

the ordinary measuring machine, it was found that the results were in good agreement, and that the actual operations occupied the same amount of time, thus saving, with the former, the time taken by the computations from the polar coordinates in the latter.

SEARCH-EPHEMERIDES FOR COMET 1894 IV. (E. SWIFT).—Owing to the possibility of its identity with the lost comet of De Vico, Swift's comet of 1894 is of particular interest.

During its return of February, 1901, it was very unfavourably placed for re-discovery, and was not seen, but in the hope that it may be re-discovered during its present return, Prof. Seares publishes two search-ephemerides in Bulletin No. 12 of the Lays Observatory, University of Missouri. The former is based on elements indicating July 9 as the time of perihelion passage, whereas the second takes July 25; both show that the comet will attain its maximum brightness, as seen from the earth, about the beginning of October. It is of interest to note that the present position of this comet is near to that of comet 1907*d* (Daniel), although there is no possibility of the identity of the two objects.

According to the ephemerides, the position of Swift's comet on August 1.5 (Berlin M.T.) will be (1) 2h. 25.7m., +12° 31', or (2) 1h. 51.7m., +8° 31'.

A QUICKLY CHANGING VARIABLE STAR.—A star having the position $\alpha = 9^{\text{h}}. 45^{\text{m}}. 39.8^{\text{s}}$, $\delta = +12^{\circ} 20' 3''$ (1900.0), and situated +12.18. in R.A. and 1'.9 in dec. from B.D. +12 20.5, has been found by Mr. Metcalf, of Taunton (Mass.), to change its magnitude from 13.5 to 11.5 in four days. The range of variability is confirmed by the Harvard plates of this region, but the exact period has not yet been ascertained. The designation of this object is 66.1907 Leonis. (*Astronomische Nachrichten*, No. 4191, p. 260; July 23).

THE VARIATION OF THE POLE.—The provisory results obtained by the International Latitude Service during the year 1906-1907.0 are published by Prof. Th. Albrecht in No. 178 of the *Astronomische Nachrichten* (p. 177, June 29). The diagram giving the projected path of the pole from 1899.9 to 1907.0 shows that during the year 1906 a further diminution of the amplitude of the variation from the mean pole took place.

UNIVERSITY REFORM.

THE discussion in the House of Lords on July 24 concerning the present state of the Universities of Oxford and Cambridge serves again to bring prominently before the public the importance of well-equipped universities to the Nation. The Bishop of Birmingham asked the Government to appoint a Royal Commission "to inquire into the endowment, government, administration, and teaching of the Universities of Oxford and Cambridge and their constituent colleges, in order to secure the best use of their resources for all classes of the community." The Earl of Crewe announced at the end of the discussion that the Government requires time to consider the question, and that for the present a Commission will not be appointed. The Bishop of Birmingham unerringly exposed many of the weak points in the older universities as they are administered to-day. "The system of prize fellowships as it was established by the last Commission is," he remarked, "a mistake—post-graduate endowments should be used to subsidise either those who are to be teachers or those who are engaged in researches such as are worthy of advanced students." There were, of course, many champions to defend the present condition of things, but both sides expressed themselves as appreciative of the value to the community of higher learning in all departments of knowledge.

It was not sufficiently realised, however, that the existence of generously staffed and handsomely housed universities is ultimately a question of funds. In directing attention in these columns to the recent appeals made by both Oxford and Cambridge for funds, it was pointed out that, until as a nation we are prepared to make sacrifices

comparable with those undertaken in Germany, the United States, and other countries, our older universities will continue to be a "playground for the sons of the wealthier classes" in order to secure money which is elsewhere provided by the State. There are many inquiries awaiting a Commission when it is appointed, and among them may well be a comparison of the amounts provided by the State for university work in the great countries of the world. The subjoined summary of the *Times* report of the debate in the House of Lords contains the substance of the Bishop of Birmingham's plea for a Royal Commission, the Bishop of Bristol's remarks relating to it, and the reply made by the Earl of Crewe on behalf of the Government.

