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is drawn that heredity exercises a more important influence than environment.

The question of the individuality of Lorraine as a whole is not entered into very fully by the author, who sums up very briefly the results of his investigations as affecting the province generally. He holds that it does certainly form a distinct geographical entity, but except the regularity of its structure and the even level maintained by the crests of the ridges, he does not show what broad characteristics distinguish it from other parts of the Paris basin. The Jurassic beds all pass out of the limits of the province, and the natural boundaries suggested are not very decided in parts. Towards Germany, the Vosges, the Permian and carboniferous *massifs* of the Saar, and the Ardennes, are held to be unmistakable natural limits, while on the side of France the transition is said to be imperceptible. Yet elsewhere the importance of the Moselle in forming a tie with the regions to the north-east is pointed out, and the long hostility of Lorraine to France is ascribed to geographical causes. The small influence of the German race on its inhabitants is, however, pointed out in several places.

There is, perhaps, some risk in this method of inquiry, lest the mutual relations of the various units of which a country is composed should be lost sight of. The work, however, only professes to be a chapter in general geography. The author has brought to his researches that philosophic spirit which can alone lead to a profitable result, and a large measure of success has been attained in the attempt to explain the phenomena observed. He has had recourse to the most complete sources of information on the various subjects dealt with, and copious references to authorities are added to the text. The book is well illustrated by reproductions of photographs and by numerous sketch-maps.

THE PEVTSOF EXPEDITION AND M. BOGDANOVITCH'S SURVEYS.*

By E. DELMAR MORGAN.

WHEN the late General Prejevalsky died at Karakol, at the east end of Lake Issyk-Kul, as he was on the point of setting out on another expedition to explore Northern Tibet, the Russian War Minister and the Russian Geographical Society selected as his successor Colonel Pevtssof, an officer well known for his excellent geodetic surveys in Jungaria, Mongolia, and along the Chinese frontier, as well as for his treatise on a new method of finding the latitude by the corresponding altitudes of two stars, which he kindly explained to the writer at Omsk in 1880. The staff of his expedition was composed of the two officers, Captain Robarofsky and Lieutenant Kozlof, who had accompanied Prejevalsky's former expeditions, and of the mining engineer, K. I. Bogdanovitch, known for his geological investigations in Trans-Caspia and

* Map, p. 96.

North-Eastern Persia. Besides these officers, twelve Cossacks, an interpreter, an assistant for dressing skins of birds and animals, and native guides formed the *personnel* of the expedition.

To summarise as briefly as possible the results obtained by the expedition and its leader before noticing the special part taken in it by Bogdanovitch, I cannot do better than quote General Stebnitsky's report to the Russian Geographical Society.* He says: Thus for the first time an itinerary has been laid down and explored from the bisection of the caravan routes near Ush-Turfan in a south-easterly direction to the River Yarkand-daria; along this river for about 270 miles to the city of Yarkand; the position of this river and of objects along its banks having thus been for the first time ascertained by Pevtsof and his companions. From Yarkand the expedition joined the highroad leading past Khotan and Keria to Niya, surveyed by former explorers, and plotted on the map according to the observations of English travellers. From the oasis of Niya the travels and surveys of Pevtsof and his companions, to the north (as far as Mazar Jafar Sadyk), to the east and south, to the elevated plateau of Tibet, contribute many new geographical and cartographical data. To the south-east of Cherchen, the expedition went as far as Unfreezing Lake (Aiag-kum-kul), and thus linked its survey with that of the late General Prejevalsky. The most important geographical observations made in the course of the expedition were those undertaken in the great area containing Lakes Achik-kul and Aiag-kul, situated between the Kuen-Luen, the ranges of Astyn-tagh, Tokuz-dawan, and Akka-tagh. Quite a new light has been thrown on this borderland of Tibet by Pevtsof's surveys.

Farther north the route taken by the expedition along the Cherchen-daria, closing upon and bisecting the itineraries of Prejevalsky from Lob-nor, and along the Konchek (or Kurla)-daria, goes as far as Kurla (Kuropatkin's farthest in 1876-7). Eastward of Kurla, Pevtsof's expedition carried their survey round the whole of Lake Baghrash-kul, the western end of this lake having been reached by A. Wilkins, Kuropatkin's companion, in 1877; he was, however, only able to establish the fact of the existence of such a lake; it has now been accurately surveyed for the first time. Furthermore, Pevtsof's survey from Manas to the Russian frontier supplies new facts for the cartography of the region traversed.

