

REPORT OF THE ASTRONOMER ROYAL

TO THE

BOARD OF VISITORS,

Read at the Annual Visitation of the Royal Observatory, Greenwich, 1848, June 3.

THE Report which I have the honour now to present to the Board of Visitors adverts to some points in the last year's history of the Observatory, and to some proposals for the future, more important than I have usually had occasion to communicate to the Board. These, perhaps, will be exhibited most clearly by arranging them under heads of division similar to those by which the Reports of several past years have been marked.

1. Grounds and Buildings.—The room formerly occupied by the 25-foot Zenith Tube, has been vacated by the removal of that instrument (in conformity with the Resolution of the Board, passed at their meeting of January 15 of the present year). The N. W. Dome, adjoining the Zenith Tube Room, had already been left empty by the dispatch of the N. W. Equatoreal to the Cape of Good Hope. These two rooms were likely to be never again occupied by astronomical instruments: for, in addition to the general unfitness of position and access caused by their proximity to my dwelling-house, each of them was characteristically unfit for the instrument which it contained. The N. W. Dome, appropriated to an equatoreal, which ought to command the sky in nearly all directions, is overshadowed in the S. E. quarter to the height of 50° by the Great Room. The Zenith Tube Room is so situated that the difference of temperatures above and below is usually great; and its difference of latitude from the Circle Room is uncertain to an amount incompatible with the connexion of the series of observations made in the two places. I am, therefore, at the present time engaged in preparations for connecting these rooms with my dwelling-house. As regards the N. W. Dome this is only a resumption, for that room was originally a part of the dwelling-house.

The lower story of the N. E. Dome has hitherto been a passage-room. In the great want of space for every purpose at the Observatory, I have found it desirable to make this room useful as an inclosed room, and I am accordingly preparing a new entrance into the Dome.

An old kitchen in the East Buildings has been nearly useless. I have, by a small alteration, converted it into a useful room.

I now request the attention of the Board to the change which I propose to make in the Circle Room, in preparation for the New Transit-Circle, of which I shall speak shortly.

It appears, that a length of about 35 feet is necessary for the instrument and its colli-

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mators, in the form in which I propose to mount them. I propose to gain this space by extending the Circle Room southward, into my private garden, so as to range in its south front with the south front of the East Buildings. The ridge of its roof may be either E. and W. or N. and S.: the latter probably would be more convenient. If it were adopted, the arrangement of roof-opening and shutters would be nearly the same as in the small building called Struve's Observatory. The two stone piers which now carry Troughton's and Jones's Circles must be moved to new positions. For the roof-shutters, I propose to use hinged flaps, balanced and moved nearly in the same manner as those of the Berlin Observatory. During the change of the building, it will not be possible to use either Mural Circle in its usual place. Preparations accordingly are nearly completed for mounting Troughton's Circle on the wall of the East Buildings. Some parts of the Circle are already removed, and during this time Jones's Cape Circle is employed. Thus the Circle-observations will be continued without the smallest interruption. The Transit-observations will be in no way affected until the new instrument shall be completely mounted: after that time the Transit Instrument may be removed, and the Transit Room will be free for any other purpose. I propose to take it as Private Room for the Astronomer Royal: a purpose for which its neighbourhood to the Computing Room and the Observing Rooms adapt it well. The Computing Room would thus be relieved from its present pressure. A passage taken from the south side of the Transit Room would form a convenient communication between the Computing Room and the Observing Rooms.

2. Moveable Property.—The moveable property of the Observatory is generally in good order; and is entirely at home, with the exception of the following articles:—

One Journeyman Clock and one Bar-Magnet—lent to the Observatory of Kew.

A copy of Piazzi's Catalogue, 1814—lent to the Observatory of Durham.

Two Chronometers, by Massey, for measuring small portions of time—delivered, by instruction from the Admiralty, to Sir James South.

It may be proper to state here that the following standards, not strictly belonging to the Observatory, are at present preserved in the Observatory:—

Ramsden's 20-feet Standard-Bar.

General Roy's 3-feet Standard-Bar.

One of the Cape 10-feet Standard-Bars.

The Royal Society's 3-feet Standard-Bar.

