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THE SCOTTISH GEOGRAPHICAL MAGAZINE.

RAILWAY CONNECTION WITH INDIA.

By Sir T. H. HOLDICH, K.C.I.E., C.B.

WITH the rapid development of Russian railways in Central Asia and Siberia, the intermittent progress of lines of internal communication in China, the realisation of modern schemes in India, which will gradually cover that country with a complete network of commercial and military railways, and the certainty of a connection between existing systems in Asia Minor and the head of the Persian Gulf—public attention must necessarily become more and more concentrated on the possibility of reaching India overland from the great commercial centres of Europe. The reason why English interest in this matter has never been acute is doubtless that it is so easy to reach India by other routes which are not overland. We already possess a magnificent sea service, and a magnificent navy to protect it. We are not forced into inhospitable waters and wide spaces of unproductive country; nor have we to take up the burden of creating a commerce to sustain a railway which is essential to our national development in the East, like Russia. Were there an open Arctic sea and an easy line of ocean communication between the White Sea and Vladivostok on the Pacific coast, it may well be doubted if the Siberian railway would have ever been called into existence, in spite of the abnormally favourable geographical conditions which support it; for commercially, steam communication by land can never compete with steam communication by sea as a means of transport for bulky produce. Besides this there are other considerations, both political and military, which have weighed (perhaps more heavily than they should do) against any development of open lines of communication with India, the ends of which, and the protection of which, are not absolutely in our hands. About such considerations I can have but little to say at present. At present I only wish to point out that with the rapid development of railways over nearly all the productive area of Asia, it will eventually

be found impossible that one comparatively small space of country (which is certainly not unproductive) should remain undeveloped in their midst—that one comparatively short link which is required to connect two vast and complicated systems of land communications should remain unforged, for either political or military reasons alone. Direct railway connection between Europe and India is certain to be established sooner or later, and it is therefore a matter of more than passing interest to examine the geographical conditions of those countries and districts which intervene, which must govern the general principles of its alignment. The special conditions which would be favourable for such a scheme as the linking up of Europe and India are in many respects different from what they were some twenty, or even ten, years ago, and they are continually changing. Mechanical science has advanced so far, that railways are now made to run where railways were previously impossible; and in the realms of what we may call strategical geography we have learnt very much lately that still requires to be straightened out into axiom and precept, all of which has a most important bearing on the approaches to India. But the general features of favourable geographical condition remain unchanged in spite of special modifications in the conditions of alignment. We must still study the strike and the altitude of the main mountain ranges, the orography and hydrography of the regions to be traversed, and still make an exhaustive study of the land surface by means of technical surveys, if we would avoid the penalties that invariably attend the process of jumping to conclusions in the matter of alignment. The scientific study of the countries which lie between Europe and India has not been by any means exhaustive, but it has made great advance during the last twenty-five years; and we at any rate are now positively assured of certain geographical facts which limit the area of technical investigation to very narrow bounds.

Right across Asia, from NE. to SW., through the great central region of inland drainage, from Bering Strait to the north of Afghanistan, and thence curving north-west to the southern shores of the Caspian and Black Sea, there runs a band of central highlands. This band is flanked to the east by the great Turkestan and Mongolian depression—a region of desert and salt lakes—which is again parted from northern India by the vast mass of the Tibetan tableland, edged on the north by the Kuen Lun and subsidiary ranges, and on the south by the Himalayas. The Russians have found a way across this great central divide, passing round the southern shores of Lake Baikal into the head of the Amur basin which turns the northern end of the Mongolian deserts. And there may be other passages across it of which the mere altitude would not forbid the construction of a railway, but no such railway could by any possibility be aligned in the direction of India. For the present we may consider the great Tibetan highlands and its flanking ranges, as well as the vast uplands of the Pamirs, as quite beyond the pale of serious consideration so far as any opening for railway extension towards India from the north is concerned. West of the Pamirs we find the Hindu Kush and the apparently complicated mass of elevated mountain ranges diverging therefrom southwards presenting a further barrier,

which is, indeed, only secondary to that of the Himalaya in its impracticable nature and rugged obstructiveness. And indeed, we may hunt along the whole range of the Hindu Kush to its western roots in the mountain masses which divide northern Afghanistan from southern, and still fail to mark any possible opening for a continental line of railway. We are here dealing with altitudes of over 12,000 feet, with perpetual barriers of ice and snow. Through the northern Afghan highlands, the Koh-i-Baba, the Firozkoh plateau, the Band-i-Turkestan, we are still faced by an impenetrable wall. During the process of surveying these elevated wilds we found mountain tracks, indeed, in abundance, tracks running from side to side across the water-parting which were enough to serve the purposes of purely local traffic; and here and there the Hindu Kush is intersected by roads and passes which are open to the passage of slow-moving kafilas, converging on the great central mart of Kabul. But there was nothing which, in the present stage of mechanical advance as applied to railway construction, favoured the possibility of carrying an open line through such mountain barriers as these, nor is it possible to conceive of any future principle of railway development that will deal successfully with the raging storms, of wind and snow, the avalanches of mud and stones, the intense fierce cold and the bitter experiences of a winter climate that hitherto, for untold ages, has rendered these mountain regions uninhabitable for many months of each successive year.

