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THE SCOTTISH GEOGRAPHICAL MAGAZINE.

ACROSS THE ELBURZ MOUNTAINS TO THE CASPIAN SEA.

By Lieut.-Colonel H. L. WELLS, C.I.E., R.E., F.R.G.S., Corr. Member.

THE expedition, a description of which is given in the following paper, was undertaken in September 1896, with a view to exploring the country north of Baladeh, and between that place and the Caspian, as a continuation of the sketch made by Lieut.-Colonel, now Major-General, Beresford Lovett, C.S.I., which, with his map, is given in the *Proceedings* of the Royal Geographical Society, No. 11, February 1883.

It was then thought that this bit of country had not been previously sketched. A sketch was made for which the scale 1:100,000 was chosen, so that it might be easily reduced, and the country added on, if necessary, to Colonel Lovett's map, which is on a scale of 1:500,000. Shortly after it had been made, a copy of a pamphlet and map entitled *Reisen in Nord- und Zentral-Persien*, by A. F. Stahl, published in supplement No. 118 to *Petermanns Mitteilungen* on 31st August 1896, reached Teheran, which showed that the country had already been surveyed. However, as the scale of the last-named map is small, and no description of the country or its population accompanies it, it is thought that the matter now given may still be of interest.

From what was seen by the writer, both during the trip now described and during one made in 1895, an account of which is published in the *Geographical Journal* for November 1896, it is judged that the mountain ranges between the watershed of the Elburz and the Caspian, like those on the southern side of the main range of that system, have almost invariably an outcrop running east and west, and are cut at right angles by the watercourses which have eroded deep gorges or cañons through them, so that the maps hitherto published give

a wrong impression, at all events of the lower slopes of the Elburz range towards the north.

The shortest route from Teheran to the Caspian is *viâ* the Afcha pass to the Lar valley, and thence by the Yalu or Ab-i-Safid pass out of the Lar valley to that of the river Nur; then out of the Nur valley by a third pass over the Kuh-i-Kuruk into the Kujur valley, and by the course of the stream which drains the last-named down to the sea, by which means the latter can be reached in three days, or two forced marches by a traveller without a change of horses. This was the route followed.

This route is said to be closed for five months in the year; and so any one wishing to come to the "Capital" from Kujur in the interval between November and March must descend to the sea, skirt its shores to Barfarush, and thence come *viâ* the town of Demavend, a journey of fourteen days. The Afcha pass is that over the watershed dividing the central plateau of Persia from the basin of the Caspian, and probably has an altitude of 9866 feet above the sea.

The valley of the Lar, with its trout-fishing, has been described in Baker's *Clouds in the East* and in Stack's *Six Months in Persia*.¹ In the latter book the road from Teheran to Lar *viâ* the Afcha pass is also described; the altitude of the latter is, however, wrongly stated as 13,000 feet, and the Gerdaneh Hazar Cham, which Stack mentions, is far away on another road to the Caspian (*vide Geographical Journal* for November 1896). A sketch of this portion of the road, *viz.*, the Afcha, is shown on the map which accompanies General Schindler's paper, *Eastern Persian Irak*, published by the Royal Geographical Society in 1896.

No one seems to have noticed the ruins of a small fortress or castle which commands the pass out of the Lar valley near Verdegar (*vide* General Schindler's map), or the remains of a stone rampart which undoubtedly formed a barrier right across the valley at Chesma Shahi, which place is shown on Lovett's map.

The road from Lar to Baladeh, on the Nur river, is shortly described by Colonel Beresford Lovett in the periodical already referred to, and a map of the road is therein given by him.

At the Yalu gorge the Nur cuts at right angles through an enormous mass of basalt, forming a rocky defile very remarkable for its gloomy grandeur and dark colouring, so markedly in contrast with the snow-white precipices of gypsum which rise on either side of the valley at the village of Yalu. The valley is ruggedly picturesque the whole way down to Baladeh, and the river contains trout that took our flies.

At Baladeh, the Nur, passing through a defile, turns sharply east to join the Lar river at Panjab; and the route for Kujur and the Caspian quits it here, going westward under the walls of a ruined castle. The track follows a terribly strong watercourse, the steepness and roughness of which is testified by the number of dead mules lying in it. In September, the month we visited Kujur, great numbers of these animals

¹ *Six Months in Persia*, by E. Stack. Sampson Low and Co.

are employed in bringing charcoal from the mountains of Northern Mazanderan to Teheran.

