col and crossed further hills to the W before descending below Pilang). If not quite in the same league as Tilman's appearance in Milam after crossing the rim of the Nanda Devi sanctuary, our arrival had something of the same absurd flavour. Though a little more developed than Gangi (the last village in the Bhillangana) Pilang is still a pretty unvisited place as far as foreigners are concerned and we were as curious to stare at the wild Garhwalis and their bejewelled women as they were to stare at us with our muddy torn clothes and huge rucksacks. They must attribute amazing powers to Western maps, for the idea that strangers should navigate alone across their hills (however incompetently) with the aid only of a scruffy square of paper was clearly hard for them to credit. One of the more suspicious asked us how many tarns there were up on the col, and when we got the answer wrong it was impossible to explain in our limited Hindi that, first, we hadn't been specially on the lookout to count tarns and, secondly, we could easily have missed one in the deep snow cover.

Our host, Deb Ram, was a paragón of good manners, serving us kindly without being too inquisitive. Next morning we left him various useful bits and pieces and set off on the final stretch to the main road at Malla. One last route-finding error had us climbing up the other side of the Pilang valley on the old path to Silla, instead of taking a more direct newly-built path. But we reached the hot Bhagirathi valley early in the afternoon and after a bus ride—whose discomforts, even after 9 months in India, ranked as badly as anything in the previous week—we arrived safely in the fleshpots of Uttarkashi, while thunderstorms broke over the mountains.

The mountains of Tibet and the Tibet/China border

Frank Boothman

Since boyhood the mountains of the Tibetan plateau and the Tibetan/Chinese border ranges have fascinated me—largely because they were high, remote and we really knew very little about them. While the majority of the world's high peaks have been climbed, photographed and written about (many in great detail), our knowledge of these Tibetan peaks remains, with very few exceptions, just as it did in 1914; at best scanty, relying exclusively on the brief reports of the few explorers who passed by in the vicinity (often at a considerable distance), while the rest are still virtually unknown. Indeed there still remain areas which, so far as Westerners are concerned, are unexplored; truly therefore are they 'mountains of mystery'.

Behind this fascination lay the dream that perhaps one day someone might discover a mountain challenging, or even higher than Everest; that

dream was fed from time to time by articles in the more lurid press (I am talking of the 1930's) about some intrepid explorer having seen a mountain 'somewhere in Tibet' (as I recall the 'somewhere' was never clearly defined) higher than Everest. This desire was, of course, further fuelled by the reports of the American 'hump' pilots during the 1939-45 war whilst ferrying supplies over the Tibet/China border ranges into China, that the Amne Machin mountain was higher than Everest (c.31,500 ft was one report I read; Appalachia states 32,000 ft). For a time this belief held some credence; indeed, I well remember soon after the war, reading in a book on modern exploration, an article by F. Kingdon Ward, the explorer and plant hunter of SE Tibet in the '20s and '30s, in which he categorically stated it was now quite clearly established that the Amne Machin was higher than Everest! Alas what we do now know, and quite categorically at that, is that the Amne Machin falls a long long way short of Everest; nevertheless there are still plenty of other mountains in that country, of quite respectable height, to keep mountaineers and others well occupied for many a day yet—when they can get access of course! I propose therefore in this article to survey, in the limited space at my disposal, the current state of our knowledge of these mountains; in doing so I shall omit the Himalaya, Karakoram, Pamirs and the Hindu Kush on the grounds that these are by now reasonably well known and measured, and confine my survey to the Kun Lun, the internal Tibetan ranges and those of the Tibet/China border.

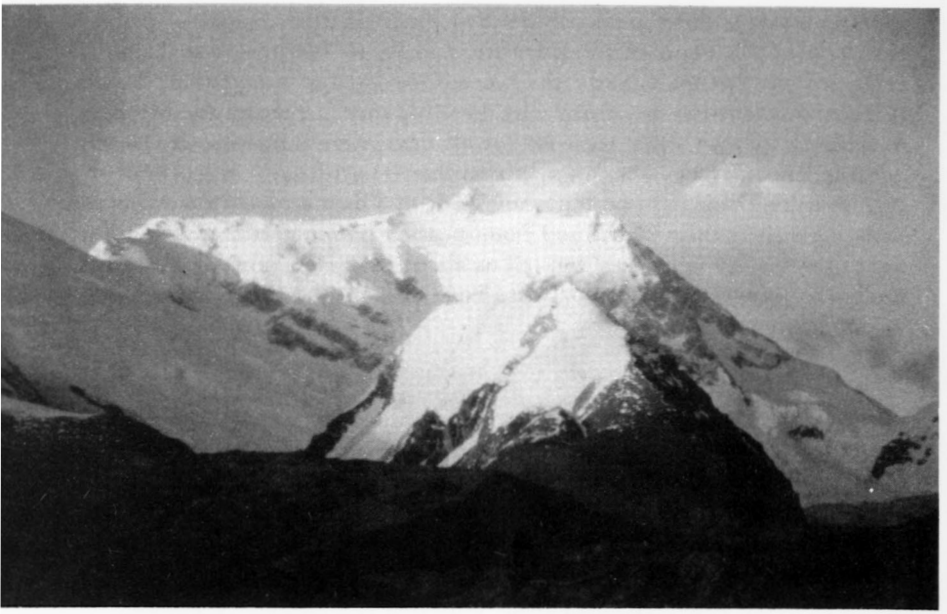
Modern exploration of Tibet really began in the 1860s with the training and dispatch into Tibet proper of the Indian Pandits. At that time outside the Lhasa area, parts of the Tsangpo valley, a small area around Kailas and Lake Manasarowar, and the western fringe of Tibet, some of whose mountains had been surveyed as part of the great trigonometrical survey of India in the 1850s and early 1860s, (including a number of Kun Lun mountains designated with the prefix 'E'), virtually nothing was known of the rest of the country—*terra incognita* indeed! Initially the Pandits concentrated on SW Tibet (Nain Singh *et al*) but in 1878 A.K. (Krishna) began a great journey from India crossing the whole of Tibet from S to N via Lhasa as far as Tsaidam and back again, not finally returning until 1882. The Europeans really started in the 1870s with the Russians (Prejevalsky *et al*) coming from the N and, crossing the Bokalik Tagh (Eastern Kun Lun), concentrated mainly on NE Tibet; these Russian expeditions continued until the early 1900s. At that time virtually all European expeditions entered Tibet from the N—either directly over the Kun Lun (e.g. Russian, French, Swedish and some British) or from the NW via Ladakh (mainly British). By this they avoided coming into contact with the highly suspicious and inward looking Tibetans (who lived mainly in the S and E) until a considerable portion of the country had been traversed. The goal of most of the explorers of that era was Lhasa but, being invariably turned away when approaching it, they perforce travelled out of the country by a different route—much to the benefit of geographers and all others who were interested in the topography of this unknown land. In chronological order then we next have Carey and Dalgleish (British,

