

1875.

VICTORIA.

T E N T H R E P O R T

OF THE

BOARD OF VISITORS

TO THE

O B S E R V A T O R Y ;

WITH THE

ANNUAL REPORT OF THE ACTING GOVERNMENT ASTRONOMER

FOR THE

YEAR ENDED 29TH MAY 1875.

PRESENTED TO BOTH HOUSES OF PARLIAMENT BY HIS EXCELLENCY'S COMMAND.

By Authority:

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TENTH REPORT OF THE BOARD OF VISITORS TO THE OBSERVATORY.

TO HIS EXCELLENCY SIR WILLIAM FOSTER STAWELL, *Knight, Acting
Governor of the Colony of Victoria, &c.*

MAY IT PLEASE YOUR EXCELLENCY—

The Board of Visitors to the Observatory made its annual visitation on June the 2nd 1875.

Mr. Ellery, the Government Astronomer, having obtained leave of absence, the Board found the staff of officers and all the instruments in charge of Mr. White, in whose management it unhesitatingly expresses its fullest confidence.

The Board finds that the instruments are all in good working order. Those which were purchased for the observation of the transit of Venus have given general satisfaction, and are a useful addition to the Observatory; among which may be specially mentioned a photo-heliograph and an 8-inch equatorial. Owing to the haste with which some of these instruments were sent out, they were not all perfect; it is very satisfactory, however, to learn that the working machinery at the Observatory is adequate to remedy most of the defects. It has been thought, nevertheless, desirable to send some parts back to be perfected. The stock of meteorological instruments which are supplied to country observers is almost exhausted. To meet this deficiency the Board begs to recommend an extra grant.

The Board must again call attention to the necessity of keeping the building of the magnetograph and other self-registering instruments in repair. Moreover, the time-ball at Williamstown, for the use of the shipping, is fast falling into decay. So far it has done its work well, having, during the past year, failed only 21 times out of the 302. Seeing, however, that Mr. Ellery, during his visit to Europe, will probably obtain many hints for improved construction, the Board recommends that only such repairs should be undertaken as are sufficient to keep the buildings watertight and the machinery in working order; but it is strongly of opinion that such steps should now be taken as will enable the building to be proceeded with immediately on Mr. Ellery's return to Melbourne.

In accordance with a recommendation in the last Report of the Board, the great Melbourne telescope has been confined as much as possible to its specific work. One photogram of the moon, in the opinion of the Board, surpasses in beauty of outline and in accuracy of definition any hitherto taken in the world. The best mode of lithographing the nebulae is still under consideration and awaits Mr. Ellery's return.

The Melbourne Observatory was selected as the head quarters in the south for the necessary preliminary observations in connection with the transit of Venus. These were made in great numbers at all the stations to secure identity in the results. The work, in spite of atmospheric difficulties, proved most satisfactory. Those entrusted with it exerted themselves unflinchingly; and there is too much reason to believe that the late Professor Wilson, whose loss the Board records with deep regret, hastened his end by over-exertion. The photograms of the transit have all been taken to England by Mr. Ellery. The instruments used at the various observing stations have been returned and carefully packed away. One permanent benefit from these observations will be a more accurate determination of the longitudes of various places. It is, however, to be regretted that Lieutenant Harkness, who was at the head of the American party sent to Tasmania, was summoned home too suddenly to admit of his fulfilling his intention of sailing to Port Darwin, with the object of accurately determining the difference of longitude between Melbourne and Batavia. There is good hope that this work may yet be done.

The number of observations in R.A., during the year, has been 2,064.

All the "former are" reduced, but the reduction of the "latter" is somewhat behindhand in consequence of increased meteorological work. All the other reductions are well in hand and making good progress ; and the whole, it is expected, will be brought up to the mark before next Report.

The Board is glad to find that the Chief Secretary has placed a young gentleman, Mr. Hay, to assist in the necessary and increasing work of the Observatory, and that he is giving perfect satisfaction.

