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Academy Observatory

Recording report on
the working of the —

for 1891 with a brief
historical sketch of the
institutions during the past
hundred years —

base of solid brickwork measuring 37 feet $\times$ 10 feet $\times$ 6 feet separated from the foundations of the walls by a space filled with coarse river-sand. On the south wall of the Observatory is a slab bearing the following inscription:—

ASTRONOMIE Consecratum
sumptibus Societatis Anglicanæ
in INDIA mercature faciendæ
favente CAROLO OAKELEY Baro
Prefecto Presidii Sancti Georgii

A.D. MDCXCII.

and a translation in Tamil, Telugu and Hindustani is carved on the granite pier in order that "Posterity may be informed a thousand years hence of the period when the mathematical sciences were first planted by British liberality in Asia." The architect of the building apparently was Captain Michael Topping, of the E.I.C. Ship *Walpole*, for on the top of the granite pier there is cut MICHAEL TOPPING ARCH. A.C. MDCXCII. Captain Topping was in 1792 engaged in taking observations of the currents in the Bay of Bengal and in 1794 he became Chief Surveyor in Madras, but it does not appear how he came to be architect of this building. The first Astronomer was Mr. J. Goldingham, who also held the appointment of Government Architect and as such built the Banqueting Hall. His earliest observations made in 1793 are recorded in a manuscript volume prefaced by an account of the building of the Observatory from which quotations have been made above. Two folio volumes contain the observations made by him between 1812 and 1825, while another volume contains an account of his very valuable pendulum determinations made near the equator and at Madras and other miscellaneous observations. He also did much good work in determining the longitudes of a number of stations in India and elsewhere. He made a long series of observations on the velocity of sound by means of the Fort and Mount time guns and began a meteorological register in 1796. He was evidently a man of great energy and resources and made full use of the somewhat insufficient appliances which were at his disposal. He died in February 1849.

The second Astronomer was Mr. Thomas Glanville Taylor, F.R.S., who was in charge of the Observatory from September 1830 till early in 1848. He received his training as an Astronomer at Greenwich Observatory under Mr. Pond. On his arrival he found that three new instruments which had been sent out in 1829 had been allowed "peacefully to repose in their packing cases." His first duty was to remove the old and erect these new and much more powerful instruments. These consisted of a five-foot transit instrument, a mural circle of four feet in diameter, and a five-foot equatorially mounted telescope by Dollond. With these instruments Mr. Taylor began the construction of his star catalogue, which in its final form was published in 1844 and contains the places of over 11,000 stars. This catalogue is still frequently asked for but very few copies of it are left, and the proposal to reprint it seems never to have been carried out. Mr. Taylor was hampered in his work by also holding an appointment in connection with the great Trigonometrical Survey which sometimes necessitated his absence from Madras for as much as 6 months at a time. In spite of this, he not only completed the catalogue already referred to, but also made a large number of other observations on the sun, moon, planets, &c. He also carried on the hourly meteorological and magnetical observations begun in 1840 by Captain Ludlow and transferred to the Observatory in 1845, when the buildings were considerably enlarged. His observations are contained in 7 published volumes. He died in England in May 1848, having never completely recovered from a serious injury received from a fall when on a visit to the Trivandrum Observatory.

In 1849 Captain W. S. Jacob, of the Bombay Engineers, was appointed Government Astronomer. His tenure of the office marks a new departure in the form of extra-meridional observations made with an equatoreal purchased originally by Captain Jacob himself, but afterwards taken over by Government and now occupying the small dome at the Observatory. He published one volume of astronomical results

besides contributing papers to the Royal Astronomical Society. Captain Jacob resigned the appointment early in 1859 on account of ill-health and died at Poona in August 1862.

The appointment was held during the next two years, part of the time by Major W. K. Worster, R.A., and the other part by Major (now General) J. F. Tennant, R.E. The instruments up to that time in use having become obsolete, it was resolved to replace them by modern instruments of a high class—a change which caused much delay in the work of the Observatory for several years. In 1861 the late Mr. N. R. Pogson arrived in Madras as Government Astronomer, and found the erection of the new transit circle still far from complete, so that it was not till May 1862 that it was fully ready for use. This instrument has a telescope of 5 inches aperture and a circle 42 inches in diameter read by six microscopes. It was made by Messrs. Troughton and Simms.

In 1866 a new equatoreal with an 8-inch object glass was erected on the roof of the Astronomer's house. Thus supplied with excellent instruments Mr. Pogson set vigorously to work, and, though hampered by want of proper assistance, accumulated a vast quantity of observations. The transit circle was employed for the preparation of a catalogue of 5,000 stars, each of which was observed at least five times. The whole of these observations were reduced as soon as possible after they were made, and four volumes containing the results for the first 12 years have been published. These observations were made almost entirely by the native assistants. Mr. Pogson himself chiefly used the equatoreals and in addition to the discovery of six minor planets and seven variable stars he continued the work begun at home on his "Atlas of variable stars" and made very valuable series of observations on the opposition of Mars, eclipses of the sun and moon, and of the positions of the minor planets. His lamented death in 1891 before the publication of these was far advanced has, to a certain extent, decreased their value, but much remains which is of permanent use to astronomers.