1885-87) coming over the eastern Kun Lun (Bokalik Tagh) from Sinkiang into NE Tibet towards Lhasa but, supplies running short, retraced their steps back to Sinkiang while Bonvalot (French, 1889-90) crossed the central Kun Lun (Arka Tagh) down as far S as Lake Tengri Nor (the first European expedition to actually see it) and then E to Batang. Slightly later W. W. Rockhill (American)—unusually starting from Peking to Sinkiang (Lake Koko Nor)—crossed the eastern Kun Lun and travelled SW towards Lhasa before turning E to Tatsienlu. Bower (British, 1891-2), starting from Leh, traversed the central lake region right across Tibet also reaching Tatsienlu, while the De Rhins expedition (French, 1893-5) crossed the Arka Tagh (central Kun Lun) at about 87°E, somewhat W of Bonvalot, and like them, also reached Lake Tengri Nor before turning NE to Sining, De Rhins being killed in eastern Tibet (Tungbundo). Littledale (British, 1894-5), with wife and cousin, starting from Leh to Sinkiang, similarly crossed the Arka Tagh at about 87°E, and also travelled S as far as Tengri Nor but turned W, crossing the outliers of the Transhimalayan ranges on the way back to Leh. In 1896—verily the *annus mirabilis* of Tibetan exploration—Deasy (British), likewise from Leh to Sinkiang, crossed the western Kun Lun down to about 34°N and circled back over the Kun Lun to Sinkiang before returning to Leh; he was the first real surveyor of the Tibetan mountains since the Trigonometrical Survey ceased operations on the verge of that country in the early 1860s. Deasy fixed the locations and measured the elevations of scores of peaks both in the western Kun Lun and on the plateau proper. In the same year Welby and Malcolm (British) traversed the whole of Tibet from W to E (but N of Bower's route—travelling just S of the Kokoshili range) to Sining, while Hedin (Swedish), surely the guru of all Tibetan explorers, began the first of his several journeys in Tibet by crossing the Arka Tagh broadly in the same place as De Rhins and Littledale and then proceeding E between that range and the Kokoshili, before exiting via the NE. Hedin was to continue his explorations—almost always in unknown country—until 1908, being the first to discover and explore that vast and complex system of ranges lying in the W between the Tsangpo valley and the central lake region and which he called the Transhimalaya. Regrettably, while he measured virtually everything else, eg the elevation of base camps, passes, the fixing of the locations of many peaks, length and depth of lakes, flow of rivers, etc, etc, he measured few peak elevations and those only on his last great 'exploration' expedition—the 1906/08 one—when he took sightings on 20 peaks.

In 1898 the first German (Futterer) expedition did some work in the NE, while in 1904 his compatriot (Filchner) also travelled in that region; both apparently saw the Amne Machin, but from a distance as also did Tafel (likewise German) in his 1905/8 travels in E Tibet. In 1900 the Anglo-Hungarian, M. A. Stein, with his Indian surveyor and taking time off from his archaeological work in the Taklamakan desert, surveyed a portion of the Western Kun Lun, fixing and measuring the elevations of a number of peaks (and repeating this exercise in his 1906/08 expedition) while in 1903 Rawlings and Hargreaves (British), starting from the NW, mapped the

central lake regions as far E as 84° (but do not seem to have included peak elevations in their endeavours—albeit carrying the necessary equipment). Following the British expedition to Lhasa in 1904, Ryder and Wood fixed and measured peaks of the Nyenchen Tangla range and, travelling W up the Tsangpo valley to Lake Manasarowar, similarly fixed and measured a number of peaks on the S portions of the Transhimalaya, while somewhat later, Bailey and Morshead explored the Tsangpo gorges to the E, solving both the mystery of the Tsangpo Falls and the great bend through the Himalayas. However, with the advent of the 1914/18 war, followed by the Russian Revolution, all entry via the N was stopped, while the British similarly refused entry via Ladakh. Thus virtually all future exploration was confined to the E portions of the country, entry being via Burma/Assam, or China proper (the great Sino-Swedish expedition of 1926/35, led by Hedin, and the sole major one outside the E region covered, in the Tibetan portion of its journey, mainly territory in the N already traversed by Hedin in his earlier explorations). The first post war expedition of any note in E Tibet was that of Pereira (British); unfortunately he died whilst attempting a second. He was followed later in the 1920s, by the American, Rock, who journeyed within sight of the Amne Machin and in subsequent journeys measured the Minya Konka and visited other high peaks in the border ranges to the W of Minya Konka, while in 1932 the Americans, Burdsall and Moore remeasured and climbed Minya Konka; our current elevation comes from this expedition. In the mid 1930s Kaulbeck and Hanbury Tracy (British) attempted to reach the source of the Salween, while in both the 1920s and 1930s the plant hunter Kingdon Ward (British) combined plant hunting with some exploration of the SE gorge country. As in 1914/18 the 1939/45 war virtually stopped all further western exploration of Tibet and while one or two journeys in that region were made soon after the war ended (the main one, from a topographical point of view, being the American Clark's expedition in 1949 to measure the Amne Machin) the takeover of Tibet by the Chinese Communists that year effectively stopped all further travel of any kind in the country. And so the position remains today - albeit tourist trips to Lhasa and the Amne Machin (!) have recently been introduced by the Chinese. Apart from a few fringe mountain climbs (Gosainthan, Amne Machin, Minya Konka, Muztagh Ata, Kongur 1 and, of course, Everest) plus a reference to possible joint mining operations in the Kun Lun with the Russians before the great break c.1959, I am not aware of attempts by the Chinese, following their 1949 takeover, to survey any part of the country I am concerned with in this article; in fact, given the general context of Chinese affairs up to very recent times, I would be extremely surprised to find if anything of that nature had ever been contemplated. So we arrive at the position today (Autumn 1981) with our knowledge of most Tibetan mountains and ranges virtually frozen since the early 1900s.

