

have learned very much from what the various speakers in the course of the discussion itself have said. But it is important for us, before arriving at a final conclusion, to know what the most thoughtful and the most competent opinion at both universities really demands, and we also must either inform ourselves or be informed exactly what the universities cannot do of their own motion and for what purposes legislation would be required on the recommendation of a Commission, and we should also desire to be informed as to whether there does exist at the universities anything like a deadweight of obstruction against reforms which is of the character which could only be removed by statute. Consequently, therefore, we desire time to consider this matter in the light of the best information which we can receive, and we look with confidence for help and suggestions as to the best methods of proceeding from those of both universities who are most competent to give it. In the meantime, I am quite confident that this discussion will of itself have done good and have been useful. This is one of the subjects on which, in Carlyle's famous phrase, "if we differ we differ only in opinion." It is merely a question of honest differences of opinion as to what the best way to proceed is in order to do what we all wish to be done; and certainly it does seem to me that the best minds of those who are either at the universities or who are interested in the universities cannot possibly be applied to a higher object than that of putting these ancient homes of learning, which many of us so deeply venerate, with all their splendid traditions, to the fullest possible use, and, where necessary, of bringing them into closer conformity with the needs of the country and with what, in the opinion of those best qualified to judge, is the truest conception of learning as it should exist to-day.

#### ARCHÆOLOGICAL EXPLORATIONS IN CHINESE TURKESTAN.

FURTHER news of Dr. M. A. Stein's archæological explorations in Chinese Turkestan has now been received. After leaving Keriya at the beginning of the winter, he proceeded eastwards 1200 miles along the borders of the Taklamakan desert to the Lop-nor region, where he intended to excavate. On the way he made further investigations at the Rawak Stupa, in the Hanguya Tati, and at the Domoko desert site, where he found remains of the Dandan-Uiliq period, the eighth century A.D. At the desert-site north of Niya, where in 1901 he had discovered the remains of a settlement buried in the third century A.D., renewed excavations brought to light more interesting and important antiquities of the same kind as those discovered in 1901, especially noticeable being the wooden tablets inscribed in Kharoshthi. Among the clay seals of these tablets, impressions from Græco-Roman intagli are the commonest.

Dr. Stein passed the scene of his former work at Endere on his way eastwards, and also made further investigations there. Evidence was now found that this site also was originally occupied in the time of the Indian "Kharoshthi" - using kingdom, and had been abandoned and re-occupied by the Chinese in the seventh century, only to be abandoned again after the Tibetan conquest a century later. During the period of their first abandonment, the Endere settlements were seen as ruins by the great Chinese pilgrim Hiuen-Tsang.

Similarly, the oasis of Cherchen, which Dr. Stein reached after leaving Endere, has undergone various vicissitudes of settlement and desolation, having come into being again only a few years ago, when, after the re-conquest of Turkestan, the Chinese made it a penal station for refractory Turkis and Tibetans. Since Marco Polo's day it had been abandoned, but then it was a flourishing province, which had grown up since the time of Hiuen-Tsang, who had seen but the desolate and uninhabited ruins of what had once been a town, where in 519 A.D. a previous Chinese pilgrim had found a hundred families living. The Taklamakan desert now encroaches, now recedes; now there is plenty of water, now little, and so the southern oases wax and wane and wax and wane again.

Dr. Stein's objective being the Lop-nor region, he passed on beyond Cherchen to Charkhalik, in the Tarim basin, finding various Mohammedan remains on the way. From Charkhalik he marched to Abdal, and thence more than a hundred miles northward into the salt desert, to an ancient site discovered by Dr. Sven Hedin in 1900. As it is only in winter that explorations in these deserts can be conveniently carried on, the rigours of the Central Asian winter had to be faced by Dr. Stein now as in the Taklamakan six years before, and 48° F. of frost, coupled with an icy boreal wind, were the usual weather.

On December 17 Dr. Stein reached the site, and pitched his camp at the base of the ruined stupa of the ancient town. This turned out to be very like Niya, and is of the same date (third century A.D.). Not only were masses of Chinese correspondence of that period found, but also, what was really unexpected, large numbers of Kharoshthi documents, which show that the Indian kingdom of Khotan included, not merely Cherchen, but the distant Lop-nor district in its dominion. The whole, then, of the Tarim basin must have been ruled by the Indian maharajas of Khotan in the third century A.D. This is a new contribution to history.

