in particular those of East and South-East Tibet, began with the expansion of the East India Company to the borders of Sikkim, Bhutan and Nepal, and the first contact with these independent kingdoms of the Himalaya came in 1766–7 through the survey work of James Rennel in the Bhutan border region. Among Rennel's most important contributions was his contention that the Tsangpo river, whose course in Tibet was appreciated but whose final destination was then unknown, flowed via the Dihang into the Brahmaputra.[2]

The acquisition in 1765 by the East India Company of Bengal coincided with the conquest of most of Nepal by the Hindu Gurkha, Prithri Narayan. In 1767 he invaded the Newar state of the Nepal valley which had close ties with Tibet and the resulting military operations disrupted trans-Himalayan trade. The Newars appealed to the East India Company for help against the Gurkhas and a force under Captain Kinlock was dispatched to Nepal. This, however, was unsuccessful in preventing the subsequent fall of Kathmandu, and the trade route between India and Tibet was closed. The East India Company then started to look for a route through the eastern Himalaya, in Bhutan and Assam, as an alternative means of access to Central Asia.

Warren Hastings began his administration in April 1772 and the following year Cooch Behar, a small state on the southern borders of Bhutan, appealed for help against the invading Bhutanese. Hastings saw his chance and the successful campaign waged by the Company and the intervention of the Panchen Lama of Tashilumpo monastery in Shigatse in South Tibet on behalf of the Bhutanese enabled Hastings to open trade negotiations with the Tibetans. The Bogle mission of 1774 and the Turner mission in 1783 both visited the Panchen Lama at Shigatse but both were denied access to Lhasa, as Chinese influence there was strong and the Tibetans followed an active policy of excluding foreigners. This was partly due to Chinese wishes and partly due to the Tibetans' apprehension at the extent of British control in the Himalaya. In

addition, the Tibetans mistrusted the activities of Christian missionaries on the Indian and Chinese borders.

Information about Tibet was extremely scanty during the later part of the 18th and much of the 19th century. Only three Europeans successfully travelled in Tibet during this period. In 1811 Thomas Manning became the first Englishman to reach Lhasa, and two French Lazarist fathers, Huc and Gabet, normally stationed in Peking, reached Lhasa from the north in 1864, having crossed the plateau. After a stay of two months they were expelled owing to the influence of the Chinese Ambans (political representative) and left by travelling through East Tibet to China. In the later part of the 19th century, therefore, information about Tibet and its borderlands depended almost exclusively on that provided by the Pundits, or Secret Native Explorers, trained and employed by the Survey of India, who from 1865 onwards to the end of the century travelled extensively in Central Asia. Several reached Lhasa and a number worked in East and South-East Tibet. Though most efforts to enter Tibet were made from India, some were made from China, and the establishment of a British Consular Office in Kunming in 1877 led to the initial exploration of the Chinese–Tibet border.

North-East Frontier

From 1771 onwards in the North-East Frontier region efforts were made by the East India Company to promote trade with Assam, but these efforts ceased in 1789 because of the civil disturbances. In 1792, at the invitation of the Assamese, a detachment of soldiers was sent by Lord Cornwallis, Governor-General of India, to restore order; this small force was withdrawn in 1794. In 1817 and 1819 Assam was invaded by the Burmese, and as the security of the North-East Frontier depended on a friendly power in Assam the Anglo-Burmese war was fought from 1824 to 1826; following it the British acquired Assam, thus bringing the Raj for the first time into contact with the Himalaya, east of Sikkim and Bhutan. Occupied mainly by primitive tribes, this area acted as a buffer with Tibet, and interest was focused on two main trade routes. To the west one ran from Lhasa through Tawang (east of Bhutan) over the Se La to the Brahmaputra river, whilst further east one connected Rima in East Tibet with Sadiya in Assam by way of the Lohit river; this was the shortest route between Assam and China.[3]