A climb of one and a half hours from Baladeh brought us to the watershed that divides the ancient principalities of Nur and Kujur, known as the Kuh-i-Kuruk. The views thence looking north as well as south were very magnificent. In the latter direction the mountain ranges are rugged and grand, formed of basaltic and other volcanic formations, leading the eye up to the superb cone of Mount Demavend, which looks as fine from this side as when viewed from the south.

Looking north, the mountains were seen to be capped with forest or scrub and clothed with verdure. The basalt is replaced by greyish-blue limestone, the whole aspect being a very refreshing contrast to the brown desolation at our backs. The low-lying cloud-banks stealing up from the Caspian, and penetrating into the valleys, cut out the far distance, but still are a welcome harbinger of coolness and moisture.

The north slope of the Kuh-i-Kuruk has cowslips and gentians dotted about; the south is bare, save for thistles and coarse herbs. It was just at the summit of this watershed, on our return journey, that we were attracted by the quaint whistle of Snow-cocks, *Tetraogallus Caspius*, and marked down a covey of eleven; after an exciting stalk, a young cock, weighing six lbs., was bagged. Whilst looking about for the rest, we added a hare and a *chukar*, or red-legged partridge, to the bag. A zigzag road leads from the summit to the Kujur valley, with a steep precipice of grey limestone on the right. At the foot of this mountain is the village of Varasun, where we halted, and were hospitably welcomed by the Ked Khoda (=headman), Ismail Khan. This man boasted that he and the inhabitants of Varasun were descendants of Turks, and that their forefathers had been brought by Fath Ali Shah from Turbet-i-Sheikhjam; but for what purpose, whether to keep them out of mischief or to establish order amongst the existing inhabitants of Kujur, did not transpire. The men were a fine, hardy race. The women were for ever quarrelling and yelling at each other from their flat house-tops. The stream that runs through the village is bordered with large hazel bushes. Primroses and ferns abound.

The headman sent out *shikaris* in all directions to watch for bears for us, but none was to be found during the whole of our stay in Kujur. We were after pig one day; the whole of the able-bodied men of the village turned out as beaters, accompanied by their dogs, a large, fierce, wiry breed, very much resembling the boar-hounds in Snyders' pictures. The climbing about these hillsides and through the scrub was anything but easy. Whilst waiting on a rock for a drive, we were passed by a herd of hill cattle accompanied by a beautiful stag of the Maral breed, which had been brought as a fawn from the jungles to the north, and has become domesticated. It certainly was a beautiful beast, its antlers resembling those of the red deer, but its coat somewhat greyer than the latter's; its rump and the inner sides of its hind legs were fawn-coloured. A beautiful white mark ran on the outside of this colouring, looking like a sort of piping or ornamental line, and was prolonged down the hind legs of the animal.

The pariah pack at length caught a full-grown sow, and the excitement the villagers evinced was amazing; the noise that was going on as we ran up led us to believe that some one was in dire straits, and that we might be charged at any moment by a furious boar; but the dogs had the poor pig tight by the ears and throat, and there was nothing for it but to despatch her. Without leashes or means to hold them the lurchers would never have allowed the animal to escape, even had they been beaten off. On our way back we fell in with several large coveys of partridge, *Perdix barbata*, very much resembling the English bird in plumage, and exactly similar to it in flight; one of these was bagged. A second time we explored the hill to the north-east of Varasun, but would have no more of pig, as the sport seemed extremely tame. We bagged a brace of pheasants, a hare, and a quail, and came across a quaint dairy, or *gav sarai*, the property of a certain Habib Allah Khan, and the home of the herd and the stag we had seen the day before.

We emerged out of the mist and jungle into a clearing divided up into paddocks with hedges of thorns, in the centre of which was a large shed or hut, half excavated out of the hillside, and so low that it was necessary to stoop to enter it. Inside it was tolerably commodious, though the roof of branches and brushwood would evidently only turn the worst of any wet that might fall on it. The hut was divided into two compartments—one apparently for the dairy produce, the other for the dwelling-place of the dairy-men, who, to the number of eight or ten, were either squatting, smoking, inside, or lounging outside the doorway of the hut. A pleasant-faced, brawny bearded lot they were; all dressed alike, in rough black homespun and brown felt caps, and all of them much fatter than ordinary Persian peasants. The milk diet and damp atmosphere seems to be good for complexions, for these men all had fair skins, and their whole aspect, and that of their surroundings, was so quaint and uncommon, that it seemed to us that we had fallen in with a lot of amiable troglodytes or brownies of a large breed. Scattered about were huge wooden vessels, in shape like our washhand jugs, holding, say, six or eight gallons; also trenchers and quaint dippers or pannikins of artistic shape, with long handles, carved out of solid hornbeam. Outside, a huge churn formed from a hollowed trunk, and holding about a hog'shead, stood fixed beside a bank with a ramp or gangway of wood for the operator to stand on whilst working the piston. There was an air of prosperity about the whole of this "concern" quite foreign to what is usual in ordinary Persian enterprises.