The Royal Astronomical Society's 5-feet Standard-Tube.

3. Manuscripts.—All the letters of Mr. Pond's time, and all the papers which had accumulated during the last year, have been arranged. The actual binding has been delayed in consequence of the illness of the person usually employed.

4. Library.—A few books have been added, principally relating to Astronomy and Magnetism. The routine of classifying the books, lending them to the Assistants, calling them in at times, and verifying the Catalogue, has been followed as usual.

5. Astronomical Instruments.—The standard instruments of the Observatory are in general good order.

The Transit is in the same excellent condition which I described in the Report of last year. An examination of some of the observations, and more especially of those made contemporaneously with the transits observed by Mr. Otto Struve with another transit-instrument on the Observatory Grounds (for the adjustment of the chronometers employed in determining the longitude of Altona), has impressed me strongly with the belief, that it would be advantageous to refer very frequently to marks fixed near the meridian on the North and South sides. Accordingly, in the last autumn I caused to be prepared two lenses of long focus, adapted to the circumstances of this locality, and proper signals to be placed in the foci of the lenses; and I made some progress in experimental trials of their mountings. Partly, however, because I was not quite satisfied with the image given by these lenses, and partly because I began to contemplate the adoption of the same principle in a more perfect form for a more important instrument, I have made no further progress in the mounting.

Troughton's Circle, which alone has been used till within a few weeks, is in good order. It has been used in the same manner as during some years past, with no fixed horizontal wire, the bisections being made by a micrometer-wire. A circumstance has been observed, in reference to the divisions of the limb, which I think deserving of special notice, as bearing strongly on the selection of the method to be adopted in dividing new circles. During the past autumn, when the observations of the new planets as well as the old ones pressed rather heavily upon us, I thought it desirable to lighten our load in some degree, by determining the zenith-points from reflexion-observations of the Wire, instead of reflexion-observations of Stars. In this process the same divisions on the limb were constantly used; and the determination of the Error of Runs of Microscopes over an arc of five minutes, for those special divisions, became important. In every examination it was found that the Error of Runs for these divisions differed six seconds from the mean of Errors of Runs on other parts of the limb; shewing that for this special part of the circle there were irregularities in the relative position of adjacent divisions to the amount of six seconds. Yet this occurs in one of the first and favourite specimens of Troughton's method of eye-division. An irregularity of the same kind could scarcely have occurred in any engine-division based on a screw-motion. This instance has strongly confirmed me in an opinion which I have long held,—that no independent division is comparable in general accuracy to engine-division, where the fundamental divisions of the engine have been made by Troughton's method, and where in any case the determination by the astronomer of errors of a few divisions will suffice, in consequence of the uniformity of law of error, to give the errors of the intermediate divisions.

Preparations for removing Troughton's Circle to a temporary position on the east wall of the East Buildings are now far advanced. As some of the clamps and microscopes are at present dismounted, Jones's Cape Circle, of unhappy celebrity, is in use for the present.

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The irregularity of the divisions gives great trouble to the observers; but I have every reason to believe, with Messrs. Henderson and Maclear, that the results of the mean of the six microscopes are always accurate.

The Zenith Tube is now entirely dismantled. The parts of the iron support (an admirable specimen of engineer's work) are lying in the Front Court. The parts of the instrument are collected in a frame in the Great Room. Among the possible causes of the failure of this instrument may be mentioned the rude mounting and adjustment of the lower plumb-line microscope, upon the firmness of which the result entirely depended.