The Assam–Tibet border region was inhabited by a number of tribes, the majority of a warlike disposition. To the west, on the Bhutan border, were the Buddhist Monpas of Tawang who paid dues to Drepung monastery in Lhasa, whilst further east were the non-Buddhist Abors, Mishmis and Apa Tanis who lived along the Subansiri, Dibang, Dihang and Lohit rivers, each a tributary of the Brahmaputra. The British paid these tribes an annual subsidy on condition that they did not raid the plains, and the 'Inner Line' was established in 1873. This ran along the base of the Himalayan foothills and restricted free intercourse between the hill and plains people and also marked the limit of British-administered areas. Initially, exploration of the river valleys and mountains of the North-East Frontier was prompted partly by the commercial possibilities of a link between India, China and Tibet along the Lohit river, but it was also concerned with finding the correct course of the Tsangpo river.

The existence of the Tsangpo river of South Tibet first became known to western geographers through D'Anville's map published in 1737 which was based on the 'Jesuit Map' drawn by Jesuits in Peking (1717–18) from work carried out in Tibet by Chinese surveyors between 1708 and 1716.[4] The upper reaches of the Tsangpo were crossed by Bogle and Turner on their way to Shigatse and by Manning on his way to Lhasa. In about 1860 Colonel Montgomerie of the Survey of India started to train Himalayan natives (Pundits) in survey work and a number followed the course of the Tsangpo in South Tibet on the north flank of the Himalaya in the later years of the 19th century.[5] Of the various tributaries of the Brahmaputra on the southern side of the Himalaya, the Dihang had the largest flow of water, with a minimum discharge of 55,000 cubic feet per second, that is twice the volume of that from the Dibang. For this reason the Dihang was for many years considered to be the continuation of the Tsangpo, although at one time the Irrawaddy was a candidate,[6] an idea that originated from D'Anville's map and the Chinese surveyors. In 1880 this problem was essentially solved by the Pundit Kinthup and the Tsangpo, Dihang and Brahmaputra were shown to be one continuous river.

Although a number of explorers made their way up the Lohit, the development of trade was hindered by the nature of the country and the extreme difficulty of movement and also by the hostility of the hill tribes. In 1885 French Catholic missionaries began working in Szechuan but were continuously harassed by Tibetans. In 1904 the Younghusband mission to Lhasa and the flight of the Dalai Lama led to a political vacuum in Tibet which the Chinese hastened to fill by administrative and political means. They had little success until Chou Erh Feng became commander of the Chinese forces and entered Lhasa in 1910, the Dalai Lama fleeing once again. Chinese activity in East Tibet now extended to Pome and Zayul and this posed a direct threat to the security of the North-East Frontier of India. The murder of Williamson, an Assistant Political Officer, in Sadiya in 1911 forced direct action and a punitive expedition was sent against the Abors. The survey work and exploration during and after this mission was to provide information from which the Macmahon Line in the North-East Frontier Agency was drawn at the Simla Conference in 1914.

In 1913 Bailey and Morshead surveyed the Upper Dihang river and the Tsangpo gorge from the south and then travelled west, north of the Himalaya, to Tawang. This journey proved that the Tsangpo passed between Gyela Peri (7150m) to the north and Namcha Barwa (7765m) to the south, the river then becoming continuous with the Dihang. The Pundit Kinthup's supposition was thus confirmed by the work of Bailey and Morshead and Rennel's hypothesis about the course of the Tsangpo was also proved correct.

Explorers

In the later part of the 19th century information about East and South-East Tibet depended largely on that obtained by the Pundits,[5] and one of their main tasks was to map the course of the Tsangpo river.

