

Number of pages. 40
Date of receipt. 2-4-20
Initials of Receiver. *[Signature]*

M.E.O. 1-30,000-16-10-20.

MADRAS RECORD OFFICE.

Government of Madras.

DEPARTMENT.

G.O. No.	515	Press Mis.
Dated	21-4-1918	

Not to be folded or roughly handled

Read again Extract from the Proceedings of the Government of India, Home Department, dated 20th June 1868, No. 36-2620, recorded in Proceedings of Government, dated 14th July 1868, No. 843.

Read also the following papers:—

No. 189. From the Government Astronomer and Meteorological Superintendent, to the Chief Secretary to Government, Fort Saint George; dated Madras, 15th March 1869.

With reference to the Proceedings of the Madras Government, Public Department, 14th July 1868, I have the honor to express my deep regret that, owing to successive interruptions over and above the severe strain of ordinary scientific duties which devolve upon me in carrying on the routine of the Observatory work, I have hitherto been so frustrated from carrying out my intentions and plans in regard to the Presidency Meteorological scheme, that in the hope of being able to render up a better account of its present state, in the shape of printed results, I have delayed from month to month, and, after all, am still unable to answer the Proceedings under consideration as I could wish, though with a hopeful and pretty certain prospect that such will not be the case much longer.

Before proceeding to recount the actual progress of the Presidency Meteorological Establishment, it is due, for the satisfaction of Government, to offer other evidence than my own as to the excessive burden of routine and casual duties which I have to plead as my apology for what would have been, under ordinary circumstances, highly reprehensible neglect; but which, in my own case, has been simply unavoidable. Upon my first assuming charge of the Madras Observatory, I too hastily arranged a programme of pursuits far beyond the power of any astronomer to carry out alone. Once embarked therein, it was not creditable or desirable to withdraw from the tasks I had undertaken. There were also arrears of calculation and unpublished work of many years' standing to be brought up. An English Assistant was applied for, and considerably urged as necessary by both the Local and Supreme Governments, but was thrice denied by the Home Authorities. When the question of the abolition of the Madras Observatory, or rather of its removal to Bombay was raised, about two years back, the Astronomer Royal was consulted; and in his replies, under date 20th September and 19th October 1867, (vide Proceedings of Madras Government, 27th March 1868,) after stating his views upon the question at issue, which resulted in the maintenance of the Madras Observatory, he finally suggested that a Code of Instructions for the future management of the Observatory should be drawn up, and urged that the duty should be confided to Colonel J. T. Walker, R. E., Superintendent of the Great Trigonometrical Survey of India; upon the grounds, to quote Mr. Airy's own words, "that no assistance in drawing up such documents would be so valuable as that of Colonel Walker, not only for his official position and his local knowledge, but also for his personal claims to respect in reference to scientific matters of the class here discussed." With the most courteous consideration, the distinguished scientific Officer referred to, in turn suggested to the Home Department at Fort William, that the party most deeply interested in the proceedings (myself) should be associated with him in the preparation of the proposed "Code of Instruction;" and, as will be found in the

Proceedings of the Madras Government, Public Department, 9th May 1868, I was forthwith ordered to place myself in communication with Colonel Walker for the purpose alluded to, viz., the carrying out of the Astronomer Royal's suggestions for the future management of the Madras Observatory. A variety of circumstances combined to prevent either Colonel Walker or myself from accomplishing the task assigned us until the end of last month, when that Officer availed himself, of the opportunity of his being in Madras for a few days, to visit the Observatory, examine into the past proceedings, and make plans for the future, in consultation with myself. His report, the result of our deliberations, is, I trust, by this date under consideration of the Supreme Government, and will, in due course, find its way to the Government of Madras; but one point therein is so important a corroboration of the pressing difficulties of my position, that I do not hesitate to avail myself of it upon the present occasion. After careful examination into, and consideration of, the works accomplished, of those in hand, and of the proposed future proceedings of the Observatory, Colonel Walker has urged the aid of a Deputy Astronomer or English Assistant as indispensable to the efficiency of the Madras Observatory; and so, for the fourth time, will this most pressing need be brought before the notice of the Secretary of State for India. Meanwhile, it is well known to the Government of Madras that I am now in daily expectation of a private assistant, had out at my own expense, to enable me to realise the results, alike in the Observatory and in the Presidency Meteorological Establishment, which I have so vainly struggled to accomplish, but which it was simply impossible for me to get through alone.

