spring, a series of oscillations of the bobbin is produced, and there are then formed induced currents capable of acquiring considerable force and overcoming a great resistance. As may be seen, the apparatus is very simple. It requires no keeping in repair, and it is as easily set in action as are the bells now used employing piles.—*Revue Industrielle*.

THE ELECTRIC LIGHT AT MOSCOW.

In our time, great popular fêtes can no longer dispense with the wonderful luminous effects that can be obtained by means of the electric light; and so, when last summer the Czar of Russia finally decided to have himself crowned with solemn ceremony, the city of Moscow prepared for the eve of the event a series of luminous decorations that left a deep impression upon the gigantic crowd which had come in from all parts of the empire, and upon the innumerable visitors that had been attracted thither from various points of the old and new world.

The reception of the deputies from the Cossack and Asiatic part of the population occurred on the 28th of May, at the Kremlin Palace. This part of the programme was particularly curious because of the strangeness of the costumes and types that were represented in the delegations which had been sent from the most distant points of the territory.

The Hall of the Throne had been arranged for the ceremony. Towards one end of it rose the imperial throne, and, on the left, were placed the imperial insignia and the flag of the empire. Grenadiers of the *Compagnie Dorée* formed the guard of honor, and the Czar and Empress stood in front of the steps of the sumptuously decorated throne. In measure as each delegation presented itself, its chief offered the

Edison lamps were mounted on the high tower of Ivan Velikoi, which rises in the center of the Kremlin, and formed silhouettes of fire of most fantastic forms; and, at the same time, the belfries of the strange cathedral of Wassili-Blajenoi were illuminated with many-colored facettes, while a scintillation of electric points, running along the pinnacles of the ancient citadel, and reflected by thousands in the bed of the Moskowa, seemed to give the waters of this usually dark river the appearance of a vast sheet of molten metal. Upon the eighteen towers of the Kremlin there had been arranged, in addition, enormous regulators, which shot their luminous fascicles to a far distance, and illuminated the cupolas of the Terem, of the Temple of the Saviour, and of the cathedrals of the sacred precinct, as if with a continuous lightning flash.

It is this last part of the electric illumination that is represented in our engraving, which shows the immense fascicles of light emerging from all parts of the towers of the Kremlin and projected against the surrounding structures, and which gives an idea of the wonderful way in which the electric light contributed to add to the fantastic side of the fête.—*La Lumière Electrique*.

THE TRINIDAD COAL MINES.

ISAAC T. GOODNOW.

We were now coming east, on a beautiful afternoon, just in the right mood for enjoying the scenery. The railroad very nearly follows the old Santa Fe trail, and also the present well traveled wagon-road over the Raton Mountains, whose fantastic peaks tower right and left to the skies, with openings occasionally to the north that enable us to see,

fans on the outside driven by steam-power. Turning to the left some fifty feet, we found what appeared to be a small engine with a horizontal cylinder, made so as to drag along the ground, and working a drill horizontally. The machine is really operated by compressed air forced into the mine through iron pipes, which are connected with the machine by flexible rubber tubes. This machine is placed at the end of the tunnel and is moved by hand from one side to the other at the bottom, and by its effective action cuts to pieces a thin layer of coal under the great mass at the end of the tunnel; two holes, twelve feet apart, near the top of the mine, are bored and cartridges inserted, and the mass of coal at the end of the passage way is blown off, several tons at a blast; quite an improvement on the old pick. Everything is systematized and moves like clock-work.

Friday, May 18th, 4 o'clock, P.M., finds us at Trinidad, the guests of its enterprising and hospitable citizens. With an elegant array of carriages we were met at the depot and driven over the city, and those who wished went to the Engle coal mine, three and a half miles away. At the mouth of the mine, at the west and south, we found a comfortable little mining town of some five hundred inhabitants, representing the usual nationalities. The coal beds, three in number, usually crop out near ravines, are easy of access, and are naturally drained. The beds are horizontal, no shafting or hoisting is necessary, there is no dampness or bad air, as in most mines. These veins are parallel, varying in thickness from six to fourteen feet. The middle one is worked the most; the roof of this is light-colored sandstone, and sufficiently strong to sustain itself, consequently saving all expense in blocking. Never before have I seen such a rare combination of circumstances to produce first-class coal with so little labor, so little inconve-

THE ELECTRIC LIGHT AT THE CORONATION, MOSCOW.

gold and silver plate containing bread and salt, which was afterward placed upon a table alongside of the windows overlooking the Moskowa.