And what then, amidst all this exploration, do we know of the mountains themselves? Very little, I regret to say—certainly in respect of even moderately reliable elevation figures; we must remember that most of the above were explorers travelling hundreds of miles in totally unknown and



33 Mount Kongur from the SW (Photo: 1981 Mt Kongur expedition)

difficult country and with limited supplies, so that those few who actually measured peak elevations with instruments did so under considerable difficulties since the very ground on which their instruments stood was itself of completely unknown height and could be measured only by methods of such dubious accuracy as barometers and hypsometers; in addition, because of further adverse factors like shortage of time, weather, etc, their sightings must have been limited both in quality and number. Probably the only exception to these latter drawbacks was Stein, who concentrated his resources on a relatively small area of the western Kun Lun; of those others who used proper instruments, there were only 3 groups, viz. Deasy in the western Kun Lun and part of the NW tableland proper, Ryder and Wood in the Nyenchen Tangla and the Transhimalaya and Hedin, in respect of his 1906/08 expedition, also in the Transhimalaya. Among the rest there were some minor exceptions (e.g. the Pandits were taught how to ascertain peak elevations by sextant but as Burrard says, 'of the third order of reliability'), whilst Littledale, in ascertaining the height of the Ulugh Muztagh, presumably used a theodolite (since he carried one with him) but this seems to have been the only peak elevation he measured at all. Grenard (De Rhins expedition) also used instruments for some peak measurements but how many and with what degree of accuracy I am unable to say; certainly these would be subject to all the limitations I have referred to above. Thus many elevations were no more than pure 'guestimates', often from a considerable distance and on such notoriously inaccurate evidence as 'the amount of snow on the peak'.

However there has been, and for a number of years now, another source of information available to us—and one not merely confined solely to peak

elevations and to those areas traversed by these old time explorers—but for the whole of Tibet and all its border areas, explored and unexplored alike. I refer to the United States Air Force Operational Navigation Charts (ONCs) published in this country by the Ordnance Survey for the Ministry of Defence. These, while basically for air navigation purposes, are clearly accurate enough (see later comments on this)—particularly in location—to throw entirely new light on the whole issue of Tibetan topography. Let us look therefore at these charts and examine their parameters and then in the light of these, see what they can tell us about peak elevations in Tibet and the border ranges. For this purpose I have used the latest I have been able to purchase, viz.

No. of map	*Edition*	*Date of completion of data*	*Maximum vertical error (of sheet)*	*Approximate area covered*
ONC G7	5	July '74	1,600 ft	32°—40° N: 74°—88° E
ONC G8	3	Dec. '73	1,500 ft	32°—40° N: 88°—102° E
ONC H9	6	Oct. '70 (Revised Mar. '78)	1,800 ft	24°—32° N: 77°—89° E
*ONC H10	6	Oct. '72 (Revised Mar. '78)	5,000 ft	24°—32° N: 89°—101° E
ONC H11	4	Dec. '74	1,900 ft	24°—32° N: 101°—113° E

*Chart ONC H10 bears an additional cautionary note that errors up to 5,500 ft may exist in both elevations and maximum elevation figures (MEFs): however, of the peaks listed later in this article, only 2 are on this particular sheet.

Firstly then, all elevations are in feet, while such peaks as are named (not many) are all in Chinese but using the old Wade Giles transcription system. Since this has now been superseded by the current Pinyin one and I am not able to translate the one into the other, I have decided, both in discussing individual peaks and furnishing my final list of those over 21,500 ft, to use (a) both feet and metres for elevation purposes and (b) the old names for these peaks (i.e. those under which they were, until recently, always known to us); in any event it would not surprise me in the least to find in the not too distant future all these old names restored and the current Chinese ones disappearing like morning mist.

Two types of indicators are used to record the location of peaks—a period (.) denoting an accurate elevation (i.e. error not in excess of 100 ft) and a cross (X) denoting a less accurate elevation (error from 300 ft up to the maximum for the chart); with one single exception (almost certainly an error) all peaks concerned with here are of the latter variety. Location is accurate within 7,500 ft (personal communication) except in certain areas marked 'Relief data incomplete'—again this does not concern any of the peaks listed in this article. Each chart has its own maximum vertical error (MVE) but it is possible in many cases to reduce this when considering individual peaks, since the chart is divided up into individual squares of 1° latitude and longitude each, which are then overprinted by a figure

representing the maximum terrain elevation (MTE) or the maximum elevation figure (MEF—a newer system), for that square. The former (MTE) means just that—it is the height of the highest terrain, i.e. a peak, in the particular square concerned, rounded up to the nearest 100 ft plus the maximum vertical error for that peak, while the latter (MEF) includes in addition an allowance of 200 ft for man-made artifacts where these are not separately indicated; needless to say, none are indicated for the peaks listed in this article. Thus by working backwards we can easily calculate the MVE for each square. However one uncertainty remains here—where there is more than one peak elevation recorded in any particular square it is not clear whether the MVE ascertained by the above method also applies to all other lesser (peak) elevations in that square; one therefore has the choice of using the square MVE for all peaks in the square or using the chart MVE for the lesser ones. For my final list I have decided to use the former method. In respect of the old peak locations I have used the *Times Atlas,* where these are listed; for others I have used a variety of sources, one or 2 of which are very imprecise e.g. Hedin's map of Tibet at the end of his book *Transhimalaya* where peak names and elevations are given but no specific triangulation points printed.