GEO. VERDON, F.R.S.
 H. AMSINCK, Commander.
 J. W. STEPHEN, M.A.
 JAMES MOORE, M.A.
 M. H. IRVING, M.A.
 G. V. SMITH,
 J. E. BROMBY, Hon. Sec.

REPORT OF ACTING GOVERNMENT ASTRONOMER, 1875.

To the Board of Visitors of the Melbourne Observatory.

GENTLEMEN,

The present Report is intended to give an account of the actual state of the Observatory on 29th May 1875, and of the business transacted therein since 28th May 1874, the date of the last annual visitation of the Board.

PERSONAL ESTABLISHMENT.

The only alteration in the staff of the Observatory has been the appointment, on probation, of a young gentleman, in accordance with the suggestion contained in the last Report of the Board. Mr. Hay, the gentleman referred to, commenced his duties at the Observatory on 26th November 1874, and has proved himself, by his punctuality and diligence, to be a very valuable aid in the routine duties of the establishment. Mr. Ellery, the Government Astronomer, after an unremitting application of 22 years to the duties of his office, which had greatly impaired his health, has obtained twelve months' leave of absence for a visit to Europe. He sailed for London in the *Loch Maree* on the 20th of March last, and I was shortly after commissioned by the Government to act for him during his absence. The staff at present consists of—

MR. ELLERY, Government Astronomer, absent on leave,
 MR. WHITE, Acting Government Astronomer,
 MR. MOERLIN,
 MR. TURNER,
 MR. GILBERT,
 MR. HAY, on probation.

On the permanent staff are also a messenger and a workman, principally engaged in connection with the great reflector; and the temporary staff consists of a clerical assistant and a mechanic.

BUILDINGS.

The buildings, with the exception of the differential magnetic house, are in good condition. The only additions since the last Report consist of two circular chambers with revolving roofs, in the south-western portion of the grounds, one of which is devoted to the Troughton and Simms 8-inch equatorial, the other to the Dallmeyer photo-heliograph. The magnetic house referred to above is in a very ruinous state; I have had it lately patched up, and a drain cut round it, so as to avoid the lodgment of water, which proved so destructive to the silk suspending fibres; these, however, are mere palliatives, and the time is not far distant when it will be necessary to erect a new room for the photographic recording instruments, so that the magnetic results may attain to the same accuracy as the astronomical ones. The revolving dome of the photo-heliograph room, which was constructed rather hurriedly, to be ready for the observation of the transit of Venus, shows signs of weakness; no great inconvenience is felt, however, from this at present, as it is moved very much less than an ordinary equatorial dome. The movable roof of the great reflector house began to give some trouble a few months ago, owing to the shrinking of the wooden sleepers that supported the iron rails, which caused the eaves to rest and rub on the lead flashings, thus making it at times very difficult to move. This, however, was remedied about a month ago by the Public Works department—the rails were raised, and the roof now works quite freely.

INSTRUMENTS.

The old working instruments of the Observatory are in their usual good order. The transit circle is in excellent condition, and the stability of its mounting is as great as ever; the fine system of spider lines inserted by Mr. Ellery soon after its arrival, and which has been in use for the last fourteen years, narrowly escaped destruction a few weeks ago, owing to one of the screws of the illuminating apparatus having got adrift, and fallen on to the wire plate; measures have been taken to prevent the recurrence of such an accident. The great reflector is in a satisfactory state of preservation; the great mirror was taken out in February last and cleaned, and now performs as well as ever. The east transit instrument, fitted for the zone observations, has not been in use since the last Report; it is, however, examined every week among the other instruments by the mechanic of the Observatory, and is ready for use whenever required. The north equatorial of 4½ inches aperture, which was taken to Mornington by the late lamented Professor Wilson for observing the transit of Venus, was returned in excellent order, and is now mounted on its old pier, and has been lately used in observing Encke's comet.