The promenade of the court at the Kremlin, which was brilliantly illuminated at night by the electric light, took place in St. George's Hall. The cortège was preceded by the masters of ceremonies clad in green tunics decorated with embroidery, and carrying in their hands a golden baton, two meters in height, surmounted by the double-headed eagle. The orchestra at this moment played the *Glenka Polonaise*, and, at the sound of this, the imperial cortège, guided by the Emperor, executed the *Kourka*—a traditional promenade through a crowd bowing with respect.

Outside, the true popular fête was much more picturesque. It took place in the plain of Kodinskoie-Pole, about two kilometers from Twerskaia, opposite the Petrowski Castle. This plain, which has a superficies of nearly five square versts, had been surrounded by a barrier of small barracks, presenting 400 entrances. Each person on passing through the wickets received a small osier basket containing cakes, a pound of bonbons, a bottle of liquor, and an earthen goblet. It is estimated that 428,000 persons entered this vast inclosure and received the popular present.

In the center there was a circus capable of holding fifteen thousand persons, this being flanked by four theaters in which were exhibited the drama, pantomime, and military pieces. After these day exhibitions, came a night fête, whose brilliancy was such that no idea could be given of it by any known comparison. For some time past, electric arrangements had been under preparation, and, by successive trials, all the apparatus had been ascertained to work well. Never, until then, had there been lighted within the same space a like number of lamps. Trimmings formed of

low down in the horizon, the famous Spanish Peaks, one hundred miles away, a wonderful demonstration of the purity of the atmosphere. Just before leaving New Mexico, the train suddenly plunges into a tunnel 2100 feet under the highest crest of the Raton Pass, and on emerging we find ourselves inhaling the pure air and enjoying the bright, mellow sunshine of a Colorado day. The highest point of the Raton Pass is 7861 feet, and of the tunnel 7688 feet, a height of 173 feet saved by the tunnel. On leaving this we pass the Devil's Canon, and in five miles reach the foot of the pass at the little station of Morley; farther on four miles we find Starkville, a sort of suburb to Trinidad, and the site of a remarkable coal mine, stopping an hour and a half to examine it.

The veins of coal are horizontal, and from nine to fourteen feet thick; no finer bituminous coal can be found. This mine has been worked steadily one and a half years, and yields three hundred tons a day, and ninety tons of coke. This is made by heating the coal in ovens to a red heat, and driving off the water and gases. One hundred pounds of coal will make fifty-five pounds of coke, which is nearly pure carbon. Forty-two ovens are in operation here; one hundred and fifty-five men are employed, nine hours constituting a day's work. Laborers outside are paid \$2 per day; inside, \$3; for mining coal, sixty cents per ton is paid. The laborers are Americans, Swedes, Italians, and Mexicans. We entered the mine on the east side of the mountain by a tunnel six to eight feet wide, and perhaps twelve feet wide, coal above, below, and on both sides, glistening from our little lamps like black diamonds, and generally constituting a self-supporting roof. We penetrated in a straight chute 1400 feet, finding openings to the right and left, with occasional doors to regulate the draught of air which is supplied by

nience to health and life to work the same. We notice here the mouths of two other tunnels, one opening into a mountain on the north and the other into a mountain on the east, both the mountains joined together at the base. The north tunnel runs clear through the mountain and also connects with the east tunnel. The magnitude of the work may be realized when it is understood that there are twenty-six miles of underground railway in this mine.

Two hundred and seventy men and boys are here employed, and the amount of coal produced each day is one thousand tons; its cost of production is sixty-two and a half cents per ton; this includes interest on investment, wear and tear of machinery, weighers' and superintendent's salary. Coal sells at the mine at one dollar and a half per ton, leaving eighty-seven and a half cents profit. On one thousand tons, the product of this mine per day, yields \$875, or \$319,375 per year, a very fair profit. Coke sells here at \$5 per ton, though formerly brought from Pittsburg at \$25 per ton. To produce coke costs \$2 per ton, leaving a profit of \$3 per ton; two hundred and fifty ovens will produce three hundred and twelve and a half tons each day, or a net profit of \$93,740 per year. After a general survey of the outside, some twenty of us, with the Hon. E. J. Morrill, M. C., than whom a better traveling companion never existed, with lamps in hands, took our seats in some half dozen coal cars, drawn by three fine looking mules. At the crack of the whip, we plunged into the earth, every face glowing with expectation and excitement. The similarity of the Starkville mine renders a description of this unnecessary; they both belong to the same great system of coal measures underlying this portion of the Raton Mountains and comprising an area of one thousand square miles. How far we penetrated I can only guess, probably three-quarters of a