In the light of the above, therefore, let us now look at the 4 highest known peaks in Tibet (excluding of course the Tibetan Himalaya) and compare the old figures (with a glance at the circumstances in which these were originally obtained and, therefore, their likely veracity) with the new airchart ones:

Ulugh Muztagh (Arka Tagh Range—Central Kun Lun) 25,340 ft (7723m) location 36°26′ N, 87°27′ E. Generally considered to be the highest known mountain in Tibet. So far as I can trace, the first Westerners to see this mountain were the Dutreuil de Rhins expeditioners who passed by in September 1893; about it Grenard wrote that it was dominating etc., and thought it likely to be the highest between Turkestan and the Himalaya—he measured it at 24,160 ft (7340m). Next to see it was Littledale who passed by in January 1895, described it as a double peak and who measured it at 25,340 ft (7723m). The third, and last Westerner to see it, was the ubiquitous Hedin, who saw the mountain in his first (1896) Tibetan expedition and also on his second (1899-1901); he also described it as a double peak. I have already commented on the general uncertainties in these early Tibetan peak measurements (ground of unknown height, lack of time for a full survey, etc.,) and while Littledale apparently used instruments for his measurements (his account refers to 'angles taken from several points') there is no reference to any corrections for refraction etc. It is also curious to note that in his list of Kun Lun peaks, Burrard, at that time Superintendent of the India Triangulation Survey, only records the Ulugh Muztagh as 24,000 ft (*A Sketch of the Geography and Geology of the Himalayas and Tibet*—1907) and credits this to Hedin! Since Burrard was clearly well aware of Littledale's journey and refers to it elsewhere in his book, one can only conclude he was doubtful regarding the reliability of Littledale's figure. Chart ONC G7 records an elevation of 23,370 ft

(7123m) at 36°23′ N, 87°20′ E with an MVE of 400 ft—a reduction of some 2,000 ft.

Shapka Monomakha (Bokalik Tagh Range—Eastern Kun Lun) 25,328 ft (7720m), location 36°22′ N, 90°55′ E. Of known Tibetan mountains second only to Ulugh Muztagh and that by just a few feet. So far as I can trace, first seen and named by Prejevalsky in his 1885-87 expedition; however the report on this (*Proceedings of the R.G.S.* 1887) makes no mention of its elevation, albeit 2 other peaks in the vicinity are credited with c.20,000 ft. Since a peak well in excess of 25,000 ft would have dominated all around (unless partially hidden, and there is no mention of that) it is clear that so far as Prejevalsky was concerned, this mountain was no more than one of a group of peaks, none of which had any special claim to outstanding elevation etc. The only other Westerners I have been able to trace who have ever been in its vicinity, are Carey and Dalgleish, Rockhill and Hedin. The former contributed little accurate mountain topographical data (their sketch map records 'high peaks over 18,000 ft' in the general area of the Shapka Monomakha), while Rockhill states he may have seen it, but his map shows he was never closer than about 80 miles. Hedin saw it in 1900—calling it Tschulak-akkan but says this is almost certainly Shapka Monomakha; no mention was made of commanding height etc. I can only conclude it must have been one of the other Russian explorers (Kozlov or Roborovsky?) since while, in general, British atlases have tended not to include this peak (the *Times* has only recently started to do so) it is shown on Russian and Polish ones. Clearly therefore, an extremely doubtful figure and the doubt is fully substantiated when one looks at the appropriate air chart (ONC G8) which, while no peak is recorded at the specific location listed, has peaks of 18,200 ft (5547m) at 36°05′ N, 91°05′ E; 18,870 ft (5752m) at 36°01′ N, 90°57′ E and 20,140 ft (6139m) at 35°39′ N, 90°45′ E;—all with MVEs of 500/600 ft. Even if we are charitable and take the highest, it is still a reduction of over 5,000 ft.

Mount Dupleix (Dupleix Range) c.26,247 ft (8000m) location 34°00′ N, 89°30′ E. First seen and named by the Bonvalot expedition who gave it this height (estimate only—in a mountain mist and when night was closing in!); the only other Westerner I can trace who has seen it was (of course) Hedin, who called it 'this great glaciated mass', but refrained from putting any elevation figure to it. Bonvalot was known to be prone to exaggeration in a number of his elevations (all 'guestimates') when in unknown country and both Grenard and Hedin believed this elevation to be so—nevertheless if verified it would be a very welcome addition to the select circle of 26,247 ft (8000m) peaks. Alas! once again our hopes are dashed—the air chart concerned (ONC G8) recording only 22,730 ft (6929m) at 33°55′ N, 89°14′ E, MVE 400 ft.

Shahkangsham. (Transhimalaya) 25,131 ft (7660m), location 31°40′ N, 85°20′ E. Both the discovery of this mountain and its height are credited to Nain Singh on his great 1873-75 Leh—Lhasa journey. However, examination of his account of that journey and his map (as written up by

Captain Trotter, his chief,) make no reference either to this name or elevation figure; the nearest is Shyalchi Kang Jang, described only as 'high snow peaks'—no height quoted—at about 31°40′ N, 84°45′—84°57′ E. The next traveller I can trace to have seen it (no other Pandit was ever in that region) was Littledale on his way back to Leh; since at that time his wife was very ill, I cannot imagine him taking time off to measure peak elevations and he merely enters it (but as Shahkangsham) on his map—again no height quoted. Hedin then saw it in 1901 and several times on his .1906-08 expedition—he always refers to it as Nain Singh's 'Shahkangsham' and records on his map at the above elevation. It is clear therefore that both name and elevation came out of the Indian Survey Office, sometime between 1875 and 1895—though on what evidence is not known. As with Shapka Monomakha, the air chart (ONC H9) has no peak at this specific location, but peaks of 19,200 ft (5852m) at 31°21′ N, 85°21′ E; 20,800 ft (6340m) at 31°42′ N, 85°03′ E; 20,140 ft (6110m) at 31°34′ N, 85°06′ E; and 19,520 ft (5940m) at 31°22′ N, 85°17′ E; all with an MVE of 500 ft.

So, of the four known peaks, all with elevations formerly listed as in excess of 25,000 ft, we find one (the highest) reduced by some 2,000 ft, a second by c.3,500 ft and the other 2 by something of the order of 5,000 ft.