The clocks are in fine order. They have now all been fitted with an electric contact apparatus, similar to that placed by Mr. Frodsham in the zone clock (No. 1062), which requires adjustment much less often than the old arrangement.

The magnetic instruments are in a good state of preservation, and work well; the same may be said of the meteorological instruments; our stock of the latter is now, however, very low, so that it has been found impossible to equip some of the country stations. I believe, however, that Mr. Ellery intends while in England to select and purchase a fresh supply.

No alteration has been made in the arrangement of the standard measures of length, weight, and electrical resistance. The English standard weights are lent to the Royal Mint in Melbourne.

A set of shelves, protected by glass doors, has been lately fitted in the chronometer room, which has proved a very great convenience for stowing away the various small optical and physical instruments; these are now classified and arranged so as to be of easy access. The altazimuths and other geodetic instruments have been stored in one of the rooms of the great telescope house.

Several new and important instruments have been added to our establishment during the period under notice. The first to arrive was the photo-heliograph, which we received on 28th August; it was mounted a few weeks after, as soon as the building was ready for it. It comes from the well-known maker, Dallmeyer of London, who constructed it under the advice of Warren de la Rue, Esq.; it is a fine piece of workmanship, and an excellent instrument of its class. The equatorial refractor of 8 inches aperture was received on 16th October, and, as the house had been ready for it for some weeks, it was at once mounted on its pier. It was made by the celebrated firm of Troughton and Simms, under the advice of Sir George Airy, the Astronomer Royal, and is, generally, a fine specimen of good workmanship and convenient arrangement. It came out, however, with an apology from the makers, who had been so hurried to prepare it in time for the transit of Venus that they had not had sufficient time to put the finishing touches to some of the parts; they therefore requested that, if we found any mistakes or omissions, on thoroughly testing it after the transit of Venus had been observed, that we would return them any parts that required alteration. On subjecting the instrument to a minute scrutiny it was found that the clockwork was the only part that contained bad workmanship; this was remedied at the Observatory. The object-glass was found to be of good figure, but a slight meakiness was apparent on the surface of the lenses, owing to a little defect in the polishing, so Mr. Ellery determined to return it to the makers to remedy this imperfection, and he has taken it home in his personal charge. The only other alteration required was in the heads of the microscope micrometers, which had been numbered in the wrong direction; these also he has taken with him, in order that the engraver may rectify the mistake. A portable equatorial, of $4\frac{1}{2}$ inches aperture, was received from Messrs. Cooke and Son, of York, on 16th October, together with a cheap astronomical clock, and some supplementary eye-pieces; these are all well-made instruments, but, not being intended for ordinary daily work, they are packed away ready for use at any station we may desire to occupy. A double-image micrometer was also received from Mr. Browning. Besides these, an equatorial mounting was made at the Observatory for the $6\frac{1}{4}$ -inch object-glass of the east transit instrument, for observing the transit of Venus at the Sandhurst station, also two barrel chronographs, governed by a conical pendulum, mounted according to Huyghens's suggestion, so that the centre of oscillation describes a parabola in moving towards or from the central axis; the success attending these chronographs has been very great, as may be seen by inspecting the papers taken from the barrel.

TIME SIGNALS.

No alteration has been made in the method of distributing Observatory time throughout the colony.

The Williamstown time-ball has been dropped with its usual regularity. Out of 302 times, when it was intended to drop the ball, it failed 21: 15 of these failures being due to interruptions on the telegraph line, 4 to the return signal apparatus being out of order, 1 to the ball sticking to the top of the mast, and the remaining 1 was caused by a defect in the contact springs of the clock. Having lately heard that the ball and working machinery were out of order, I sent our mechanic, three days ago, to inspect them; he reports that the machinery is in very bad condition, positively dangerous to work, and that the ball itself is in such a rotten state as to be liable to a collapse at any time. The machinery is now very old and nearly worn out, having been in use for the last twenty years, and although I do not think it desirable to have any extensive alterations till the return of Mr. Ellery, who will be able to bring to bear the result of his observations on similar machinery at home, yet I think it necessary that some repairs should be done to enable it to last till then, and to secure safety in the working of it.