In addition to the too heavy routine work of the Observatory, there have, since the date of the Order of Government, 14th July 1868, No. 843, now under reply, been casual yet unavoidable interruptions of a most perplexing nature, the chief of which it may be well to enumerate. The great total Eclipse of last August took both me and my first Native Assistant totally away for nearly the whole of that month, besides requiring the sacrifice of many weeks, before and after, in the preparation for, and calculations relating to, the great event. A severe search for a nearly lost planet, which it would have been highly discreditable not to have used every exertion to recover, but which I succeeded in refinding, and thereby for ever rendering a known member of the solar system: the discovery of another, involving laborious observations and immediate calculations, to prevent it also from being lost before European astronomers could be set upon its track. The long-delayed issue of the new Reye-nue Board Rain-gauges has been fairly commenced, seventy-three having now been tested, corrected, and despatched. And lastly, I have just had to throw all else aside for a series of observations of the planet Mars in opposition, for the correction of the constant of Solar Parallax, requiring my own personal exertions, two hours after sunset and two hours before sunrise, continuously, until, at least, twenty observations were obtained. This last is a work only possible in a tropical Observatory; yet of such special importance, that it would be well worthy of the foundation of one for no other object, if England had not already her Indian Observatory in existence. It forms one of the leading points laid down for future investigation in the "Code of Instructions" previously mentioned, and involves a fresh series of observations at each successive opposition of the planet Mars, *i. e.*, nearly at intervals of twenty-five months, the set just completed being only the third yet taken. With such an incres-

sant strain, mental and bodily, for eight years, without being able to avail myself of a day's leave up to the present time, and with the heavy casual or extra labors which have fallen to my share since last July, I trust that I shall be readily pardoned for apparent neglect, whether in submission of Reports or in failing to carry out all that I had promised to attempt, within the time specified. I much regret the delay, and beg leave to tender my most respectful apologies for it; but venture to express my hopes that, when aided by my expected private assistant, a very short time will enable me to restore the order and punctuality which should characterize the proceedings of every astronomer when not completely overwhelmed by over-work or failing health.

I shall now proceed to remark, *seriatim*, but as briefly as possible, upon the successive paragraphs of the Proceedings of the Government of India in the Home Department, (Public,) dated Simla, 20th June 1868, No. 36-2620, and first, in regard to the time elapsed since the new system of Meteorological Registration was commenced in various parts of India. Although it is perfectly true that the several officers entrusted with the charge of the observations must by this time have gained considerable experience as to the wants of the various establishments under their supervision, so as to be able to render up pretty approximate estimates as to future expenditure, and may also have been able to form opinions as to the amount of dependence to be placed upon the results furnished by their subordinates, it must yet be borne in mind that some years must elapse, at least ten or twelve, before any comprehensive scientific review of the mass of records can be attempted. By prompt reduction and publication it is the duty of each Superintendent to afford Government every facility for feeling assured that the great task in hand is steadily progressing, and the results should invariably be made available for present use, especially to such Medical and Sanitary Officers as may require them, for purposes of current comparison with the records of public health, mortality returns, and other similar enquiries; and the general adoption of one uniform system throughout India, so as to render all meteorological returns precisely similar in form and quality, would be a great desideratum; but it is not easy to see how such a step could be readily taken. At present, the various Superintendents or Reporters are, for the most part, strangers to each other, and each adopts his own forms, rules, and methods of instrumental treatment, of reduction, and publication. If it were possible for all to meet, or, failing that, to enter into some mutual agreement by correspondence, so as to ensure uniformity throughout India, there is no doubt but that the ultimate value of the results to be expected a few years hence would be far greater than can ever be realized by the present arrangement. For instance, the system of taking monthly means most frequently adopted is a great mistake, and one which, years hence, will doubtless give rise to a vast amount of fresh reduction and expensive republication. Twelve points in an annual curve, whether of atmospheric pressure, temperature, humidity, rainfall, velocity, or direction of wind, &c., are insufficient to fix the dates of maxima and minima with any thing like accuracy. I cannot at this moment recal the precise reference; but I well knew a proposal emanated from the Royal Society to divide the year into seventy-three five-day periods. It would, however, be vastly inconvenient for many important practical inquiries thus to abandon the ordinary calendar divisions of the