But as this great Asiatic water-parting trends westward, and passes through the districts that lie to the north of Herat, its conditions change considerably. Here it assumes the form of a comparatively low range, composed of material soft enough to be largely influenced by the action of wind and weather, worn into rounded peaks and hillocks, which sweep down to the lowlands in long, well-graded spurs. To this part of the divide we have given the ancient and classical name of Paropamisus, a name which more accurately should be applied to the Hindu Kush, but which has found a convenient, and we hope a lasting resting-place on the summit of this northern watershed of the Herat valley. So easy of access and so fertile are the grass-covered slopes of the Paropamisus, that wheeled vehicles can be driven across it in some parts without even the preliminary necessity of road-making. It is actually pierced and parted by the Hari-Rud—the river of Herat—which, rising not far to the west of Kabul in the uttermost highlands of the Hazara country, runs a straight course westward in a long narrow valley, passing the walls of Herat to the south, and finally bending northwards near Kuhsan, it divides the Paropamisus backbone, and rushes through a picturesque series of mountain gorges out into the open plains of Turkestan. Westwards, beyond this passage of the Hari-Rud, the great continental watershed again assumes the conformation of a rugged system of mountain chains, forming, not one, but a whole series of walls and barriers, right athwart the course of existing roads and projected railways to the south, and thus it continues through northern Persia to the regions of the Caucasus and the Black Sea. Through this western part of its extent I will not follow it, partly because I am unacquainted with that part,

and partly because it is here beyond the reach of direct British political influence, and is likely to remain so.

There is but one geographical opening leading from the northern regions of the Aralo-Caspian depression—the region of Russian interest and Russian railway enterprise—to northern India. From the southern shores of the Caspian Sea to the tableland of western Afghanistan about Kandahar, one may pass by the Hari-Rud opening without encountering a single obstacle of the nature of a mountain pass, without ever negotiating any considerable gradient even, provided the alignment curves sufficiently southward to embrace the agricultural districts of Farah, whence it would pass by easy stages to a culminating altitude at Quetta, of about 6000 feet above sea. This route never drops to a lower level than that of the Herat valley—say 2500 feet. This, then, is the one highway to India which is rendered feasible by the geographical conformation of the districts intervening between the Caspian and the Indian frontier. Eastward of it there is, in my opinion, no alignment practicable for railway construction till we reach China and the possible Burmo-Chinese connection.

We will now consider what there may be to the west of the Hari-Rud, or Herat, gateway.

The great plateau or table-land of Persia, like most of the table-lands of Asia, is fringed on its northern and southern edges by mountain ranges, forming, as it were, a protecting rim or barrier, of which the general conformation is but a repetition of what we find in the Kuen Lun and the Himalayan systems fringing the plateau of Tibet, or the Hindu Kush and the Sulaimans, what equally bind the edges of high Afghanistan. Whatever may have been the nature of those vast natural forces which ranged the Himalaya and our Indian frontier mountains into a compact band of ridge and furrow, with long, narrow, serrated ridges folded and bent into parallel flexures like the waves of the sea, with long trough-like valleys intervening, the main ranges being split asunder, or cracked across, to admit of main drainage channels, those forces have obviously affected the whole of South-west Asia more or less equally, and with analogous results. From the head of the Persian Gulf, through southern Persia, Makrán, Baluchistan, Afghanistan to the Himalaya, the tectonic principle—the system of construction—is the same, whatever the geological conditions may be. But whilst our western India frontier is broken here and there by curves and bends in the general strike of ridge and furrow which occasionally admit of the passage of a river from the highlands to the plains which has not to carve its way from side to side of any gigantic ridge (as, for instance, the Puráli river, which forms a most admirable line of approach to Kandahar from the corner of the Arabian Sea), the configuration of the Persian hills seems to be more regular, and to offer fewer opportunities for outflanking, or for directly crossing, them. Obviously a conformation of mountains ranging east and west, such as this, is especially favourable for railway making from western Persia to India, inasmuch as the general alignment of the railway would follow the general alignment or strike of the mountain ranges; and especially unfavourable for any projected line from northern