Ismail Khan, the Ked Khoda of Varasun, is a pleasant fellow and interesting, as he has a great knowledge of the folklore of Kujur. He is kindly disposed and good to the poor. He is a believer in the existence of treasure in all kinds of unlikely spots, and told us of books (the names of which I forget) in which full instructions are given how to trace treasure, if once you get a proper start, etc. etc. He told the following stories of how he and his father had missed chances of amassing wealth.

His father, he said, had first thought of digging the ground and

planting an orchard on the spot where we were encamped, and had employed an ignorant hind to perform the manual labour. After some days he came to see how the work was progressing, and as a proof of his energy the hind pointed out a stone some three feet in length by eight inches by ten inches, which he had removed from the ground and thrown over the side of the steep bank which still descends from the orchard to a stream.

The stone, which is roughly hewn, has the impression of a hand, life-size, very neatly sculptured on the smoother side and near to one end. The disconsolate owner begged of the hind to tell him exactly where the stone originally lay, and in which direction the hand was pointing, but, alas, this the stupid fellow could not do, and so the chance of finding the treasure to which the hand pointed was lost! A big depression not far from our tents shows where a trial pit was sunk, and the stone lies where it was thrown by the labourer many years ago. Ismail Khan half thought we might indicate a spot for a second trial pit.

The other case he thus described. "Not many years ago a dervish arrived at Varasun, who, to judge from his straight hair and very dark complexion, was of Indian descent; he had a 'shagird' or pupil with him. The two were kindly treated by me, and prowled about the mountain at their will, nominally in search of herbs, as they professed a knowledge of the healing art, and had a book, which there is now no doubt was a book about magic, or the art of finding hidden treasure. After some time they said they were going over into a neighbouring valley for a few days. They departed, but never returned. A stone carved somewhat in the form of a lion, which had stood on a spur of the mountain above Varasun, and which was always considered to be a sign showing the *direction* in which treasure had been hidden on some distant hills, was found upset and a big hole excavated under it."

Ismail Khan told us legends of an impregnable castle that once existed near Nao Rudbar, the name of which was Kala-i-Mur, a corruption no doubt of Kala-i-Mar, *Mar* being Persian for snake, which having resisted for many years the attacks of the kings of Irak, was taken by the stratagem of sending in the guise of a present thirteen loads of baskets full of snakes, which were let loose by the people who brought the present in the dead of night, on the eve of its formal presentation. The serpents killed all the garrison of the impregnable fortress.

On September 19 we left Varasun. Marching due north we descended into the valley of Kujur, which gradually widens from *nil* to two miles, and has plenty of hamlets and cultivation; side valleys join the main one on either hand. The whole look of the country reminded one of Kashmir, very beautiful and seemingly very rich. Through a gap to the north-west a view of lofty and very distant mountains was caught, the snow with which they were capped proving their great altitude. The streams that flow in from the Kuruk and other surrounding mountains and side valleys are lost in the main valley to reappear as fresh springs at its lower end, where, uniting, they form quite a considerable stream, whose course we followed for five miles