The Altitude and Azimuth Instrument having now been in use for an entire year, I am able to give some account of its success or failure, as a mechanical arrangement. The first subject for remark is the steadiness of support of the upper pivot, which is held in its place, as the Visitors will remember, by a frame of bars whose arrangement in every part is triangular. The steadiness is perfect: in the first observations, the levels were read before and after the telescopic observation, but it was very soon found that this caution was entirely unnecessary. The next point is the steadiness in the position of the horizontal axis of the vertical circle relatively to the vertical revolving-frame, and generally the steadiness of the constants of instrumental errors. For some time, the constants were so unsteady as to give me great trouble. Several observations of stars were absolutely rejected. In the month of July, after careful consideration of the discordances, I came to the conclusion that there was a wandering of the horizontal pivots in their Y's, caused probably by the counterpoises: the counterpoises were therefore diminished by one-third part, and since that time the constants of instrumental error have been steady, and not a single observation has been rejected. The next circumstance which gave me trouble was the uncertainty in the scale-values of some of the long levels. The singular good fortune of having four parallel levels upon the instrument, which are always read, enabled me to compare the proportion of the scale-values in actual use to the scale-values determined before mounting. These were very discordant. I became at length persuaded that this was caused by the very defective construction usually adopted in the mounting of English levels: and in the autumn I applied to the two largest levels the construction with which I had become familiar in Germany and Russia, in which the glass tube of the level is supported in Y's: since that time the levels have been fairly accordant. Another contrivance extensively applied to German levels, namely, the covering by glass shades, has also been applied here. A difficulty which can be surmounted only by constant care, has sometimes presented itself, namely, that when the Dome is opened very shortly before observation, the changes of readings of the upper and lower levels do not exactly correspond. Lastly, when the best values of instrumental errors of every kind are applied, the accuracy of every part of observation, of calculation and application of instrumental errors, and of tabular calculation, is checked by the determinations of the Zero of Azimuth. These determinations are sufficiently steady in any one evening, or perhaps, in groups of several evenings; but they are not steady from time to time: the variation amounting to three or four seconds of arc. Whether this

arises from a twist of the brick pier, or from a twist of the piers of the Transit Instrument (the times being obtained from the Transit-clock), or from a change in the observer's personal equation, I cannot tell. The substitution of improved meridional instruments for those now in use, will enable me to remove one of these conjectural causes.

I have spoken hitherto solely with respect to the Azimuthal observations, in which alone, from the first, I anticipated any difficulty. The Zenith Distance observations have never given the smallest trouble.

The accuracy of the results, as estimated by the observation of stars, is somewhat less than that of the Mural Circle: perhaps nearly in the degree which might be expected in circles whose diameter is half that of the Mural Circle.

The North-East and South-East Equatoreals (Shuckburgh's and Sheepshanks') are in their usual good order.

The small instruments and detached telescopes are in good order. The ancient instruments have not been specially examined, but appear to be in their usual state.

I now request the attention of the Board to the proposals which I have to make in regard to new instruments.

An object-glass of 8 inches clear aperture and 11 feet 6 inches focal length, having been placed in my hands by Mr. Simms, I carefully examined it. I found that it shewed some objects not of the closest class (as ϵ Bootis and ζ Cancri) better, I think, than I had seen them before: that it separated η Coronæ: that it did not separate γ Coronæ (which, having witnessed the difficulty of that star in the great Pulkowa refractor, I was prepared to expect): and that it dispersed light no more than the best object-glasses usually do. At my recommendation, therefore, this object-glass was purchased by the Lords Commissioners of the Admiralty, at the price of £275. I have now to explain the form in which I propose to mount it. No verbal description, probably, can dispense with reference to the model, and I will therefore confine myself to the leading points. I propose to mount it as a Transit-Circle, its Y's bearing solidly on the piers far from their edges, and having no adjustments; the axis carrying two nearly similar circles on the East and West arms, one for clamping, the other for the divisions. I propose that the clamps have no tangent-screw, the bisection being in all cases effected by the micrometer in the field of view of the telescope. I propose that the divisions be illuminated by a single lamp in the prolongation of the axis, without reflectors; and that the microscopes be in a conical surface, passing through one pier, the eye-ends being in a circle of two feet diameter: and that the divisions be cut upon a limb of metal which is so bevelled on the circle, that the light of the lamp will be reflected up the microscopes. Several microscopes to be permanently mounted, in positions proper for ascertaining with the utmost exactness the errors of division. Microscopes to be mounted for ascertaining the laws of movement of points on the ends of the pivots. The instrument never to be reversed: but an apparatus to be provided for raising it so far that a collimating telescope firmly fixed on a solid pier on the north side, and one on the south side, can be adjusted on each other: then when the instrument is