year, and I have, therefore, in the Madras Presidency, adopted half-monthly means; 1st to 15th, and 16th to end, except in February, when 1st to 14th, and 15th to end, are more equal divisions. The slight inequality of the lengths of the successive half-months is a very trifling objection, and the annual curves are thus clearly defined, and their treatment, whether by calculation or graphical projection, rendered far more satisfactory. This is one point well worthy of careful deliberation amongst Meteorologists at the present time. Again, with regard to the calculation of daily means. The observations are necessarily made at certain hours of the day, and to deduce therefrom the same result as if a complete system of hourly records had been maintained, requires the application of small corrections, differing slightly for every locality. Tables for this purpose were prepared by Mr. Glaisher, of the Royal Observatory, Greenwich, for general use in England; but they are, of course, inapplicable to the reduction of tropical meteorological records. At the Observatories of Madras and Bombay and also at the Surveyor General's Office at Calcutta, there exist hourly meteorological records extending over, at least, twenty years at each station, and tables, similar to Mr. Glaisher's for England, ought to be deduced and employed in Indian meteorological reductions. It is not to be expected for a moment that the hourly corrections derived from the observations at these places could be indiscriminately applied to those made in localities widely differing in altitude above the sea level, in distance from sea coast, in contiguity to mountain ranges, or in the nature of the soil and prevailing vegetation; but by adopting tables of factors instead of absolute corrections, *i. e.*, by applying corrections dependent upon the observed local daily change of each meteorological element, yet strictly proportional to those found from the long series of hourly observations at the Observatories named, a close approximation to truth would be obtained. Such factors are in use in the Madras Presidency, and are, I believe, fairly applicable to all India, depending, as they do, most chiefly upon the sun's angular distance from the meridian at the hours of observation; and, I believe that, although the absolute corrections at the three places referred to would be found to differ pretty considerably, the ratio of each hourly correction to the corresponding daily range, *i. e.*, the hourly range factor tables would be practically identical, not only at each of the three old-established meteorological observatories, but throughout the tropics. To publish simple arithmetical means of the observations registered without the application of any corrections at all, is perfectly useless and absurd. We cannot do more than approximate to the truth, for Meteorology is not, like her elder sister Astronomy, an exact science; but we are bound to employ the best means available to hand. Again, no meteorological instruments should be taken on trust. All should be compared with fixed standards, and maximum and minimum thermometers should only be used as differential instruments. I have no hesitation in expressing my conviction that, owing to disregard of the relative capacities and figures of dry and wet bulb thermometers, the whole subject of Hygrometry is at sea, and the relative humidity of no one spot in India, if, indeed, in the world, has been truthfully investigated. Under the same atmospheric conditions, wet bulb thermometers with large round bulbs will give very much less depression than others with small round bulbs; and these again are far less sensitive than thin cylindrical bulbs. Such, and numerous other questions of difficulty and importance, ought to be discussed and agreed upon amongst the Superintendents or

Reporters, to ensure uniformity in their methods and publications; and I fear that the greatest evil to be dreaded and guarded against in Indian meteorology, and one sure to arise as the matter now stands, is the diversity of the methods of reduction and forms of publication in use in the various Presidencies and divisions of India.

2. *Meteorological Establishment of the Madras Presidency.*—The establishment for the Madras Presidency consists of a Superintendent, on an allowance of Rupees 250 a month; and of 17 Local Superintendents, drawing a carriage hire of Rupees 30 per month, for their services in controlling the 17 Native Assistants (each upon Rupees 40 per month) and for general supervision of the instruments and registers under their charge. The Proceedings of the Madras Government authorising this establishment are dated 10th April and 28th May 1867, and an additional monthly outlay of Rupees 167 has also been found requisite for stationery, postages, and minor repairs. Of the eighteen stations, (including Madras Observatory as head quarters,) twelve are now at regular work, so far as the registration of observations is concerned, and the remaining six will be started as early as possible. The system of observation and reduction adopted in the Madras Presidency differs, in many respects, from any that has hitherto been attempted in India. None of the instruments are taken upon trust, but all are compared with the Madras standards before being issued for use. All maximum and minimum thermometers are used only as differential instruments, *i. e.*, are daily compared with the standard dry and wet bulb. In consequence of these precautions, the readings are strictly comparable with those of the Madras Observatory, at which Kew standards only are adopted. Tropical hourly correction tables, deduced from the twenty-year series, (1841 to 1861,) at the Madras Observatory, are to be employed for the reduction to daily means; and the results derived will thereby be rendered nearly as perfect as if an extensive system of hourly registration had been set afloat at each station. Half-monthly means are preferred, in order to fix with greater precision the turning or maximum and minimum points of pressure, temperature, humidity, &c., and the times of commencement and duration of periodical rains and winds. Copies of the original daily records and reduced daily and half-monthly sheets are to be supplied to the Superintendent, and to be published annually; but here, unfortunately for the present, has occurred a temporary failure in the Madras Presidency scheme. Owing to severe pressure of Observatory duties and several unavoidable interruptions, I have never been able up to this time to prepare the printed instructions and tables to be used. Each observer, except those of Trichinopoly and Secunderabad, who had been previously well trained, was duly instructed in his duties at the Madras Observatory, and was ordered to go on registering as taught, transmitting copies of his original registers half-monthly; but to leave the reductions entirely untouched until the new tables were printed and distributed. Publication was in consequence delayed, and now that the tables and instructions are printing and very nearly ready for issue, there is reason to hope that the reduction and publication of the proceedings in 1868, will not be long delayed. Upon finding myself so completely overwhelmed with other scientific duties, I at first felt a strong inclination to seek to be relieved of the additional labor of these meteorological reductions; but as my position as Government Astronomer enabled me to draw up the new tables so urgently required, and my long experience in the subject had led me to regard with regret many failing