Combining all the geographical work done by the several members of the expedition, we obtain the following: A route survey, 6300 miles in length, 4000 of which were taken by Pevtsof's own hand with plane-table, on a scale of 5 versts to the inch, the heights of distant mountains having been measured. The latitude and longitude of 34 points have been determined astronomically, and of these 18 were fixed by Pevtsof himself, besides six longitudes by lunar occultations of stars. All Pevtsof's positions, being those of an experienced geodetist, have considerable weight as regards accuracy; thus the probable error in the determination of time by a pair of stars (at equal altitudes) is only $\pm 0.1''$, and the probable error in latitude $\pm 0.7''$. No less than three hundred and fifty heights were determined barometrically, and one hundred of these by Pevtsof himself with mercurial barometer.

Near Lake Dashi-kul, in order to ascertain by triangulation the height of Mount Ak-tagh (in the Kuen Luen), Pevtsof measured a base, 2 miles in length, from which he took angles to the summit of the mountain. By means of this base he made some interesting observations on the velocity with which sound travels in these regions at an elevation of 14,000 feet above the sea, the mean of twelve good observations resulting in a velocity of sound = 1068 feet per second, or 325.5

* Otchét (Report) for 1891.

mètres, and this, after applying corrections for temperature, gave a deduced velocity of $330\cdot7$ mètres per second.

The highest points reached by the expedition were 18,000 feet (Robarofsky) and 19,000 feet (Bogdanovitch), and near Toksun they discovered the hollow of Assa, 160 feet below sea-level, the same hollow having been observed at its eastern end by the Brothers Grum-Grijimailo.

Magnetic observations were carried out by Pevtsuf at ten points, and at two of these all the co-ordinates—variation, dip, and magnetic intensity—were determined. Collections in zoology, entomology, and geology were made, and ethnographical particulars relating to the inhabitants of those regions, collected.

Thus far General Stebnitsky, we now proceed to the account given by Bogdanovitch* of his explorations. The geography of the regions he was about to visit had been outlined by former travellers. Following the chronological order, these were from the Indian side—Mir-Izzet-Ullah in 1812; Thompson in 1848; Hermann Schlagintweit in 1854–8; Pundit Muhammed Hamid in 1864; Johnson in 1865; Robert Shaw in 1868–9; Hayward in the same years; Henderson in 1870; Forsyth and the officers of his expedition in 1873; Pundit Nain Singh in 1865–6 and 1873–5; Carey and Dalgleish in 1885; Ney Elias in 1887; Younghusband and many others in 1887–90. From the Russian side—Trushnikof in 1713; Yefrémoſ in 1780; Valikhanof in 1858; Kaulbars in 1872; Kuropatkin in 1876; Prejevalsky in 1878 and 1885; Grum Grijimailo in 1886; Grombcheſky in 1885, 1887, and 1890.

While the general result of all their explorations was to acquaint us in broad outlines with some of the principal features of the physical geography, there yet remained much detail to fill in, and the state of our knowledge showed the want of systematic treatment.

There was, moreover, one great *desideratum* felt. Of all the above-mentioned travellers only three† were geologists, and not one of these returned to tell his tale. Adolph Schlagintweit was killed at Kashgar in 1857, and Stoliczka died on the Karakoram on his way back from Kashgar in 1874. To supply this want was, therefore, the aim and ambition of Bogdanovitch, whose earlier studies of the works of Humboldt and Von Richthofen and of his eminent countryman, Mushkétov, had roused in him an enthusiasm for the task, and a desire to continue investigations they had so successfully initiated.

If there were no more brilliant discoveries to make in descriptive geography, such as those associated with the names of the travellers and writers enumerated above, a closer study of the geology of the region on the spot might lead to generalisations and conclusions tending to the furtherance of knowledge. "The fertile syrts of the Tian Shan, the gigantic heights buttressing the Pamirs on the east, the stifling plains of Kashgaria and their oases, the sandy deserts with their buried cities, the wild and desolate mountain-chains of the Kuen Luen, and lastly the death-like solitudes of Northern Tibet," these, in the words of our author, were to be the scenes through which the expedition was to take its way.