The Bishop of Birmingham said, in the course of his remarks, that undoubtedly within the last thirty years immense changes had taken place in the higher education of the country—changes so immense that, unless the University was to fall out of the relation which it ought to hold to the whole education of the country, it was inevitable that reforms should be required. To an even greater extent, a fundamental change in the balance of power in the classes which formed the English nation had taken place. It had always been the honour and the pride of the old universities that they trained the governing classes of the country. The term "governing classes of the country" had, however, received a very wide extension. For example, it included now the working classes. There was a very real desire for the diffusion of higher education, and it was hardly possible to exaggerate the need for permeating those classes which were playing, and were destined to play, so increasingly an important part in the government of the country with the best education which we had to offer. Could not the university be brought into more immediate, direct, and effective relations to all those who really desired to be students and to profit by the best education the country could afford?

There could be no reasonable doubt that at present our ancient universities were allowed to become to an extent altogether beyond what ought to be tolerated a playground for the sons of the wealthier classes. As at present constituted, the universities were to a very large extent not in any serious sense places of study at all. There were a vast number of young men who never in any kind of way attained to the position of students—they never acquired the instinct or the power of getting knowledge out of books. The universities should have far more stringent and effective machinery for getting rid of those who had neither the ability nor the intention of becoming students. If those who had no real intention of becoming students were got rid of, the teachers would have more time for study and for the teaching which more properly belonged to a university; and a great deal more teaching power would be liberated for the system of university extension in the real sense—namely, for the purpose of teaching, not popular audiences, but trained and sifted students in different parts of the country, so that the influence of the university might be extended to those who were hungering and thirsting for that sort of knowledge and training which a university was able to supply.

He supposed it would not be denied that a very large part of the endowments of scholars and exhibitioners at the present time went to those who could in any case be at Oxford or Cambridge. It had been calculated recently that two in five of the scholars of the colleges did not, in fact, need the endowment in order to enable them to go there. He did not think it could be denied that the unlimited belief in open competitive examinations which characterised the last Commission had had effects which the reformers of those days never contemplated. Open competition had not really proved to be competition open to all classes; it had given an immense advantage to those whose parents were in a position to supply them with education of the more expensive kind. As a matter of fact, he expected it would be found that the universities did less now than they did generations ago to provide the crown of the educational ladder of the country. If the universities could get rid of the great body of those who had not the slightest intention of using the university as a place of study, there would be room for the employment of the

endowments to do what they would all admit was the highest function of a university—namely, to provide a centre for the educational aspirations and desire for knowledge of the whole country. What they wanted was that the universities should be so re-organised and that their endowments should be so used as that, whatever there was of real intellectual aspiration and real desire for knowledge, should find its home and instruction in Oxford and Cambridge; and that, and nothing else, should be the real object which the universities manifestly existed to serve. As to the use of post-graduate endowments, there seemed to be wide agreement that the system of prize fellowships as it was established by the last Commission was a mistake—that post-graduate endowments should be used to subsidise either those who were to be teachers or those who were engaged in researches such as were worthy of advanced students. In order to redress the balance between the wealth of the colleges and the poverty of the university the principle had been established that the colleges should contribute to the needs of the university. But there was a widespread idea that certain colleges had in recent years grown very wealthy, and that the subsidies from the colleges to the university were in a number of cases very inadequate. If another Commission were appointed, it would be part of the duty of that Commission to inquire into the uses made of the college endowments, as well as the university endowments, and, perhaps, carry further the principle established by the last Commission of contribution from the colleges to the university.

The Bishop of Bristol spoke against the proposal, so far as Cambridge was concerned. He endeavoured to show that Cambridge had adapted itself to modern conditions, and he hoped that, as regarded Cambridge, the Government would not trouble the Commissioners with an inquiry. Last year the endowment of the University of Cambridge from its own property, which it could spend as it would, was half as much again as when he left the University, and it had now reached the large sum of 1965*l.* 6*s.* 4*d.* The quarterly payments from members were 14,500*l.*, fees for degrees 28,000*l.*, and oddments 1000*l.*, which, with 30,300*l.* received from the colleges, made a total receipt of 75,000*l.* or 76,000*l.* There were besides trust funds for various professorships, scholarships, studentships, and prizes. The estates of the colleges provided 220,000*l.*, while fees, rent of rooms, &c., amounted to 90,000*l.* The estate management of that 220,000*l.* cost only 7 per cent., but the management, rates, taxes, improvements, and cost of the national monuments came to 130,000*l.* This left a net amount for all purposes of 180,000*l.* Of this, scholarships absorbed 32,000*l.* It was difficult to imagine that Cambridge could have adapted itself more completely to modern conditions. But if a Commission were issued, it would be received, not only respectfully, but willingly; for a Commission could cut some knots which the University could not, or would not, cut for itself. One of these was the question of Greek. Science students ought to be allowed to pass their examinations without a knowledge of Greek. He suggested a small statutory Commission which would be able to make statutes having the force of law. It should be composed of experts who were not faddists and who had full sympathy for the new as well as full respect for the old. The Government might, perhaps, issue two Commissions, one for Oxford and one for Cambridge. Let them give the Bishop of Birmingham all he asked for; but not one-tenth part was necessary for Cambridge. The Government might well, in grateful recognition of the wonderful manner in which Cambridge had adapted itself, in spite of restricted means, to modern conditions, declare that they would secure to the University an additional 75,000*l.* a year.