During the 33 years which have elapsed since the instruments now in use in the Observatory were ordered, astronomy has advanced so rapidly along certain lines that the instrumental equipment is again found very defective. The transit circle is still a thoroughly satisfactory instrument, but even its value might be considerably increased by the addition of modern appliances, while for the "new astronomy"—photography and spectroscopy—there is practically no provision. The liberality of the Government, which has from time to time in the past hundred years been shown in the re-equipment of the Observatory, will doubtless again make such provision as will enable it to take a due share in the work now lying before astronomers.

ADMINISTRATION REPORT FOR THE YEAR 1891.

Staff.—The staff of the Observatory suffered a most serious loss by the death on June 23rd of the Government Astronomer, Mr. Norman Robert Pogson, after a continuous service of more than 30 years. On July 4th Mr. C. Michie Smith took over charge as Officiating Government Astronomer from Mrs. Pogson, who had held the acting appointment from June 24th. On July 11th Mrs. Pogson resigned her appointment as Assistant to the Government Astronomer and this appointment has not been filled up. The only other change in the staff during the year was the temporary addition of a clerk to assist in the non-scientific work of the office.

2. *Buildings and Instruments.*—These have been kept in good order throughout the year. Owing to the thorough renovation of the principal astronomical instruments in the two preceding years, they required only the ordinary attention and are all now in good working order. The anemograph was thoroughly cleaned and repaired as far as could be done without actual renewal of the gearing, and, though nearly worn out, still performs fairly well.

3. *Observations.*—In accordance with the instructions laid down several years ago, observations have been held as altogether subordinate to publication except as regards those necessary for the time service. These have been continued exactly as in former years. The transit of Mercury was observed on May 10th and the results communicated to *The Observatory*. The great increase of solar activity as evidenced

by the outburst of numerous groups of sun spots has been watched with interest but the appliances at the Observatory for solar observation do not permit of any really valuable work being done in this direction.

4. *Time Service.*—This has been maintained efficiently throughout the year. The time gun was fired correctly on 710 out of 730 occasions, giving 97·3 per cent. of success. The failures were almost entirely due to defective friction tubes. The semaphore failed on 36 occasions, of which 28 were between January 1st and May 31st; part of the failures in that period were due to a want of delicacy in the adjustment of the dropping apparatus combined with the high resistance of the earth circuit caused by the excessive dryness of the season. Between May and December there were only eight failures, none of which were due to any fault in the Observatory. On the average for the year, the semaphore gave 1·90 correct signals daily and the gun 1·95, so that in spite of the failures it may safely be said that the shipping was amply supplied with time signals. Probably no other port is supplied with equally numerous signals. The electrically-controlled clock at the Post and Telegraph Office kept good time throughout the year, but that at the Port Office continued to prove so unsatisfactory, in spite of all attempts to set it right, that permission was requested to hand it over to the Port Trust to be used as an ordinary clock without electrical control. The daily time roll was sent as usual from the Observatory at 4 P.M., and distributed by the telegraph system throughout India.

5. *Publications.*—The distribution of Vol. III. of the *Madras Meridian Circle Observations* was not completed till May, and comparatively little work was done on Vol. IV. during the first six months of the year on account of the continued serious illness of the Astronomer. During the second half of the year the work was pushed on as rapidly as possible, and by the close of the year the volume was completed with the exception of a few pages of introductory matter. At the same time the publication of the meteorological results for the 30 years, 1861–90, was taken in hand and the volume was almost completed by the close of the year. This volume contains the mean daily meteorological records with monthly and annual means as well as the means for the whole period, but it does not contain any general discussion of the results, as it seemed that that ought to be left till, by the publication of the results for the period, 1856–60, the whole period of 50 years, 1841–90, could be dealt with.

6. *General.*—During the latter part of the year the 5th Observatory Assistant has undergone a course of training in time observations and is now qualified to take transits accurately. At the same time, the observer selected for the new time observatory at Rangoon has been trained in the use of the transit instrument and other duties connected with a time observatory. Much time has been devoted to the arrangement of papers and the introduction of a proper system of record of documents and correspondence, with, it is believed, satisfactory results as far as official correspondence is concerned. Much, however, still remains to be done in arranging and cataloguing the library and the manuscript records, and at the close of the year steps had been taken to have this thoroughly done. The manuscript records go back to 1792 (a few meteorological ones are even earlier), and while some of them are in a thoroughly good state of preservation, many have been seriously damaged and require very careful treatment. Much of the damage seems to have been due to a great cyclone in October 1836 which broke in two of the doors of the Observatory and carried away the shutters of the transit slit and the dome of the Observatory, exposing the contents of the room to the heavy rain which accompanied the storm.