M. Bogdanovitch, like many another traveller whose experience of mountaineering has been gained in the Alps of Europe, where fertile valleys and lowlands lend so pleasing a contrast to the background of rugged cliffs and snowy peaks, was much impressed with the grandeur of the scenery in Central Asia, where snowy chains

* *Trudii Tibetskoi ekspeditsii*, part ii. St. Petersburg, 1892.

† M. Bogdanovitch speaks of *three*, but he includes Hayward who was not a geologist. Hayward's earlier training was that of a soldier, and he took up exploration from a general love for geographical science, not as a geologist.

extend in almost unbroken continuity for thousands of miles, where the uplands of Tibet and the plains of Kashgaria oppress the traveller from their very vastness.

Maps constructed after the most improved methods may give an idea of the leading physical features of the country, and enable one to take in at a glance immense tracts; but to realise the magnitude of Nature's work in Central Asia, to learn its aspect, it is necessary to visit and travel in these regions.

Leaving the Russian town of Prejevalsk on May 25th, 1889, M. Bogdanovitch, escorted by a Cossack interpreter, Shestakof, and two Kirghiz guides crossed the Tash-Rabat Pass (about 13,000 feet), and proceeded *viâ* Turugart to Kashgar. From this city he made an expedition to the Mustagh-ata* group with the object of studying its geology. To reach these mountains it was no longer possible at so advanced a season of the year to follow the valley of the Gez which traverses their whole width from west to east, and flows close under Mustagh-ata itself, for the rivers were already flooded with melted snow and ice. Neither was it possible to hire guides for the Kashgarian mountains. He therefore went first to Yanghi Hissar, and here with the obliging assistance of M. Petrofsky, the well-known Russian consul, succeeded in hiring men and pack animals for the transport of his supplies and forage, for at that season supplies were not procurable on the Pamirs. The little Karakul route by way of the Kara-tash Pass † was that chosen. Passing along the King-gol (Kinkol) and Ridjek streams he reached the foot of the Ridjek-dawan Pass (about 14,000 feet) on June 7th. Here he was delayed a day owing to the excessive steepness of the Pass. At length the baggage-horses were safely over, and the journey was continued with comparative ease for upwards of 20 miles, at first down the Chat-su, then up the Kara-tash-su to the Kara-tash Pass over the Mustagh-ata. The Kara-tash Pass (16,500 feet) under the best of circumstances is reputed to be the most difficult in the eastern border-land of the Pamirs. However, by hiring yaks of the Kirghiz, and favoured by splendid weather, the ascent was accomplished on June 9th without difficulty, after turning the gigantic moraine of a glacier, now hidden in the recesses of the defiles in the southern group of Mustagh-ata. Very little snow was left on the summit of the pass, but the descent towards Kara-kul was most difficult, the path for upwards of 13 miles clinging to the side of the mountain along huge slopes of detritus. Having skirted the south shore of little Kara-kul (about 12,500 feet) the party made their way round the western foot of the southern group of Mustagh-ata, separated from the northern peak by the gorge of the Iki-bel-su. The position of the little Kara-kul valley is compressed between the slopes of Mustagh-ata and the wall-like, granitic range of the Sari-kol mountains on the west. On the east, however, there is room enough for the Iki-bel-su to wind its course between the lake and the mountain much in the same way as the Chu approaches Issik-kul without mingling its waters with that lake. On the south and south-east of Kara-kul a gravelly, saline plain extends to some granitic heights connecting Mustagh-ata with the Sarikol range. These heights drain into the river not by narrow water channels but by broad streams of a temporary nature descending the mountain sides. Having united at the foot of the mountains they flow in a wide, slightly inclined channel, at times over the perfectly level plain. The gravelly deposits formed by this system of drainage may be compared with those of Khorassan, the higher valleys of Tibet, and other valleys in the Pamir itself. Their irregular stratification may be attributed to the periodicity of the floods and varying volume of water discharged, though they might easily be mistaken for glacier-drift.

* The Tagharma Peak of the maps.

† The route is mentioned by Trotter in the Report of the Mission to Yarkand, p. 265.

M. Bogdanovitch passed into the valley of the Tagharma by the Ulugh-Rabat Pass. Here he learned that there were no roads along the Yarkand-daria by which he might proceed to Yarkand, but only foot-paths, and that from the middle of June to the end of July, and even late into August, the rivers were unfordable. As the date for his rejoining the main expedition was fixed for June 22nd, he had to decide on the route *viâ* the Kok-moinak and Chichiklik Passes, and content himself with a survey of only the central portion of the Kashgarian Mountains.