dropped into its usual place, the error of collimation and the flexure will be determined without reversion, by observation of the two collimators. No spirit-level or equivalent instrument to be used, but the error of level to be determined by observation of the image of the wires by reflexion in a trough of mercury. A parallel-motion apparatus to be used for carrying the trough : and a peculiar arrangement for facilitating the process of cleaning the mercury. In regard to the material, I propose that the whole be made of cast-iron : the axis being in two parts (which enables the founder to make the pivots of hard chilled iron while the rest is of soft iron) and each end of the telescope being in one part : each of the two circles being cast in one piece. An instrument thus constructed, would, probably, be more accurate for right ascensions than the present transit, in so far as the frequent observation of the well-mounted collimators would add to the knowledge of its azimuthal error : and perhaps more accurate for zenith distances than Troughton's Circle, in so far as the circle is in a state of less strain, while its construction possesses greater firmness. But the reasons for recommending it, as is known to the Visitors, are—the power of carrying a larger object-glass, and the enabling one observer to complete the observation of the two elements.

I now request the Visitors' attention to some remarks on the Zenith Tube. Although no formal record was made, it was understood to be the wish of several Members of the Board, that the Zenith Tube should be remounted in a less exceptionable position than that which it formerly occupied. If the Visitors retain this opinion unaltered, I propose that it be mounted in the small room which occupies the angle between the East Buildings and the advance of the Circle Room ; where every circumstance of ease of access, proximity to the other instruments, and equality of temperature, is favourable. But if, instead of this, it be the object of the Visitors to obtain a continuous series of accurate observations of γ Draconis (a thing to which, in my opinion, too great importance cannot be attached), and to adopt, if expedient for that purpose, a new construction, I submit for their consideration the following principle. Let the micrometer be placed close to the object-glass, the frame of the micrometer being firmly connected with the object-glass cell, and a reflecting eyepiece being used with no material tube passing over the object-glass : and let a basin of quicksilver be placed below the object-glass, but in no mechanical connexion with it, at a distance equal to half the focal length of the object-glass. Such an instrument would at least be free from all uncertainties of twist of plumb-line, viscosity of water, attachment of upper plumb-line microscope, attachment of lower plumb-line microscope, and the observations connected with them : and might be expected, as a result of this extreme simplicity, to give accurate results.

6. Astronomical Observations.—The stars observed on the Meridian have been, the stars of the Nautical Almanac list (making 20 observations in every three years, if possible), Moon-culminators, occultation stars, and stars insufficiently observed in preceding years. The moveable bodies observed are the Sun, Moon, and all Planets, at every practicable opportunity; except on Sundays, when the Moon alone with accompanying stars is

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observed, and except on a monthly holiday. The new planet, Metis, has been seen but a few times.

The last observation with the Zenith Tube was made on May 1.

For observations with the Altitude and Azimuth Instrument, the following rule is laid down. The Moon is to be observed if visible, and the observer is bound to watch if necessary while the Moon is above the horizon, and the Sun is not more than an hour above the horizon. One Azimuth and one Altitude are to be observed, and if possible, two Azimuths and two Altitudes in reversed positions of the instrument: and if the night is fine, a low star and a high star are to be observed in azimuth, both in reversed positions of the instrument, and one star in altitude, in reversed positions. Thus a complete set includes ten observations. These rules have been followed carefully during the thirteen lunations intervening between 1847, May 15, and 1848, May 30; and I am now able to give a comparison of the number of days of observation of the Moon with the Altitude and Azimuth Instrument and with the Meridional Instruments. With the Altitude and Azimuth Instrument no days are included except both altitudes and azimuths are observed; and with the Meridional Instruments, no days except both right ascensions and polar distances are observed. The days are arranged in reference to the hour of the day at which the Moon passes the meridian:—

