a useful general account of Manchuria and its history. Mr. James calls it the Manitoba of Asia. What with the depletion of the country for military service and the influx of immigrants from China, there is little of the old Manchu population left. Nearly all special Manchu customs have disappeared, and the language itself is now only spoken in a few remote valleys. Mr. James's party started from Newchang and went north to Mukden. Thence they went due east up the beautiful and well-wooded valley of the Hun. This is a particularly rich region, and is being rapidly colonized. The first day Mr. James began to collect he found no less than five kinds of lilies of the valley, and it was common to see whole hill-sides covered with masses of that flower. On account of the flooded state of the rivers, it took them a month to reach Mau-erh-shan, the furthest Chinese outpost on the Yalu, at the south foot of the Lao-ling Mountains. Thence they struck northwards across the mountains to the junction of the Sungari and Tang-ho, four days march. Here they looked in vain for the snowy peaks of 10,000 to 12,000 feet high, reported by previous writers on Manchuria; they were assured no such peaks existed in all the region. An official guided them back south-east to the Pei-shan Mountains, a sort of knot in which the Yalu, the Tumen, and the Sungari take their rise. For a long distance the route was over a succession of ranges covered with dense forests, with only at long intervals a hut of a ginseng cultivator, sometimes in the crater of an old volcano. Bogs also were frequent, and gave much trouble. It was the ninth day before they actually began to ascend the mountain itself. The lower slopes are covered with birch and pine, leading to a delightful grassy plateau dotted with trees, and rich open meadows bright with flowers of every imaginable colour. As they approached the needle-like peaks of Old White Mountain, the noise of underground streams was frequently heard. The steep sides of the two-peaked upper ridge shines white with disintegrated pumice-stone. On reaching the saddle and looking over the edge, the party found themselves looking down into a crater, at the bottom of which, about 350 feet below, was a beautiful lake, of the deepest and most pellucid blue. The lake was about 6 miles in circumference. The height of the mountain is not more than 8000 feet. The party then proceeded north to Kirin and Tsitsikar, through forests and swamps, and, lastly, across Mongolian steppes. Then, proceeding eastwards and southwards, the country to the east of the previous route was explored, Mr. James learning much by the way of the country and the people. Altogether the journey has been a fruitful one, and shows how much can be done for science by our Indian officials when they have the inclination and are properly trained.

WE have already referred to the remarkable journey of Mr. Carey in Central Asia. Information has now been received from him showing how the second year of his journey was passed. In May 1886 he started from Châklik, with the object of exploring some of the northern regions of Tibet. He passed south, across the Altyn and Chinan Mountains, and reached the foot of a high chain, which is probably the true Kuen-lun. Here he had to travel a considerable distance eastwards, through barren and difficult country, until an opening was found leading to the valley of the Ma-chu, the head source of the Yang-tse-kiang. After falling down the river some distance, Mr. Carey had to turn northwards again, and recross the Kuen-lun. He now found himself in the Tsaidam region, and made an interesting round journey from a place called Golmo and back to the same point, during which he saw a good deal of the nomadic Kalmucks and Mongols who inhabit the comparatively low valleys of Tsaidam. In the autumn, Mr. Carey made a second journey across the Kuen-lun, and then, again turning northward, struck straight across the Tsaidam country and the Gobi, to Sáchan and Hami, whence he travelled to Urumtsi in the Tian-shan. Thence the party left for Yarkand, whence a start was made on March 7 for Ladak. A great part of the ground traversed by Mr. Carey is new, and he and his assistant, Mr. Dalgleish, are the only Englishmen who have ever travelled through the entire length of Chinese or Eastern Turkestan.

M. CONSTANTIN NOSILOFF writes to the Royal Geographical Society of his intention to undertake this year a summer expedition to Nova Zembla. His object will be (1) to prepare a detailed map of the coasts and interior of the island; (2) to study the hydrography of the coast, and make observations regarding the movements of the ice in the Kara Sea, and in the straits leading to it; (3) to make meteorological observations, and to collect zoological and botanical specimens; (4) to study the ethnography of the Samoïedes.

THE ANNUAL VISITATION OF THE ROYAL OBSERVATORY.

