

ROYAL ASTRONOMICAL SOCIETY.

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M. J. JOHNSON, Esq. President, in the Chair.

J. B. Dancer, Esq., Manchester ;

Wentworth Erck, Esq., 27 Herbert Place, Dublin ; and

R. J. Mann, M.D., 7 St. Boniface Terrace, Ventnor,

were balloted for and duly elected Fellows of the Society.

Death of Professor Gauss.

A letter was read from M. Hausmann, Secretary of the Royal Society of Sciences of Göttingen, announcing the death of this distinguished individual, on the 23d ultimo, in the seventy-eighth year of his age.

Account of Operations connected with the Advancement of Commercial Astronomy in Australia. By Robert L. J. Ellery, Esq.

(*Extracts of a Letter to the Astronomer Royal.*)

“ Although not a member of the Astronomical Society, I take the liberty of communicating to you, as President of that body, the following information, deeming that the interest felt by the Society in the progress of science may prove a sufficient excuse for addressing them on so trivial a matter.

“ In June 1853, a time-ball signal—visible to the shipping in Hobson’s Bay—was erected on the mast or flagstaff, Gellibrand’s Point. Soon after its erection, I was appointed to take the necessary observations for the regulation of this signal. At that time, two chronometers (neither of them first-class instruments), and two indifferent sextants, with a small artificial horizon, composed the staff of instruments. By using the system of equal altitudes on every possible opportunity, I ascertained the rate of one chronometer to be sufficiently reliable to enable me to give the time,

even through a few days of cloudy weather; but the sudden and great changes of temperature act as a severe test to a chronometer's performance.

"In August, a small transit instrument was offered for sale, and bought by Government, with the works of a new regulator clock by Evans of Birmingham. Authority was given me to get a room built for the instrument and clock, which was done, attached to my quarters. The instrument was one of Spencer and Browning's 23-inch, on iron stand. Having some fine stone close at hand, I got some blocks cut, and a very substantial pier built. The building being of wood, the foundations for both transit-pier and clock had to be quite free from the building. The works of the clock were put in a case I got made here, and was mounted on a stone pier, built up about an inch above the level of the floor, with a large plank as a support at the back, built in with the foundation. The room had its meridional opening from horizon to horizon,—the south opening having a sea horizon, the north highlands at the back of Melbourne. After much trouble in adjusting the transit from the constant settling of the pier, from bad cement having been used, I got it into working order: got up a meridian mark, about half-a-mile away, consisting of three parallel vertical lines, finely marked with black paint on a white ground; and after that it soon became so steady as to only require occasional levelling. The clock, whose compensation was the mercurial one, after some little trouble, went very well and steadily in all the great extremes of temperature we are subject to (the temperature often has varied 45° from noon till midnight).

"With these instruments the time-signal has been given daily, Sundays excepted, up to February 1854, when a few instruments which had been ordered by the Colonial Government arrived, consisting of 30-inch transit by Potter (late Bates), regulator-clock, mercurial pendulum by Frodsham, sextant by Potter. These instruments were put into use at once; a new pier with a broader foundation was built for transit, and the old clock was removed to a room we use for chronometer-room, where a great many chronometers are brought for rating, &c. Up to this present time no other addition has been made, with the exception of one or two plain meteorological instruments. The clock by Frodsham is performing beautifully, having a steady rate of $-0^{\text{s}}.3$ a-day, with scarcely any perceptible deviation for temperature. Several times I have noticed, when the barometer was at 30.20 — 30.25 , a little more loss; but on the whole it has performed exceedingly well. The work that I have done with these instruments is as much as could be well done. The time-keeping is, of course, the main object at present; but, in addition, I am tabulating a regular list of zenith and circumpolar stars (of course of right ascension only, as the instrument has only a setting circle reading to minutes). I have, I think, determined the longitude of the observatory pretty closely, from the mean of

35 sets of moon-culminations. Its previously assigned position was $9^{\text{h}} 39^{\text{m}} 41^{\text{s}}.8$ E., $37^{\circ} 52' 42''$ S.; but I make the longitude, $9^{\text{h}} 39^{\text{m}} 40^{\text{s}}.0$ by the mean of 35 culminations. The assigned latitude I have always found correct. The previous position was, I believe, given by Captain Stokes, of one of her majesty's surveying vessels.