One of the first was Nain Singh who in the winter of 1874 travelled along

the Tsangpo in Tibet as far as Tsetang; then, striking south through Tawang he crossed the Brahmaputra near Tezpur and returned to India. In 1875 the Pundit 'L', or Lala, set out from India, reached Shigatse and travelled as far as Tsetang. Unable to go any further he returned by his original route. Three years later, in 1878, 'GMN' or Nem Singh, a lama from Sikkim, reached a point 300km beyond Tsetang. He was accompanied by 'KP', or Kinthup, and their measurements of water flow suggested that the Tsangpo and Dihang were the same river. In 1880 KP set out with a Chinese lama; their mission was to throw marked logs into the Tsangpo at Gyala, which would be identified by watchers at the junction of the Dihang with the Brahmaputra. After many hardships which included being sold into slavery by his lama colleague, and his subsequent escape, Kinthup explored the Tsangpo to its Great Bend, discovering in the process the Rainbow or Kinthup Falls,[7] and reached Olon (Onlet), 160km further than any previous explorer's limit. This village was said to be one march from Muri Padam, itself 50km from the Indian plains, whose haze Kinthup could see in the distance. According to instructions he threw marked logs into the river, but none were seen. He returned to India via Lhasa.

Some years later another Pundit, Sarat Chandra Das, described[8] how an inscribed piece of wood which had been found in the Dihang could have come from a monastery near the Tsangpo in Tibet. Finally, Bailey and Morshead at the end of the Mishmi survey operations in 1911–13 discovered Gyela Peri and confirmed that the Tsangpo and Dihang were one and the same river. Previously Namcha Barwa had been found in 1911 by members of the Abor Expedition 1911–12 when its position and height were fixed from the south.

The most famous and remarkable Pundit was 'AK', Kishen Singh or Krishna, who made a series of journeys in Central Asia.[9,10] Living until 1921, the year of the first Everest reconnaissance from Tibet, he made his first journey in 1872, reaching Lhasa from the north after travelling around the Nam Co (Tengri Nor) and describing the Nyenqentangla range, north-east of Lhasa, for the first time.

In 1873–4 AK accompanied the Forsyth mission to Yarkand and Kashgar, and in 1878 he set out on his most famous mission which lasted until 1882, during which he traversed Tibet from south to north, then travelled extensively in East and South-East Tibet. Before he left India he was given instructions by General J T Walker of the Survey of India to 'strike across the Great Plateau of Tibet into Mongolia by any route from south to north which he might find practical and to return by a parallel route over new ground'. He followed these instructions to the letter. 'He was provided with a nine-inch sextant for taking latitude observations, a Tibetan tea bowl for a mercury trough, a prismatic compass for taking bearings to distant peaks, a pocket compass for common use in taking his route bearings, a rosary for counting his paces, a Buddhist prayer-barrel for secreting his field books, an aneroid barometer and some boiling point thermometers.'

From Lhasa, AK followed the main track north, crossing the Changthang and the Kun Lun range, descending to Naichi (Nachatai) and reaching Golmo (Golmud). He then crossed the Tsaidam to Saitu (Tun-Huang). Returning he

went through East Tibet reaching Darchend (Tachienlu) and then he struck west through the 'Gorge Country' to Batang, and mentions the 'lofty peaks of Khakarpo' at around 6000m. Reaching Rima he turned north crossing the Ata Kang La (4600m) to reach the plateau again. At Lhojang he joined the official Lhasa–China road and at the Kyichu river he turned south (rather than going north to Lhasa), crossing the Tsangpo and arriving at his original starting place at Khambarji. Finally, 4½ years after leaving, he returned to Darjeeling. The first to provide a reasonable map of Central, East and South-East Tibet, which was drawn from his observations *en route*, he must be considered one of the outstanding scientific explorers of Central Asia.

In the late 19th and early 20th centuries, a number of Europeans travelled in the Tibetan Marches. These included Gill,[11,12] Pereira,[13,14] Teichman,[15,16] Morshead, Bailey,[17,18] Coales[19,20] and Gregory,[21] and they contributed greatly to our knowledge of the region. However, we owe much of our detailed knowledge of the mountain topography to plant-hunters, in particular to two highly talented and formidable botanists, Frank Kingdon-Ward and Joseph Rock.