THE Report of the Astronomer-Royal to the Board of Visitors, read at the annual visitation of the Royal Observatory on Saturday last, refers to the period of twelve months from 1886 May 21, to 1887 May 20, and exhibits the state of the Observatory on the last-named day.

The following are among the points of most general interest:—

I. Buildings and Grounds.

Above the extended portion of the upper computing-room, a dome 18 feet in diameter is to be erected, in which it is proposed to mount a Cooke 6-inch equatorial, a photo heliograph tube being attached to the same mounting. The combined instrument will command a complete view of the sun throughout the day—an important consideration, as the work of the present photoheliograph is seriously interfered with by trees and the Lassell dome. The new instrument will be available for occultations, phenomena of Jupiter's satellites, and other occasional observations.

II. Astronomical Observations.

Transit-Circle.—The regular subjects of observation with the transit-circle are the sun, moon, planets, and fundamental stars, with other stars from a working Catalogue. On the conclusion of the observations for the Ten-Year Catalogue at the end of 1886, a new list of some 3000 stars was prepared, to include all the stars in Groombridge's Catalogue and in the Harvard Photometry, which had not been observed at Greenwich since 1867. The Annual Catalogue of stars observed in 1886 contains about 1665 stars.

The observations for the Ten-Year Catalogue, epoch 1880, were concluded at the end of 1886, special efforts being made in the latter part of the year to make the Catalogue as far as possible complete to the sixth magnitude inclusive. It is estimated that the Catalogue will contain about 4000 stars, all of which, with very few accidental exceptions, have been observed at least three times in R.A. and N.P.D., the total number of observations being about 40,000 in each element.

The following statement shows the number of observations made with the transit-circle in the twelve months ending 1887 May 20:—

Transits, the separate limbs being counted as separate observations	6366
Determinations of collimation error	304
Determinations of level error	410
Circle-observations	5983
Determinations of nadir point (included in the number of circle-observations	385
Reflexion-observations of stars (similarly included)	602

About 400 transits (included in the above number) have been observed with the reversion-prism, to determine personality depending on the direction of motion.

The value found for the colatitude from the observations of 1886 is 38° 31′ 22″·03, differing by 0″·13 from the assumed value; the correction to the tabular obliquity of the ecliptic is +0″·65, and the discordance between the results from the summer and winter solstices is −0″·25, indicating that the mean of the observed distances from the Pole to the ecliptic is too great by +0″·12.

The mean error of the moon's tabular place (computed from Hansen's lunar tables, with Prof. Newcomb's corrections) is +0·029s. in R.A. and +0″·34 in longitude as deduced from ninety-seven meridian-observations in 1886. The mean error in tabular N.P.D. is −0″·66, which would appear to agree with the observations of the sun in indicating that the mean of the observed N.P.D.'s is too great.

As regards the computations for the Ten-Year Catalogue, a large amount of preparatory work has been done in the application of corrections to the observations as printed to reduce them to a homogeneous system, and some progress has been made in the formation of the Catalogue results. The proper motions actually used have been thoroughly revised for every observation in the period 1877-86, and corrections applied where, as occasionally happened, different proper motions had been used in the same year. A comparison has been made of the R.A.'s of clock-stars as observed in the last ten years and as computed from the Nine-Year Catalogue, epoch 1872, with Auwers' recently published proper motions, the result of which is to show that the Greenwich observations are better represented by these than by the proper motions in use hitherto, and it has therefore been

decided to adopt Auwers' proper motions throughout. Preparations have accordingly been made for reducing the observations in the Ten-Year Catalogue to the epoch 1880, with Auwers' proper motions wherever available.

It has appeared doubtful whether the reading of the exterior thermometer placed near the north wall of the transit-circle room represents the true temperature of the external air as affecting the refraction for the sun and other southern objects in the daytime. A discussion of simultaneous readings of the exterior, front court, and meteorological standard thermometers, which is being made by Mr. Thackeray, shows systematic differences between the first and last at the time of observation of the sun, the mean monthly excess of the meteorological standard over the exterior thermometer for the ten years 1877–86 ranging from +0°·7 in December to +2°·1 in May and August and +2°·6 in September. The reading of the front court thermometer (which is at a distance from any building) appears to agree closely with that of the meteorological standard, and it has been adopted, from the beginning of this year, in computing refractions for the sun, moon, planets, and stars south of the zenith observed in the daytime, the exterior thermometer being still used for northern stars as probably representing better the temperature of the air on the north side of the transit-circle. The systematic differences in thermometer readings have a sensible effect on the position of the ecliptic as deduced from observations of the sun, the discordance in the results between the summer and winter solstices found when the reading of the exterior thermometer are used being rendered insensible when corrections are applied to reduce to the reading of the meteorological standard thermometer.