Time of passage of the Moon.			Number of days of complete Observations with Altitude and Azimuth Instrument.		Number of days of complete Observations with the Meridional Instruments.	
^h	to	^h				
0	to	1	.....	0	.....	0
1	to	2	.....	4	.....	0
2	to	3	.....	5	.....	0
3	to	4	.....	7	.....	0
4	to	5	.....	8	.....	2
5	to	6	.....	11	.....	7
6	to	7	.....	11	.....	6
7	to	8	.....	12	.....	8
8	to	9	.....	14	.....	11
9	to	10	.....	10	.....	7
10	to	11	.....	10	.....	7
11	to	12	.....	13	.....	9
12	to	13	.....	14	.....	9
13	to	14	.....	12	.....	8
14	to	15	.....	10	.....	7
15	to	16	.....	7	.....	5
16	to	17	.....	7	.....	4
17	to	18	.....	12	.....	9
18	to	19	.....	11	.....	6
19	to	20	.....	7	.....	6
20	to	21	.....	9	.....	0
21	to	22	.....	6	.....	0
22	to	23	.....	3	.....	0
23	to	24	.....	0	.....	0
Whole number of days of observation				203		111

The results of the observations, as reduced to the state of Apparent Errors of Tables in R.A. and N.P.D., appear very good; perhaps a little, and but a little, inferior to those of the Meridional Instruments. I consider that the object for which this instrument was erected is successfully attained.

The North-East and South-East Equatoreals have been used for Occultations of Stars by the Moon, Phenomena of Jupiter's Satellites, Transits of the Moon for measure of its diameter, and observations of the planet Iris. No Comets have been observed. The star Groombridge 1830 and its comparison-star, to which I made allusion in the last Report, have been observed with great regularity to Feb. 22 of the present year.

The Double-image Micrometer has been used for measures of γ Virginis, and for measures of planets, especially Jupiter.

The northern boundary of annularity in the Solar Eclipse of 1847, October 7, passed so near to Greenwich, that it was doubtful whether the Eclipse would or would not be annular at the Royal Observatory. I determined, therefore, for the purpose of carefully observing all the phenomena of close contact, and for fixing with great precision the boundary of the annular track, to observe it at several stations north and south of Greenwich. Availing myself liberally of the assistance of astronomical friends, I equipped in the most complete manner, seven stations besides the Royal Observatory: at Chingford, Walthamstow, Stratford, Blackwall, Lewisham, Lewisham-Southend, and Hayes. At none of them, however, was the Eclipse seen for five minutes, and at none at all in its annular phase.

7. Reduction of Astronomical Observations.—The following was the state of calculations on May 29. The Transits were reduced to the state of Apparent R.A. of Center deduced from observation, as far as May 25. Corrections of small stars are not completed (though some progress is made in them) beyond 1847. The Mean Times for Meridional observations and Equatoreal observations were computed to 1848, March 4: those for other extra-meridional observations to the end of 1846. The Mural Circle observations were reduced to the stage of N.P.D. of Center deduced from observation, as far as May 23: corrections of small stars to the end of 1847. The Star Catalogue, and the Geocentric Errors of the Sun, Moon, and Planets, to the end of 1847: the Heliocentric Errors of Planets, to the end of 1846. The Zenith Tube observations were completely reduced. The observations with the Altitude and Azimuth Instrument were completely reduced, to the stage of Apparent Errors of the Moon in R.A. and N.P.D., as far as 1848, April 28: a large proportion of the other calculations up to the last day of observation. The reductions of the observations of Groombridge 1830 were nearly finished. Other Equatoreal observations and occultations were reduced to the end of 1846. The observations with the double-image micrometer are completely reduced.

Throughout the year 1847 the new form of star-reductions, which I have proposed as a substitute for Bessel's, has been used, and it has been found convenient.

At the present time Assistants are employed in collecting all the star observations made in 1842, 1843, 1844, 1845, 1846, and 1847, for the purpose of forming another Grand

Catalogue, reduced to the epoch 1845. I propose, in printing it, to attach to the stars the numbers for the star-constants $e, f, g, h, l, e', f', g', h', l'$, and the day-constants (for a few years), E, F, G, H, L , which are peculiar to my method.

8. Printing of Astronomical Observations. — In the volume for 1846 the Introduction is nearly finished; the sections of Transits and Mean R.A. and Circle Observations and Mean N.P.D. are finished; the Star Catalogue, Geocentric and Heliocentric Reductions for Sun, Planets, and Moon; the Equatoreal Observations; and part of the Solar Eclipse Observations, are finished: in fact, there remains nothing to be printed but the Reduction of Occultations. In the volume for 1847, four sheets of Transits and four sheets of Circle Observations are finished. The printing of the observations with the Altitude and Azimuth Instrument will add sensibly to the extent of this volume; and it may be again a question for the consideration of the Visitors whether any restriction should be put upon the printing of the original observations.