The Kok-moinak Pass (about 15,000 feet) leads over the southern lower part of the Mustagh-ata group; the descent from this pass opens on a circular expansion of the Upper Dorshat-su Valley, separated by the low Chichiklik Ridge from the Tarbashi-su (tributaries of the Yarkand-daria). These valleys have all the characteristics of glacier-channels, with typical alluvial deposits in their lower parts very similar to those of the Kara-tash-su below the last Kirghiz camping-ground. Their higher valleys are specially selected by the Kirghiz for their summer pasturages, and it is only after the intense heats are over that these nomadising inhabitants descend below the great beds of detritus and the desolate transverse defiles to warmer quarters. Huge boulders of granite occur between the last camping-grounds and Pas-rabat. These and the rush of the torrents oblige the rider to dismount, and let his horse pick its way as best it can, while he wades in deep water, now climbing on to the blocks, now ascending the steep banks of the channel to escape being swept down by the stream. Here, in the very wildest part of the defile, M. Bogdanovitch came upon warm springs,* slightly ferruginous, with a temperature of 127° to 135° Fahr. They rise from thick masses of conglomerate rock overlying granite and crystalline schists.

From Pas-rabat our traveller rode *viâ* the Turut (Torut) Pass (about 13,000 feet †) to Chehil-gumbaz,‡ and descended the valleys of the Charling and Kaiz to Kuserab, a settlement on the Yarkand-daria, marked in his map as the site of a coal-mine.

In the valley of Tagharma there are several settlements of Tâjiks (*e.g.* Beshkurgan and Chashman), known here as Sari-kolis. In winter they are concentrated near Tash-kurgan, and are also met with at Kuserab. They are distinguished from the inhabitants of the Kashgarian oases by their distinct Aryan type, and by their speaking Persian.

The Tagharma Valley is a wide pasture-land,§ visited in spring by thousands of Kirghiz from the neighbouring mountains; here and there are plots of arable land cultivated by Sarikolis, whose invariable corn-mills have given the country its name—Tagharma, *i.e.*, “corn-mill.” Near Pas-robot, between Chehil-gumbaz and Kuserab, beyond the Kara dawan (11,000 feet) and Kizil dawan Passes, and in the valley of the Arpalik-su, wherever the valleys widen the Kirghiz pasture their flocks. Barley || is the only corn which ripens.

On June 19th M. Bogdanovitch arrived at Yarkand with his tired-out horses, having accomplished 305 miles in fourteen days, over the worst of mountain paths. Here he rejoined the expedition under General Pevtsof, and

* Warm springs were noticed by Colonel Gordon with a temperature of about 116°, *cf.* Report of a Mission to Yarkand, p. 223.

† Colonel Gordon gives the height at 13,400 feet, *cf. ib.* *l.c.* Trotter gives Torat (horse's sweat) as an alternative name for the Pas-robot Pass, *ib.* p. 266.

‡ Or “the forty domes,” *cf.* Report of a Mission to Yarkand, p. 222.

§ About 12 miles long by seven broad, extending from the south-west to the north-east, according to Gordon. Report of a Mission to Yarkand, p. 224.

|| A beardless kind, *ibid.*

accompanied it as far as Takhta-Khon in the mountains south-west of Kok-yar, whither they proceeded to recruit their tired camels. Leaving it once more at Takhta-khon he set off on another expedition to explore the mountains aligning the upper course of the Yarkand daria and advance as far southwards as circumstances might permit.

However few the itineraries of European travellers in the mountainous region bordering on Chinese Turkestan, the tract south-west of Yarkand has not been unexplored. The caravan route from Yarkand to Ladak, passing Kok-yar, Ak-Meshet and Akchi-Kabak, though easier than that *viâ* Sanju, has been abandoned, owing to the depredations of the Kanjutis. It was by this route that Forsyth's mission returned to Ladak in 1874, crossing by the Yanghi-dawan Pass, the easiest in this part of the Kuen Luen, into the Yarkand daria basin. Other passes are mentioned by Adolph Schlagintweit from hearsay information and by Grombchevsky, who approached the Yarkand daria (Raskem-daria) from the west in 1888. M. Bogdanovitch decided on exploring one of the passes between the Yanghi-dawan and Kurumat-dawan, hitherto entirely unknown.