The Post Office clock daily records its error on the Observatory chronograph as usual. About the beginning of last February the clock began to show signs of weakness, caused by want of cleaning. It was stopped on the 8th, thoroughly cleaned, and set going again on the 16th of that month. Advantage was taken of the stopping to correct the pendulum for the over-compensation for temperature, which experience had shown us to exist. Of the two methods of doing this, either by diminishing the amount of quicksilver, or increasing the weight of the iron, the latter was adopted, and a cylinder of cast-iron, weighing 20 lbs., was placed on the top of the bob. The clock was finally rated on the 23rd of March, and since that time no appreciable change has occurred in the rate, so that we may now assume the outstanding error of compensation to be very slight indeed.

THE LIBRARY.

Besides purchases, the library has, during the last year, received the following donations:—

Books, &c., Presented to the Observatory.	By whom Presented.
Patents and Patentees, vol. vii.: Indexes for the Year 1872	William Henry Archer.
Different Pamphlets read before the Royal Academy of Stockholm	Dr. Hugo Gylden.
On the Summation of Periodic Functions	Ditto.
Deductions of Declinations from Observations made with the Vertical Circle of the Pulkowa Observatory during the Years 1842 to 1849	Ditto.
Bengal Weekly Meteorological and Rainfall Report, 14th June to 11th July 1874; 12th July to 8th August 1874; 6th September to 3rd October 1874; 7th November to 28th November 1874; 6th November to 19th December 1874; 27th December to 23rd January 1875; 24th January to 24th February 1875; 21st February to 17th April 1875	H. F. Blanford, Bengal, India.
The Bases of Gauss's Theory, and the Appearances of the Terrestrial Magnetism in the Year 1829	Kaiserlichen Admiralität Hydrographisches Bureau, Berlin.
Annales de l'Observatoire de Moscou, 1874	H. Wild, Director des Physikalischen Central Observatoriums, Russia.
Journal of the Scottish Meteorological Society for the Quarter of January to April 1875	Scottish Meteorological Society.
Quarterly Weather Report of the Meteorological Office, part iv., 1871; part ii., April to June 1873; part iii., 1873	Meteorological Committee, Board of Trade.
Bollettino Meteorologico dell'Osservatorio del R. Collegio Carlo Alberto in Moncalieri, vol. vii., No. 6, 30 Giugno 1870; vol. viii., No. 11, 30 Novembre 1873; vol. viii., No. 12, 31 Dicembre 1873; vol. viii., Anno 1872-3; vol. ix., 31 Gennaio 1874; vol. ix., 30 April 1874; vol. ix., No. 6, 30 Giugno 1874; vol. xi., 28 Febbraio 1874, with Index for vol. viii.	Director of the Collegio Carlo Alberto