In replying on behalf of the Government, the Earl of Crewe said:—There is no doubt that for some time what may be called university reform has been in the air. That is due to a variety of causes. The fields of study have been widely expanded in the manner so fully described by the Bishop of Bristol. Then there has been the upspringing of the new provincial universities with all their consequences; and there has within the last few years been impressed upon the public mind the whole question of

university extension and the methods by which the endowments of the universities can in some way be applied for the benefit of those poorer citizens of this country for whom, as has been so truly said, they were originally intended.

The appointment of a Commission is urged upon various grounds. We are told that it is important to deal with the problems of the government and constitution of the universities, and to deal with the problems of study, both as regards the nature of the different studies carried on and what I may call the financial side of the question—such matters as scholarships and prize fellowships. Then, again, it is urged that the relations between each university and its colleges, and between college and college—with special relation, of course, to endowments—demand a close inquiry. We are reminded, too, that it is almost thirty years since the last Commission sat, and that even if the universities desired to reform themselves from within, yet it would not be possible for them to do so without the intervention of a Royal Commission. And it is further pointed out that the very work of the last Commission has in some cases proved to be of an actually hampering nature, and that the errors into which as human beings the commissioners in some cases naturally fell could only be set right by legislation founded on the report of a further Commission. Those are the reasons for which we are told that a Commission ought to be appointed. On the other hand, certain objections have been made, both in the course of the debate and outside. Lord Burghclere specially alluded to the requests which have been made by the Chancellors of both universities publicly for those who have been educated at each respectively to come to their aid. They no doubt bear in mind the fact that if such a movement is to succeed it must be to some extent of a national character, because the old universities cannot make those appeals to local patriotism which have been responded to so freely in the case of the newer universities. I have no doubt, also, that they compare the state of things somewhat sadly with what obtains in the United States, where it is estimated that during the last thirty years 48 millions sterling have been privately subscribed for the benefit of the universities of America. And my noble friend argued that, if we were now to accede to the request for the appointment of a Royal Commission, the flow of money which has come in to some extent, and which, it is hoped, will come in to a greater extent, would be, if not stopped altogether, seriously checked. Then, further, it is urged against the appointment of a Royal Commission that, although it is true that there are certain things in the direction of allowing greater flexibility to colleges and universities which the new Commission might do by undoing what has been done by the last one, still you cannot have any guarantee that the Royal Commission would undertake that duty, and that it might not imitate its predecessor in making very distinct and positive suggestions which would have to be carried out, and some of which might prove, as former ones have proved, to be erroneous and unfortunate. And, again, we have been told that really more time is wanted to watch the effect upon our national life and our education generally of the foundation of the new universities. It is urged that it is only after some experience of their work that we can decide what place Oxford and Cambridge really ought to take in our national life. Everyone will, I think, agree that we do not wish these universities to plunge into a competition of science and technology with such universities as those of Leeds and Birmingham, and consequently we are asked to wait in order to see what the next few years at any rate may bring.

Those are the various opposing views which are set before His Majesty's Government. I may remind the House that the Government, as such, has only had the opportunity of considering this matter at all for about ten days, and we certainly do feel that the appointment of a Royal Commission, like other important events in life, is one which is not to be undertaken lightly or inadvisedly. We have, as a matter of fact, only what I may call casual evidence of the feeling which actually exists either at Oxford or Cambridge, such intimations as people have been kind enough to send before this debate began, and we

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.