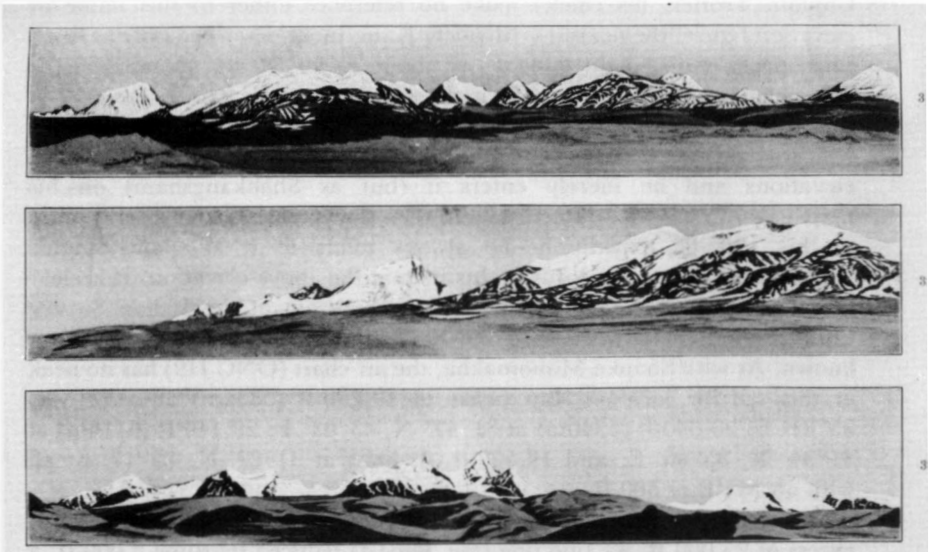
Let us therefore now look at a few more of the 'known' Tibetan peaks:

Muztagh (Western Kun Lun) 23,888 ft (7281m) location 35°57′ N, 80°14′ E. Originally known as E61 and measured by the Survey of India in 1862 at the quoted figure. Stein named it 'Muztagh' in his 1901 survey but also called it K5 (it is not clear if he ever re-measured it but it seems unlikely—from his account he appears to have accepted the old survey figure). Air Chart G7 records a peak of 21,380 ft (6517m) at 36°03′ N, 80°07′ E with an MVE of 900 ft—a drop of some 2,500 ft.

Cholpanglik (Western Kun Lun) 23,330 ft (7102m) location c.35°47′ N, 79°55′ E. Probably a Stein survey; it is difficult at times to untangle which of these Western Kun Lun figures are Stein's, Deasy's or the old Survey ones. Air Chart G7 records 2 peaks both of 21,600 ft (6574m) at 35°53′ N, 79°56′ E and 35°35′ N, 80°00′ E;—the latter denoted by a period (.) thus indicating a peak with a vertical error of 100 ft or less—probably therefore, a printer's error (even Kailas has an 'X' marking.)

Chung Muztagh (Western Kun Lun) 22,705 ft (6920m) location c.35°35′ N, 82°15′ E. This could well be a Deasy figure (he has a peak of 22,700 ft at 35°35′ N, 82°23′ E. Air Chart G7 lists a peak of 23,160 ft (7070m) at 35°39′ N, 82°20′E: MVE 1,100 ft, a rare case of the air charts increasing the elevation—albeit small (but with the possibility of a maximum height of 24,000 ft + —higher than that of Ulugh Muztagh).

Aling Kangri (Aling Kangri Shan, Transhimalaya) 24,000 ft (7315m) location 32°51′ N, 81°03′ E. First seen, named and given this location by Nain Singh in his 1867 journey. As with Shahkangsham, it is difficult to know whether the elevation is actually Nain Singh's own estimate or Montgomerie (his chief at the time) interpreting Singh's narrative (the figure was entered in the report as 'exceeding 23,000 ft and possibly



319, 320, 321. The Summits of Lunpo-gangri from Camps 379, 381, and 383.
From Water-Colours by the Author.

34 (This and next print reproduced from Trans Himalaya, *Sven Hedin)*

24,000 ft' and was based on the amount of snow at that time—September—as seen from the S). Singh saw it again (but some 90 miles from the north) in 1874, whilst Littledale saw it in 1895 and Hedin in 1901.

Chart G7 has an unnamed peak of 21,160 ft (6450m) at 32°50′ N, 81°04′ E; MVE 300 ft—albeit slightly to the W of the range marked 'Aling Shan' which starts at about 81°30′ E; however, as none of the peaks in the vicinity reaches 20,000 ft (c.6000m) I have taken this peak to be Aling Kangri—still a substantial reduction from the old figure.

Lungmari (Transhimalaya) 23,290 ft (7100m) location c.30°43′ N, 86°14′ E; another peak whose details I have not been able to track down satisfactorily. I think it is the same as Nain Singh's Targo Gangri peaks (1873/75 expedition) which he estimated at about 25,000 ft (7467m) and which Hedin's map places slightly E of 86°14′. Hedin is the only other explorer I can trace to have been in that region measuring one peak at 22,745 ft (6933m). Chart H10 records two peaks of 21,160 ft (6450m) each.—one at 30°56′ N, 86°25′ E and the other some 5 miles due S—both with MVEs of 400 ft, (but note Chart H10!).

Lunpo Gangri (Transhimalaya—Lunpo Gangri Range) 23,150 ft (7056m) location 29°50′ N, 84°36′E, W 134 of Ryder and Woods' 1904 survey, the highest peak they measured in the Transhimalaya. However, in his 1906/08 journey, Hedin measured it at 23,635 ft (7204m) from 4 separate stations, but Ryder's figure seems to have prevailed (there is some doubt as to whether they were measuring the same peak, but lack of space prevents me from giving full details). Chart H9 records a peak of 24,040 ft (7324m)

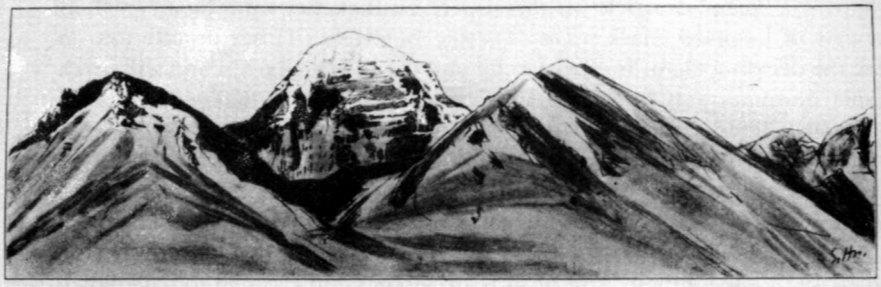
at 29°50′ N, 84°31′ E with 2 others (one a few miles N and the other a few miles S) at 22,380 ft (6821m) and 22,630 ft (6898m) respectively, the MVE for all 3 being 400 ft. This is the highest peak recorded in the air charts for the whole of the Tibetan plateau and the Tibet/China border ranges (but always excepting the Tibetan Himalaya) and the only peak to exceed 24,000 ft. Another of the few cases where the charts record an increase over the old figure.