7. *Meteorology.*—The meteorological register was continued as in past years, but certain additional observations were taken. The observations at 10 A.M. and 4 P.M., which had been discontinued owing to a mistake as to the wants of the Meteorological Department, were again begun, while observations of the duration of bright sunshine were commenced. Special attention was also given to the record of lightning. The chief feature of the meteorology of the year was the great deficiency of rain during the first 9 months. The total fall up to the end of September was only 6·85 inches, which is the smallest fall on record. The monsoon rainfall amounted to 23·41 inches, against an average of 27·6 inches. The atmospheric pressure, temperature, humidity, and wind velocity were all slightly above the average. The highest temperature

(107·3) was recorded on June 6th, and the lowest (61·7) on January 9th. The greatest fall of rain on one day was 3·60 inches on October 18th. An appendix contains an abstract of the meteorological observations for the year.

8. The following list shows the surplus copies of the Madras Observatory publications in store on December 31st:—

				Wrappers.	Bound.
Madras Astronomical Observations in 1831	..	..	..	..	5
Do. do. in 1832–33	..	..	..	13	5
Do. do. in 1834–35	..	..	..	15	6
Do. do. in 1836–37	..	..	..	26	6
Do. do. in 1838–39	..	..	..	25	6
Do. do. in 1838–39	..	..	..	..	8
Taylor's Madras Catalogue of Stars, Epoch 1835	..	..	..	..	6
Madras Solar, Lunar and Planetary Observations, 1831–1847	..	..	..	11	5
Do. Astronomical Observations (Jacob's) 1848–1852	..	..	..	14	..
Do. Meteorological Observations, 1822–1843	..	..	..	30	..
Do. Hourly Meteorological Observations in 1841	..	..	..	1	..
Do. Hourly Meteorological Observations, 1841–1845	..	..	..	..	2
Singapore Hourly Magnetical Observations, 1841–1845	..	..	..	3	..
Madras Hourly Meteorological Observations in 1843	..	..	..	..	..
Do. Magnetical Observations 1846–1850	..	..	..	16	..
Dodabetta Meteorological Observations, 1847–48	..	..	..	61	1
Do. do. do. 1848–1850	..	..	..	1	..
Do. do. do. 1851–1855	..	..	..	1	..
Do. do. do. 1851–1855	..	..	..	1	48
Madras Hourly Meteorological Observations, 1851–1855	..	..	..	..	88
Do. Magnetical do. 1851–1855	..	..	..	..	7
Telegraphic Longitude Determinations (Pogson) 1870–1875	..	..	..	..	57
Madras Meridian Circle Observations (do.) 1862–1864	..	..	..	..	49
Do. do. (do.) 1865–1867	..	..	..	..	..
Do. do. (do.) 1868–1870	..	..	..	..	50

Mean Monthly and Annual Meteorological Results at the Madras Observatory in 1891.

Barometer.		Dry Bulb Thermometer.				Wet Bulb.	Tension of Vapour.		Relative Humidity.	Sun Max. in Vac.	Min. on Grass.	Wind.		Rain.		Clear Sky.	Bright Sunshine		
Reduced to 32°.	Daily Range.	Mean.	Max.	Min.	Range.	Mean.	Inches.	Cents.				Daily Velocity.	Points.	Points.	Inches.	No.	Cents.	Hours.	Per cent.
	Inches.	°	°	°	°	°				°	°	Miles.							
January	29.997	0.105	76.8	87.3	67.7	19.6	.700	76	143.3	65.4	143	3	N.E. by N.	3	0.62	3	62	283	80
February	29.980	0.090	78.4	87.9	70.1	17.8	.743	76	141.0	68.2	138	7	E. by N.	7	..	69	273	84	87
March	29.908	0.114	80.8	90.1	72.3	17.8	.796	76	143.3	70.5	144	12	S.E.	12	..	81	325	87	84
April	29.866	0.107	83.7	93.6	76.8	16.8	.891	77	144.6	75.1	183	14	S.S.E.	14	..	67	317	85	87
May	29.755	0.099	85.4	95.7	79.6	16.1	.943	77	138.0	78.0	195	15	S. by E.	15	0.49	3	42	260	66
June	29.706	0.114	88.2	102.2	82.6	19.6	.884	67	143.1	81.6	256	18	S.S.W.	18	0.20	4	51	258	67
July	29.723	0.123	86.6	99.3	80.6	18.7	.802	64	142.5	79.0	226	20	S.W.	20	0.97	15	22	154	39
August	29.763	0.137	85.5	97.5	79.1	18.4	.808	66	144.8	77.6	200	19	S.W. by S.	19	2.41	12	33	212	55
September	29.787	0.142	84.8	97.0	78.8	18.2	.838	71	146.8	77.5	181	18	S.S.W.	18	2.16	10	42	212	58
October	29.882	0.112	80.9	88.2	75.5	12.7	.881	83	138.7	74.4	128	5	N.E. by E.	5	13.42	18	41	194	53
November	29.915	0.105	78.4	86.6	72.2	14.4	.780	80	139.8	69.8	131	3	N.E. by N.	3	4.87	12	45	210	61
December	29.984	0.104	76.8	83.4	72.5	10.9	.775	84	133.3	70.6	228	2	N.N.E.	2	5.29	17	41	196	56
Annual	29.856	0.113	82.2	92.4	75.7	16.7	.820	75	141.6	74.0	179	11	S.E. by E.	11	30.43	94	50	2,804	66
Average, 1861-90.	29.843	0.124	81.2	90.4	74.9	15.6	.768	72	138.5	72.0	170	12	S.E.	12	49.68	93	51		