mile; here we left the cars, and walking a short distance, found a new machine, operated by the same motive power as the machine described in the Starkville mine; this has been used about two years and is an improvement upon that.

This machine, instead of having the drill of the other machine, has an iron roller four feet long and two and one-half inches in diameter, armed with projecting teeth. This, when pressed against the bottom of the coal at the end of the tunnel, by revolving rapidly cuts away the foundation of the great body to the thickness of the rollers, two and a half inches, four feet wide, and projecting under the coal some five feet; when one breadth is cut, the machine is moved one side to another cutting, till the whole mass of coal at the end of the tunnel, some twenty feet across and five feet in width, is undermined. Two holes two and a half inches in diameter and twelve feet apart near the top of the mine are then bored six feet in depth, and a pound cartridge inserted in each. The joint explosion throws off some twenty tons of coal. Only two of these are used in the mine. The old pick still plays an important part. A shout of "all aboard," and we are speedily in our little cars, and Jehu with a flourish of his whip sets our faithful animals upon a jump till we find ourselves again upon the outside of the earth.—*Kansas City Review*.

THE NORTHERN PACIFIC RAILROAD.

In order to form even a moderately appreciative idea of what importance should be attached to the completion of this great work, it is nearly indispensable to have lived in the midst of the seclusion common to the entire region of California and Oregon, when our only means of communication with the outer world on this side of the continent and in Europe was, first, by steamer, once a month, and later still, twice a month, then by overland stage (which was itself a great advance), and then, finally, by pony express. The feverish anxiety which would send half a community tumbling out of their beds to rush to the window or the door when the newsboy's cry, "New York papers," broke the silence of the night, only showed the state of expectancy in which we lived, and the intense need we felt continuously for some line or chain which could link us with "home."

This may be called the sentimental side, but the practical business side showed itself when a merchant could well afford to pay fifty or even a hundred dollars for a single copy of a newspaper, provided he could get it an hour or half an hour before any other copy came to hand. It was not possible to live or do business in such a state of things without a constant strain and a constant danger, individually and as a community. And when therefore we heard in San Francisco the roar of bells and of cannon, which rang out for us as they did in the Eastern cities as well at the moment that Gov. Stanford's hammer completed the circuit by coming down on the last spike in that dreary desert land north of the Great Salt Lake, the spike that made the Central Pacific and the Union Pacific one continuous line for travel from the Pacific to the Atlantic network of roads, our hearts fairly bounded and venerable patriarchs acted like so many school boys. We felt that a new life had come, and it is but reasonable to say that the result, since the opening of that first line, has shown that we did not overestimate the value of the achievement.

This first road was naturally but the forerunner of others; of how many others it is not for us as yet to even guess. And inasmuch as the difference between nothing and one is, so to speak, infinitely greater than between one and two, or one and three, it might be readily inferred that the opening of the second—the Southern Pacific with its connections and dependencies—would awake but little enthusiasm; yet now that we have reached the completion of the third—the Northern Pacific—it really seems as though we were brought face to face with an event scarcely inferior in its results to the great predecessor of all, the Central and Union.

The reasons which lead us to this belief are well worth considering, and before looking to see what really has been accomplished by the company, under the management mainly of Mr. Billings and Mr. Villard, in the completion of their line or lines, from Lake Superior to the Pacific waters, we will note one or two features which distinguish this new road from the two preceding lines.

The first point to be made is that which cannot fail to strike even the least observant traveler, as he carelessly sits and glances out of the windows on his passage across the continent. It is the nature of the country through which he passes.