Altazimuth.—The total number of observations of various kinds made in the twelve months ending 1887 May 20 is as follows, the observations of the moon having been as usual restricted to the first and last quarters in each lunation :—

Azimuths of the moon and stars	356
Azimuths of the azimuth mark	208
Azimuths of the collimating mark	242
Zenith distances of the moon	181
Zenith distances of the collimating mark ...	240

The altazimuth observations are completely reduced to March 31, so as to exhibit errors of moon's tabular R.A., N.P.D., longitude, and ecliptic N.P.D., and the manuscript for the printer has been prepared to the same date.

Equatorials.—Various additions have been made to the Lassell equatorial with a view to making it available for astronomical photography and for general use. A delicate slow motion in R.A. (with differential wheels) and a firm N.P.D. clamping arm with fine motion in N.P.D. have been applied, the steadiness and general usefulness of the telescope being greatly increased by these additions. The Corbett 6½-inch refractor has been mounted below the tube of the reflector and parallel to it to serve as a directing telescope in taking photographs and also for observation of occasional phenomena. A camera to take circular plates 8¼ inches in diameter (giving a field 1° 58′ in diameter) has been mounted at the principal focus of the Lassell mirror, and some trial photographs of the moon, Procyon, Regulus, γ Leonis, and Præsepe, have been taken.

The construction of the new 28-inch refractor has been delayed by difficulty in obtaining the disks of glass. Messrs. Chance are engaged in removing a bunch of fine veins from the flint glass disk, and have every hope of being able very shortly to report the disk practically perfect ; and M. Feil's successor has successfully moulded a crown disk from which he believes that he has removed all defects.

The south-east and Sheepshanks equatorials are in good order. Some trouble has been experienced with the water-supply for the driving clock of the former instrument, and an alteration in the arrangements for maintaining the pressure has been made at the Kent Waterworks, since which the working has been found quite satisfactory.

The Cooke 6-inch equatorial is being mounted in the south ground for trial as to the practicability of using curved plates for stellar photography and other questions which have been raised at the Paris Conference on Astronomical Photography.

III. Spectroscopic and Photographic Observations.

For determination of the motions of stars in the line of sight, 206 measures have been made of the displacement of the F line in the spectra of 26 stars, and 20 measures of the *b* lines in 8 stars, besides comparisons with lines in the spectrum of the moon made in the course of the night's observations of star motions, or of the sky on the following morning, as a check on the general accuracy of the results. The observations of Sirius since the date of the last Report indicate that the apparent displacement of the F line (which was originally towards the red and subsequently towards the blue) is now insensible. The displacement of the F line in the spectrum of Algol has been measured as frequently as possible during the winter months, in order to ascertain if any evidence could be obtained of rapid orbital motion such as would result from the hypothesis of the variability of Algol being caused by the transits of a large satellite. A sufficient number of observations has not yet been obtained to allow a definite conclusion to be formed, but as far as the observations go there are indications of a variation of the motion in the line of sight corresponding to orbital motion, having the same period as that of the star's variability.

A photographic corrector, consisting of a concave crown and convex flint lens (in contact), placed about 30 inches within the focus, has been applied to the telescope of the south-east equatorial to correct the chromatic aberration of the object-glass for the photographic rays without alteration of the focal length. A Dallmeyer doublet (formerly used in the photoheliograph) has been employed to enlarge the primary image about 7½ times, so as to give on the photographic plate an image on a scale of about 0·45 inch to one minute of arc, or 15 inches to the sun's diameter. A number of trial photographs of Castor, γ Virginis, Venus, Jupiter, and Saturn have been obtained. The photographs of the double stars appear to be susceptible of very accurate measurement, and several of the photographs of Jupiter show the four satellites, the belts, and the red spot. A photograph of γ Virginis, showing the components widely separated, has also been taken at the primary focus, the Dallmeyer enlarging doublet having been removed. It is intended also to use the photographic corrector with the Dallmeyer doublet to obtain photographs on a large scale of sunspots, craters on the moon, and other objects of small angular dimensions. The field of view with the photographic corrector is necessarily very restricted.