On August 3rd, taking with him the same trusty Cossack, Shestakof, and two experienced natives he set out from Kok-yar, with a supply of bread and barley to last twelve days. Crossing the Tiznab at Mumuk he advanced along the valley of this river fording a number of its left affluents—the Gusás, the Usiás, the Chikhsho with its tributaries, the Yolun, Bolun, and the Pakhpu. The scenery here is very picturesque and the country comparatively fertile. Here, for the first time after leaving Russian territory, he saw fine forests of great extent and alpine meadows above the belts of forest land. The inhabitants of the Tiznab valleys are Yarkandi-Taghlyks (mountaineers) leading pastoral lives. In summer they usually drive their sheep and cattle to the alpine meadows near the sources of the streams, descending again in autumn and winter to the more central parts of the valleys where their permanent habitations, built of clay, are situated.

The Taghlyks of the Tiznab are emigrants from the west and are easily distinguishable from the aborigines, *e.g.*, the Taghlyks of Russian range (known to us by Prejevalsky's description as Machinians) by their pure Tâjik type.

At the tenth march from Kok-yar M. Bogdanovitch reached the source of the Pakhpu at Koi-yailak at the foot of the Takhta-korum Pass. Here he hired pack animals, and on August 25th began the ascent of this magnificent pass, leading across the principal chain of the Kuen-Luen. At 14,000 feet he found the soft loess replaced by rock detritus. Toward the summit mountains close in from every side to form a vast amphitheatre, entered by a giant staircase of natural steps of great width, slightly inclined and studded with blocks of fallen rock. The character of the scenery agrees well with the name—*Takhta-korum*, Persian for "rocky throne."

The ascent of the pass occupied eight hours of difficult climbing. Half way up their heads began to ache, giddiness was felt, and one of the guides expectorated blood. The hypsometer showed $T=182^{\circ}$ Fahr., and t of the air $=39.2^{\circ}$ Fahr. (about 17,000 feet). Masses of snow were only met with immediately below the summit where freshly-fallen snow was lying; in summer the pass is quite free from snow. The descent on the opposite side is very abrupt, lying over beds of detritus at an angle of 40° , into the deep valley of the Kulan-aghil (or Kulan-aryk), a right tributary of the Yarkand daria. Beyond the valley rises a snow-clad range with another terraciform ascent, though less remarkable than the Takhta-korum. M. Bogdanovitch crossed this range by the Kokelan Pass (about 17,000 feet—the snow line) and descended by the Malgum-bash gorge and the valley of the Bazar-dereh, a right affluent of the Yarkand daria. This is a raging torrent of dirty water, 30 to 40 yards wide, and

quite unfordable. It was hoped that by waiting till daybreak the waters might subside and become clearer so as to enable them to see the bottom; but this expectation proved vain, for when the morning dawned the torrent was, if anything, higher, and dashed its waves furiously against the schistose rocks. Yet to reach the sources of the Tiznab by the Yanghi-dawan and Chirak-saldi Passes it would have been necessary to cross the river five or six times. An attempt to circumvent the river by scaling the mountain side was unsuccessful and nearly terminated fatally, for M. Bogdanovitch slipped on the first detritus slope, and was only rescued from headlong descent to the precipice by the timely aid of his companion. This mishap decided him on tempting fortune no more, but to return the way he had come, *viâ* the Malgumbash and Takhta-korum Pass.

His second attempt to cross the Yarkand-daria was equally unsuccessful, and he then learned from the inhabitants that the only season of the year when this valley was accessible for horse and rider was the winter, and that in summer and autumn, not even at the villages of Pihl and Kuserab, could its stream be crossed. Above Pihl, visited by Grombchevsky in 1888, there are no settlements along the Yarkand-daria. Ruins of former villages may be seen occasionally, for instance at Ish-debeh on the Bazar-dereh above its confluence with the Yarkand-daria, a place where there had once been iron smelting works. M. Bogdanovitch did not discover the exact locality whence the iron ore, a brown ironstone, had been obtained, but the clay schists in the neighbourhood were found to be highly charged with ferruginous deposits. Many parts of the Yarkand-daria bear traces of smelting works like those at Ish-debeh, and the abundance of iron has, according to Grombchevsky, originated the names Raskem-daria, from *ras*-much and *Kau* mines. In this part of its course the river discloses to view metamorphic deposits of iron ore in very much disturbed schists of the Devonian series. The Arab geographers of the eighth to the eleventh centuries, and especially Edrisi, mention that Eastern Turkestan supplied the Western Mohammedan world with iron and iron-ware.* At the present day, however, only one of the mines of this brown ironstone, situated in the mountains south of Yanghi-Hissar, is worked.