We will start with him from San Francisco by the Central Pacific road. All the country for about 120 miles is charming, and is productive to a degree that is delightful. By this time he has entered the foot hills of the Sierra Nevada, and is leaving behind him not only the evidences, but also the possibilities of agricultural development. The hills are becoming barren, and though the intervening valleys are tolerably fertile, they grow less and less extensive, and when he has reached, say New England Mills, fifty miles this side of Sacramento, he has passed the last land of productive value which will greet his eyes for many a long, and perhaps he will call it tedious stretch. He climbs up the long slope of the Sierra Nevada, magnificent in its scenery, but yielding small profit except in an aesthetic way. A little lumber from the sugar pines (*Pinus Lambertiana*) may be reckoned, and as he rattles down the short, eastern slope more lumber occurs, but nothing beyond what a few mills at Boca, etc., can utilize, and just below Verdi he opens into the valley which skirts the eastern base of the mountains. Alkaline sand, clothed with gray, withered looking sage brush, is what he sees down past Reno, and on through the cañon until, at the Big Bend of the Truckee, he opens on the desert, and then, in the vernacular of the country, "Good bye, John!" The stamp of "the desert's death" is all about him. For sixty miles his engine must draw the heavy load of an extra car, for there is no fresh water within that distance. And when he strikes the rapid current of the Humboldt, he has made no gain. The river is so salt and so alkaline that even marine plants cannot grow, and the river channel is like a trench with vertical walls cut through a plain destitute of every sign of life. As he follows up the stream until he reaches sweet water at last, he sees too plainly for a weary length of miles how fully it deserves the name given to it by those who formerly crossed this fearful region with teams—the "River of Death."

Along the upper Humboldt is a small amount of pasture land; there can be and is an attempt at cultivation, but it can make only a local supply, and thence onward to Salt Lake the same condition prevails.

Directly about the lake, and inclosed between the ranges of the Wahsatch Mountains, is a little good land, but its whole extent is very small, and the one thing which has forced itself on his attention by this time, and will continue

to do so more and more for the next thousand miles, is that the whole country is almost absolutely *treeless*, so much so, indeed, that a single tree in Weber Cañon is one of the most conspicuous objects, bearing a sign, "The Thousand Mile Tree," as giving its distance to Omaha.

Nearly five hundred miles further he will ride before he reaches Laramie, and in that whole distance he will not have seen five hundred acres of really good land. Even the fine valley of Green River itself, charming as it is, will show him scarcely a spot to tempt a man who wishes to "make a crop." Laramie Plain, it is true, is fertile in some of its extent, and his eye will dwell on it with pleasure, but when his train has wound its way up the slope of the Black Hills, the eastern ridge of the Rocky Mountains, and from just this side of Sherman (the highest point on the road) he looks off eastward, it is like looking out to sea; the surface is apparently as level—and as bare—and the view is bounded only by the distance limiting his vision; and to the utmost stretch he sees no land which can fairly be called anything but barren. As he wheels off from the mountains and is fairly out on "the plains," the dreary barrenness begins gradually to undergo a change, but the improvement is slow. A hundred miles has helped matters somewhat; two hundred have done better, and three hundred have brought him pretty well into the range of farming land again.

This seems like a harsh account, but it only gives the impressions which repeated transits over the road have produced. Of the 1,867 miles between Omaha and San Francisco, at least 1,500 are apparently useful chiefly in that they give a firm bed on which to build the railroad, and at the same time they "hold the world together," for there must be something to preserve the continuity of the earth's surface. But they are not fitted to support a population, and they can never yield a support to the road from local productions.

Such is the line of the Central and Union Pacific. We have gone over it more in detail because it is as yet the main road of all, and we have had knowledge now for so many years of what it could do even while burdened with the heavy load of relying to such a great extent upon its extreme western limits and its eastern connections for its business. And the fact of the mighty work which it has done but forces on us a growing conviction of the grand future which is before it, even though additional and to a certain extent parallel roads may come into competition.

It is not practicable neither is it required to follow out the Southern Pacific at this moment, with the same degree of special detail; our space would not allow it. All that has been said, however, in relation to the general nature of the country traversed by the old central line, its barrenness and unfitness for human occupation, is strictly true of the southern, only that it is "more so." The terrible wastes of New Mexico and Arizona, where the only crop is cactus and rattlesnakes, and the jomadas where even these cannot flourish, are more or less known to all by published reports.