"The time-ball is a frame-work ball covered with canvass painted black, and is hoisted to the masthead by halyards, which halyards, when the ball is hoisted, are attached to a trigger below, and by a slight pull on which the halyards are released the ball drops. It is rather a primitive arrangement, but answers pretty well. Since the chief station of the electric telegraph has been completed at Melbourne, a time-ball has been placed on the tower of that building for the benefit of the city of Melbourne, and it is dropped at the same instant as the one here by means of the telegraphic wire. As yet no coil magnets are used for releasing the detents, as we have not been able to get them made yet; but I am only now waiting for authority to get the connexion as complete as possible. As it is now, I have to take a previously compared chronometer to the Flagstaff, a distance of about 50 yards from the observatory, and by the side of the trigger of the time-ball is a little brass *circuit closer* (the whole line being in complete circuit from 5 minutes to 1 o'clock, except at the Flagstaff, where the signal is given from). The ball in Melbourne being hoisted at the same time it is here—3 minutes before one—I connect the circuit several times to see all is right; each connexion is made known to the telegraph operator in Melbourne by the deflexion of a small needle indicator; he then stands in readiness with his hands on the trigger, and 5 seconds before one—I give seconds beats of the indicator—by connecting each second at the fifth beat both balls are released; and, from repeated watching, no perceptible interval in their dropping is perceived. The time-balls are about 8 miles apart: the one in Melbourne is a little to the eastward of the observatory,—about 2 seconds' time, I think. The exact instant of the drop of the Williamstown time-ball is marked by my only assistant, my wife; and if any error occurs, from wind or otherwise, it is thus accurately accounted for, and published in the daily papers.

"It is proposed to erect time-balls on the electric telegraph stations, which are now in course of erection at Geelong and Port Phillip Heads, so as to make every use of the observatory possible in giving mean time to different parts of the colony. The plan for these time-balls I have given myself, and will be constructed so as to be dropped by direct galvanic current without any manual intervention; and I wish to adopt the same means that you have done with regard to the time-ball at Deal (I think it is Deal),—viz. an appraisal by the drop of the signals themselves that they have dropped correctly. In addition to time-balls here, since June last another means has been adopted as a time-signal,—viz. the light of the lighthouse on Gellibrand's Point. It having been

represented to the chief harbour-master that on account of the great crowd of shipping those lying towards the opposite shores could not see the time-ball, and begging that some means might be adopted to make the signal more generally seen, the harbour-master had an apparatus fitted to the inside of the lantern, which obscures the light by releasing one trigger, and shows it again suddenly by releasing another. This was his own arrangement, and my instructions were to obscure the light at 2 minutes to 8 P.M., and suddenly show it at 8 o'clock, the latter being the true signal, any error of which would be published in the daily papers. It answers very well, but is very inconvenient, climbing the lighthouse-tower with a chronometer in hand. The master-mariners think it a great convenience, as it allows them to attend to the rating of their chronometers themselves, for business often keeps them on shore during the day. If this is continued, I must get some better plan devised: the telegraph wires could be used here too.

"The sum of 2500*l.* was voted by the Legislative Council for the building a stone observatory at Williamstown; this has not been done yet, but the Governor has placed in the estimates for next year the sum of 660*l.* for the purchase of astronomical and meteorological instruments, according to a list of what would absolutely be required that I was instructed to send in. The chief of these instruments were,—a transit circle, by Troughton and Simms; a 5 or 6-feet equatoreal by Troughton and Simms, or Ross; a portable transit collimator, &c.; with a small equipment of good meteorological instruments. In the ultimate purchase of these instruments, perhaps you might give some advice, from your great experience in such matters. At all events, I shall take the liberty of informing you when the orders are sent home for these instruments, in case you might feel any interest in guiding the purchase of them. I had omitted to say, that since December last I have kept a regular journal of three-hourly meteorological observations,—at least, so far as my limited staff of instruments allowed me, having only a simple, but very good pediment barometer, Zambra's thermometer, and aneroid barometer. Having neither rain-gauge, anemometer, or hygrometer, of course my observations are very limited; but, such as they are, they represent some interesting facts with regard to Australian meteorology.

*" Observatory, Gellibrand's Point,
Williamstown, Victoria."*

Account of the Steps recently taken by Her Majesty's Government for Promoting the Regular Observation of Meteorological Phenomena at Sea. By Capt. Robert Fitzroy, R.N.

"The importance of accumulating meteorological observations,