Frank Kingdon-Ward, who was born in 1885 and died in 1958, is with Aurel Stein, Sven Hedin and AK one of the greatest scientific explorers of the mountains of Central Asia. He worked in the eastern Himalaya and South-East Tibet (Hengduan Shan) from 1909 to 1958, and without his work our general knowledge of this most difficult region would be patchy, of the topography scanty, and of the plants and trees considerably less than at present. As a plant collector he was without peer, introducing a large number of specimens to the gardens of the United Kingdom as well as collecting countless herbarium specimens. The plant for which he is best known is the Himalayan blue poppy, *Meconopsis baileyi*, originally named in honour of Colonel F M Bailey who with Morshead confirmed that the Tsangpo and Dihang were the same river. This plant has now passed through a number of taxonomic transformations, from *M betonicifolia var baileyi* to plain *M betonicifolia*.[22] The business of collecting plants for commercial interests is very different from acquiring herbaceous specimens, and he quickly developed his own methods of doing this which gave him an extraordinarily intricate knowledge of the region in which he worked. His zest for the unknown, the 'blank on the map' and his love of flowers formed the basis of his career.

The Gorge Country was at the time one of the least known and most difficult in which to travel, particularly as Kingdon-Ward was continually having to cross the grain of the country. As he collected plants from higher altitudes for horticultural purposes, this meant that his observations and descriptions of both the topography and the vertical changes in vegetation played a prominent part in his field notes and writing. He really understood the country in which he worked, and mountaineers will always be in his debt for his descriptions of the peaks, passes and glaciers of this unknown land. His topographical descriptions enabled the best commonly available sketch-map of the area in which he travelled to be drawn by the Schweinfurths of Heidelberg University, and his field notes are still being used to understand more fully the region in which he worked.[23] His observations on climate and local wind

phenomena are very pertinent, and his division of the country into lower V-shaped, upper U-shaped gorges and the plateau is important, for each represents a different habitat in which different types of vegetation flourished, and this in turn determines the way in which the population lives. In this respect, therefore, he was a geographer of the first rank, though his scientific publications were in the field of botany.

In addition to the physical problems of travel there were also the political problems of sovereignty and suzerainty between Tibet and China in an area where the local people were not inclined to take much notice of either power.

Kingdon-Ward took part in 24 expeditions, wrote 25 books, 705 scientific articles and contributed to many newspapers and magazines. His executor Sir George Taylor FRS, formerly Director of the Royal Botanic Gardens, Kew, who has travelled in this area, told me that Kingdon-Ward was a phenomenon, in a class of his own. It would be difficult to disagree with this assessment.

Joseph Rock, born in 1884, was another erudite and distinguished traveller in East and South-East Tibet. He was born in Vienna and emigrated to America in 1905, finally going to Hawaii because of his health. In 1908 he joined the Division of Forestry and until 1920 worked and collected for the Bishop Museum, which became part of the University of Hawaii. From 1920 onwards for three decades he spent his time in exploration and research in Western China, East and South-East Tibet. His first expedition was to Indo-China, Siam and Burma to obtain seeds of the Chaulmoogra plant for the treatment of leprosy (Hansen's disease). Thereafter he travelled mainly in Yunnan, the Gorge Country, around Minya Konka, and further north in the country to the east of the Amne Machen range.

An exceptional linguist, Rock had learnt Hungarian and Chinese by the time he was 15, and he taught Arabic at Vienna University. He was also fluent in Italian, French, Spanish, Tibetan, Latin, Greek and the language of the aboriginal people of South-West China, and he had a reading knowledge and comprehension of Japanese, Hindi and Sanskrit. He spoke English without a Germanic accent, and for 12 years studied and translated the religious texts of the Na-Khi tribe of North-East Yunnan. For mountaineers his description of the Minya Konka region was an important preliminary to the first ascent in 1932. In his book on the Na-Khi kingdom there are descriptions and maps of the mountain ranges in this area.[24] In addition, he contributed many articles about South-East Tibet to the National Geographic Magazine between 1922 and 1935. In 1949 he was forced to leave China by the Communists and returned to Hawaii where he died in 1962, regarded as the father of Hawaiian botany for his immense contribution to the understanding of the botany of these islands. His main contributions to knowledge were concerned with the flora of Hawaii and the natural history of Western China, and East and South-East Tibet.[25]

Mountain Ranges

Although there are a number of maps of the region (see in particular References 26 and 27), the whole area is hardly known from the mountaineering point of view, and the country is topographically so complicated that a full description will have to wait until many more parties have visited these mountains.