to Nao Rudbar.¹ Below Kujur village the valley becomes, first narrow, and then a mere gorge. The road, fairly good at the entrance to the gorge, crosses from the right to the left bank of the stream, which it has to leave to avoid the slopes that rise steeply from it, taking the softer ground at the foot of the rocks which rise abruptly where the slope ceases. The slopes, as well as the crevices in the rocks, are clothed with verdure, and between Kujur and the sea we saw the following varieties of trees and shrubs, viz., willows, alder, ash, wild apple, pear and plum, poplar, hawthorn, hazel, laurel, box, holly, medlar, sycamore, oak, mistletoe, hornbeam, tulip-tree (?), juniper, fig, walnut, and a tree with a leaf like the alder, the name of which I do not know. The Persian name is Khorda Yalu, probably a corruption of *Khurda alu*=little plum. Near the Caspian the undergrowth was in many places white jessamine and the pretty julibrisin acacia, with a leaf like a sensitive plant, and a pink fluffy bloom which is cultivated as an ornamental tree in the gardens around Teheran, and is there known as the silk-tree. On the shores of the sea, just out of reach of the storm waves, are clumps of blackberry growing in the greatest profusion and covered with fruit. On our way down a thick mist hid the beauties of the scenery, but on the return journey they showed to perfection, with a cascade falling into the gorge just above where our camp had been. We passed close to another cascade falling from a cliff some 300 feet high, but this was between three and four miles farther down stream. Our camp was pitched at Nao Rudbar, and it became evident that for the last four miles of our journey we had been following a cutting, from south to north, through a chain of limestone of that thickness formed by the stream we were following. At Nao Rudbar soft strata cropped out, forming a hollow between the masses of rock formation already referred to and another mass of less altitude, which has a strike east and west here and as far as could be seen in either direction. Mr. Stahl has made a mistake in giving the name of Nao Rudbar to a stream which falls into the main stream from Kujur, some five miles north of the true place of that name, where there is no confluent on the left bank. There are remains of iron-working and the ruins of one or two domed buildings at Nao Rudbar, and a tumble-down stable and rest-room of recent construction show that it is used as a halting-place by muleteers and travellers. The mass of limestone which, as already stated, runs right across the course of the stream, has been eroded into magnificent cliffs, which form a gateway, through which the course of the stream is followed into a picturesque valley or gorge with precipitous sides, about half a mile in length and 200 yards wide. The open space forms a meadow, and not long since, no doubt, was partially, if not entirely, covered by a lake, for even now, along the wall of the cliff, on the right bank, are the remains of a track, partly built out and partly hewn into the rock, which was doubtless used to avoid the lake; and our guide, whom we took from Varasun, said that it was not long since that Shah Nasser-ed-Din caused the barrier of rocks and boulders that dammed the northern end of the

¹ Stahl is mistaken in showing a stream falling in on the right bank from Firoz Kala.

gorge to be removed with gunpowder, and so did away with the pool or lake. It is certain that Nasser-ed-Din did descend from Kujur to the sea a few years ago, and the road, such as it is, below the gorge of Nao Rudbar was constructed for him. It will soon disappear below that place, as the present Shah will probably never care to visit his father's haunts in Mazanderan, much less push down to the Caspian. It is a fact that the late Shah is honestly regretted by the people, such as we met in Kujur. He paid his way during his visits to Mazanderan, and made his followers do likewise. Now the market for their produce, which the Shah's huge camp afforded, is wanting to this people, who are cut off from the rest of the world, and whose produce, except, say, clarified butter, rice, and charcoal, do not pay for transport. Already the traffic kept up in spring and autumn avoids the Shah's road. The riparian population at the former season goes up to Kujur to avoid the heat of the coast country and to till the lands there, descending again in the autumn to avoid the cold. Truly, from the site of the dam to the sea a worse bit of country to traverse is scarcely imaginable. The deep black leaf-mould that forms the soil, the rough rocks and sharp slopes of the side of the gorge are all insurmountable obstacles to any but a properly constructed road. The forest that flourishes wherever a tree can take root prevents the earth getting dry even when mists and rain cease, which apparently is not often. The journey down this gorge is the reverse of pleasant, except for the beauty of the glades, with their undergrowth of ferns, primroses, butcher's broom, and suchlike plants. But after all it only takes four hours from Nao Rudbar to the sea, and an equal distance with very similar difficulties is found on the high road from Resht to Teheran. From the mouth of the gorge at Mula Kala it is two and a half miles to the sea at Sarin Kala. Owing to the thickness of the jungle with its undergrowth of white jessamine, etc., it is not till within a mile of the shore that the sea becomes visible. It then appears to rise so dark and high up to meet the horizon that it is scarcely recognisable for what it is, and looks like a great wall. This strip of two and a half miles from the mouth of the gorge to the shore is of the richest alluvial soil and is well watered. It is, however, only near the shore that patches of luxuriant rice are cultivated. The dark yellow of ripening grain made a most lovely foreground, both to the deep blue of the sea and to the dark green of the forest, and we enjoyed the beautiful scene. We pitched our tents on the grass sward between clumps of blackberry bushes close to a pool, which the pebbly beach had formed by banking up the outlet of a stream. The water-snakes that inhabited the pool evinced great interest in our proceedings, showing their heads above the surface. A surf of waves about two and a half feet high beat along the coast. The brushwood and trees growing right down the beach and to within thirty or forty yards of the water, together with the absence of all tides and cliffs, made the scene like the shores of a lake, which in fact is what one would expect. The trend of the coast in both directions showed plainly we were near, if not actually at, the most southern bay of the greatest of inland seas.