Persia, or from the stations of the Trans-Caspian line of railway, to the shores of the Persian Gulf. To put it shortly, if we want to reach India from western Persia we have but to follow up the long lateral valleys between the crests of ridge and plateau, and we should never cross any divide or watershed that partakes of the nature of a mountain barrier; whilst if the Russians wish to reach the shores of the gulf from the north they have at best nothing but open columns of such barriers to face, and perchance the necessity for encountering them in a serrated mass of close formation. Judging from the accumulated evidence which a wide system of geographical map-making has placed in our hands, no less than from personal observation, I should say that it would be incomparably easier and cheaper to run a line from Western Persia to the Indian frontier than it would be from Mashhad direct to Bandar Abbas, or from Tehran to Bushire. And yet the geographical difficulties in the way of the Indian line through Persia are considerable, as I will proceed to show. Commencing then with the assurance that east of Herat there is no way open to railway construction on account of the natural obstruction offered by great mountains and high altitudes, and that west of Herat we must adapt our line to the accidents of geographical conformation if we would successfully avoid such obstructions, we will proceed to consider what alignment connecting the head of the Persian Gulf with the west of India is likely to support a productive railway.

One alignment which has been suggested, and which has already received some consideration in scientific circles, is that which would connect Basra with Karachi by way of the Persian coast and the northern shores of the Arabian Sea.

Independently of engineering difficulties and the cost of construction, there appears to me to be certain commercial and climatic objections to such an alignment, which would in themselves render it almost prohibitive. The long, low foreshore of the Persian coast is usually backed by rugged bands of mountains, which leave but a narrow space between their outer ridges and the sea. Where these mountains recede from the coast the width of intervening flat is often so low as to be lost in swamps and morass. There are no harbours, excepting that which gives access to Bushire—a harbour with a difficult entrance and a dangerous bar—and there are but few ports connected with the interior by road. Linja and Bandar Abbas are indeed trade ports of some significance, but they possess no harbour—nothing but an open roadstead, which under certain conditions of weather affords but a risky anchorage: and the roads which at present connect these ports with the interior of Persia are of the very worst possible description, barely meriting to be called roads at all. Even the high-road from Bushire to Shiraz is but a very indifferent mule track. To the east of Persia, along the coast of Makrán, there are at present no ports (although there are harbours) which possess sufficient commercial importance to be included in the visiting list of the British India Company's steamers. Trade developments would undoubtedly follow a railway, but throughout the length of the line from Basra to Karachi; the three ports of Bushire, Linja (possibly), and Bandar Abbas, are all that can at present be considered as of any commercial significance.

The climatic conditions which govern the Persian and Makrán coasts are of course variable, but for four or five months of the year they can only be regarded as insufferable. The intensely humid, vapour-bath atmosphere of the gulf in the summer months makes life a burden to those telegraph officials who are compelled to face existence wrapped round with its pernicious influence, and it is but indifferently balanced by the fresh clear skies and breezy seas of the too short winter season. There is also the objection that a coast railway line would be brought into direct competition with the gulf steamer traffic, and under no consideration, neither that of bulky goods traffic, or of passenger conveyance, does it appear to me that it could ever compete with the sea-line. With a comparatively fast service of steamers from Basra to Karachi the main objects of a railway would be defeated, and such a steamer line will be the natural sequel to the railway terminus at Basra. It is true that in following a coast line we are conforming to the general principles which fit a railway to the formation of the country and lead to fewest natural obstructions, but still the engineering difficulties would be considerable. From Basra to Bushire a railway would inevitably have to skirt the low flats of the Euphrates and Karún deltas, and turn inland so as to tap the commercial resources of Ahwaz. Four great rivers—the Shat-el-Arab, Karun, Kurdistan, and the Tab—would have to be bridged in the first 300 miles of this alignment before reaching a point from which a branch could be carried to Bushire. In the next 400 miles, between Bushire and Bandar Abbas, several more shifty, expansive, and troublesome rivers would have to be negotiated, but beyond this ever recurrent necessity for bridging, there would be few engineering difficulties. There is indeed an alternative line between Basra and Bandar Abbas to be found on a higher level parallel to the coast, inland—a line which occasionally approaching within twenty miles of the coast, touches several large inland towns such as Ram Hormuz, and is lifted well above the heat-ridden atmosphere of the sea-board. No great engineering difficulties would attend such an alignment, as it passes between ridges following the general strike of the mountain system, and encounters no formidable transverse watersheds until it approaches Bandar Abbas. This is a line which might certainly claim the promise of paying its way locally, and it would be in all respects a superior alignment to that of the actual coast, always provided that the descent by the Sarzeh gorge from the highlands to Bandar Abbas proved feasible after technical examination. Neither alignments would actually touch the port of Linja, which is shut off by a wide stretch of swampy country from the hills behind. When, however, we leave Bandar Abbas to strike eastward to India, the route is beset with difficulties. All this intervening country has been fairly well surveyed, and it is safe to assert that no high level line is possible between Bandar Abbas and Jashk (say, for 200 miles), and that once again our railway would have to take to the flats bordering the coast. Once again we should be face to face with the incessant necessity for bridging the innumerable rivers and streams which carry the drainage of a narrow strip of mountain country to the sea. For 500 miles east of Jashk to Urmara, a railway approximating to the Indo-