Kuhanbokang (Transhimalaya) 23,688 ft (7216m) location c.31°57′ N, 83°15′ E. A virtually identical situation to that of Shahkangsham—Singh's map (1873-75 journey) recording only Ning Kangri snow peaks at about 32°25′ N—no elevations quoted. Next is Littledale's map recording the name Kuhanbokang (no height) and Hedin passed near in 1901 but recording both name and height in his 1908 map. As with Shahkangsham therefore, we are left wondering how, between the years 1875 and 1895 Ning Kangri (no height recorded) became Kuhanbokang and with the above altitude. Chart H9 records peaks of 21,430 ft (6532m) at 31°38′ N, 83°27′ E and 20,740 ft (6324m) at 31°52′ N, 83°34′ E both with an MVE of 400 ft.

Nyenchen Tangla (Nyenchen Tangla Range) 23,252 ft (7088m) location 30°22′ N, 90°36′ E. A Ryder and Wood elevation—the highest of all their SW Tibet elevations. First seen by Nain Singh, then (in order) Bonvalot, De Rhins and Littledale—all from the shores of Tengri Nor with 'guestimates' of 24,000 ft and 25,000 ft elevation. Chart H10 records a peak of 22,920 ft (6986m) MVE 400 ft at 30°24′ N, 90°35′ E.

Kan Lan Shan (Kan Lan Shan Range) 22,966 ft (7000m) location 29°54′ N, 90°03′ E. A Ryder and Wood elevation (R 210)—sometimes known as Chomo Gangar (A.K.). Chart H10 records a peak of 20,000 ft (6096m) MVE 500 ft at this location, with another of 20,200 ft (6157m) a few miles N and a third of 20,140 ft (6139m) a few miles W—both with MVEs of 400 ft. However as stated before, elevations on this chart must carry some degree of doubt.

Kailas (Kailas Range) 22,028 ft (6714m) location 31°04′ N, 81°91′ E. This elevation comes from the Karakoram Survey of the 1860s, but the peak had been known to Europeans for a number of years before that.

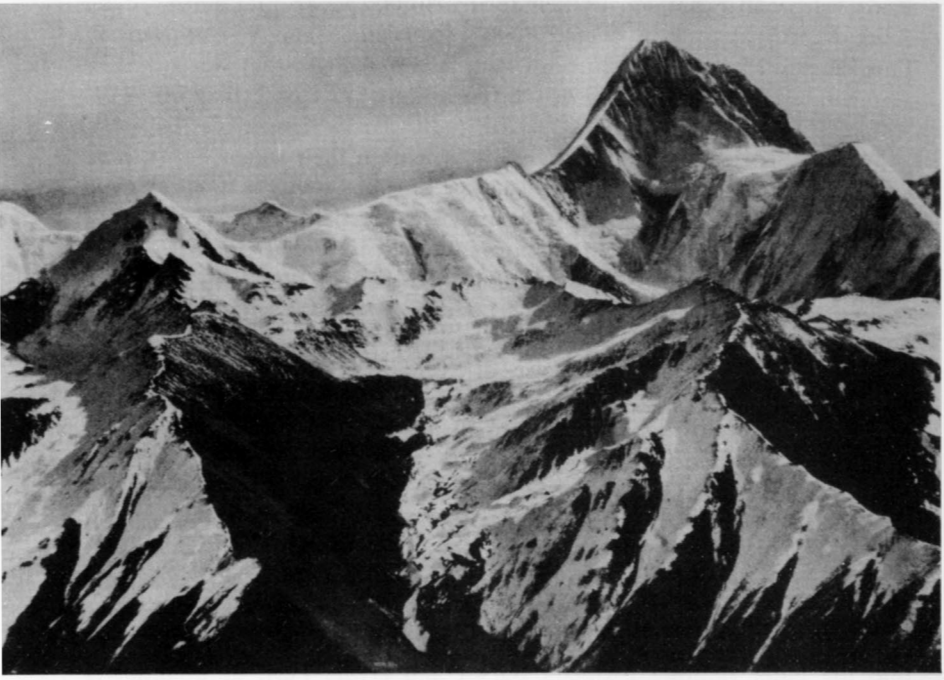


268. KAILAS FROM DIRI-PU.

Chart H9 records a peak of 21,770 ft (6635m) MVE 300 ft, at this location.

Amne Machin (Amne Machin Range) 23,490 ft (7160m) location 34°48′ N, 99°29′ E. The mystery mountain *par excellence*—mainly because of its reputed great height and the inability of explorers to get anywhere near it, due to the hostility of the local tribes (Ngoloks) to whom the mountain was holy and who therefore permitted few to approach—unless their forces were strong enough to do so; it therefore became an object of outstanding geographical interest. The fact of its existence was known to Europeans at least as far back as the early 19th Century, since I understand it appeared in the great 1707 Chinese Atlas compiled by the Jesuits for the Chinese Emperor; one also finds references to it in early Tibetan explorers' dispatches, etc. (e.g. Prejevalsky mentions it in one of his in the 1870s.) However the first Westerner I can trace to have actually seen the mountain was Grenard, late in 1894 (following the death of De Rhins) when he was on his way out to Sining; he speaks of it as 'dazzling and dominating' but his 1904 map only records it as 21,325 ft (6500m). Next was Roborosky (Russian) in January 1895, who actually camped at the foot of the mountain—vastly superior fire power over the locals enabled him to do this—he spoke of it as 'entirely snow clad and with many mighty glaciers' but no elevation figure was mentioned. Futterer (1898), Filchner (1904) and Tafel (1905-6) were next, while in the early 20s Pereira saw it and spoke of its dominating height, estimating this as at least 25,000 ft (this may possibly have been the start of the speculation re the mountain challenging or being even higher than Everest). These speculations were certainly well fed by the next traveller to see it, Rock, who, in 1928, estimated its height at 28,000 ft + and wrote an account of this expedition in the *National Geographic Magazine,* thus ensuring his speculation reached a wide public. In 1956, Rock published a book revising his figure down to c.21,300 ft. All these, except Roborovsky, saw it only from a minimum distance of some 50 miles or so. The crowning heights were, of course, those of the American 'Hump' pilots during the 1939-45 war, of 31,000/32,000 ft, the claim being that on the flight from Northern Assam to China they were blown N off their course and, whilst flying at c.30,000 ft, saw this high peak off their port wing some 2,000 ft or so above them, (e.g. *Appalachia*—January 1944—there were other reports). In my view the claim that they were ever near the Amne Machin is nonsense; there is a splendid article on this aspect by Blakeney and Tobin in their review of Leonard Clark's *The Marching Wind* (*AJ 61*) but in addition, to me the deciding factor is range; to fly past the Amne Machin and still reach their destination (Chungking or Chengtu) would virtually double the distance of the journey and would therefore require them carrying what, in my view, are quite unacceptable reserves of fuel. I do not, therefore, believe they ever saw the Amne Machin—or were ever anywhere near it and I am following this up elsewhere before it becomes enshrined for ever in the mythology of this mountain.

