adoption of such measures would be. As soon as a sanitary measure has been approved anywhere, as soon as some hygienic discovery has been made in the workshops of medical science, it should be the duty of the State to try it, to estimate its practical value, and to make it generally known.

It is only by such means that hygiene will become a science, that this science will become the most important part of statesmanship, and that the State will become, as it ought to, a healthy State.

ACROSS CENTRAL ASIA.

AT the meeting of the Royal Geographical Society, on April 9, Mr. St. George Littledale read a paper on his recent journey across Central Asia. Mr. and Mrs. Littledale left England in January 1893, with the intention of crossing Asia from west to east, filling up some blanks in the map, and procuring specimens of the wild camel. After purchasing nearly two pony-loads of silver Yamboos, known on the Chinese coast as Sycee Silver, they travelled in carts to Kurla, where they organized a caravan of twenty ponies and forty donkeys, and followed the river Tarim to Lob Nor. They camped by the Lob Nor swamp, but found the water too salt near the edge to drink; by wading out some distance they were able to get some less brackish, which was just drinkable. Along the Altyn Tag range, as far as the Galechan Bulak, there was a certain amount of water and grazing. This was the point where the great Russian traveller, Prjevalsky, turned back; but beyond, the desert was of an appalling nature—hardly any grass was to be found, and water was very scarce; all the men suffered greatly from thirst, the animals lost flesh rapidly, and many died. Water as a rule was only found every second day. Mr. Littledale in this district shot four wild camels, one of which he has presented to the British Museum. Prjevalsky's wild horse was not seen. The guides were thorough scoundrels, and tried to wreck the expedition in every way; on one occasion they denied the existence of a spring from which they were discovered getting water secretly during the night.

Mr. Littledale was unable to see any trace of a large range of mountains marked on the maps as running north-east from the Altyn Tag. When a few days' journey from Sai-ju they met the first inhabitants, and in vain tried by bribes to get a guide to show a pass over the mountains. They afterwards discovered that their interpreter was playing false; he was scheming to get to some town where he could desert.

They passed an embankment several miles in length, which it was difficult to account for unless it was a continuation of the Great Wall of China from Suchan, two hundred miles to the east. At Sai-ju the Chinese officials were civil, but tried to prevent the travellers returning to the mountains, and their men, exhausted with their journey, were now in addition terrified at the tales they heard of the Tonguts, a Tibetan robber tribe, and refused at first to go on.

Colonel Yule questioned the accuracy of Marco Polo's statement that it was a month's journey from Lob Nor to Sai-ju; but, curiously enough, it took Mr. Littledale exactly thirty days to traverse the distance. As they travelled further east, and crossed the Humboldt range, they found the map which had been constructed from native evidence entirely wrong, and a considerable readjustment is necessary in order to secure an approach to accuracy. They passed large herds of yaks and thousands of antelopes and wild asses. Guides were a great difficulty, and the party were soon left to find their own way. At one place upwards of a hundred mounted Tonguts, carrying lances at least fourteen feet long, match-lock guns, and swords, came past their camp. Their followers predicted an immediate attack. Two Ladakis were sent to parley with them; one expounded a repeating rifle with such marked effect that when the other man proposed to explain the beauties of a revolver they begged him to put it aside, and any idea, if it ever existed, of attacking the camp died a natural death.

Mr. Littledale found his own way over the mountains by a pass, and reached the head waters of the Buhain Gol. They travelled for six days through a luxuriant grass country, and camped on the shores of Koko Nor. Thirteen days more found them at Lanchan, where they disbanded their caravan; their interpreter, who was an arrant coward, absolutely refusing to go to Pekin. Here some China inland missionaries kindly helped them to arrange a raft, on which they drifted down the Hoang-ho, a journey of exceptional interest through country which is largely un-mapped. Soon after leaving Lanchan the river dashes through a narrow gorge, and the raft had several narrow escapes of being broken up; it was knocked out of shape, and some of the logs smashed. The boatmen had each an inflated sheepskin to act as a life-buoy in case of accident, but none were provided for the passengers. Lower down the river became broader and shallower, and they changed their raft for a flat-bottomed scow, and reached Bonto in twenty-five days. From Bonto to the Great Wall they passed through a country abounding in ruined towns and villages, the result of the disastrous Mahommedan rebellion in 1861. On September 27 they passed through the Great Wall, and reached Pekin three days later.

ELECTRIC TRACTION.

IN the present state of electrical science and practice, electric traction must be considered as a branch of the electrical transmission of energy. We require, first of all, a natural source of energy, such as coal or other fuel, or water at a high elevation or in motion. In the next place, we require a prime mover to transform energy into work, such as a steam or gas engine, a turbine, or water- or tide-wheel. Then this work has to be transformed into electric current, by means of a dynamo or magneto-electric machine, the so-called primary machine. The electric current has then to be transmitted from the place where it is produced to the place where it has to be used, by means of a conductor or a storage battery. The current has next to be retransformed into work, by means of a motor carried by or attached to the vehicle which has to be moved. This work has then to be mechanically transmitted from the motor to the axle of the wheel of the car which travels along the line.

In each of these transformations and transmissions a loss takes place, reducing the original unit of energy to a less and less fraction of itself. In the case of water, with a turbine as the prime mover, we obtain 60 per cent. of the energy as work or motive power, or an efficiency of ·6. With a steam-engine, owing to the coal having to break up water into steam, a proportion only of the heat or expansive energy of which can be applied as pressure to drive the piston, because of the impossibility of obtaining, at least at present, a perfect vacuum, or, stated otherwise, of getting the lower limit of temperature anywhere near the absolute zero; and again, owing to the loss occasioned by transforming the motion of translation of the piston into rotatory motion, we have a much smaller efficiency than in the case of a water-wheel. About one eighth only of the energy of the coal is transformed in a steam engine into work to drive the axle, or we have an efficiency of only 125.

The efficiency of electrical machines is very high, as high as ·9 with primary machines or dynamos, and ·75 with secondary machines or motors. The conductor, or its substitute a storage battery, offers a resistance to the passage of the current, and when the latter is used its weight is so much extra weight to be carried by the car.

All these considerations seem to lead to the conclusion that before electric traction can be employed on a very large scale, we must possess a means of producing the electricity on the spot and at the time it has to be used, or, in other words, we must possess a battery in which the energy of coal can be transformed directly into electric current, so that we may do without storage batteries in which to carry electric energy about, or heavy copper conductors through which to convey it at moderately low tension from the spot where it is produced to where it is used, or light aërial conductors through which to convey it at high tension.

How long we shall be without this, or how many minds are engaged in the solution of this or some such problem, we know not, but the moment it is solved, and solved doubtless it will be, there will be such a transformation scene in the industrial applications of electricity as one can hardly conceive. It would mean that for almost every purpose except those in which heating is required, electricity would or could be used. An electric light-producing battery in every house, quite independently of any mains in the streets; an electric power-producing battery, to carry us whither we would on rails or on the street; and in every house, to put an end to all the evils attendant on crowded factories and workshops in crowded streets and towns; such