Extreme Monthly Meteorological Records at the Madras Observatory in 1891.

	Barometer.		Dry Bulb Thermometer.		Humidity.		Sun Th. in Vacuo.		Grass Therm.		Wind.		Rain.	
	Highest.	Lowest.	Range.	Highest.	Lowest.	Cents.	Day.	°	Highest.	Lowest.	Highest.	Lowest.	Greatest Fall.	Day.
	Inches.	Inches.	Inches.	°	°	Day.	°	Day.	°	°	Miles.	Miles.	Inches.	Day.
January	30.105	29.897	0.208	89.1	61.7	48	8	147.2	58.7	6	13	82	0.48	11
February	30.035	29.858	0.177	90.0	63.7	44	5	145.4	60.6	22	12	66	..	..
March	30.004	29.799	0.205	93.9	61.5	44	3	149.2	61.7	31	14	73	..	..
April	29.978	29.750	0.228	97.1	70.9	48	2	150.1	68.5	9	24	112	..	..
May	29.928	29.696	0.232	104.3	76.8	35	25	148.4	74.9	16	24	77	..	..
June	29.807	29.624	0.183	107.3	77.3	33	11	150.5	73.2	31	24	23	0.36	23
July	29.884	29.601	0.283	104.3	75.2	29	18	159.5	73.1	8	24	18	0.16	7
August	29.882	29.656	0.226	103.7	74.4	30	6	159.8	72.5	30	25	148	0.22	31
September	29.934	29.667	0.267	101.6	72.4	29	8	157.4	71.8	28	26	101	0.80	30
October	30.020	29.727	0.293	93.1	72.8	54	9	153.1	71.0	29	22	55	1.49	28
November	30.051	29.772	0.279	89.6	64.1	42	19	149.2	59.8	24	25	58	3.60	18
December	30.128	29.884	0.244	86.5	66.2	51	6	144.6	64.0	39	25	124	1.44	1

ORDER—dated 14th June 1892, No. 403, Public.

Recorded.

(True Extract.)

Chief Secretary.

To the Government Astronomer.
Editors' Table.

ENDORSEMENT—dated 14th June 1892, No. 404, Public.

Copy to the Government of India, Revenue and Agricultural Department.

J. F. PRICE,
Chief Secretary.

Exd. A. Raitt.

Govt. of {1892} Madras.
PUBLIC.

Issued

Recd.

Encl.

G.O., &c., 14th June 1892,
Nos. 403, 404.

JUNE.

Madras Observatory.

Recording report on the working of the — for
1891 with a brief historical sketch of the institu-
tion during the past hundred years.

note for the H.M.

These reports are
usually "recorded"
simply. Orders are
requested whether
any remark need
be made on this
^{particular} ~~special~~ occasion.

Z.B.
8/6.

X
9 June

I am honored to say

Yours
11 June

order. 14 June 2 A 403

Recorded.

(from orders)

To Mr. Govt. Secy
astronomer 5/6/92

Encl. A 404

Copy to the G.O. of } 5/6/92
Rev: & Agri: Dept. } 20/6/92

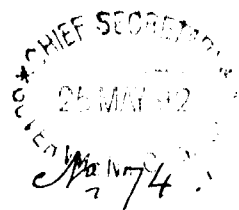
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11/6

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Public (1892) Dept.

6/8/91 No 667/8 Pres.

From
The Govt. Astronomer



Date 23rd May/92
Recd
Reg^d 26th — do

Encls. ~~two~~

Submitting Annual
Report for 1891 with an
historical sketch.

Mean Monthly and Annual Meteorological Results at the Madras Observatory in 18

[illegible]

Extreme Monthly Meteorological Records at the Madras Observatory in 18

[illegible]

Mean Monthly and Annual Meteorological Results at the Madras Observatory in 1891

	Barometer.		Dry Bulb Thermometer.				Wet Bulb.		Tension of Vapour.		Sun Max in Vac.	Min on Grass.	Wind.			Rain.		Clear Sky.		
	Reduced to 32°.	Inches.	Mean.	Max.	Min.	Range.	Mean.	Min.	By Blanford's Tables.				Points.	Direction.	Miles.	Points.	Amount.		Days.	Cents.
									Inches.	Cents.										