Persian telegraph alignment might be practicable; but near Urmara there occurs a great natural obstruction, of which I am not prepared to say that it could be surmounted. The Ras Malan thrusts out into the ocean a gigantic headland with sheer cliffs 2000 feet in height towering above the ceaseless surf of the Arabian sea, and these cliffs are backed and bound by a mass of mountains which not only extend far inland, but for some sixty miles farther east towards India offer a physical block to railway enterprise of such intricacy that, with all the advantage of a comparatively close survey of them, I cannot say in what way a successful crossing might be engineered. The last 140 miles of coast route to Karachi, touching Sonmiani and crossing the Hingol, the Puráli and the Hab (all rivers of importance), presents no impracticable obstacle, and indeed might be termed an easy section of the line but for the bridge-making. Taking the alignment as a whole, we have at least 1600 miles of line passing through a district which is, as yet, undeveloped, and which can never develop without roads to supplement the railway; which enjoys the reputation of simmering perpetually in one of the worst atmospheres in the world; and which possesses at least one obstacle to engineering which may be pronounced impracticable until full technical examination can be made. There is the further and final disadvantage that it competes, on almost impossible terms for success, with a sea service which is already established, and is capable of much improvement.

I think, then, we are justified in setting aside the coast-line project as a desirable enterprise. Persia, however, is a wide country, and we need not necessarily look to the coast as affording the best prospects for railway evolution.

For an average width of about 200 miles inland from the coast line all western and southern Persia, as well as southern Baluchistan, is more or less densely packed with mountains, the conformation of which, as I have already endeavoured to explain, is that of a system of parallels and approaches, rising by successive steps to the central region of inland hydrography, but itself intersected and traversed by lines of drainage which, winding and twisting through the infinite complexity of subordinate mountain spurs, or cleaving asunder the axis of the main ridges, finally reaches the ocean. So that within this band of mountains no longitudinal alignment is possible which does not encounter in a greater or less degree each successive stream or river which drains that area. If, instead of dealing with the coast, we were concerned with the future of a Grand Trunk line through Central Persia, linking up Tehran Ispahan or Kashán with Yezd and Kirmán, the physiographical conditions of the line would be much altered. It is a geographical fact no less remarkable than that to which I have referred in pointing out that from the Caspian to Kandahar, or by way of Herat, one may pass through a generally mountainous region without encountering any obstacle in the nature of a formidable pass, that from the extreme west of Persia to Kalat and Quetta, or even to Karachi, it would be equally possible to indicate an alignment which would never cross a difficult watershed or ascend a mountain side. Regarding this as a Persian line,

and setting aside for the present the difficulty of bringing Tehran, Kashán or Ispahan into connection with European systems either at the head of the Persian Gulf or on the Caspian, it is a line which promises such important local developments, throughout the very heart of Persia, it is so favourably placed as regards the important accessories of climate, and geographical position, it would be so cheaply constructed, and withal so rapidly, that it is impossible to believe that in the ordinary progress of Asiatic commercial evolution it will not sooner or later figure as the great central line of Persia. Such a line as this, could no doubt be readily connected with the Indian systems. South-east from Kirmán, a way is to be found between the Jamal Bariz range and the Kirmán desert to Bam and Bampur, which leads into the long narrow level valleys of the Mashkel and Rakshan, hugging the mountain slopes indeed; but never actually facing them, and terminating either at Kharan, on the way to Kandahar, or at Kalat and Quetta, with no worse obstacle to overcome than a rough but short cross-country section between the head of the Rakshan and the Kalat plateau. Not only does this line encounter no formidable difficulties in the shape of passes across important water-partings, but it traverses no important water-channels, and no deserts, but runs an even course through a cultivated and in many parts a rich and prosperous part of Asia. It is bound to be one of the important lines of the future, and, consequently, one of the political problems of to-day is whether in the final adjustment of political influences in Persia, the construction of that central line is to fall to English or to Russian engineers. Geographically speaking there is little throughout its entire length which requires more exact technical information than that which we now possess to assure us of its easy alignment. That little lies chiefly in southern Khorasan to the south-east of Kirmán—but as there are two or three Russian survey parties, and at least one English survey explorer, already in that region, we shall surely be sufficiently well informed ere long. But, as I have already pointed out, the difficulty of connecting a Central Persian line with any European system to the north or west is a very serious one. It is impossible at present to indicate any satisfactory alignment that might connect it either with the Caspian on the north, or Basra on the south, or even admit of branch lines to Bushire or Bandar Abbas. Here we at once encounter all the physical obstruction presented by a compact band of mountain ranges directly traversing such an alignment, an obstruction which has hitherto rendered the reputation of Persian roads that of the worst system of trade communications in the eastern world. To say that such connections are impossible would of course be absurd, seeing that they possess none of the crowning difficulty of vast altitudes; but they would possess more than all the disadvantages which beset such mountain lines as now exist between Jacobabad and Quetta—disadvantages which still render the Harnai and the Bolan loops of the Sind Pishin railway a source of constant anxiety; and which might possibly turn them into a source of weakness at some critical period of our history in India. But such a central line would undoubtedly relieve Bushire and Bandar Abbas, (I do not include Linja because the