These mountains aligning the Raskem-daria also abound in jade deposits. One of these, Shanut, on the northern slope of the Kuen Luen, was visited by Bogdanovitch. Copper is found at the confluence of the Yanghi-dawan-su and Tash-Kurgan-su (head waters of the Tiznab), and the metal obtained is minted. Our traveller had no opportunity of visiting this or the copper-mines of Kucha and Urumchi, known only by hearsay report. The copper-mines of the Tian-shan, between Aksu and Urumchi, were known in very early times, and were mentioned by Hwen Thsang, as well as lead, sulphur and alum. These mineral deposits are also spoken of in the history of the earlier Han dynasty in the first century, and Bogdanovitch considers the numerous traces of copper smelting observed by him refer back to the pre-historic age and possibly to the great migration of races from east to west.

The valley of the Yarkand-daria, near Ish-debeh, is comparatively narrow and diagonal or transverse with respect to the mountain chains as far as Pihl. Above the Yanghi-dawan road, however, it widens, and is evidently longitudinal. Though pasturage is abundant it is never visited by the inhabitants of the Tiznab Basin, who dread the Kanjutis. These marauders make their appearance in winter, descending from the Mustagh Range, where they leave their flocks and herds in some place of security while they themselves ascend by the Takhta-korum to the valleys of the Pakhpû and Chikhsho to collect tribute in the shape of cattle and money. Four years had elapsed since their last appearance. The inhabitants have come to regard

* Russ. ed. of Ritter's 'Asia.' E. Turkestan, ed. by Grigorief, ii. 225.

this tribute as obligatory, and collect it themselves in readiness for the Kanjutis, who are so much dreaded, that it was with great difficulty that Bogdanovitch could hire men at Pakhpu to go with him to the Malgum-bash.

The point where he struck the Yarkand-daria is some distance above Uprang, visited by Grombchevsky, and a long way from the sources of this river in the Mustagh Range, judging from the fact that the melted glacier water does not reach Ish-debeh before the morning. The sources of the Yarkand-daria have been described by the Brothers Schlagintweit; Grombchevsky crossed the Taghdumbash (Dangnin-bash) heights of the Mustagh, and Younghusband explored the now abandoned Mustagh Pass, so that very little remains unexplored of this range, except where the Yarkand-daria takes a sharp turn to the eastward. This particular locality is absolutely unknown.

The two head-streams of the Yarkand-daria, the Raskem-daria and the Taghdumbash-daria, unite below the village of Kuserab. On June 16th Bogdanovitch observed the second of these rivers to be smaller, narrower, and shallower at Kuserab than the Raskem-daria at Ish-debeh on August 27th. Unfortunately no contemporaneous observations were made, and therefore no positive conclusions could be formed. The Yarkand-daria is the chief river of Eastern Turkestan; its course is upwards of 1300 miles long, and the determination of its sources is an interesting geographical problem.