Books, &c., Presented to the Observatory.	By whom Presented.
Results of Meteorological Observations made at the Radcliffe Observatory: 1871, two vols.; 1872, two vols.	Radcliffe Observatory.
Third Report of the Meteorological Office of the Dominion of Canada, Year ending 30th June 1875	Magnetic Observatory, Toronto.
Extract from <i>New Zealand Gazette</i> , Meteorological Report of New Zealand from 19th March to 10th September 1874	Dr. James Hector, Wellington, New Zealand.
Meteorological Report, 1873, including Returns for 1871-2, and Abstract for previous Years; also Abstracts on an Essay on the Climate of New Zealand, by Dr. J. Hann, one vol., and sheet extracts from <i>New Zealand Gazette</i> , No. 14, 4th March 1875	Ditto.
Meteorological Observations, Wellington, New Zealand, February to August 1874 ...	R. B. Gore, Wellington, New Zealand.
Results of Meteorological Observations made in New South Wales during 1873 ...	H. C. Russell, New South Wales.
Meteorological Observations made at the Government Observatory, Sydney, for each Month of the Year 1874	Ditto.
Transactions and Proceedings of the Royal Society of Victoria, vol. v. to vol. xi., 1860 to 1874	Royal Society of Victoria.
Transactions of the Philosophical Society of Victoria, vols. i. to iv., 1850-60 ...	Ditto.
Transactions and Proceedings of the Victorian Institute for the Advancement of Science: Session 1854 to 1855	Ditto.
Results of Meteorological Observations made at G. V. Juggarow's Observatory, Daba Gardens, Vizagapatam, India, 1872 and 1873	Daba Gardens Observatory, Vizagapatam, India.
Results of Meteorological and Magnetical Observations made at Stonyhurst College Observatory, 1873-4	Superintendent of Stonyhurst College.
Comet III., 1874, Coggia observed in Münster, 12th July 1874, two copies ...	Dr. E. Heis, Münster, Germany.
Almanaque Nautico, Para, 1875, calculado de Orden se la Superioridad in el Observatorio de Marina, 1875	Cecilio Pujazow, Observatory, San Fernando, Spain.
Report of the Meteorological Committee of the Royal Society for the Year ending 31st December 1873; also Report of Weather Telegraphy and Storm Warnings by a Committee appointed at the Leipzig Conference	Meteorological Committee, Board of Trade.
Magnetische und Meteorologische Beobachtungen an der K. K. Sternwarte zu Prag im Jahre 1874	Director of the Prague Observatory.
Publicationen der Hamburger Sternwarte, 1874	George Rümker, Observatory, Hamburg.
Synopsis of the Results of the Operations of the Great Trigonometrical Survey of India, 1874	India Office, London.
Annales de l'Observatoire Physique Central de Russie, 1872	Physikalisches Central Observatorium, Russia.
Hourly Readings from the Self-registering Instruments at the Seven Observatories in connection with the Meteorological Office, eight months, 1874	Meteorological Office, London.
Charts of Meteorological Data for Square 3, lat. 0° to 10° N., long. 20° to 30° W.: Remarks to accompany Monthly Charts of Meteorological Data, Square 3	Meteorological Office, London.
Transactions of the Royal Society of New South Wales, 1872	Royal Society, New South Wales.
List of Clock and Circumpolar Stars for 1875, two copies	Greenwich Observatory.
Eighth Annual Report of the Warden of the Standards on the Proceedings and Business of the Weights and Measures Department of the Board of Trade, 1873-4	Board of Trade, London.
Astronomische Beobachtungen auf der Sternwarte der Königlich Rheinischen Friedrich Wilhelms Universität zu Bonn, three vols.	Dr. H. Seeliger.
Resultate aus den Meteorologischen Beobachtungen Angestellt an fünfundzwanzig Königl. Sächsischen Stationen im Jahre 1871	Dr. C. Bruhns, Observatory, Leipzig.
Assumed Mean Right Ascension of Clock Stars and Circumpolar Stars, with the Corrections to the Nautical Almanac, 1st January 1875	Greenwich Observatory.
Jahrbücher der K. K. Central Anstalt für Meteorologie und Erdmagnetismus Neue Folge, band vii., viii., Jahrgang 1870 and 1871	Herr C. Jelinck, Central Observatory, Vienna, Austria.
Nederlandsch Meteorologisch, Jaarboek voor 1870, vol. ii.; 1873, vol. i.	M. Buys Bullot, l'Institut Royal Météorologique des Pays Bas, Holland.
Instructions for Meteorological Telegraphy	Meteorological Office, London.
Report of the Proceedings of the Conference on Maritime Meteorology, held in London, 1874: Protocols and Appendices	Meteorological Committee, London.

PUBLICATIONS, ETC.