Linja trade is chiefly a local pearl trade) of the greater part of that inland trade which still finds its painful and difficult way across the sea-board hills to the coast, and turn it into Indian channels. Of the local success of such a line there can be no reasonable doubt, but for the present it can hardly be advanced as a prospective link between Europe and India.

We may turn now from Persia to that central opening at Herat to which I have already alluded. Whilst employed on the Russo-Afghan Boundary Commission both as surveyor and reorganiser of the defences of Herat, I had ample opportunity for studying that special link between East and West which has been so much in men's minds of late, and which must inevitably occupy public attention yet more closely in future. The problem of connecting Europe with India is clearly not to be speedily solved in Persia. Geographical considerations, which means in other words financial considerations, will block the way for many a year to come, even were we assured of our political position with sufficient certainty to declare that we would construct a railway in that country. But here, between Herat and Kandahar, or rather between the Russian terminus of Kushk and the British terminus of New Chaman, we have a short 500 mile project offered to us of such favourable nature as we may assuredly look for in vain elsewhere. It is indeed so plain and simple a project that it has not escaped the attention of even the most elementary critics of our Eastern position, and we may be certain that its value and its possibilities have been reckoned up with all care by the governments both of Russia and of India. Consequently a few words about the geographical surroundings of such a line may be interesting from a purely original source.

From the Russian station of Kushk to Herat is roughly a distance of sixty-six miles, and midway is that great Asiatic water divide which, insignificant as it may appear when represented by the rounded crests of the Paropamisus, can be traced east and west right across the continent. The one gateway through it, which is formed by the passage of the Hari Rud river, is considerably to the west of Herat, and the direct connection between Kushk and Herat is by the Ardewán pass—a pass which is so little formidable to engineering projects that it is improbable that the circuitous route which takes advantage of the gorges of the Hari Rud would be adopted in preference, even for a railway. For that part of the distance which lies north of the Paropamisus the grade is but a gentle ascent over the smooth slopes of the Badghis uplands. Here indeed is no great wealth of villages and population, but there are nevertheless many narrow valleys and gentle hill-sides which are full of cultivable possibilities, and have ever afforded good grazing. I should think it probable indeed that fifteen years of security has brought about considerable changes already in the wind-swept, but always smiling, "chol" of Badghis. Kushk is about 2000 feet above sea level, and the pass of Ardewán about 4800. The soft broad back of the Paropamisus widens somewhat about this pass, so there is a twisting course of some seven miles ere the road leading down from the pass emerges from amongst the foot-hills at Kush Robat. Here we