For the year 1886, Greenwich photographs are available on 199 days, and photographs from India and Mauritius filling up the gaps in the series on 164 days, making a total of 363 days out of the 365 on which photographs have been measured, the record being thus practically complete for 1886.

As regards the photographic reductions :—

The Greenwich photographs have been measured in duplicate as far as 1887 April 28, and the measures have been completely reduced so as to exhibit heliographic longitudes and latitudes of spots and areas of spots and faculæ.

The photographs from India and Mauritius have been received from the Solar Physics Committee as far as March 10 and February 20 respectively, and these have all been measured, and the measures completely reduced.

IV. Magnetical Observations.

The observations have been continued on the same lines as in former years, changes in the magnetic declination, horizontal force, and vertical force being continuously recorded by photography and the absolute values of magnetic declination, horizontal force, and dip being determined from time to time by eye-observation. Earth currents in two directions nearly at right angles to each other are also photographically registered. For these last the ordinates have hitherto been measured on an arbitrary scale, and it appeared desirable to obtain the data for expressing this in terms of the accepted electrical units. The authorities of the Post Office Telegraphs have courteously given every assistance in regard to the requisite electrical measurements, and an electrical balance for measuring resistance, a standard cell, and a galvanometer of the Post Office pattern have been procured under their auspices. In October last, Mr. H. R. Kempe, of the Post Office Telegraphs, made some measures of the resistances of the earth current wires, but the conditions were not then favourable for insulation. Subsequently the wires were damaged in the snowstorm of December 26–27 last, and were temporarily repaired on January 25. It is believed that they are now restored to their normal condition, and arrangements are being made to obtain the value of the difference of electric potential between the two earth-plates on each line corresponding to a given length of ordinate on the photographic register. An experimental set of measures of resistance has been taken recently.

The following are the principal results for magnetic elements for 1886:—

Approximate mean declination	... ...	17° 55′ West
Mean horizontal force...	...	3·9379 (in British units) 1·8157 (in Metric units)
Mean dip		67° 26′ 38″ (by 9-inch needles) 67° 26′ 45″ (by 6-inch needles) 67° 27′ 40″ (by 3-inch needles)

The declination and horizontal force magnets were thrown into vibration by the earthquake shock of February 23, the extent of vibration being 20′ in declination and 0·004 of the whole horizontal force in that element. The motion commenced at 5h. 37·6m. Greenwich civil time, and a second double disturbance of much smaller amplitude (possibly accidental) was registered from 7h. 39m. to about 7h. 57m. At the request of M. Mascart, a copy of the photograph has been sent to him for discussion with other records of the earthquake which he is collecting. In view of the importance of the study of earthquakes, it appears desirable that a suitable seismograph should be procured for the Observatory.

V. Meteorological Observations.

The mean temperature of the year 1886 was 48°·7, being 0°·6 below the average of the preceding forty-five years. The highest air temperature in the shade was 89°·8 on July 6, and the lowest, 16°·5, on January 7. The mean monthly temperature in 1886 was below the average in January, February (6°), March, June, and December, and above the average in September, October, and November. In the period of 156 days from 1886 December 16 to 1887 May 20 the mean temperature was 3°·1 below the average of twenty years, the daily temperature being below the average on 115 days.

The mean daily motion of the air in 1886 was 291 miles, being 7 miles above the average of the preceding nineteen years. The greatest daily motion was 857 miles on December 8, and the least, 56 miles, on October 8. The recorded pressures in 1886, exceeding 20 lbs. on the square foot, were 27·6 lbs. on March 31, and 23·5 lbs. on December 9.

During the year 1886, Osler's anemometer showed an excess of about 17 revolutions of the vane in the positive direction N., E., S., W., N., excluding the turnings which are evidently accidental.