points in ordinary Meteorological Registers, I preferred rather to persevere, and suffer the records to accumulate unreduced for the first year, than to give up the opportunity of ultimately securing valuable returns and developing the new scheme to the best possible advantage, as could only be done in this Presidency by one who had access to, and familiarity with, the unpublished meteorological records of the Madras Observatory. Judging from the copies of the original observations furnished me to up to this dated, I feel satisfied that, with one or two trifling exceptions, all my personal instructions given to the assistants who are actually taking the observations appear to be satisfactorily remembered and fairly carried out. The speedy issue of the printed instructions and tables will enable each assistant to commence current reductions, and to fetch up the first year's arrears; and I may further add, that much of the time of my private assistant, just expected from England, will be devoted to the verification of these reductions and to the preparation for press of the first volume of results, under my own eye and immediate superintendence. The first two sheets of the tables are struck off; the rest are in hand, and a copy of the official instructions shall be submitted, as desired, as soon as completed and bound.

The observations on hand so far, up to December 31st, 1868, awaiting reduction under the new scheme, are as follows:—

Madras.....	from January	1861.
Secunderabad.....	" July	1863.
Trichinopoly.....	" "	1866.
Salem.....	" December	1867.
Bangalore and Bellary.....	" February	1868.
Coimbatore.....	" August	"
Masulipatam.....	" September	"

From Madura, Kurnool, Cochin, and Negapatam, part of 1868; but doubtful from which portion of the year the observations will be sufficiently trustworthy for publication.

The remaining six stations were not started in the year under consideration, neither instruments nor trained observers being ready. It appears further doubtful whether it will be possible to find any Native or East Indian willing to take up the post of observer at Rangoon on the scale of pay offered, the station being, by all accounts, far more expensive than any other. The Medical Officer in charge, when the starting of the station was under immediate contemplation, also refused to undertake the responsibility of acting as local Superintendent.

3. *Revenue Board Rain Returns.*—Registers of the rainfall, of a very rough and imperfect kind, have been kept at a large number of stations, more or less, since 1852. I have Returns in my possession from 266 places; in some cases, merely for an odd month or two; but, in a few instances, pretty continuously from 1853. The great mass of these Returns is, however, worse than useless, and any attempt at averaging them as they stand would be mere waste of time and labor. This appears to be chiefly owing to the gauges having been entrusted to the care of peons or other equally ignorant and careless servants, who neither understood nor cared for the work in hand. Apart from this cause, however, the gauges issued were so rough and inaccurate, that no amount of care could have rendered the Returns reliable or comparable. The number of stations now on the retaining list is 218,

and to each of these, cheap but carefully constructed gauges with glass measures are being supplied as fast as I can find time for testing the funnels and measures, and packing and despatching them. Seventy-three stations are already equipped; and as each new gauge is sent out, the return of the old one hitherto in use is urged, with a view to my being enabled to judge by its present state, and by actual measurement of the diameter of its funnel and the contents of its measure, whether the old returns are in any way trustworthy, and, if so, what correction to apply to turn their very erroneous and discordant scales into approximate inches of rainfall. The mere sight of some already in my possession is enough to destroy all hope of ever making any use of the Registers, even if honestly kept, with such rubbish. But if out of all the past records only a score can be found, the Returns from which appear to have been decently kept for a few years, and the old gauges sufficiently well preserved to give any approximation to the requisite corrections, the averages derived from such twenty places would be worth the trouble involved. I fear it is of little use supplying fresh gauges as indiscriminately as they appear to have been hitherto distributed. No person should be entrusted with one who is not reliable, and sufficiently careful and intelligent to keep a correct Register. A much smaller number, placed in the hands of suitable trustworthy persons, would yield infinitely better results than the misleading, and, too often, evidently false entries hitherto palmed off as Rain Returns.