are 3900 feet above sea. Sixteen miles on a slight downward grade over the gravel formations of the "dasht" carries the road to a populous town called Parwāna lying at the back of a subsidiary range which forms as it were the southern edge of the "dasht" uplands. It is this secondary ridge (called the Mulla Khwaja) which you may see to the northward from the Herat walls, and not the actual Paropamisus, which is hidden by it. A nullah bed with a wide and winding course of eight miles intersects the Mulla Khwaja and opens a passage into the Herat valley, where within the last six miles there is an extensive system of irrigation canals to be crossed, and much close cultivation. Herat is 2600 feet above sea level. Three miles south of the town the Hari Rud river is crossed by the Malun bridge, and beyond that river southward through Sabzawar and Farah to Kandahar, for 360 miles more, there is no obstacle to railway engineering that is worthy to be called "serious." The exit from the Herat valley turning the Doshak ridge at its eastern extremity presents no difficulties of grade, and thenceforward through the indefinite Perso-Afghan borderland we have to deal with an open rolling country of scrub-covered "dasht" (or sandy uplands), alternating with flats of gravel and sand, but sparsely supplied with water and ribbed here and there with the black craggy streaks of isolated ridges which nowhere offer any continuous or formidable obstacle to a fair alignment. This part of Khorasan has been sometimes described as desert, but it is a mistaken application of the term; the desert lies farther west. Water is scarce, but the sources of water-supply have been hitherto undeveloped, and the actual waste spaces where no agricultural or pastoral acres exist are but comparatively small. There are at least two walled towns which can lay claim to considerable commercial importance in western Afghanistan—viz. Sabzawar and Farah—and many large and important villages lie between Sabzawar and northern Sistan (somewhat to the west of Farah) which are centres of large areas of cultivation and of local industries. Amongst them are Zakin and Kang and the interesting little town of Anardara perched in the recesses of one of the transverse and rocky ridges of which I have spoken, the centre of the carpet industry of Adraskand. Pasturage is in most parts abundant, and the staple product of the district as a whole is undoubtedly wool. Between Farah and Girishk on the Helmand (assuming that our line turns eastwards from Farah leaving Sistan to the south) there are 150 miles presenting rather more doubtful facilities for railway purposes than the rest of the line between Herat and Kandahar, which is well known and mostly surveyed. Here the connecting alignment between these two places traverses the strike of the long spurs which form the ultimate foot hills of the Hazara uplands, which trend downwards towards Sistan from north-east to south-west. But so far as we can see, it skirts the extremities of these spurs although it strikes across their successive lines of drainage which here carry their waters southward. The bridging of the Helmand at, or near, Girishk is the one important feature of the line. Taking it as a whole it may be said that there are no formidable engineering difficulties to be encountered, but there are three large and

somewhat uncertain rivers to be bridged (the Farah, Adraskand, and Helmand) all three being liable to heavy floods. There is an irregular distribution of populous and fertile districts interspersed with waste spaces, but quite enough of it to ensure the success of the railway as a local venture independently altogether of its value as a link between Europe and India, if we may judge by our own experiences in Sind and the Panjab, and by those of the Russians in Siberia. Whilst considering the local possibilities of a line in western Afghanistan we must not overlook the influences of the extension of Russian systems in the north. Of more significance to India than the Baghdad concession is the project of a direct connection between the Trans-Caspian system and the Central railways of Russia. The effect of the proposed alignment from Alexandrof-hai, where the Ryazan Ural railway now ends, almost in a straight line to Kungrad, Khiva, Charjui and Merv, has already been ably dealt with by Mr. R. Long in the *Fortnightly Review* for December 1899. It enables troops to be sent from "Moscow to Merv in a hundred hours, and from Warsaw in less than six days," and apart from these strategical advantages, it outflanks the passage of the Caspian and offers the enormous advantage commercially of a direct line to Merv involving no break of bulk in transit. Into this Russian frontier aspect of the question we have no time to enter further, but I understand that within the last twelve months considerable modifications in this alignment have been proposed. I can but record my opinion as a surveyor and geographer on that part of the scheme which immediately concerns our own interests in Afghanistan and Persia. Here at least I can claim the advantage of original and independent observation.

Whilst I have endeavoured to emphasise the geographical advantages of a European connection for India *via* Herat rather than by any long, expensive, and undesirable route which might be found on the Persian coast, I can hardly leave the subject without a brief reference to some of the more weighty objections which have been urged against the linking up of Kandahar and Kushk. First, politically, it is often said that under no conceivable circumstances would the Amir be induced to grant a concession for such a line. To press the matter to an issue might even lead to a war with Afghanistan. It is a curious illustration of the influence of geographical position on international policy that the little semi-barbarous kingdom of Afghanistan, hemmed in between two gigantic civilised Powers, as it is, and possessing no natural barriers to free intercourse on either side, should be able to maintain a position of conservative independence of outside influences which neither China nor South Africa have been able to secure. And it is not difficult to understand the reluctance of the Amir—who studies European papers and is well aware of the practical effects of the extension of European influence—to the introduction of the outlander or any of his works. But in Afghanistan, as in China or South Africa, there can be no final barrier maintained against the expansion of civilisation. If England and Russia were agreed on the point, the Amir would certainly have to give way; and to those who have studied the idiosyncrasies of the Afghan mind there is little doubt that a concession in western Afghanistan is but a