January	29.57	0.105	70.8	87.3	67.7	49.6	7.4	70	14.3	66.4	14.8	8	N. E. by E.	14.8	31-9	3	42	200	52	253	100
February	29.50	0.090	73.4	85.5	70.1	47.8	7.0	76	14.0	63.2	10.8	7	E. by N.	10.8	4-20	3	61	258	54	250	80
March	29.63	0.114	80.8	90.1	72.3	47.8	7.5	70	14.3	70.8	14.4	12	S. E.	14.4	1-12	10	42	212	54	252	80
April	29.86	0.107	83.4	98.0	76.8	46.7	7.2	77	14.4	76.1	18.3	14	S. S. E.	18.3	1-12	10	42	212	54	252	80
May	29.68	0.099	85.4	98.7	74.0	46.1	7.4	74	13.8	73.0	19.5	15	S. S. E.	19.5	1-12	10	42	212	54	252	80
June	29.71	0.114	89.2	102.2	82.0	49.6	7.4	67	14.3	81.6	25.0	18	S. S. E.	25.0	1-12	10	42	212	54	252	80
July	29.72	0.123	86.5	99.3	80.0	49.7	7.1	64	14.5	79.0	22.6	20	S. W.	22.6	1-12	10	42	212	54	252	80
August	29.73	0.137	85.5	97.5	74.1	48.4	7.0	60	14.4	77.6	20.0	19	S. W. by S.	20.0	1-12	10	42	212	54	252	80
September	29.78	0.142	84.8	95.0	73.8	48.2	7.3	57	14.0	74.5	18.1	18	S. S. W.	18.1	1-12	10	42	212	54	252	80
October	29.82	0.112	80.4	88.2	75.5	42.7	7.1	53	13.7	74.4	12.8	5	S. S. E. by E.	12.8	1-12	10	42	212	54	252	80
November	29.61	0.105	78.4	86.6	72.2	44.4	7.2	50	13.9	69.8	10.1	3	N. E. by E.	10.1	1-12	10	42	212	54	252	80
December	29.64	0.104	70.8	83.4	72.5	40.9	7.3	54	13.3	70.6	22.8	2	N. E.	22.8	1-12	10	42	212	54	252	80
Annual	29.66	0.113	82.2	92.4	75.7	46.7	7.5	65	14.1	74.0	17.5	11	S. E. by S.	17.5	30-43	46	50	284	57	286	86
Extreme 24h. Range	29.86	0.124	81.2	90.4	72.7	50	7.4	72	13.8	72.0	17.0	12	S. E.	17.0	49-68	93	57	284	57	286	86

Extreme Monthly Meteorological Records at the Madras Observatory in 1897.

	Barometer.		Dry Bulb Thermometer.		Wet Bulb.		Humidity.		Sun Th. in Vacuo.		Grass Therm.		Wind.		Rain.	
	Highest.	Lowest.	Inches.	Range.	Highest.	Lowest.	Lowest.	Day.	Highest.	Day.	Lowest.	Day.	Miles.	Day.	Miles.	Day.

January	29.105	29.857	29	0.208	29	6.7	9	48	8	14.2	6	50.2	9	24.5	13	0.28	28
February	29.005	29.868	4	0.237	4	6.7	0	44	5	14.2	2.2	50.2	1	23.4	12	0.28	28
March	29.004	29.74	15	0.205	15	6.7	1	44	3	14.2	3.1	51.7	1	21.4	24	0.28	28
April	29.79	29.768	14	0.220	14	7.09	5	48	2	14.2	4	53.5	5	27.4	24	0.28	28
May	29.229	29.594	30	0.332	31	7.08	25	39	2.6	14.2	4	74.9	16	24.4	31	0.28	28
June	29.904	29.624	21	0.165	6	7.08	29	32	11	15.5	3.0	74.4	1	21.4	25	0.28	28
July	29.804	29.601	15	0.203	15	7.42	1	29	18	15.5	4	74.4	12	21.4	31	0.28	28
August	29.82	29.648	5	0.220	6	7.44	12	20	6	15.7	14	74.4	26	21.4	31	0.28	28
September	29.84	29.607	1	0.274	7	7.44	28	24	3	15.7	14	74.4	26	21.4	31	0.28	28
October	29.82	29.727	22	0.243	25	7.28	19	22	9	15.3	11	74.4	24	21.4	31	0.28	28
November	29.87	29.772	5	0.274	6	6.41	22	24	14	14.9	6	74.4	24	21.4	31	0.28	28
December	29.28	29.824	46	0.244	6	6.62	30	24	6	14.4	2	64.4	30	21.4	31	0.28	28

The greatest fall of rain on one day was 3.60 inches on October 18th. An appendix contains an abstract of the meteorological observations for the year.