4. The only official Report yet submitted from the Madras Meteorological Establishment is the brief Administration Report for the year 1867-68, a copy of which is herewith enclosed. I shall use every exertion to furnish a first volume of reduced observations at the earliest possible date; but the past overworked and inadequately assisted state of the Observatory establishment has hitherto disabled me from realizing that most important and desirable result. As before stated, my new private assistant will be immediately set to this work upon his arrival at Madras.

5. *Madras Meteorological Superintendent's own opinion of the existing system.*—I have already stated, in reviewing the first paragraph of the Proceedings under reply, my opinion as to the desirability of uniformity of methods of reduction and forms of publication being aimed at, by mutual arrangement amongst the various Reporters and Superintendents throughout India. I most respectfully venture to suggest that the methods and forms which I have adopted for the Madras Presidency will, I hope and believe, be found sufficiently comprehensive, and neither deficient in any important point nor yet fastidiously overwrought in a vain attempt at unnecessary refinement. Upon the completion of the tables and instructions I shall supply copies to all my fellow-laborers similarly situated, and shall request their opinions thereupon. If so fortunate as to secure their approbation, my forms may possibly be deemed worthy of general adoption; but I regret that the want of intercommunication complained of has deprived me of the benefit of their suggestions before the publication of the work in hand.

There is yet one more point in regard to these new establishments upon which I cannot too strongly insist, and that is, that if ever a Superintendent is to be expected to guarantee the accuracy and value of the Returns from his division, he must be ordered to make at least a starting tour of inspection to as many of the stations under

his general supervision as possible. Only in this way can he ever become aware of the stupid miscomprehension of his directions, sometimes to be met with where he may least expect it. The practised eye of an experienced meteorologist may, by a single glance at the placing and arrangements of the instruments he sends out, detect departures from what is requisite, which may vitiate a whole series of observations. A Meteorological Register is worse than useless, if the barometer, thermometers, or anemometer are improperly placed; and no one but the Superintendent should be entrusted to decide as to whether they are so arranged as to be fairly comparable with all others in his division. Out-of-the-way stations, beyond reasonable control and inspection, should be either handed over to some nearer Superintendent; or, at least, the local Officer in charge should be required to furnish such sketches or photographs and detailed descriptions as may satisfy the controlling officer that his intentions are being fairly carried out, and that he is not unwittingly printing observations which, upon mere inspection of the instruments, he would condemn as unreliable and useless.

Paragraphs 6 and 7 require no remark on my part beyond a respectful suggestion that the opinions of none but practical meteorologists are of much value upon such matters. A few such may be found on the staff of the Great Trigonometrical Survey; but not many, I fear, elsewhere: and too frequently mere readers and theorists adopt very decided views, which would be greatly modified by a year's experience as Acting Superintendent of a number of meteorological stations.

No. 190. Proceedings of the Board of Revenue, dated 15th January 1869.

Read again Government Order, dated 18th July 1868, No. 1993, recorded in Board's Proceedings, dated 11th August 1868, No. 5854.

Read also the following Official Memorandum from the Acting Under Secretary to Government, Revenue Department, to the Acting Secretary to the Board of Revenue; dated Fort Saint George, 12th November 1868, No. 154:—

ABSTRACT.—Requesting speedy despatch of report called for in Government Order, dated 18th July 1868, relative to Registers of rainfall.

It appears that, in accordance with a Minute* of the Governor, Sir W. Denison, the Government Astronomer was requested† to undertake the reduction and comparison of the observations made in the different districts in the Revenue Department, and on his suggestion certain changes in the forms of registers and instruments then in use were made. The system then adopted still continues.

2. The duty of keeping the Registers at each Taluq station is entrusted* to one of the Native Clerks in the Revenue Department, under the superintendence of the Sheristadar of the Taluq, or other competent officer. A copy of the Register kept at each station is forwarded at the end of each month to the Collector, by whom a copy is furnished to the Government Astronomer, and one copy is sent to the Board of Revenue. In the office of the latter, these Returns are tabulated, and a statement compiled for submission to

* Dated July 1862.

† Government Order, 28th July 1862, No. 889.

* Board's Proceedings, 18th February 1864, No. 1064.

Government every month, showing the average rainfall in each of the four Ranges into which the twenty districts of the Presidency have been divided. No expense is incurred for the special purpose of collecting and arranging these observations in the Revenue Department.