Irrawaddy–Tsangpo Divide

This range is about 200km long and most of the tributaries that are the source of the Irrawaddy arise from it. The highest four peaks appear to be about 5800m high and lie north of the Adung river. There are a number of small glaciers.[28]

The highest peak is Kakarporazi (5873m) at the head of a branch of the Adung river. It is the highest peak in Burma and was first discovered and had its height measured by Indian surveyors in 1923. Possible approaches are from the north and west, via the Diphuk La. Of the various passes over this range, the Diphuk La (4350m) connects with Rima on the Lohit river to the north, whilst further east is the Lachong La (3995m), which is the connection between the Irrawaddy and Salween rivers. The Namni La (4657m) crosses the middle of the range.

In general the country is extremely compressed, with gorges so steep and narrow and ridges so high that it is impossible to obtain extensive views.

Irrawaddy–Salween Divide

The highest peak in this group appears to be Keni Chu Pu, which was described by Rock and Kingdon-Ward.

Tsangpo–Salween Divide

The country between the Tsangpo and its tributaries and the Salween is so complicated that it is impossible to give a good overall description. To the north, between the Po Yigrong river, a northern tributary of the Tsangpo, and the Salween, there are a number of peaks of about 6000m, some sighted by Kaulback and mentioned in his book.[29] One peak (7535m) is marked on the map of the Mountains of Central Asia[26] at 94°E 31°N. This height is taken from an ONC map of the region and may be in error as no large peaks have been described by any European traveller in this region. However, good panoramic views tend to be the exception rather than the rule in this region with its high rainfall and extensive cloud.

Along the Po Tsangpo, a more southerly tributary of the Tsangpo, are a number of peaks mentioned by Kaulback,[29,30] Hanbury-Tracy[31] and Kingdon-Ward.[32] These appear to lie below the 6000m height.

Between the Tributaries of the Lohit River and the Salween

There are a number of peaks in this divide, among them Chombo (6700m)[30], a twin-headed mountain which is south and west of the Ata Kang La and may be the highest peak east of the bend of the Tsangpo. There appear to be a number of summits of around 6000m clustered around Shugden Gompa. The Ata glacier which rises north of Chombo is about 20km long and is possibly the

largest glacier east of the Tsangpo, according to Kingdon-Ward. There are several other glaciers, 10 to 13km in length.

Within the Bend of the Tsangpo[32,33]

Here the peaks of the eastern Himalaya end in Namcha Barwa which is surrounded on three sides by the Tsangpo river. The complete ascent has yet to be accomplished but a lower minor summit was reached by Chinese mountaineers in 1983 and 1984.[34]

To the north of Namcha Barwa, on the N side of the Tsangpo river, lies Gyela Peri which was climbed by a Japanese party in 1986,[35] and further north again are peaks to the south of the Po Yigrong river, including Namla Karpo.

Salween–Mekong Divide

The Salween has many tributaries and arises from the south and east portion of the Tanggula range, which runs in an east-west direction across the middle of the Tibetan plateau. The Mekong river rises from the E portion of the Tanggula range, and between the two sources there are a number of high peaks.

Further south in this divide there are many peaks described but not named by Teichman,[15,16] and further south again, around 29°N where rivers are crowded together, are Damyon (5800–6100m), Mts Kagur Pu (Kakarpo), Mo and Drachhen. Of these, Kagur Pu (Kakarpo, Kangkarpo or Meili, 6840m) has had the most attention from mountaineers, with American and Japanese attempts.[36] According to Kingdon-Ward the name means 'white mountain', and it is sacred and famous throughout East Tibet. One of the first to photograph it was Joseph Rock.[37] It is a fine glaciated peak, one of a group and the highest in the Mekong-Salween divide. Another peak in this group is Miyetzimu, also mentioned by Rock.