8. The following list shows the surplus copies of the Madras Observatory publications in store on December 31st :—

	Maples	Bound
Madras Astronomical observations in 1831	13	5
Do " " " in 1832-33	13	5
Do " " " 1834-35	15	6
Do " " " 1836-37	26	6
Do " " " 1838-39	25	6
Taylor's Madras Catalogue of Stars Epoch 1835	"	8
Madras Solar, Lunar and Planetary observations 1831-1847	11	6
Do Astronomical observations (Jacobi) 1848-1852	14	5
Do Meteorological observations 1822-1843	30	"
Do Hourly meteorological observations in 1841	1	"
Singapore hourly magnetic observations 1841-1845	"	2
Madras hourly meteorological do in 1843	3	"
Do magnetic do 1846-1850	16	"
Do dathetta meteorological observations 1847-1848	61	1
Do " " 1848-1850	1	"
Do " " 1851-1855	1	"
Madras hourly meteorological observations 1851-1855	1	48
Do magnetic do 1851-1855	"	88
Telegraphic Longitude Determinations (Pogson) 1870-1875	"	7
Madras Meridian circle observations " 1862-1864	"	57
Do " " 1865-1867	"	49
Do " " 1868-1870	"	50

C. Michie Smith,
Offg. Genl. Astronomer.

due to a great cyclone in October 1836 which broke in two of the doors of the Observatory and carried away the shutters of the transit slit and the dome of the Observatory, exposing the contents of the room to the heavy rain which accompanied the storm.

7. Meteorology. The meteorological register was continued as in past years but certain additional observations were taken. The observations at 10 A.M. and 4 P.M. which had been discontinued owing to a mistake as to the wants of the Meteorological Department were again begun while observations of the duration of bright sunshine were ~~commenced~~. Special attention was also given to the record of lightning. The chief feature of the meteorology of the year was the great deficiency of rain during the first nine months. The total fall up to the end of September was only 6.85 inches which is the smallest fall on record. The monsoon rainfall amounted to 23.41 inches against an average of 27.6 inches. The atmospheric pressure, temperature, humidity, and wind velocity were all slightly above the average. The highest temperature ($107^{\circ}.3$) was recorded on June 16th and the lowest ($61^{\circ}.7$) on January 9th. The

of the year the 5th Observatory Assistant. has undergone a course of training in time observations and is now qualified to take transits accurately. At the same time the Observer selected for the new time observatory at Rangoon has been trained in the use of the transit instrument and other duties connected with a time Observatory. Much time has been devoted to the arrangement of papers and the introduction of a proper system of record of documents and correspondence with, it is believed, satisfactory results so far as official correspondence is concerned. Much, however, still remains to be done in arranging & cataloguing the library and the M. S. Records, and at the close of the year steps had been taken to have this thoroughly done. The M. S. records go back to 1792 (a few meteorological ones are even earlier) and while some of them are in a thoroughly good state of preservation many have been seriously damaged and require very careful treatment. Much of the damage seems to have been due

5. Publications. The distribution of Vol. III. of the Madras Meridian Circle Observations was not completed till May and comparatively little work was done on Vol. IV. during the first six months of the year on account of the continued serious illness of the Astronomer. During the second half of the year the work was pushed on as rapidly as possible and by the close of the year the volume was completed with the exception of a few pages of introductory matter. At the same time the publication of the meteorological results for the 30 years, 1861-90 was taken in hand and the volume was almost completed by the close of the year. This volume contains the mean daily meteorological records with monthly and annual means as well as means for the whole period, but it does not contain any general discussion of the results as it seemed that that ought to be left till, by the publication of the results for the period 1856-60, the whole period of 50 years 1841-90 could be dealt with.

6. General. During the latter part of

of the dropping apparatus combined with the high resistance of the earth circuit caused by the excessive dryness of the season.

Between May and December there were only 8 failures none of which were due to any fault in the Observatory. On the average for the year the semaphore gave 1.90 correct signals daily and the gun 1.95 so that in spite of the failures it may safely be said that the shipping was amply supplied with time signals. Probably no other port is supplied with equally numerous signals. The electrically controlled clock at the Post and Telegraph Office kept good time throughout the year but that at the Port Office continued to prove so unsatisfactory in spite of all attempts to set it right, that permission was requested to hand it over to the Port Trust to be used as an ordinary clock without electrical ~~control~~ ^{control}. The daily time roll was sent as usual from the Observatory at 4 P.M. and distributed by the telegraph system throughout India.

Publications,

the instructions laid down several years ago observations have been held as altogether subordinate to publication except as regards those necessary for the time service. These have been continued exactly as in former years. The transit of Mercury was observed on May 10th and the results communicated to The Observatory. The great increase of solar activity as evidenced by the outburst of numerous groups of sun spots has been watched with interest but the appliances at the Observatory for solar observation do not permit of any really valuable work being done in this direction.