On August 30th, M. Bogdanovitch and his party reached Pakhpu, after three heavy days' marching on foot, extricating their worn-out horses with great difficulty from the rocky defile of Malgum-bash and the detritus-covered slopes of Takhtakorum. From Pakhpu two long marches over the Ishekat (about 14,000 feet, here they had to rope the horses) and Ak-korum Passes brought them to Expedition Camp. In nineteen days of itinerary they had gone 280 miles. They had examined the orography of the region visited, and had found that in this part of the Kuen-Luen the ranges change from a N.E.-S.W. direction to N.W.-S.E., forming an arc. The number of peaks and groups massed together to the east of Takhta-Korum and in other parts made it impossible to have a correct idea of the orography, the ramifications of separate chains, and their interlacement. This too explains the absence of any definite local nomenclature. The mountains are called after the rivers flowing below them (*e.g.* Pakhpu-tagh, Chikhsho-tagh, Gusas-tagh, &c.), or after the passes (Takhta-korum, Kulum-bagh, &c.), sometimes even after villages, and it not unfrequently happens that a mountain obtains different names from the inhabitants of separate valleys. Combined with this characteristic in the mountains is the complete absence of longitudinal valleys. Nearly all have either a diagonal or transverse direction with reference to the axis of the nearest chains, *e.g.*, all the left tributaries of the Tiznab. Pointed peaks, groups of jagged, snowy summits, now and again a well-defined snowy chain, the prevailing lines of the valleys with their much lower aligning hills, these are general features of the panorama. Towards the west, however, where the direction changes to N.W.-S.E., the scenery changes. The Chup and Kulan flow through distinct longitudinal valleys between the snowy ranges of Kulum-baghla, Takhta-korum, and Kokelan. The second of these forms the watershed between the basins of the Tiznab and the Yarkand-daria. South-east as far as Yanghi-dawan the mountains appear as a very lofty snowy mass, feeding the sources of the Tiznab (the Yanghi-su and Tashkurgan) and the right tributaries of the Yarkand-daria (the Kulan-aghil and Bazar-dereh). The extension in an east-south-east direction of this main chain of the western Kuen-Luen is the lofty Arpa-vash-tagh, crossed by the high road to India at the Kilian Pass.

I have only mentioned in this short paper a few of the topographical results of

the Pevtsof Expedition. The observations made were of the most varied kind, and have thrown much light on the mineral and other resources of the regions visited. Among these, special attention is drawn to the part taken by the poplar forests in Eastern Turkestan in protecting the fertile tracts from the ravages of shifting sands, and to the system of irrigation adopted by the inhabitants, who allow their fields to remain coated with ice during winter, in order to ensure an early supply of moisture in spring for cultivation. The jade quarries and deposits, and the different kinds of this stone, precious to the Chinaman, are noticed at some length, and the information collected supplements the observations of the Brothers Schlagintweit and the late Dr. Stoliczka. A separate chapter treats of the gold placers and the manner of working these, celebrated since the time of Herodotus.

It is worth while remarking that, in M. Bogdanovitch's opinion, the only chance of penetrating into Tibet from the north-west is by travelling on foot, without any beasts of burden, the necessity for taking forage for these increasing their number without any advantage resulting from them. Donkeys, of course, would be the most serviceable, and he recommends making a start from Karasai, where animals, supplies, and men may be obtained. Water is always procurable under the surface in low spots between the ranges; and, if this should fail, snow-storms, of such frequent occurrence even in July, would supply all that was necessary. The best season for such an expedition, he says, is from July to September. But, on the whole, he would prefer Ladak as a base, an entrance being made into Western Tibet *viâ* Rudok or Tankse, *i.e.*, by the route recently followed by Captain Bower.

In conclusion let me say that the map to illustrate this paper has been most carefully compiled from every available source of information, and has been executed by Mr. Scharbau, the Society's draughtsman.

NOTE ON THE MAP.—We may add that the map referred to above is part of the general map of Tibet, now in preparation for the Society. With this have been combined the surveys of Colonel Pevtsof and M. Bogdanovitch, as published by the Imperial Russian Geographical Society in the *Ivestija* and the 'Memoirs of the Tibetan Expedition,' Part II. The yellow portions on the maps indicate sand.

THE MONTHLY RECORD.

EUROPE.

New Geological Map of European Russia.—The Russian Geological Committee has just published a beautiful geological map of European Russia, in six sheets, on the scale of 60 versts (40 miles) to an inch. The last geological map of Russia was compiled by Helmersen in 1873, and is now old. Therefore the Committee, in commemoration of its ten years' existence, has prepared this map, which embodies all explorations up to date.

The Black Sea in Pliocene Times.—M. Andrussof gives a note on this subject in the *Bulletin de l'Acad. Imp. des Sciences de St. Petersburg* (1893, p. 437). While it is generally agreed that the basin of the Black Sea was separated from the Mediterranean in the Pliocene epoch (the Ægean being then dry land), its condition at that time is still a disputed question. From the presence of Sarmatic and Pontic deposits on its shores, M. Andrussof has long held that some part at least was then covered by water, while the nature of the fauna disclosed by certain deposits discovered by him in the Crimea leads him to conclude that the area was occupied by a large brackish lake, similar to those of the south of Russia. This view is supported by the dredgings carried out by the expedition of 1890, of which the writer was a member. The empty shells of brackish-water species, which alone were