In 1947, the Chinese/American pilot Moon Chin claimed to have flown over the full length of the range but saw nothing over 18,000 ft (when faced



36 Minya Konka (Photo: AC Collection)

with this, Rock is reported to have recanted his 28,000 ft figure and agreed that 18,000 ft was correct!) while in 1949, the American Leonard Clark claimed to have ground surveyed the mountain at 29,661 ft (9040m) in an expedition there during the last days before the Chinese Communists took over completely.

The final word should have been the official Chinese expedition of 1960 which apparently thoroughly surveyed the mountain—checking their heights constantly on the long march to their base camp and taking at least 9 readings on the summit peak giving an average of 23,490 ft (7160m); as readers of this journal are aware, they then climbed it. However Chart G8 only records an elevation of 20,030 ft (6106m) MVE 300 ft for the peak, while some recent correspondence with the *Times Atlas* staff elicited the information that the latest Chinese Atlas only credits it with 20,610 ft (6282m)—roughly in line with the Air Chart figure and repudiating their own expedition's findings. From approaching 10000m (the 32,000 ft claim) to just over 6000m must be something of a record in peak elevation reductions; however we can now go and see it for ourselves since, as I write, (Autumn 1981), the Chinese have started to run holiday trips to the foot of the mountain. No doubt soon ski-runs, chair-lifts, hotels and all the other mod. cons. will be available (the Ngoloks no doubt being the waiters)—all except the mystery—that will have gone for ever.

Minya Konka (Tibet/China Border Ranges) 24,900 ft (7590m) location 29°45′ N, 101°50′ E. Seen (*inter alia*) in the early 1900s by Kermit

Roosevelt, who estimated its height at c.30,000 ft; ground surveyed by Rock c.1930 at a little over 25,000 ft (c.7620m) and re-surveyed by Burdsall and Moore in 1932 from whom the quoted elevation derives; they then climbed it. Chart H11 records an elevation of 22,820 ft (6956m) MVE 500 ft, at 29°39′ N, 101°57′ E.

The 64,000 dollar question therefore is, within their stated limits, how far can we accept these charts as accurate? One possibility is to check their figures against those of really well known and reliably ground surveyed peaks e.g. Everest, K2, Kangchenjunga, Nanga Parbat, etc.; unfortunately, for the most prominent well-known peaks the standard ground surveyed elevations have been used (personal communication). However, continuing on these lines with peaks not quite so prominent or well known, but whose elevations are also reliably ground surveyed (the air charts indicate these with a mixture of (.) and (x) marks) I find that, out of 11 such peaks, 6 have identical or virtually identical elevations, one (Gurla Mandhata) for which the chart figure is 200 ft higher than the standard one and the remaining 4 for which the chart elevations are lower, (Manaslu—100 ft; Himalchuli—300 ft; Annapurna—500 ft;—the location is also moved some 17 miles E—and Cho Oyu—770 ft). However, of the 6 with equal elevations, it is not possible to tell which are the charts' own figures and which the standard ones. Looking at some other peaks, perhaps not quite so reliably ground surveyed, and all marked x on the charts, we find the latter quoting Namcha Barwa and Gyala Peri, approximately 1,000 ft lower than the standard figures, but showing an increase of c.300 ft for both Kungur 11 and Muztagh Ata. From the above, therefore, it does seem that on balance the charts tend rather to under than over measure peak elevations and that the degree of the former is generally somewhat greater than that of the latter. Unfortunately, there is no means of detecting in any individual case which is over and which is under, or by how much. I do not think, therefore, that at present we can take this much further than just to note it as a possible tendency.

Here then is a list of all Tibetan and Tibet/China border ranges mountains, in peak elevation order, of 21,500 ft (6553m) or higher.

A few quick observations on the table listing of summits.

(a) The highest peak in Tibet and the Tibet/China border ranges (always excluding the Tibetan Himalaya) is Lunpo Gangri in the Transhimalaya, at 24,040 ft (7324m) with an MVE of ± 400 ft. The Ulugh Muztagh is now relegated to No2 but it should be noted that, taking the MVE into account, there are 5 other peaks in the Kun Lun with possible maxima higher than that of the U.M.—3 of which could exceed 24,000 ft.

(b) On the basis of peak elevations, the Kun Lun is definitely the lowest of the major Central Asian ranges (Himalaya, Karakoram, Pamirs, Hindu Kush, Tien Shan, and Kun Lun), all except the last 2 having peaks in excess of 25,000 ft, the highest of the Tien Shan being 24,406 ft (7439m).