The instruments at first used were not to be relied upon, and under the Orders of Government above quoted, new and more reliable instruments, duly tested and corrected by the Government Astronomer, are in course of being issued to all Collectors. Already four districts and the Commissioners of the Nicobar Islands have been supplied with these instruments; the requisite Rain-gauges for two more districts will be issued in a few days, and the rest at an early date.

4. The Revenue Returns comprise the Registers kept at 204 places of observation throughout the whole Presidency, the area of which is 1,41,086 square miles; observations are, therefore, taken for an average area of 692 square miles.

(A true Extract).

(Signed) A. MACGREGOR,

Actg. Secy. to Govt.

No. 191. From the Acting Inspector General of Police, to the Chief Secretary to Government, Fort Saint George; dated Madras, 1st August 1868, No. 3864-1485.

General Department.

With reference to paragraph 2 of Government Order, No. 543, of the 14th ultimo, I have the honor to state that Registers of Rainfall have been kept by Police Officers in this Presidency.

2. A Rain-gauge has recently been supplied to the Police Officer at Baliguda, in the hill country of Ganjam, and a Register of rainfall will now be kept at that station.

No. 192. From the Acting Under Secretary to Government, dated 21st April 1869, No. 514.

The foregoing papers, with a brief report, will be forwarded for the information of the Government of India.

(Signed) R. S. ELLIOT,

Secretary.

No. 193. To the Secretary to the Government of India, Home Department, dated Fort Saint George, 21st April 1869, No. 514.

I am directed to forward, for the information of the Government of India, the following papers, which have been submitted to the Government of Madras, and which are of a nature to be of service to the Government of India in the collection and arrangement of the observations taken in this Presidency.

2. Of the eighteen stations, the establishment of which was sanctioned in the Proceedings of this Government, dated 10th April and 28th May 1867, twelve are now at regular work; and observations received by the Meteorological Superintendent (who is also Government Astronomer) from the dates noted in the margin are awaiting reduction and publication. Each of the Observers, except those of Trichinopoly and Secunderabad underwent a course of training at the Madras Observatory before proceeding to his station, and was directed to go on

Madras,	from January 1861.
Secunderabad,	from July 1863.
Trichinopoly,	" " 1866.
Salem,	" Dec. 1867.
Bangalore,	" Feb. 1868.
Bellary,	" " " "
Coimbatore,	" Aug. 1868.
Masulipatam,	" Sept. 1868.
Madura,	Part of 1868, but doubtful
Kurnool,	from what date, suffi-
Cochin,	ciently trustworthy for
Negapatam,	publication.

observing and transmitting his registers unreduced to the Meteorological Superintendent at Madras. The Superintendent explains that this course was necessary, as reduction of the observations to daily means requires the application of tropical hourly correction tables, which have to be prepared at the Observatory at Madras, and which, with instructions for their use, are now being printed, and nearly ready for issue. These tables, it is gathered from Mr. Pogson's report, will be factors dependent upon the observed local daily change of each meteorological element, and proportional to the corrections deduced from a long series (twenty years) of hourly observations taken at Madras. Mr. Pogson explains that the severe pressure of his other scientific duties has been the cause of the delay in the preparation of the tables. The observations will be reduced to half monthly means. He states, also, that all the instruments in use at the stations have been carefully compared with those in the Madras Observatory, and thus uniformity in the character of the results has been secured. The cost of the establishment at each station is 70 Rupees per mensem, and the salary of the Meteorological Superintendent is Rupees 250 per mensem. Besides this a monthly outlay of Rupees

Total monthly cost.	Rs.
Twelve Stations	840
Meteorological Superintendent	250
Postage, Stationery, &c.	167
	1,257

167 for stationery, postage and repairs has been found necessary, and it is supposed that the expense on this head will increase proportionately when the remaining six stations sanctioned are started.

The reason assigned for the delay in the establishment of these stations is that neither instruments nor trained Observers are ready. Mr. Pogson expresses doubts whether, on the scale of pay sanctioned, it will be possible to get an Observer, to be stationed at Rangoon. The only report received prior to that now submitted will be found in the Madras Presidency Administration Report for 1867-68, paragraphs 467 to 471.

3. The Registers of rainfall kept at the revenue stations throughout the Presidency, under the orders of the Board of Revenue, are sent for comparison and reduction to the Government Astronomer. Mr. Pogson states that he considers these registers of but little value, both from the rude nature of the instruments employed, and from the ignorance of the Observers. On the former point it will be seen that steps have been taken to provide instruments of a more reliable character; and on the latter, it is to be observed that the observations are taken under the superintendence of the Taluk Sheristadars, a class of officers drawing 60 Rupees a

month, and presumably competent to take and register observations of such simple character. The observations are taken at 218 stations, and 73 of these have already been supplied with improved rain gauges.