Between Kangkarpo and Damyon, 80km to the south, there are no less than five scattered snow peaks and several dead glaciers.

Kingdon-Ward[32] describes the peaks of the Mekong–Salween divide as seen from above the village of Atunzu. 'To the west a grand panorama now unfolded itself, about 60 miles of the Mekong–Salween divide'. Far away to the south he caught sight of a snowy peak with extensive snow-fields – the mountains then grew lower until the Kakarpo group was reached – about seven peaks were visible.

Divide between Mekong–Yangtse Kiang and its Tributaries

Topographically this is another extremely complex region. The Pai Ma Shan are glaciated, and Rock and Kingdon-Ward describe two peaks Tsa-Ya and Omagu at about 28°30′ N. Near Batang is a group of 'snowy peaks', and further north still at 30°–31°N there are further groups of 'snowy peaks', each described but not named by Teichman.[15,16]

A long way south at 27°30′ in the bend of the Yangtse Kiang is the Likiang group of peaks (*c*5500m), visited by de Beer[38] and Rock. The country is particularly beautiful, with marked slopes of rhododendrons. Recently Chinese and British botanists have worked in this region,[39] and there have been attempts on peaks in the Yulong Shan.[35,40]

Gongga Shan (Minya Konka Group)

This is the best-known range and has been investigated by both mountaineers and geographers. It is a considerable way to the east, being at 102°E and 30°N. The nearest town is Tatsienlu, to the north of the mountain mass.

First glimpsed by American travellers in the late 1920s, it is a very fine group of mountains, with many peaks rising above extensive glaciers. At one time it was thought that there might be a peak of 9000m or more in the area. Articles in the *Geographical Journal*[41,42] go into this assumption in great detail and contain sketches by Herbert Steiner; however, they came to the correct conclusion that a mountain of this height was unlikely. The Gongga Shan supports 159 glaciers, up to 16km in length.[43] The whole area was mapped, explored and photographed for the first time by Joseph Rock and a National Geographic Society party in 1929.[44] A number of peaks were named, including Mount Grosvenor after the President of the Society, and Reddomain Solo (7000m). The highest peak, Minya Konka (7556m) was climbed by an American party, Burdsall, Emmons, Moore and Young[45] in 1932. A panorama from the summit shows a remarkable array of peaks in the group. It has now had five ascents.[34]

Another peak in the area, Jiazi (?6540m), was attempted by a British Army party in spring 1981.[46]

The East Kun Lun Shan (Burhan Budai Shan) and Amne Machin Shan

See article by Ward in the *Alpine Journal*.[47]

TABLE OF PEAKS:
MOUNTAINS OF EAST AND SOUTH-EAST TIBET

Name	*Height*	*Reference*
Huzhu	6224m	26
Kekesaijimen	6197m	48 (map)
Yagradze Shan	?	26
Amne Machen		26
Maqen Gangri	6282m	49
Bayan Har Shan	?	26
Nyen-Po-Yur Tse	?	49
Dza-Ra		
No name	5940m	26
Snow Range	?	15, 16
Xiari Aba Shan	?	26
Pk 5931m is close by		
Snow Range	?	15, 16
No name	5850m	26
Chola Shan	6141m	26
No name	20,000 ft	29
Snow Range	?	15, 16
No name	?7353m	26
Snow Range	?	15, 16