matter which might be included within the pale of political financial arrangements. Nevertheless, as the political aspect of the question is one which bears precedence of all others so long as our present relations with Afghanistan remain undisturbed, it may be well to emphasise its importance. The disadvantage, if not the danger, of breaking in upon the sanctity of the Afghan "buffer," of arousing suspicion or fanatical opposition amongst the border people of Afghanistan, with whom we are now on terms of neutrality, is not lightly to be regarded, nor is it lessened by the fact that these Afghan races spreading north-westwards from Kandahar towards Herat include what have always been reckoned as the most fanatical and dangerous of those clans who belong to the true Afghan, or Durani, community. It must be remembered, however, that certain sections of these very same people have already been brought under the British flag by the recent demarcation of the Afghan boundary, and it is a curious fact that where this demarcation has cut across Durani territory there was none of that actively fierce and determined opposition which was aroused by the boundary demarcations of the north. So far as I know, these new recruits to the population of British Baluchistan have accepted the new order in quiet contentment, and prove to be peaceable, if not always desirable, neighbours. Chiefly, however, it is important to note in this connection that the proposed line of railway lies on the extreme west of Afghanistan—so far west and so near to the Persian frontier for the greater part of its alignment, that it would be a stretch of imagination to regard it as an invasion of Afghan territory such as would in any way weaken the solidity of the now united Afghanistan under the central government of Kabul. And there is one other point which requires consideration. I have already referred to the difficulty that must attend the construction of any line connecting Mashhad on the north with the Persian Gulf on the south; but if it is a question of Sarakhs on the north and Sistan on the south much of the difficulty vanishes. In other words, instead of constructing a connecting link with Russia through Afghan territory alongside the Perso-Afghan border, it would be very possible to construct it on Persian territory alongside the same border, but shifted, as it were, to the other side of the hedge. Such a line would connect the Russian line at Tejend with Sarakhs (361 feet), and, passing through the Hari-Rud gorges about Zulfikar, would cross over the hills bordering the district of Hashtadan on the west into vast intervening spaces of flats and open plains to Yazdan (2313 feet), and so, by the Chah Sagak pass, leading across the tail of a low intervening range (about 4000 feet) it would run through the Birjand district to Sistan. There is no great engineering difficulty to be apprehended on such a line; there are no difficult rivers to cross in open, sandy, shifting beds; no mountain ranges barring the way with lofty altitudes. There is the Hari-Rud series of gorges between Sarakhs and the point at the elbow of the river where the Perso-Afghan frontier line leaves it, and there is a certain amount of rough, sterile, hill country in Birjand, as well as two distinct watersheds rising to some 2000 or 3000 feet above the plains on either side, to be surmounted. Without special acquaintance with topographical details,

we know enough to be aware that such obstacles as would be encountered are far from formidable, and offer no comparison whatsoever with the difficulties presented by a line from north to south between Mashhad and Bandar Abbas. The difficulty lies in Sistan, and this difficulty is the recurrence of those far-spreading periodic floods, which, occurring in certain phases of the Helmand's rise and fall, occasionally isolate Nasirabad (the capital of Sistan) from the world to the north, west, and south, and render communication almost impossible for months together.

Various projects for connecting Sistan and Quetta by rail have already been broached, but unfortunately the recent Afghan boundary demarcation has given away to Afghanistan the one available line of approach which offered the most certain foundation for a permanent alignment. In appraising the value of the Sistan trade too much has perhaps been made of the actual productiveness of the Sistan province, and too little of the opportunities afforded by eastern Persia through Kirman. It is well known that a new trade route (or rather a very old trade route under a new form) has been opened up between Kirman and Quetta through the Helmand desert. To those who regard the eastern Persian trade as of possibly apocryphal value, it may be sufficient to point out that the first kafilā venture to Quetta, which has happily already paved the way, has rewarded its supporters to the extent of 17 per cent. of interest on the original outlay. But I am not advocating a Sistan railway, nor yet a connection between Sistan and the Russian system through Persia. I only wish to emphasise the fact that if the political difficulty of an easy line through Afghanistan is to be considered conclusive, there is an alternative which presents no great difficulties if we can only see our way past the Helmand floods.

Not much less serious is the objection of military experts to the construction of a line which would at once offer a strategic highway from the Russian border to India. But here there are many considerations which have not, I think, as yet been fully weighed. We have only learnt quite lately much about the value of single lines of railway in supporting a military advance in strength, and what we have learned has certainly not increased our appreciation of their value. A single line of railway from Herat to Kandahar would never (so far as we may be permitted to judge from South African experience) support a sufficient force to deal adequately with the strong defensive positions which would be found at the Indian end of it, even if the initial difficulty of the break of gauge between Russian and Indian systems were successfully dealt with. On the other hand, the opening up of a railway means the opening up of the country generally, the development of water supply and of roads, and the increase of facilities for advance independent of the line. No one supposes that the Russian line to Kushk (which will soon be supplemented and possibly extended) is constructed for commercial purposes. It is there to support Russia's position on the Afghan frontier, and in a less degree her position on the Chinese frontier also. It is, in short, meant for strategical purposes, and it constitutes already a menace to India. But if we leave western Afghanistan alone, that menace does not disappear. It would only be affected in degree, and I for one

think it doubtful in what direction it might be affected by free inter-communication. With Mr. Long, I am inclined to believe that political difficulties between Russia and India would be lessened by free intercourse and commerce between the two countries, that the more we know each other the better we shall appreciate the legitimate aims and aspirations of each, and the less likely we shall be to come into collision. I speak from a certain amount of personal experience when I say that whatever may be the state of international rivalry between the two countries, personal animosity (which is occasionally only too apparent in other parts of the continent) is entirely wanting in Russia; but perhaps the really aggressive section of the English travelling public has not yet made itself felt quite so far afield.