The Monthly Records of Results of Observations in Meteorology, Terrestrial Magnetism, &c., have been published down to December 1874, and the proof of the one for January 1875 has been received from the printer. The annual volume of the Results for the year 1872 was published in September last. The First Melbourne General Catalogue of 1,227 Stars, for the epoch 1870, was published early in October, in time to be distributed among the different parties charged with the observation of the transit of Venus, by whom its great utility was acknowledged.

I cannot learn anything of the measures that have been taken for engraving or lithographing the drawings of the nebulae, &c., which have been made with the great telescope; my impression is, that Mr. Ellery intended to discuss the matter with some of the European astronomers, who have taken great interest in the subject.

THE WORK OF THE OBSERVATORY.

The past year has been one of great activity in all the branches of astronomy. Not only had we to make the necessary preparations for observing the transit of Venus at our own stations, but we had also to assist with the requisite observations for finding the positions of the stations occupied by the different nations in this part of the world. For this purpose the transits of the moon and culminating stars were observed at every opportunity during the four months commencing with 1st October; during the same period also every available occultation of a star by the moon was observed. Besides this, the stars used by Professor Peters, who had charge of the American party at Queenstown, in New Zealand, in determining the latitude of his position, have been as far as possible observed, also the comparison stars used by ourselves and by Mr. Tebbutt, of New South Wales, in finding the place of the fine comet of Coggia, which first appeared here in July. Observations were also taken for finding the difference of longitude between our Observatory

and Lieutenant Harkness's station at Hobart Town; in addition to which several sets of observations were made for determining the personal equation between myself and Lieutenant Harkness, the chief of the American party in Tasmania, and Dr. Seeliger, the leader of the German party to the Auckland Islands. Magnetic observations were also made at the Observatory by Captain Becks and Lieutenant Siegel of the Auckland Island party, and observations for finding the length of the seconds pendulum were made here by Lieutenant Harkness. It was at one time thought that the United States frigate *Swatara* would have proceeded to Port Darwin, where Lieutenant Harkness would have taken the necessary observations for finding the difference of longitude between Melbourne and a station in Batavia. The *Swatara*, however, was ordered home *viâ* Cape Horn; so the proposed work could not be carried out.

The apportionment of the work among the different officers has been but slightly altered since the last Report. As senior assistant, I have general charge of the astronomical instruments and reductions, and act for the Government Astronomer in his absence. I also take special charge of the transit circle, with which, up till lately, I made nearly the whole of the observations; in October last, however, when the moon observations were commenced, it was necessary to divide the work, and Mr. Gilbert observed on alternate nights; since February each observer has taken alternate weeks.

The work with the transit circle has consisted of the usual standard stars for finding the time, and the position of the instrument; close circumpolar stars, low stars for refraction, stars with which bodies had been compared off the meridian, stars culminating with the moon, the moon itself, and stars whose places were required by outside observers for any special purpose.

The numbers of the recorded observations are as follows:—

R.A. observations	...	...	...	...	...	2,064
P.D. observations	...	...	...	...	...	1,150
Observations of error of collimation			...	...	...	111
„ „ level and nadir			...	...	...	180
„ „ runs of microscopes				...	...	47
„ „ flexure			...	...	...	35

The state of the reductions is as follows:—

R.A. observations up to date.

P.D. observations.—The stars observed in 1873 are reduced with the exception of 212, which require the corrections to reduce them from their apparent to their mean places. Of the stars observed in 1874, 865 are wholly unreduced, 267 have the reductions applied as far as the refraction, 45 are reduced to their apparent places, and the remaining 45 are fully reduced. Of the stars observed during the present year, 184 are fully reduced, 46 are reduced to their apparent places, and 122 are wholly unreduced. The backwardness of the polar distance reductions has been caused by the great extension of the meteorological work, together with the extra demands on our time caused by the preparations for observing the transit of Venus. We are now, however, observing as few polar distances as possible, and Mr. Ellery, shortly before his departure, made a redistribution of the work, so as to relieve Mr. Moerlin, who is charged with these reductions, from a quantity of the meteorological work, which consists of mere tabulating, so as to leave him more time for his astronomical duties. It may therefore be reasonably hoped that by the time of the next Report all the observations will be fully reduced.