No name	6474m	26
No name	6599m	26
No name	6870m	26
No name	20,640ft	29
Pk 20,002ft close by		
Snow Range	?	15, 16
Namla Karpo	?	23 (Map 14)
No name	6010m	26
Minya Konka	7556m	26
No name	20,000 ft	29
Pk 26,450ft close by (??)		
Snow Range	?	15, 16
Gyela Peri	7151m	23
Namcha Barwa	7651m 7765m	23
Ningri Tangor	?	23
Kongbo Peri	?	23
No name	6236m	26
Pab Ri	?	23, 26
Temu Tse	?	23
No name	21,660 ft	29
Kang Kar Hlamo	?	31
Dorjet Zenga	?	23
No name	21,680 ft	31
?Kakarpo Range	?	15, 16
Bung Bung Ri	?	26
Chombo	?6840m	23
Damyon	?	23
No name	6290m	26
Kang Pemu	?	23
Konka Ling Range	?	50
Kha Wa Karpo Ka Gur Pu ? Kang Karpo Meili	6840m	23
No name	18,000 ft	24
Pai Ma Shan	?	23, 24
Ka Karpo Razi	?	23
Kaso	?	23
Polon	?	23
Me Tse Mo	?	24
Drachhen	?	24
Ke Ni Chu Pu	?	23, 49
Kanju Shan	?	24
Mizhon Ziga	?	24
Hsin Shih Kuan Shan	?	24
Dapha Bum	?	23

Mungku Hkyet	?	23
Taru Tra	?	23
Likiang Group	?	23, 24
No name	Peaks over 20,000ft	27

REFERENCES

1 J G Marshall, *Britain and Tibet 1765–1947. The Background to the India–China Border Dispute.* Bundoora (La Trobe University Library), Australia, 1977.

2 J Rennel, 'An Account of the Ganges and Burrampooter River'. *Phil Trans Roy Soc London 71*, 87–114, 1781.

3 'Mr J F Needham's Journey along the Lohit Brahmaputra between Sadiya in Upper Assam and Rima in South Tibet.' *Royal Geographical Soc Suppl Papers 2, Part 3*, 487–555, 1888.

4 W R Fuchs, *Der Jesuiten-Atlas der Kanshi-Zeit.* Monumenta Serica. Monograph Series IV. Fujen Universität, Peking, 1943.

5 D Waller, *The Pundits. British Exploration of Tibet and Central Asia.* University Press of Kentucky, 1990.

6 J T Walker, 'The Lu River of Tibet. Is it the source of the Irawady or the Salwin?' *Proc Royal Geographical Soc 9*, 353–376, 1887.

7 L A Waddell, 'The Falls of the Tsangpo (San Pu) and the identity of that river with the Brahmaputra'. *Geographical Journal 5*, 258-260, 1895.

8 Sarat Chandra Das, 'A note on the identity of the great Tsangpo of Tibet with the Dihong'. *J Asiatic Soc of Bengal 67, No 1*, 126-129, 1898.

9 J T Walker, 'Five years' journeyings through Great Tibet by one of the trans-Himalayan explorers of the Survey of India'. *J Royal Geographical Soc (N.S.) 7*, 65–93, 1885.

10 *Reports of the explorations in Great Tibet and Mongolia made by A-K in 1879–1882 in connection with the Trigonometric Branch, Survey of India.* Dehra Dun, 1884.

11 W J Gill, 'Travels in Western China and on the eastern borders of Tibet'. *J Royal Geographical Soc 48*, 57–172, 1878.