The number of hours of bright sunshine recorded by Campbell's sunshine instrument during 1886 was 1228, which is about twenty hours above the average of the preceding nine years. The aggregate number of hours during which the sun was above the horizon was 4454, so that the mean proportion of sunshine for the year was 0·276, constant sunshine being represented by 1.

The rainfall in 1886 was 24·2 inches, being 0·5 inch below the average of the preceding forty-five years.

VII. Chronometers, Time Signals, and Longitude Operations.

The number of chronometers now being tested at the Observatory is 225.

The first seven chronometers in the competitive trial of 1886 were exceptionally good, the first chronometer being superior to any we have previously had on trial, except the first in 1882.

For the annual trial of deck-watches, which commenced last November, fifteen watches were entered, and of these nine were purchased for the Navy, the first three being classed "A," or equal, in performance, to an average box-chronometer.

A supplementary trial took place in February and March, for which nine deck-watches were entered, and of these seven were purchased for the Navy, the first two being classed "A."

The watches in each trial were rated for a period of nine weeks, viz. two weeks (dial up) in the room at a temperature of 50° to 55°, four weeks in four different positions in the oven (dial up, pendant up, pendant right, pendant left, arranged symmetrically) at a temperature of about 80°, and three weeks (dial up) in the room. When the period of rating in any position was less than a week, weekly rates were inferred from the rate for the period by simple proportion.

In order to compare the performance of the several watches, "trial numbers," representing deviations in weekly rates, have been formed on the same general principles as for the chronometer trials. The trials in different positions introduce, however, a new element, and an arbitrary weight must be assigned to them in combining them with the trials "dial up." It has been considered that when the watch is worn in the pocket the pendant will generally be "up," and that not more than one-third of the deviation "pendant right" or "pendant left" is likely to have practical effect.

Putting a = Difference between greatest and least weekly rates "dial up,"
b = Greatest difference between one week and the next "dial up,"
c = Difference between weekly rates "pendant up" and "dial up,"
d = Difference between weekly rates "pendant right" and "dial up,"
e = Difference between weekly rates "pendant left" and "dial up,"

the quantity $c + \frac{d}{3} + \frac{e}{3}$ may be taken as the measure of the deviation in weekly rate due to positions in ordinary wear. Half weight has been given to this quantity in combining it with the trial number "dial up" ($a + 2b$), on the assumption that the deck-watch would be usually lying "dial up" and that it would not be carried in the pocket more than eight hours a day on the average. Thus the quantity $a + 2b + \frac{1}{2}(c + \frac{d}{3} + \frac{e}{3})$, has been adopted as the trial number for deck-watches. It has been arranged that for the future all pocket chronometers and deck-watches rated at the Observatory after repair shall be tested in positions.

The automatic drop of the Greenwich time-ball failed on one day only during the past twelve months. On three days the ball was not raised on account of the violence of the wind, and on five days on account of accumulation of snow on the mast.

As regards the Deal time-ball, there have been twelve cases of failure owing to interruption of the telegraph connexions, and on three days the violence of the wind prevented the raising of the ball. For fourteen days after the snowstorm of December 26–27, no signals were sent to or received from the Deal time-ball tower, telegraphic communication being interrupted. There have been four cases of failure of the 1 p.m. signal to the Post Office Telegraphs.

The arrangements for hourly time-signals at Devonport to be given by a local clock, corrected daily by the help of a time-signal at Greenwich at 10 a.m., have been carried out under Captain Wharton's directions, and a return signal from Devonport (serving as a test of the accuracy with which the local clock was corrected) has been regularly received at Greenwich (at 13h. 0m. 39s. G.C.T.) since November 22, with the exception of 36 days following the snowstorm of December 26–27, when there was interruption of the telegraphic communication with the West of England, and of 23 days when no return signal was received. The failures occurred for the most part on Sundays. The plan appears to answer well, and it seems desirous that apparatus should be provided by the Government to enable the Committee of Lloyd's to establish hourly signals at the Lizard on the same system.