4. In paragraph 5 of his report, Mr. Pogson states his opinion of the existing arrangements, and dwells on the importance of the adoption of a uniform system throughout India.

(Signed) R. S. ELLIS,
Chief Secretary.

2. Of the eighteen stations, the establishment of which was sanctioned in the Proceedings of this Government, dated 10th April and 28th May 1867, twelve are now at regular work; and observations received by the Meteorological Superintendent

Madras, from January 1861.
Secunderabad, from July 1863.
Trichinopoly, " " 1866.
Salem, " Dec. 1867.
Bangalore, } " Feb. 1868.
Bellary, }
Coimbatore, " Aug. 1868.
Masulipatam, " Sept 1868.
Madura, } Part of 1868, but doubtful
Kurnool, } from what date, suffi-
Cochin, } ciently trustworthy for
Negapatam, } publication.

tendent (who is also Government Astronomer) from the dates noted in the margin are awaiting reduction and publication. Each of the Observers, except those of Trichinopoly and Secunderabad underwent a course of training at the Madras Observatory before proceeding to his station, and was directed to go on

observing and transmitting his registers unreduced to the Meteorological Superintendent at Madras. The Superintendent explains that this course was necessary, as reduction of the observations to daily means requires the application of tropical hourly correction tables, which have to be prepared at the Observatory at Madras, and which, with instructions for their use, are now being printed, and nearly ready for issue. These tables, it is gathered from Mr. Pogson's report, will be factors dependent upon the observed local daily change of each meteorological element, and proportional to the corrections deduced from a long series (twenty years) of hourly observations taken at Madras. Mr. Pogson explains that the severe pressure of his other scientific duties has been the cause of the delay in the preparation of the tables. The observations will be reduced to half monthly means. He states, also, that all the instruments in use at the stations have been carefully compared with those in the Madras Observatory, and thus uniformity in the character of the results has been secured. The cost of the establishment at each station is 70 Rupees per mensem, and the salary of the Meteorological Superintendent is Rupees 250 per mensem. Besides this a monthly outlay of Rupees

Total monthly cost.		Rs.
Twelve Stations...	...	840
Meteorological Superintendent...	...	250
Postage, Stationery, &c.	...	167
		1,257

167 for stationery, postage and repairs has been found necessary, and it is supposed that the expense on this head will increase proportionately when the remaining six stations sanctioned are started.

The reason assigned for the delay in the establishment of these stations is that neither instruments nor trained Observers are ready. Mr. Pogson expresses doubts whether, on the scale of pay sanctioned, it will be possible to get an Observer, to be stationed at Rangoon. The only report received prior to that now submitted will be found in the Madras Presidency Administration Report for 1867-68, paragraphs 467 to 474.

3. The Registers of rainfall kept at the revenue stations throughout the Presidency, under the orders of the Board of Revenue, are sent for comparison and reduction to the Government Astronomer. Mr. Pogson states that he considers these registers of but little value, both from the rude nature of the instruments employed, and from the ignorance of the Observers. On the former point it will be seen that steps have been taken to provide instruments of a more reliable character; and on the latter, it is to be observed that the observations are taken under the superintendence of the Taluq Sheristadars, a class of officers drawing 60 Rupees a

month, and presumably competent to take and register observations of such simple character. The observations are taken at 218 stations, and 73 of these have already been supplied with improved rain gauges.

4. In paragraph 5 of his report, Mr. Pogson states his opinion of the existing arrangements, and dwells on the importance of the adoption of a uniform system throughout India.

(Signed) R. S. ELLIS,
Chief Secretary.

157
Send int.
PM

Home 1869 Dept.

[]

From Government of

Fort St. George.

Dated 21st April 1869.

R. } No. }
 } Inclosures
 } Spare copies

D. No. }
 } Progs. }
L. No. 515. } No.

APRIL.
Nos. 189-193.

Forwarding the report called for by the
Government of India relative to the Meteorolo-
gical observations taken in this Presidency.

Madras Observatory, March 5th 1867.

From

N. R. Pogson, Esq.,

Government Astronomer & Meteorological Superintendent.

To W. S. Lilly Esq.