12 W J Gill, *The river of golden sand.* London (John Murray), 1883.

13 G Pereira, 'Brigadier-General George Pereira's journey to Lhasa'. *Geographical Journal 61*, 124–130, 1923.

14 G Pereira, 'Peking to Lhasa'. *Geographical Journal 64*, 97–120, 1924.

15 E Teichman, 'Journeys through Kam (East Tibet)'. *Geographical Journal 59*, 1–19, 1922.

16 E. Teichman, *Travels of a consular officer in Eastern Tibet*, Cambridge University Press, 1922.

17 F M Bailey, *China, Tibet, Assam.* London (Cape), 1945.

18 F M Bailey, *No passport to Tibet.* London (Hart-Davis), 1957.

19 O Coales, 'Eastern Tibet.' *Geographical Journal 53*, 228–253, 1919.

20 O Coales, 'Economic notes on Eastern Tibet'. *Geographical Journal 54*, 242–247, 1919.

21 J W Gregory and C J Gregory, 'The Alps of Chinese Tibet and their geographical relations'. *Geographical Journal 61*, 153–179, 1923.
22 C Lyte, *Frank Kingdon-Ward. The last of the great plant hunters*. London (John Murray), 1989.
23 U and H Schweinfurth, *Exploration in the Eastern Himalayas and the River Gorge Country of South-East Tibet. Francis (Frank) Kingdon-Ward (1885–1958)*. Wiesbaden (Franz Steiner Verlag), 1975.
24 J F Rock, *The ancient Na-Khi kingdom of South-West China* (2 vols). Cambridge, Mass (Harvard Univ Press), 1947.
25 Obituary of Joseph Rock. *Taxon 12*, 89–102, 1963.
26 *The Mountains of Central Asia* (1:3,000,000 Map and Gazetteer compiled by the Royal Geographical Society and the Mount Everest Foundation.) London (Macmillan), 1987.
27 Operational Navigation Chart 1: 1,000,000, Sheets G7, G8, H9, H10. Prepared by Aerospace Center, Defense Mapping Agency, St Louis Airforce Station, Missouri.
28 F Kingdon-Ward, *Burma's icy mountains*. London (Cape), 1949.
29 R Kaulback, *Salween*. London (Hodder & Stoughton), 1938.
30 R Kaulback, *Tibetan trek*. London (Hodder & Stoughton), 1934.
31 J Hanbury-Tracy, *Black river of Tibet*. London (Muller), 1938
32 F Kingdon-Ward, *The riddle of the Tsangpo gorges*. London (Arnold), 1926.
33 M Ward, 'The eastern Himalaya'. *AJ90*, 10–17, 1985.
34 *American Alpine Journal 27*, 336, 1985.
35 *American Alpine Journal 29*, 295 and 297–298, 1987.
36 *American Alpine Journal 31*, 270–271, 1989.
37 J F Rock, 'Through the great river trenches of Asia'. *Nat Geographic Mag 50(2)*, 133–186, 1926.
38 D H de Beer, *Yunnan 1938*. Privately printed, 1971.
39 See the following article in this journal by Tony Schilling.
40 *American Alpine Journal 28*, 303–304, 1986.
41 'Mountains about Tatsienlu.' *Geographical Journal 75*, 345–352, 1930.
42 'Sketches of the Tatsienlu peaks 1930.' *Geographical Journal 75*, 353–355, 1930.
43 B Messerli and J Ives, *Gongga Shan (7556m) and Yulongue Shan (5596m). Geo-ecological observations in the Hengduan Shan mountains of South-Western China*, Chapter in *Natural environment and man in tropical mountain ecosystems* (ed W Lauer). Stuttgart (Franz Steiner Verlag Wiesbaden), 1984.
44 J F Rock, 'The glories of the Minya Konka'. *Nat Geographic Mag 58*, 385–437, 1930.
45 R L Burdsall and A B Emmons, *Men against the clouds*. London (Bodley Head), 1935.
46 H Day, 'Da Xue Shan, Sichuan, China'. *AJ87*, 117–120, 1982.
47 M Ward, 'The Kun Lun Shan. Desert Peaks of Central Asia'. *AJ94*, 84–97, 1989/90.

48 *The Geological Evolution of Tibet. Report of the 1985 Royal Society-Academia Sinica Geotraverse of the Xizang–Qinghai Plateau.* Royal Society, 1988.

49 J F Rock, *The Amnye ma-chhen range and adjacent regions: a monographic study.* Roma: Istituto Italiano per il Medio ed Estremo Oriente, 1956.

50 'Konka Risumgongha, Holy Mountain of the Outlaws'. *Nat Geographic Mag 60*, 1–65, 1931.

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