Would the construction of a railway between Kushk and Kandahar involve any great military responsibility in addition to that with which India is already burdened on her frontier? Would it be necessary to maintain more troops and to occupy further military stations than those which now exist? I fail to see that either would be necessary. It is often airily stated by those who know little or nothing about the capabilities of defence which are possessed by Herat, that the Russians could move across the Paropamisus and occupy the fortress and the valley, as matters now stand, without any effectual resistance being possible to their advance. There were many who thought much the same of an advance to Pretoria not so very long ago. We must remember that times are changing. New weapons have to a great extent modified old methods. Irregular organisation is no longer necessarily a bar to successful defensive tactics, and there is nothing that I know of in Herat to prevent a well-sustained defence of that fortress by troops which possess as much discipline as those of the Amir's army, provided they make the best use of such weapons as they already possess, and are properly led. But however that may be, it is clear that a railway would strengthen rather than weaken that position without the addition of a single Sepoy to our frontier force, by placing within our reach a means of rapidly concentrating troops from India in the direction of Herat, should it be necessary to act so far in advance of our own frontier. Were any scheme proposed which would have the effect of rendering the frontiers of India and of Russia conterminous, undoubtedly more troops and more frontier posts would be necessary. But there is no suggestion of any such scheme in a Kushk-Kandahar railway. It does not even open a *new* line of advance to Russia. It merely improves an existing one, and whilst the fact of the break of gauge between Russian and Indian systems would certainly hamper the conditions under which Russia might essay to make use of it as a military line, no such difficulties would trouble the Indian Executive, who could make it infinitely more effective in the cause of defence than Russia could in the cause of aggression. But I hardly see why such considerations should preponderate in our councils, or why we should persist in regarding Russia as ever eager to perpetrate the folly of an attempted invasion of India whilst she still has such vast and unmanageable tracts of Asia on her hands to occupy her attention and her troops. I look on an invasion of

India as such a remote and improbable contingency that the consideration of it may very well be set aside for the discussion of the more practical question whether such a line would pay. Here again we encounter a variety of opinion amongst experts.

I cannot now enter into any detailed account of the productions and developments of western Afghanistan, pastoral and agricultural. There is nothing to prevent the districts with which we are now concerned from becoming prosperous, if not rich; and so far as I know there is no officer who is personally acquainted with these districts who does not agree that a local line would pay its way, quite independently of through traffic. The question as to which way the local traffic in wool and wheat would flow is an open one. Colonel Yate (who has had the best possible means of studying the question) thinks it probable that the wool of Baluchistan and western Afghanistan and the wheat of Sistan would find its way northward to Russian markets. I do not altogether agree with him, for I believe that, besides the burden of Russian transit dues, the necessary break of bulk at Kushk (involved by break of gauge) would be a final barrier to northern export. We should more probably take much of the commerce of Eastern Persia away from Russia, and secure to ourselves all the local traffic of the country through which the railway passes from Herat to Kandahar; and I think that the Russians are themselves prepared for this. They, on the other hand (whilst possibly congratulating themselves on the possibility of a more open line for a military advance), look to the English Government contracts for the mail service and the first-class passenger traffic to make the connection pay; and I am assured on the high authority of a great Russian engineer who is well acquainted with the country that these assets alone would repay them amply for the prospective loss of certain commercial advantages in Persia. It is, at any rate, the commercial and not the military aspect of the question which will decide when this line shall be constructed. That it will be constructed finally there can be no shadow of doubt, and in my humble opinion the construction of it will make more for peace and goodwill amongst the nations than any system of peace conventions which could possibly be inaugurated.

A SAIL DOWN THE IRRAWADDY.

By HENRY M. CADELL of Grange.

IN any one special characteristic the Irrawaddy may no doubt be easily surpassed by other great rivers, but I venture to think that few, if any, of the explored waterways of the Old or New World can be said to display for 1000 miles such a varied combination of interesting and attractive scenes, and are so well fitted to appeal to the traveller's taste, whether it be for sport, antiquities, scenery, geology, ethnography, natural history, or commercial geography. Far grander gorges than those of Upper Burma, no doubt, wall in the marvellous course of the Colorado river