9. Magnetical and Meteorological Instruments. — In the last Report I made allusion to the intended change of position of the Theodolite of the Declination Magnetometer, and to the use of a detached magnet for absolute determinations of declination. This change has not been made, as we have been very fully employed in making the changes necessary for the introduction of photographic apparatus.

The Declination and Horizontal-Force Magnetometers are completely and efficiently prepared, either for observation with telescopes in the ordinary way, or for the self-registration by photographic record, which is now adopted in the daily system of the Observatory. The Vertical-Force Magnetometer and the Barometer have been very lately fitted up in the same way, and we are now engaged with the petty difficulties which invariably present themselves in the use of a new instrument. The whole of the photographic part has been arranged for us by Charles Brooke, Esq.

The deflexion apparatus, vibrating magnet, and dipping needles, are in good order. The law of thermometrical correction, which I enunciated last year, has been completely supported by observations on the new Vertical-Force Magnet.

The Barometer and Thermometers (with the exception of two radiation thermometers, replaced for the moment by two the property of Mr. Glaisher), the Ground Thermometers, the Anemometers, Rain Gauges, and Electrical Apparatus, are all in good order. For the Actinometer, we have not yet introduced the last modification given by Sir John Herschel.

10. Magnetical and Meteorological Observations. — To the end of 1847 the observations were continued on the same plan as in preceding years: observations of the principal instruments being made by an Assistant at every two hours, day and night, except Sundays. At that time, the photographic self-registration of the Declination and Horizontal-Force Magnets being made efficient, and preparations for similar apparatus for the Vertical-Force Magnet, the Barometer, and the Thermometers being in progress, I determined on suspending the night observations. Personal observations are now made several times in the day,

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but not between midnight and six in the morning. The photographic apparatus is always in action. The observations of the Dip, the Deflexions and Vibrations, the Meteorological Term-days, the Thermometers and Rain Guages, are continued as formerly.

11. Reduction of Magnetical and Meteorological Observations.—On May 25, the following was the state of these reductions. The immediate reductions of the Declination and Horizontal-Force Magnetometers (by application of equivalents, zero points, temperature-corrections, &c.), was complete: that of the Vertical-Force Magnetometer was complete to the end of 1847, and partially advanced as far as 1848, April 19. The Term-Day observations, Extraordinary observations, and Dips, to the end of 1847. The principal steps for the Deflexion observations, to the present time: but no result of absolute measure is yet obtained. The ordinary reductions of Daily and Extraordinary Meteorological Observations, complete. The Abstracts generally are complete to the end of 1846.

12. Printing of the Magnetical and Meteorological Observations.—The Magnetical observations of every class and the Extraordinary Meteorological Observations are printed to the end of 1846. The Ordinary Meteorological Observations to June 1846. The Magnetical Abstracts are finished, and the Meteorological Abstracts far advanced. The Introduction is ready for the printer.

A large quantity of matter for the Observations of 1847 will shortly be placed in the printer's hands.

13. Chronometers.—The number of chronometers now on hand for rating is 95, which is rather less than the average.

The Abstract of Rates and Digest of Estimates are maintained in their usual form.

The Signal Ball is dropped regularly, and its error is registered, at one o'clock every day.

14. Personal Establishment.—The persons now employed in the Observatory are: First Assistant, Mr. Main. Assistants in the Astronomical Department, Mr. Henry, Mr. Ellis, Mr. Rogerson, Mr. Dunkin, Mr. H. Breen. In the Magnetical and Meteorological Department, Mr. Glaisher, Mr. Downs, Mr. Humphreys, Mr. Henderson. Six supernumerary Computers are also employed at present for the Observatory, some of whom will shortly be removed to other occupations.