From the point where the passenger leaves the fertile lands of Southern California and strikes off eastward, there is a distance of nearly fifteen hundred miles, in which if that sort of scenery is new to him, he may be much interested because it is all strange and reminds him of what he studied in his school days about Africa and the Bedouins, but along which he will look in vain for the lands which invite settlers to come and occupy them, and which can repay occupancy with food and wealth. It is a parched land, "wherein no water is."

The fact is quite manifest that the central route and the southern route must rely for their support mainly on their "through" traffic. The possibilities of the regions which they traverse do not allow of a "way" support. They are invaluable as binding elements for the country, and as reaching regions laterally whose mineral resources can never be properly developed except in connection with their agency, but they will never be the crystallizing threads for a swarming and active population.

Now here is just where the Northern Pacific is in wide contrast with them both. It can feed itself, and, what is more to the purpose, it can feed the hungry in distant lands, as we will presently see. Whoever has lived the wonderfully fascinating life of the frontier, and has begun as the sun drew westward to watch out for a camping place at night, is well aware that he always looked for two things—grass and water—to make a camp. Whatever other advantages he had so much the better, but grass and water he must have at any rate. And what is true of a night's camp is equally true of the requisites for permanent habitation. No land can thrive which is not well watered, and with the water comes fertility. And in these two respects the country crossed by the Northern Pacific Railroad furnishes just what is needed to make it the abiding place of a happy and prosperous agricultural population throughout almost its entire extent. It is not as yet exactly a land flowing with milk and honey, but it may soon be in a certain sense, for the milk of its herds and the sugar of its sorghum crop are sure to come.

The second feature distinguishing this from the two southern lines, its predecessors, has reference to its terminal point on the Pacific waters. We will say nothing of its eastern end, for the network of communication there links all into one, so to speak, and whether you reach Lake Superior or Lake Michigan is comparatively of small import. But on the Pacific side the case is very different. For seventeen hundred miles, from Cape St. Lucas, to the straits of Fuca, there is but a single harbor which is worth being called such, the one within the Golden Gate. As a natural and inevitable result of this, San Francisco must always enjoy immense facilities for commerce. With a haven sufficient in extent for the entire trade of the world, and so completely landlocked as to be really an inland lake, and this wonderful bay opening directly out toward the money giving markets of Asia and all the Pacific, why should she not do what she has already begun so prosperously to do, grow rich from Eastern commerce.

But though Mexico, California, and Oregon have not a harbor to offer us, and scarcely even Washington itself, yet when we have come to the extreme northwest corner between Washington Territory and Vancouver's Island, there we come upon that which, if such a thing were possible, outdoes even the Bay of San Francisco. Swinging in past Cape Flattery we open a range and labyrinth of interlocking inland navigation which seems, the more you explore it, to be almost without limit, and yet to all the inhabitants of that western coast it bears the absurd name of Puget Sound, whereas that still belongs only to a small and narrow part of it away at its extreme southern end. This wonderful, strangely magnificent sheet of water has in practical details perhaps not its equal on the face of the earth. The largest ship that ever floated can wind its way directly from the open sea for hundreds of miles through what seem like lakes, or lagoons, with water deep enough to float her up to their very banks, and yet sometimes scarcely broad enough

for her to turn about in her course. Wherever she goes she finds herself shadowed by forests of evergreens fit to supply spars for a navy or lumber for all common uses, or else the level shores stretch away in the midst of fertility not easily matched.

Right in the midst of such a region as this is the objective point of the Northern Pacific Railroad. The aim was to reach the deep water of the Pacific, and it has been achieved. Tacoma lies on the very southern edge of all this range of inland navigation of which we have been speaking. There we have the western terminus, as we have the eastern at Duluth, on Lake Superior. At the wharves of Tacoma, in Commencement Bay, huge ocean steamers can receive their freight sent from New York, Boston, Philadelphia, etc., by all rail or by lake and rail, and can discharge it at Yokohama, Macao, Calcutta, or wherever it is required, and by so doing they have saved over 1,000 miles, nearer 1,500, from the distance the same freight would have traveled in reaching Asia by way of San Francisco across the Central and Union Pacific, to say nothing of the Southern.