(c) Other than the Ulugh Muztagh, all the highest peaks in the Kun Lun are, as generally thought, in the W portion of the range; indeed, of the 18 listed, only 3 are W of the 83° E meridian. In fact, between the Ulugh Muztagh (c.87° E) and the Amne Machin (c.99° E) only 4 peaks are listed

Main Range	*Peak order*	*Height*		*Location*		*Max. vertical error(MVE) of square (feet)*	*Name of Mountain and/or individual range (if known)*	*Comments*
		feet	*metres*					
Transhimalaya	1	24,040	7324	29°50′ N	84°37′ E	400	Lunpo Gangri	
Kun Lun	2	23,370	7123	36°23′ N	87°20′ E	400	Ulugh Muztagh (Arka Tagh)	
Kun Lun	3	23,230	7081	35°19′ N	80°56′ E	900	Western Kun Lun	
Kun Lun	4	23,160	7059	35°39′ N	82°20′ E	1,100	Chung Muztagh (W. Kun Lun)	
Kun Lun	5	23,060	7029	35°23′ N	81°06′ E	1,100	Western Kun Lun	
Internal	6	23,000	7011	33°28′ N	86°46′ E	400	Peng-Wa-Lo-Te Shan	Mt. Bonvalot?
Nyenchen Tanglha	7	22,920	6986	30°23′ N	90°35′ E	400		Chart H 10
Kun Lun	8	22,910	6983	35°50′ N	79°35′ E	900	Western Kun Lun	
Kun Lun	9	22,880	6974	35°36′ N	80°24′ E	900	Western Kun Lun	
Internal	10	22,860	6968	34°24′ N	85°38′ E	300	Pu-Kó-Man-Na Shan	
Tibet/China Border	11	22,820	6956	29°39′ N	101°57′ E	500	Minya Konka	
Internal	12	22,800	6949	34°19′ N	85°50′ E	300	Pu-Kó-Man-Na Shan	Mt. Dutreuil de Rhins (?)
Internal	13	22,780	6943	34°21′ N	79°50′ E	900		
Internal	14	22,740	6931	33°14′ N	85°45′ E	300		
Internal	15	22,730	6928	33°56′ N	89°14′ E	400	Mount Dupleix	
Internal	16	22,670	6909	33°28′ N	85°25′ E	300		
Transhimalaya	17	22,630	6898	29°42′ N	84°43′ E	400	Lunpo Gangri Range	
Kun Lun	18	22,590	6886	35°18′ N	81°30′ E	1,100	Western Kun Lun	
Internal	19	22,430	6836	32°11′ N	79°49′ E	900		
Transhimalaya	20	22,380	6821	29°55′ N	84°33′ E	400	Lunpo Gangri Range	
Internal	21	22,370	6818	33°16′ N	85°18′ E	300		

Main Range	*Peak order*	*Height*		*Location*		*Max. vertical error(MVE) of square (feet)*	*Name of Mountain and/or individual range (if known)*	*Comments*
		feet	*metres*					
Tibet/China Border	22	22,340	6809	28°26′ N	98°42′ E	400		
Internal	23	22,180	6761	33°09′ N	86°01′ E	400		Chart H 10
Kun Lun	24	22,120	6742	35°57′ N	81°08′ E	1,100	Western Kun Lun	
Internal	25	22,110	6739	32°21′ N	79°41′ E	900		
Internal	26	22,090	6733	33°03′ N	86°35′ E	400		
Kun Lun	27	22,030	6715	35°32′ N	81°36′ E	1,100	Western Kun Lun	
Internal	28	21,840	6657	34°17′ N	79°39′ E	900		
Kun Lun	29	21,830	6654	36°40′ N	84°22′ E	300	Western Kun Lun	
Internal	30	21,820	6651	33°28′ N	87°38′ E	400		
Internal	31	21,820	6651	34°00′ N	89°01′ E	400	Dupleix Mounts	
Internal	32	21,810	6648	33°11′ N	86°58′ E	400		
Internal	33	21,800	6645	32°53′ N	86°00′ E	500		
Kun Lun	34	21,790	6642	36°03′ N	79°20′ E	900	Western Kun Lun	
Transhimalaya	35	21,770	6636	31°04′ N	81°18′ E	300	Kailas	
Kun Lun	36	21,700	6614	35°33′ N	80°18′ E	900	Cholpanglik (Western Kun Lun)	
Kun Lun	37	21,690	6612	36°44′ N	84°41′ E	300	Western Kun Lun	
Tibet/China Border	38	21,650	6599	31°07′ N	102°55′ E	300	Chiung-lai Shan	
Internal	39	21,620	6589	33°59′ N	82°16′ E	400	K'o-la-K'un-Lun Shan-Mo	
Kun Lun	40	21,600	6584	35°53′ N	79°55′ E	900	Western Kun Lun	
Kun Lun	41	21,600	6584	35°34′ N	80°00′ E	100 or less	Western Kun Lun	Peak denoted by (.) —an error?
Kun Lun	42	21,560	6571	35°51′ N	78°41′ E	400	Western Kun Lun	

Main Range	Peak order	Height feet	Height metres	Location		Max. vertical error(MVE) of square (feet)	Name of Mountain and/or individual range (if known)	Comments
Kun Lun	43	21,540	6565	35°57′ N	80°42′ E	900	Western Kun Lun	
Internal	44	21,535	6564	34°00′ N	79°27′ E	800		
Kun Lun	45	21,530	6562	35°34′ N	81°10′ E	1,100	Western Kun Lun	

as in excess of 20,000 ft, the highest being 20,600 ft with an MVE of ± 600 ft.

(d) Chart H 10 records a square (30°/31° N, 93°/94° E) with an MEF of 24,800 ft (the highest for the whole plateau) yet the highest peak there is only given as 21,310 ft—a difference of over 3,000 ft—by far the largest recorded. It is noticeable however, that part of the square is in an area designated 'Relief data incomplete' and that parts of this area are heavily contoured. One possible explanation, therefore, is that it is suspected that these areas contain one or more peaks of considerable but unknown height; in the light of the 24,800 ft MEF figure, it could be that a peak higher than Lunpo Gangri lies somewhere in this area.

Finally it seems to me that, so far as we can tell, within their stated limits these chart elevations seem to be reasonably accurate and that since for most peaks these limits are under 1,000 ft (39 out of 45) the elevations are, in nearly all the cases I have listed, more accurate than the old elevation figures (considerably more in many). It does seem, therefore, there is a strong case for the map makers to give very serious thought to using these chart elevations for Tibetan peaks, as the most accurate we currently possess, instead of the old, clearly inaccurate ones still being used, particularly since it is likely to be a long time before really reliable ground surveyed figures become available. It seems absurd that we should still have to accept such inflated and highly erroneous elevations as those for Shapka Monomakha, Shahkangsham, Aling Kangri, etc., when it is known that more accurate ones exist and are available. I conclude therefore with a plea that the map makers should now start to introduce these new figures when next revising their current maps and atlases.