The magnetical and meteorological instruments are under the special charge of Mr. Moerlin. Absolute values of the magnetic elements have been made as usual once a month, and they are all reduced up to date. The photographic curves from the magnetographs, barograph, and thermographs, are developed on every alternate day, but as yet no general tabulation of them has been made; only occasional measures are taken from them for special purposes. The ordinary meteorological observations made at Melbourne and the different stations in the colony are reduced to date; the Monthly Records in Meteorology and Magnetism are prepared to the end of April, and are in the printer's hands; owing to press of work, however, in the Government Printing Office, the Records to the end of December 1874 only have as yet been received. The Yearly Report for 1873 is in hand, and that for 1874 will be prepared as soon as possible.

The great telescope, under the special charge of Mr. Turner, has been diligently worked during the last twelve months, except during the time that we were engaged in the special observations connected with the transit of Venus, when Mr. Turner took turns with Mr. Moerlin in observing the occultation of stars by the moon. In accordance with the strongly expressed opinion of the Board in the last Report, the work done has consisted principally of drawing the nebulae, and mapping the neighboring stars; ten of the nebulae and clusters figured by Sir John Herschel have been carefully drawn, and the positions of the stars have been laid down from micrometric measurements. One nebulae has been observed which is not to be found in any catalogue in our possession. Coggia's comet was examined on 18 nights, and 15 drawings of it obtained. A drawing of the nebula surrounding η Argus, with the stars accurately plotted in, made this year, shows no appreciable change when compared with the one made last year.

The large mirror A, as finally polished by Mr. Le Sueur, is the one still in use. It was taken out in February and carefully cleaned, and Mr. Turner finds that, by attentively collimating the mirrors in the various altitudes of the telescope, he obtains excellent definition whenever the atmospheric conditions are favorable.

Considerable annoyance has been experienced lately in the frequent breaking of the clock rope, which is made of iron wire. As we have not been able to obtain a new rope of the requisite dimensions in the colony, we have had to splice the old one each time. Mr. Ellery intends, however, to select a new one immediately on his arrival in England, and to forward it without delay.

The $4\frac{1}{2}$ -inch equatorial has been used by the different observers as occasion required. About the middle of last November it was dismantled and sent to Mornington, where it was used, as mentioned before, in observing the transit of Venus; it was returned to the Observatory and mounted a few days afterwards. Besides the occultations of stars by the moon, referred to before, and of which 96 were looked out for, and only 15 observed, owing to the unfavorable weather of the time, a fine series of observations for position of Coggia's comet was obtained by Mr. Ellery and myself; an observation of Encke's comet was also obtained during the present month; all of which, including the occultations, have been sent for publication to the *Astronomische Nachrichten*.

The 8-inch equatorial was only used for observing the transit of Venus, and a few tests for finding the quality of the object-glass. As I mentioned before, Mr. Ellery has taken the object-glass to London with him to receive a few final touches in the polishing. He intends to send it back as soon as that is accomplished, after which the instrument will be used for general ex-meridian work.

The zone transit instrument of $6\frac{1}{4}$ inches aperture has not been in use since the last Report. The object-glass was fitted to an equatorial mounting, which was used at Sandhurst by Mr. Moerlin for observing the transit of Venus; since its return it has been carefully packed away.

The photo-heliograph was used for observing the transit of Venus, in charge of Mr. Kernot, the lecturer on civil engineering in the University of Melbourne. Since that event it has been placed in charge of Mr. Turner, and a negative of the sun is generally taken on each clear day. Since February 4th, 56 negatives have been obtained.