It would seem therefore that in "through traffic" this northern route bids fair to hold its own in the way of rivalry with the older lines. It is true that the prestige of already assured success will for a long time abide with San Francisco, and give it an exceeding great advantage. It has so long been recognized as our only port on the Pacific, such a vast amount of capital has been there concentrated, and everything has so fully gravitated toward it as a center, that this hold on commercial favor will not speedily be loosened, and of course it will never be lost. Such a port as that of San Francisco cannot fail to swarm with business as long as the world stands, but after a time its monopoly of the Asiatic trade will be broken. Our merchants are quick to perceive advantages, and if a cargo of teas can reach New York even a trifle quicker by way of Tacoma than by way of San Francisco, Puget Sound will receive the fragrant freight beyond a question.

But it is not in the way of "through" business that we need to look at the Northern Pacific to perceive the reasons why we said that its completion was a matter of so much interest and so full of importance to the country. Its claims to this distinction rest on the fact that it is not a mere bond joining the eastern and western sides of the continent in one, but that the natural resources of the belt of country through which it passes are such as to invite and encourage rapid settlement of the lands not yet occupied. The great hindrance to occupation of these lands in time past has been that they were so difficult of access, and their remoteness from markets rendered any crops raised upon them valueless. This difficulty the presence of the railroad at once obviates. The surplus corn of Western Dakota or of Montana, which the farmer but a short time ago could turn to no account, unless he used it for fuel, is now worth at his nearest railroad station only a trifle less per bushel than it is in Minneapolis, Chicago, or New York.

The result of this is already manifest in a wonderful degree by the steady growth in population which has followed, and often from mere faith has preceded, the opening of each progressive section of the railroad. As fast as access to market was thus made possible, the lands were occupied and brought under cultivation, and as the accompaniment of such occupation, towns came into existence at suitable points on the roads, and every town almost without exception has grown steadily and vigorously up to this moment. They have not been mushrooms, up to-day and gone to-morrow. They have not been built and held by gamblers and the rough element of frontier life. The school house, the church, the banking house, solidly constructed of brick, the elevator for grain, the spacious warehouse, have come into existence because the men who reared them knew that the population so rapidly filling up the surrounding country comprised the best class of farmers and artisans, and constituted communities which would be a pride and an honor to any land. They had come from every region between Massachusetts Bay and Minnesota, and little foresight was needed to know that with such men came prosperity to all about them. This is what makes the hope and the glory of Dakota and the land beyond, and the making a way for such a population is what gives to the Northern Pacific Railroad its peculiar importance. In order to do this it must have "grass and water," that is, it must have fertile lands. Let us look and see.

As we strike out west from Duluth (the proper eastern terminus, the St. Paul line being one of the branches), we travel 130 miles through a timbered region. In years to come that will all doubtless be farming land, after the forests have passed away, as has been the experience in the States further east, but for the present its lumber is its wealth. Pine and hard woods thrive in perfection and will yield great results for a very long time.

Passing onward from this lumber land we strike what may fairly be called the Farmer's Home, for it is not easy to find another like it. And it is not a very small home either. Six hundred miles we roll along, and we have not come to its western border; we only find that it is not quite so broad and so wonderful as that which we had seen perhaps the day before. Within this space we have passed out of Minnesota, crossing the teeming valley of the Red River of the North and then that of the Cheyenne, have traversed the breadth of Dakota, passing the Missouri River at Bismarck, and have entered Montana, striking the Yellowstone River at Glendine. Of Dakota farming it can scarcely be necessary to speak. From the many illustrated articles in the magazines it has become widely noted, and while the "Bonanza Farmer" who sends a small army of laborers into the field and cuts his wheat by steam over square miles of surface attracts the most attention, is pictured out most beautifully, it may be very much doubted whether the true welfare of the country does not depend more closely and fully on the scores and hundreds of those hardy and intelligent men who with their own stout arms and those of their no less sturdy sons are cultivating their "quarter sections" and producing something more than corn, for they are developing bone and sinew, brain and mental as well as moral wealth for the nation.

These farms, with the business establishments which must surely come with them, are the hope of all this broad region, and it is a hope with room for almost unbounded fulfillment. The millions of people which Mr. Villard said the other day he expected to see settled along the line of this road have their basis in the productive ability of the lands on its route.

And though we have thus noted the richness of Dakota, it has been only because "out of the fullness of the heart the mouth speaketh," and it is not easy to mention the Garden of Eden in the same terms that you would apply to a cabbage patch. But in real truth the resources on either side of the road, throughout its entire length, are so great that it will take years for those who do not already know the country