4. Time Service. This has been maintained efficiently throughout the year. The time gun was fired correctly on 710 out of 730 occasions giving 97.3 per cent of success. The failures were almost entirely ~~due~~ to defective friction tubes. The Semaphore failed on 36 occasions of which 28 were between January 1st and May 31st. - Part of the failures in that period were due to a want of delicacy in the adjustment of

of the Government Astronomer, Mr. Norman Robert Pogson, after a continuous service of more than 30 years. On July 14th Mr. C. Michie Smith took over charge as Officiating Government Astronomer from Mr. Pogson who had held the acting appointment from June 24th. On July 11th Mr. Pogson resigned her appointment as Assistant to the Government Astronomer and this appointment has not been filled up. The only other change in the staff during the year was the temporary addition of a clerk to assist in the non-scientific work of the office.

2. Buildings and Instruments. These have been kept in good order throughout the year. Owing to the thorough renovation of the principal astronomical instruments in the two preceding years they required only the ordinary attention and are all now in good working order. The Anemograph was thoroughly cleaned and repaired as far as could be done without actual renewal of the gearing and, though nearly worn out, still performs fairly well.

3. Observations. In accordance with the

their value but much remains which is of permanent use to Astronomers.

During the 33 years which have elapsed since the instruments now in use in the Observatory were ordered Astronomy has advanced so rapidly along certain lines that the instrumental equipment is again found very defective. The transit circle is still a thoroughly satisfactory instrument, but even its value might be considerably increased by the addition of modern appliances, while for the new Astronomy—photography and spectroscopy—there is practically no provision. The liberality of the Government which has from time to time in the past ^{hundred years} ~~century~~ been shown in their equipment of the Observatory will doubtless again make such provision as will enable it to take a due share in the work now lying before Astronomers.

Administration Report for the year 1891.

Staff. The staff of the Observatory suffered a most serious loss by the death on June 23rd of

object glass was erected on the roof of the Astronomer's house. Thus supplied with excellent instruments Mr. Pogson set vigorously to work and though hampered by want of proper assistance accumulated a vast quantity of observations. The transit circle was employed for the preparation of a catalogue of 5000 stars each of which was observed at least 5 times. The whole of these observations were reduced as soon as possible after they were made and four volumes containing the results for the first 12 years have been published. These observations were made almost entirely by the Native assistants. Mr. Pogson himself chiefly used the Equatorials and in addition to the discovery of 6 minor planets and 7 variable stars he continued the work begun at home on his "Atlas of variable stars" and made very valuable series of observations on the opposition of Mars, Eclipses of the Sun & Moon, and of the positions of the minor planets. His lamented death in 1891 before the publication of these was far advanced has, to certain extent, decreased their

at the Observatory. He published one volume of astronomical results besides contributing papers to the Royal Astronomical Society. Captain Jacob resigned the appointment early in 1859 on account of ill health and died at Poona in August 1862.

The appointment was held during the next two years, part of the time by Major W. H. Wooster R. A., and the other part by Major (now General) J. F. Tennant R. E. The instruments up to that time in use having become obsolete it was resolved to replace them by modern instruments of a high class - a change which caused much delay in the work of the Observatory for several years. In 1861 the late Mr. N. R. Pogson arrived in Madras as Government Astronomer and found the erection of the new transit circle still far from complete so that it was not till May 1862 that it was fully ready for use. This instrument has a telescope of 5 inches aperture and a circle 42 inches in diameter read by six microscopes. It was made by Messrs. Troughton and Simms.

In 1866 a new Equatorial with an 8" object

work by also holding an appointment in connection with the great Trigonometrical Survey which sometimes necessitated his absence from Madras for as much as 6 months at a time. In spite of this he not only completed the catalogue already referred to but also made a large number of other observations on the Sun, Moon, planets, &c. He also carried on the hourly meteorological and magnetical observations begun in 1840 by Captain Ludlow and transferred to the Observatory in 1845, when the buildings were considerably enlarged. His observations are contained in 7 published volumes.

He died in England in May 1848 having never completely recovered from a serious injury received from a fall when on a visit to the Trevandrum Observatory.

In 1849 Captain W. S. Jacob of the Bombay Engineers was appointed Government Astronomer. His tenure of the office marks a new departure in the form of extra-meridional observations made with an Equatorial purchased originally by Captain Jacob himself but afterwards taken over by Government and now occupying the small dome at

register in 1796. He was evidently a man of great energy and resources and made full use of the somewhat insufficient appliances which were at his disposal. He died in February 1849.