The new contact apparatus of the Westminster clock was brought into action on 1886 May 22, and the automatic signals from the clock have been received regularly from that date, except on three days following the snowstorm of December 26–27. The error of the clock was insensible on 25 per cent. of the days of observation, 1s. on 40 per cent., 2s. on 22 per cent., 3s. on 11 per cent., and 4s. on 2 per cent. On one day the signal was 15s. late, and on another day 10s. late.

A suggestion has been made that in view of the importance of the connexion of the British and Continental Surveys, the telegraphic difference of longitude between Greenwich and Paris, which was originally determined with great care in 1854, should be confirmed in order to complete the network of telegraphic longitudes which have been determined of late years by Continental astronomers. It seems desirable that Greenwich Observatory, which, under Sir G. B. Airy's direction, took such an active part in utilizing the telegraph for the determination of longitude, should now assist in completing the cycle. The necessary exchange of observers and signals could conveniently be carried out in the summer of next year, when the French geodetists will, I understand, be prepared for their share of the work.

The Report concludes with the following general remarks:—"As the result of an International Congress on Astronomical Photography held at Paris in April on the invitation of the

French Academy of Sciences, at which fifty-six representative astronomers from all parts of the world were present, a scheme has been approved for the formation of a photographic map of the heavens by the concerted action of a number of Observatories in both hemispheres. This scheme provides for two series of photographs, the one intended to contain all stars down to the fourteenth magnitude inclusive, and the other, taken with short exposure, specially designed to give accurate positions of brighter stars down to the eleventh magnitude, so that it may be possible to form an extensive Catalogue of reference-stars for the first series, and thus to give the means of accurately determining the position of any star on the photographic map down to the fourteenth magnitude. The instruments with which this work is to be jointly carried out are to be photographic refractors of 0·33m. (13 inches) aperture and 3·43m. (11 feet 3 inches) focal length, and the Directors of the following ten Observatories have already announced that they are prepared to take part in the enterprise: Algiers, Bordeaux, Paris, Toulouse, and Vienna in the northern hemisphere; La Plata, Melbourne, Rio de Janeiro, Santiago da Chile, and Sydney in the southern hemisphere. It seems fitting that Greenwich should take its share in a scheme which will in a few years so greatly extend our knowledge of the places of the fixed stars, and thus serve to carry out one of the principal objects for which the Astronomer-Royal was appointed.

"On a review of the work of the past twelve months, it will be found that the activity of the Observatory has increased in various directions. The number of meridian observations is much larger than usual; additions have been made to the work of the magnetical and meteorological branch; there have been continuous trials of chronometers and deck-watches (requiring special arrangements in each case), which have made large demands on my own time, as well as on that of Mr. Turner and of Mr. Lewis. Extraneous work in connexion with the Navy has also absorbed a good deal of time that would otherwise have been free for scientific investigations. Questions connected with gun-directors, mirrors for electric search-lights, and binoculars for the Navy, have continued to engage our attention, and since the date of the last Report 510 telescopes and 35 binoculars for the Navy have been sent to the Observatory for examination, whilst it is to be presumed that a further supply of 500 binoculars, now on order, will be forwarded here to be tested in due course.

"Whilst it seems desirable that such directly utilitarian work should be undertaken at the Observatory, as being the only existing Government establishment where it can be done efficiently, I feel it necessary to point out that the existing staff is inadequate for these extraneous duties in addition to the well-defined work for which the Observatory is primarily maintained. By great efforts, which can hardly be sustained for an indefinite period, the current reductions have been kept up, notwithstanding the large number of observations obtained in the last twelve months, but the ulterior discussions which are required to maintain the character of the Observatory as a scientific institution are falling further and further behind. Amongst other matters which I should wish to take up, if leisure could be found, I may mention the determination of proper motions of stars from the observations made at Greenwich since Sir G. B. Airy's appointment in 1835, an investigation which appears to come within the terms of the Royal Warrant directing the Astronomer-Royal 'to rectify the tables of the motions of the heavens and the places of the fixed stars.'