This eastern extension of the Buddhist kingdom of Khotan, which took its origin from that of Gandhara, explains more and more the close original connection between the hellenised art of India and that of China, and shows how the sculpture and painting styles of Gandhara passed, with their Greek character, which they derived from the influence of the Seleucid kingdom, easily by way of Turkestan to northern Tibet and so to China and Japan.

The Lop-nor settlement was occupied by the Chinese in order to control the road from Turkestan to Kansu; Sha-chau, the nearest Chinese town, lies 300 miles east of the Lop-nor district.

Among the most important and interesting of Dr. Stein's discoveries have been those made at Miran, an ancient site in the Charkhalik district, which throw light on the connection between Græco-Indian and Chinese art. In the débris mounds of a fort and stupa-shrines he has found this time frescoes in which the influence of classical art is reflected with surprising directness.

"The main paintings, which illustrate scenes of Buddhist legend or worship, are remarkable for clever adaptation of classical forms to Indian subjects and ideas. But even more curious are the figures represented in the elaborate fresco dados. They are so thoroughly Western in conception and treatment that one would expect them rather on the walls of some Roman villa than in Buddhist sanctuaries on the very confines of China. One cycle of youthful figures, in a gracefully-designed decorative setting, represents the varied joys of life—a strange contrast to the desolation which now reigns in the desert around the ruins and, in fact, through almost the whole of this region. Kharoshthi inscriptions, painted by the side of the frescoes, and pieces of silk bearing legends in the same script, indicate the third century A.D. as the approximate period when these shrines were deserted."

From this account the importance of Dr. Stein's further archæological discoveries is evident, and both he and his German imitators in the Turfan district, 200 miles north of the Lop-nor, have added by their work a new chapter to history. We cannot doubt that Dr. Stein has added more to our knowledge by his fortunate expeditions to Turkestan than had he, as he tells us his dearest wish was to do, devoted himself to the exploration of Iranian antiquities in northern Persia. We knew much about Persia, nothing about the ancient Indian kingdom in Chinese Turkestan which Dr. Stein has discovered.

Dr. Stein's minor object, the control of a trigonometrical survey of the northern slopes of the Kuen-lun for the Indian Government, has also been carried out with success by Surveyor Rai Ram Singh. The net of the Indian trigonometrical system has been extended from the headwaters of the Keriya River along the mountain slopes above Surghak and along the chain which Continental geographers call the "Russian," with its peak dubbed "Tsar Liberator," right through to the mountains between Cherchen and Charkhalik. This is a great achievement.



Why, by the way, our Continental friends call this range "the Russian chain" is not quite apparent. Russia is still a long way off, and Japan has rendered it improbable that Russian earth-hunger will ever be able to extend the dominion of the White Tsar, as was once hoped by his subjects, to the borders of Tibet. The "Yellow Tsar," the "Bogdo-khan" in Peking, still rules the lands which his ancestors held two thousand years before St. Petersburg was built, and that his subjects are worthy to administer this dominion is evident from what Dr. Stein tells us of the civilised rule of the Chinese, and of the constant friendliness of the Imperial authorities to his mission and their keen interest in his archæological discoveries. The thanks of Western science are due to the Chinese for their ever-ready help to Dr. Stein, without which his discoveries would have been impossible to achieve.

NEW HIGH VACUUM PUMP.

NO laboratory, either chemical or physical, can be carried on to-day without a vacuum pump of some form or other, and in many laboratories it is essential that the pump shall be capable of producing the very

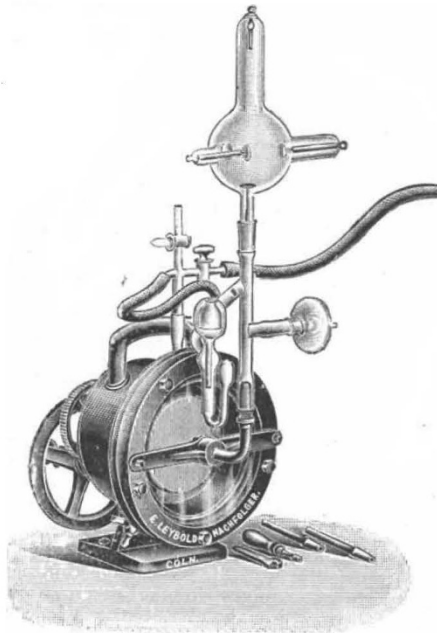


FIG. 1.

highest degree of evacuation. Not only is it necessary to be able to produce a high vacuum, but it is also eminently desirable that it should be possible to produce the state of evacuation as rapidly as possible.