The charge of the chronometers, time signals, electric telegraph, money accounts, and stores, is held by Mr. Gilbert. The number of chronometers on hand for rating generally amounts to about a dozen; at one time, however, during the past year, the number was thirty.

TRANSIT OF VENUS.

This phenomenon was observed at four Government stations in the colony, and although not one of the stations was favored with weather that enabled all the phases to be observed, yet some of the phases were observed at all of them.

At the Observatory Mr. Ellery, using the 8-inch equatorial, observed the two internal and last external contacts; with the same instrument, furnished with an Airy's double-image micrometer, we also obtained 14 measures of the diameter of Venus, 24 measures of the shortest distance between the limbs of Venus and the sun, and 23 measures of the breadth of the cusps near the time of egress. I also observed the times of the two internal contacts with the telescope of the altazimuth. The great reflector was also fitted with an appliance by means of which it was hoped that photographs of the sun would have been secured during the transit; the apparatus, however, was not finished in sufficient time to allow of preliminary practice, the result being that no pictures were obtained. The photo-heliograph was worked very successfully under the charge of Mr. Kernot, assisted by Messrs. Cook, Wilson, Tait, and Henderson; about 180 pictures were obtained with the Janssen apparatus, showing the position of Venus on the sun, at and near the times of contact; besides which, 37 views of the whole face of the sun with Venus on it were taken, with the ordinary plates, which show the sun's disc with a diameter of about four inches.

At View Hill, Sandhurst, the observations were made by Messrs. Moerlin and Black, assisted by Messrs. Pirani and McLean. The equatorial used had an object-glass of $6\frac{1}{4}$ inches aperture, by Ertel of Munich; the mounting was constructed at the Observatory. The weather was, generally speaking, very unfavorable, so that an observation of the last internal contact was the only one obtained.

At Mornington the observations were made by the late Professor Wilson, assisted by Messrs. Oliver and Cook. The instrument used was the Troughton and Simms equatorial of $4\frac{1}{2}$ inches aperture. The weather here was very unpropitious at the commencement of the transit, but the last two contacts were well observed.

At Glenrowan, near the station of that name on the North-Eastern Railway, the observations were made by Messrs. Gilbert and Allan, assisted by Messrs. Payter and Morris. The instrument used was the Cooke equatorial of $4\frac{1}{2}$ inches aperture. Here the weather was at first very promising, but near the commencement of the transit it became cloudy, so only the first internal contact was observed.

The various subsidiary computations appertaining to the transit, such as the reduction of the star transits, observations for determining the positions of the stations, &c., were completed soon after the event, and the results, together with the photographs, have been taken to England by Mr. Ellery to be dealt with by whatever authority may be selected to superintend the final combination of the observations, as any isolated efforts would be quite useless. Up to the present time, although the Astronomer Royal, in a late communication to the Royal Astronomical Society, says that he could easily fix on the foreign astronomer in whose hands he would like to see the work placed, I have not heard of any selection having been made.

The observations for finding the difference of longitude between Melbourne and Hobart Town were taken in January and February. Sets of stars were observed at Hobart Town by Lieutenant Harkness, and at Melbourne by myself, and clock beats were transmitted each way on five nights. The Melbourne observations were reduced immediately after they were taken; Lieutenant Harkness, however, had not sufficient time to read off his chronograph sheets before the departure of the *Swatara*, so it will be necessary to wait till we hear from Washington before the final result can be known. It is only right to acknowledge that the success of this work was in a great measure due to the hearty co-operation of Messrs. James and Payter, managers of the Melbourne Telegraph Office, and to Mr. W. Warren, of Georgetown, the officer in charge of the Tasmanian cable.

I hope that at the next annual inspection our respected director will have returned from his visit to Europe, with renewed health and vigor, to superintend the work of this establishment, over which he has so long and so ably presided.

E. J. WHITE,

Acting Government Astronomer.

Melbourne Observatory, 31st May 1875.