15. Reduction of Ancient Observations, and other Extraneous Computations.—The printing of the Lunar Reductions is completed and the volumes are ready for distribution, and it is therefore unnecessary for me to speak now on the character and extent of the work. It is proper, however, for me to state, that I have already deduced from them corrections of the principal elements of the Moon's Orbit, and that I have embodied these in a communication to the Royal Astronomical Society. Among the practical considerations which have been forced upon me by the examination of the observations in different years, is the necessity of a frequent revision by the Astronomer of the logical and mechanical principles of the construction of his instruments. I am fully persuaded, that the exquisite skill of Graham and Bird in finishing the details of instruments, and the popularity thereby given to

a class of instruments, which, considered in reference to the grand principles of construction, is radically bad, have done more to retard the progress of accurate Astronomy than any thing else which has occurred within the last century.

The reduction of Fallows' Cape Observations was commenced under my direction some time ago. It was interrupted by the work incident to the completion of the Lunar Reductions, but I hope shortly to take it up again and to finish it.

Some time ago I caused to be written out the Ledgers of Star-observations, and occasional Star-catalogues, which I have found in Maskelyne's manuscripts. I would submit it as matter for the judgment of the Visitors whether it is desirable that these should be prepared for printing.

It might also be worthy of consideration, whether some steps of calculation might not be taken with Bradley's Greenwich Observations anterior to 1750. It is generally understood that they were made with instruments of inferior merit, but I am not able to speak on them from my own knowledge.

16. General Remarks. — The general position of the Astronomical Observatory, supposing the proposed new instrument to answer my expectations, will be, I think, that which is proper for it. Laying aside the vain idea of being first in every branch of astronomy, we shall be first in that most important and very extensive part of astronomy upon which all the rest must be based, namely, the fundamental meridional observations; and we shall stand alone in the difficult and most valuable section of lunar observations. Believing, as I do, that the same steadiness of plan which has been characteristic of the Observatory almost from its foundation will still be its characteristic, and hoping that the same regularity and promptitude in the exhibition of useful results which have been introduced in its later times will still distinguish it, I do not at present see any further change in its material equipment which I could desire as essential or as very important.

In making these remarks, which are in some measure comparative, it is perhaps proper that I should state, that I am personally acquainted with many foreign observatories, and that in the last summer I had ample means of making myself acquainted with almost every detail in the noblest of all, namely, the observatory of Pulkowa; as well as with the general equipment and system of one of the most recent, namely, the new observatory of Berlin. From the former I have derived many ideas which I hope in time to turn to good account in the Observatory of Greenwich. But, supposing the changes which I have proposed to be cordially sanctioned and effectually carried out, I think our position will be such that we need not fear the competition of any foreign institution; and I do not anticipate that it will soon be necessary for me to request the assistance of the Visitors in any organic change in the Astronomical Observatory.

In the younger and less important branch of our institution, namely, the Magnetic Observatory, there is now pressing need for the consideration of the Visitors. The present extensive system of British magnetic observations expires with the close of this year; and it appears probable that some of the colonial and foreign observatories will be then

dismantled, and that others will be reduced in establishment. The wants of magnetic observation at Greenwich will now be much reduced, and the need for publishing the observations which may be made, in the extensive detail which has hitherto been preserved, will be greatly diminished. At the same time, the means of procuring and preserving a very complete record of the magnetical indications generally and of some meteorological indications, by photographic self-registration, are much improved. Under these circumstances, I request the advice of the Visitors to myself, and their recommendation to the Government, as to the course which ought to be pursued in the next and following years. Perhaps it may suffice for all wants, that the magnetic personal establishment be reduced at the end of the present financial year to two assistants, with the aid of occasional computers and copiers (possibly in a future year to be still further reduced): that the Magnetical and Meteorological Observations to the end of 1848 be printed in the same detail as at present: that after that time the photographic registrations be carefully preserved: but that no results be printed, except in cases of extraordinary disturbance, or when it is known that corresponding observations have been made in other places, or (as regards the Meteorological observations) in the weekly reports of the Registrar-General of Births, Deaths, &c.

G. B. AIRY.

*Royal Observatory, Greenwich,
1848, June 2.*

Erratum in the Report to the Board of Visitors, 1847.

Page 6, line 11 from the bottom, *dele* the sentence beginning with "It is proper," as it appears that Struve's instrument was moved by clock-work.