We enjoyed bathing ourselves and our horses, the latter soon con-

sending to be ridden out of their depth and showing far more courage than the Persians, who, one and all, were overcome with fear. One man, whom we knew specially required a bath, and who we insisted should take one, on going in paid two local men to hold him one by each hand. Not so the men who had Turkish blood in their veins, people from Azerbaijan, who serve as grooms. Two of these could swim already. A third actually swam at first trial, and, being held by a waist-belt, paddled out of his depth, whilst his English master swam beside him. This Turkish groom had absolutely no fear of salt water.

With sunset came flights of ducks wanting to settle on the pool beside our tents, whilst strings of cormorants, flying at prodigious rate close to the water, looked for all the world like torpedo boats doing twenty-eight knots an hour. Of real boats or ships none was to be seen, and the peasants of Sarin Kala do not possess any.

A walk along the beach showed that cockles and univalves swarm in the sea, so that Stack's dictum that at Mashad-i-Sar, only forty-six miles to the east, "there are no shells on the shore, no birds in the air," and that "the Caspian looks like the meanest sea in the world" is inexplicable.

The possibilities of this country of Mazanderan have not often been descanted on. It is painful to see how a poor and neglected people continue to neglect them. No doubt the rainy seasons on the shores of the Caspian are unpleasant, but they can be easily put up with in well thatched or tiled houses, such as exist at Resht; and with a good road to the uplands, the latter could easily be reached in a drive of two or three hours. There is really no serious obstacle to be met with from Sarin Kala to Varasun.

Myrtles and aloes, oranges, and mulberry for silk would flourish. Tea ought to be tried. The whole strip along the coast should be a mine of wealth, if only for the rice crop it could produce.

The mouths of the rivers are swarming with salmon. With a rainfall of 55 to 60 inches per annum at the coast and, say, 25 to 30 inches at the same number of miles inland, this should be a country as worthy of development as the Caucasus and the eastern shores of the Black Sea.

The accompanying Table of Altitudes shows the heights above sea-level of the various passes, halting-places, etc., on the route traversed. They were taken with an aneroid, from which both the barometric readings and the altitudes in mètres were read. No temperatures were recorded.

General Schindler kindly worked out the altitudes from the barometric readings without applying any correction for temperature, and the writer reduced the altitudes from mètres to feet. A comparison of the results shows that the latter may well be taken, as they accord with the former, only showing a slightly higher altitude, which we consider may be taken to allow for the increase which would have been shown had the correction for temperature been possible, *i.e.* had a thermometer been used as well as the aneroid.

TABLE OF ALTITUDES.

NAME OF PLACE.	Feet above Sea-Level.
Gulahek,	4656
Top of pass between Jaj Rud and Tehran basin,	6107
Bridge Jaj Rud,	5253
Galendavek,	5582
Narun Village,	5779
Village of Afcha,	6599
Plateau half way down on south side of Afcha pass,	8307
Top of Afcha pass,	9866
Ab-i-Safid at Lar side of Yalu pass, shown on Schindler's Map,	8438
Kulayek or Kulwek on Nur river, <i>vide</i> Lovett's Map,	6007
Junction of two waterways in gorge between Kuruk pass and Baladeh,	7125
Summit of Kuruk mountain,	9850
Summit of pass out of Kujur valley,	9456
Plateau going from pass to Varasun,	7716
Varasun in Kujur valley,	6173
Ruin in Kujur valley,	5073
Centre of valley below Kujur town,	4656
On road above Nao Rudbar,	3841
Ditto ditto,	3447
Nao Rudbar,	3168
At foot of precipice and on stream,	2068
Down stream at bridge,	1346
Mulla Kala,	615
Caspian Sea at Sarin Kala,	- 84

N. B.—Rud = River.
 Kuh = Hill or mountain.
 Kala
 and } = Village.
 Deh }

THE HYDROGRAPHY OF THE UNITED STATES.

By FREDERICK HAYNES NEWELL,

Chief Hydrographer, U.S. Geological Survey.

*(Read at the Meeting of the British Association, Toronto, 1897.)**(With Maps.)*

IN considering hydrography as a branch of geography, it may be claimed that the period of exploration has passed. The location of nearly every stream or source of water is fairly well known and represented on the ordinary maps of States and counties. The next stage of progress, that in which accurate information is obtained as to the