"The appointment of a clerk, which has presumably received the sanction of the Admiralty, will, when it is made, provide for the increase of office-work which has taken place of late years in regard to chronometers, accounts, stores, stationery, printing, &c., and if the maintenance of the telegraph-wire, batteries, &c., for communication of time-signals were undertaken by the Post Office Telegraphs as part of the distribution of time to the public, there would be some further relief. But to enable me to give time to extraneous questions referred to the Astronomer-Royal by the Government, it appears necessary that the Chief Assistant and I should be relieved of certain mechanical work which might be intrusted to computers, and that further responsibility should be delegated to the Assistants. Proceeding on the lines which have been laid down by my predecessor, I believe that the maximum of efficiency at the minimum of cost would be attained if an increase of work were met by an increase in the staff of computers, with due recognition of the position of two or three senior computers, and of the increased responsibility of the Assistants."

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—In Convocation on Tuesday, a grant of £4800, applied for by Prof. Clifton, for the extension of the Clarendon Laboratory by the erection of buildings for an Electrical Department, was refused by a large majority.

Twenty-seven men have entered for the final schools in Natural Science this year, of whom sixteen offer chemistry, four physiology, three animal morphology and physics, and one botany.

A course of medical teaching, including clinical demonstrations and elementary surgery, is to be given at the Radcliffe Infirmary during the first half of the Long Vacation.

Besides the lectures which we announced at the beginning of term, Mr. Arthur Evans, the Keeper of the Ashmolean Museum, is giving a course of lectures on "The Early Iron Age."

CAMBRIDGE.—The twenty-first Annual Report of the Museums and Lecture Rooms Syndicate states that during the year 1886 considerable progress has been made in arranging the various collections, but additional accommodation in the form of cases and cabinets is required in various departments, especially for botany and ornithology. Additional accommodation is urgently demanded for the teaching of physiology, pathology, and botany. It is also desirable that permanent arrangements for human anatomy and medicine should be taken into consideration without further delay, and that the work should be commenced as soon as possible after the present chemical laboratory is vacated.

Mr. J. W. L. Glaisher, F.R.S., and Mr. J. S. Nicholson, Professor of Political Economy in the University of Edinburgh, have been approved for the degree of Doctor in Science.

The University having been applied to by the Association for the Improvement of Geometrical Teaching to take some steps to give improved methods of teaching geometry fair play in their examinations, and the Association having sent a deputation to Cambridge to confer with the Board of Mathematical Studies, the latter Board have recommended that other proofs than Euclid's be accepted in the Previous Examination, no proof of any proposition occurring in Euclid being admitted in which use is made of any proposition which in Euclid's order occurs subsequently. They do not at present propose modifications in the syllabus of geometry for the Mathematical Tripos, because they are about to revise the schedule of Part I. as a whole.

The recent report on the local lectures scheme shows that a fair share of attention has been devoted to natural science—namely, thirty-five out of one hundred courses of lectures. The courses on "Work and Energy" by Mr. A. Berry, delivered at five centres in the Northumberland mining district, were very successful. There is distinct progress in the systematization of work, and the development of local centres; but there are many difficulties owing to lack of endowments. Attempts are being made to connect practical courses of instruction with the scientific lectures, but here again the lack of apparatus and laboratories is a serious disadvantage. An endowment fund of £1136 has been contributed, of which more than half is given by the Local Lectures and Examinations Syndicate. The chief purpose contemplated is the retention of the services of practised lecturers.

The class list of the Natural Sciences Tripos, Part I., just issued, contains the following names in Class I.: Anderson, Cai.; Barber, Chr.; Colbeck, Cai.; D'Albuquerque, Joh.; Dufton, S. F., Trin.; Dufton, A., non-collegiate; Elliott, Chr.; Francis, King's; Fry, King's; Grabham, Joh.; Groom, Joh.; Richardson, King's; Tennant, Cai.; Turner, F. M., Trin.; Waggett, Pemb.; Wagstaff, Sid.; Williams, Cai.

SOCIETIES AND ACADEMIES.

LONDON.

Physical Society, May 28.—Prof. W. E. Ayrton, Vice-President, in the chair.—Dr. S. P. Thompson read a note on transformers for electric distribution. In the simple algebraic treatment of the dynamo several assumptions approximately true for well-made machines are made use of. The author finds that a similar set of assumptions for transformers greatly simplifies the algebraic theory:—(1) The iron, copper, and insulation are assumed good. (2) The reaction of the secondary on the primary (other than that desired) is small; thus, if the primary be