The second Astronomer was Mr. Thomas Glanville Taylor, F. R. S. who was in charge of the Observatory from September 1830 till early in 1848. He received his training as an Astronomer at Greenwich Observatory under Mr. Pond. On his arrival he found that three new instruments which had been sent out in 1829 had been allowed "peacefully to repose in their packing cases". His first duty was to remove the old and erect these new and much more powerful instruments. These consisted of a five-foot transit instrument, a mural circle of four feet in diameter, and a five-foot equatorially mounted telescope by Dolland. With these instruments Mr. Taylor began the construction of his star catalogue which in its final form was published in 1844 and contains the places of over 11000 stars. This catalogue is still frequently asked for but very few copies of it are left and the proposal to reprint it seems never to have been carried out. Mr. Taylor was hampered in his work,

cut Michael Topping Arch. A.C. MDCXCII.

Captain Topping was in 1792 engaged in taking observations of the currents in the Bay of Bengal and in 1794 he became Chief Surveyor in Madras, but it does not appear how he came to be architect of this building. The first Astronomer was Mr. J. Goldingham who also held the appointment of Government Architect and as such built the Rangjung Hall. His earliest observations, made in 1793, are recorded in a M.S. volume prefaced by an account of the building of the Observatory from which quotations have been made above. Two folio volumes contain the observations made by him between 1812 and 1825, while another volume contains an account of his very valuable pendulum determinations made near the Equator and at Madras and other miscellaneous observations. He also did much good work in determining the longitudes of a number of stations in India and elsewhere. He made a long series of observations on the velocity of sound by means of the Fort and Mount time guns and began a Meteorological register

and apparently left unused. Amongst these were two Astronomical Quadrants (one by Bird); "two large $3\frac{1}{2}$ feet achromatic telescopes with tripple object glasses by Dolland" which "were found in opposite Provinces and restored to use"; two astronomical Clocks with compound pendulums — one of which, by Shelton, still justifies the character given it by Goldingham of "a most excellent time keeper" — and other minor instruments. To these Mr Petrie added a small but excellent transit instrument and, when he went to Europe, in 1789, he handed over his Observatory and instruments to the public service. "To this original Institution therefore", writes Goldingham, "I may securely add, the present more enlarged and commodious establishment owes its rise 'alter et idem nascitur', in the promoting of which there seems to have been a fortunate union of sentiments among the several parties concerned, a happy contention which should contribute most to its success, whether the first Founder, our present Governor, or the Court of Directors at home". The original building (the transit room of the present Observatory) was erected with great care, every precaution being taken to secure the utmost possible stability for the instruments and durability for the building — every

every operation being carried out under the eyes of the Superintendent even to the mixing of the Churnam with a proper quantity of Jaggery. The pier which carried the original small transit instrument is a granite pillar weighing $2\frac{1}{2}$ tons resting on a base of solid brickwork measuring 37 ft x 10 ft x 6 ft separated from the foundations of the walls by a space filled with coarse river sand. On the south wall of the Observatory is a slab bearing the following inscription:—

ASTRONOMIÆ Consecratum
sumptibus Societatis Anglicanæ
in INDIA mercaturæ faciendæ
Favento CAROLO OAKELEY Bar
Præfeto Præsidii Sancti Georgii
A.D. MDCCXCII.

and a translation in Tamil, Telugu and Hindustani is carved on the granite pier in order that "Posterity may be informed a thousand years hence of the period when the mathematical sciences were first planted by British liberality in Asia". The architect of the building apparently was Captain Michael Topping of the E. I. C. ship Walpole, for on the top of the granite pier there is

cut

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The present year being the centenary of the
founding of the Madras Observatory a brief
historical sketch may not be thought out of
place in the present report. The East India Com-
pany having resolved to establish an Observatory
at Madras "for promoting the knowledge of Astro-
nomy, Geography and Navigation in India"
Sir Charles Oakeley, who was then President of
the Council and deeply interested in the subject,
anticipating the orders from the India House
carried out the design under his own authority
so that when the actual orders arrived in 1792
the Observatory was already built, and partly
supplied with instruments. This was rendered
possible by the liberality of a member of the
Madras Government - William Petrie Esq. - who
had in 1787 built an Observatory at his private
expense which was the first Astronomical
Observatory instituted by any European in the
East. In this were collected such astronomi-
cal instruments as had been from time to time
sent out to India by the Company and which
had hitherto been scattered over the coast.

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No 74.

THE OBSERVATORY,

Madras, 23rd May 1891.

1300

FROM

THE GOVERNMENT ASTRONOMER,

Madras.

TO

The Hon'ble J. F. Price
Chief Secretary to Govt.
Fort St. George.

SIR,

I have the honor to submit here-
with my report on the working of the
Observatory for 1891 with a brief historical
sketch of the institution during the past
hundred years.

I have the honor to be,
Sir,
Your most obedt servant,

C. Michie Smith,

(Hq Govt Astronomer)

La

Press _____ 19
Miscellaneous No. _____, dated _____
Routine _____

[illegible]