The new high vacuum pump of Dr. Graede, manufactured by E. Leybold's Nachfolger, Cologne, would appear to meet these desiderata. It is claimed that with this pump the highest vacua yet obtainable are secured in a minimum of time. The pump is also simple and compact, and may either be mechanically or hand driven.

The pump which is illustrated in Fig. 1 consists of an iron vessel, half filled with mercury, in which a porcelain drum divided into three chambers rotates. When the drum is rotated the chambers into which it is subdivided are filled alternately with air and mercury. In the first place the chambers suck the air from the receiver, and during further rotation the air is expelled and its place taken by mercury. Fig. 2 shows a section of the pump, one-fourth the actual size. G is the cast-iron casing, which is glazed inside and is cast on to a strong base. The front of the pump consists of a thick plate of glass cemented into the frame P. It is then screwed tightly on to the frame against rubber rings, in order to make an air-tight joint.

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Three holes are bored into the glass plate, by means of which the two tubes R and R' and the tap at the bottom are attached. The tube R is connected by means of the glass apparatus, Fig. 3, with the receiver, and R' with a second pump which serves for preliminary exhaustion. The tap is for introducing mercury into the pump and also for emptying it. The auxiliary pump may be a water injector or any other suitable form of pump which is

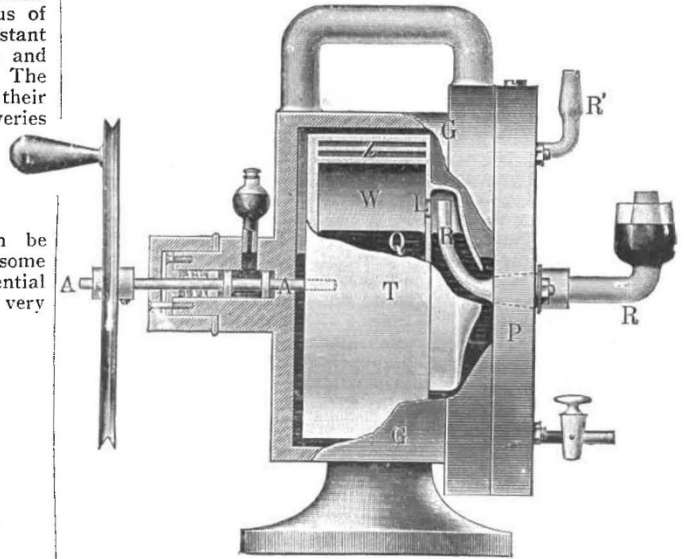


FIG. 2.

capable of giving a vacuum of from 15 to 20 mm. T is the porcelain drum which is attached to the axle A, passing through the casing by means of an air-tight joint, to which is attached the driving wheel.

In using the pump, exhaustion up to 15 to 20 mm.

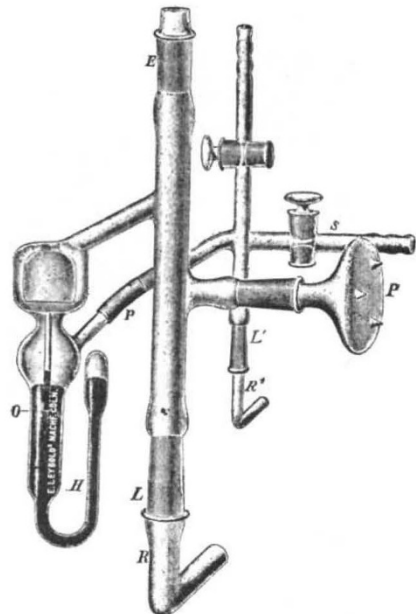


FIG. 3.

is first produced by means of the auxiliary pump; the drum is then slowly rotated in a direction contrary to the hands of a clock. The space W thus increases in size and air is sucked through the opening L. As rotation is continued the opening L passes below the level of the