Dear Sir,

In reply to your official memo. —
of yesterday, calling my attention to the delay in
regard to a Report upon the meteorological proceedings
in this Presidency, I can only express my regret
thereat, and promise a premature and very
unsatisfactory answer to the Government of India
under present circumstances. — A month ^{or perhaps two} hence I
shall I hope be in a very different position,
and able to submit just as definite business-like
and satisfactory a report as I am now unfortunately
conscious my present one must be the reverse. —

I will try to send it in however by Monday,
but am most distressingly overdone, and hard at
work, necessarily every morning till 4 or 5 A.M. —

The expected arrival of my private English

The Antislavery Report proofs were completed
some time since, but I cannot urge Mr. Burren
on with the lithographs as I could wish. - They
shall be forwarded as soon as I can get them
out of his hands. -

I am dear Sir
Yours most truly
M^R Peggson

[illegible]

Wm. W. Webb

3. The main feature of the new Meteorological establishment will be, that the results obtained at each station will be strictly comparable with each

other, and with those of the Kew Observatory. Every barometer, thermometer, and anemometer in use will have been carefully examined and corrected, and nothing taken on trust or with the maker's corrections, a too frequent practice in most similar arrangements. A plan of the thermometer shed supplied to each station is herewith appended. The instruments supplied are by first class English makers, either Messrs. Negretti and Zambra, or Mr. Browning. Repairs of the numerous damages incurred on the passage out (for such instruments too often arrive in India seriously injured) as well as the construction of a number of anemometers, ozone cages, and of the observing sheds issued, and the general packing arrangements, have been ably executed by Mr. F. Doderet, the Mathematical Instrument-maker of the Public Works Department; and without his valuable aid the scheme could not possibly have been carried out half so completely in double the time.

4. The observer at each station is under the immediate charge of the local Medical Officer, the only efficient means of securing punctuality and uniformity of method in both observations and reductions. The general superintendence of the whole scheme rests with the Government Astronomer, to whom the reduced registers are to be transmitted half-monthly, and by whom the prompt publication of the whole has to be effected.

5. The thermometers at the Madras Observatory have throughout been recorded in a verandah facing the north, but too much shielded on all other sides by surrounding walls and buildings. Since January 1st, however, a fresh set has been employed, placed in an open shed, under precisely similar conditions to those at all the new up-country stations, the verandah readings still being continued, so as to shew any difference due to the change of position. The stations at which observations are now being regularly made are Bangalore, Bellary, Cochin, Coimbatore, Kurnool, Madras, Madura, Salem, Secunderabad, and Trichinopoly. The eight about to be started are Cannanore, Kamptee, Masulipatam, Negapatam, Rangoon, Tinnevely, Vizagapatam and, Wellington.

(Signed) N. R. POGSON,
Meteorological Superintendent.

Pro 14 July 1868 to 92-93
" 9 May 1868-69
" 27 March 1868-69
" 28 May 1867 177-178
" 10 April 1867 49-50.

Public 1869 Sept

From Pro. 21 April 1869
The Government Astronomer
and Meteorological Superintendent
at the Observatory

To The Chief Secretary to Government
Fort Saint George

Madras Observatory March 15th 1869

Recd 10

No 422

Report upon the Meteorological
Establishment of the Madras
Presidency, with General
remarks in reference to the
Proc. of Madras Government
of 14th July 1868 and explanation
of cause of delay in submitting
the desired report.

cg. 11
R19

189

Proceedings of the Board of Revenue
dated 15th January 1869.

Read again G. O. dated 18th July 1868
N^o 1993 recorded in Board's Proceedings dated
August 1868 N^o 5854.

Read also Official Memo from Govern-
ment R. O. dated 12th November 1868 N^o 154.

* dated July 1862.
G. O. 28th July 1862,
N^o 589.

1. It appears that in accordance with
a Minute of the Governor, Sir W. Denison, the
Government Astronomer was requested to under-
take the reduction and comparison of the observa-
tions made in the different Districts in the Re-
venue Department, and on his suggestion certain
changes in the forms of Registers and instru-
ments then in use were made. The system then
adopted still continues.

* Date Pro. 18th Feb. 1864,
N^o 1064.

2. The duty of keeping the Registers
at each Talook station is entrusted to one of
the Native Clerks in the Revenue Department,
under the superintendence of the Amildar of
the Talook or other competent Officer. Copies
of the Register kept at each station is forward-
ed at the end of each month to the Collector,
by whom a copy is furnished to the Government
Astronomer, and one copy is sent to the Board
of

of Revenue. In the Office of the latter these Returns are tabulated, and a ~~monthly~~ statement compiled for submission to Government every month, showing the average rainfall in each of the four Ranges into which the 20 Districts of the Presidency have been divided. No expense is incurred for the special purpose of collecting and arranging these observations in the Revenue Department.

3. The instruments at first used were found not to be sufficiently accurate, and under the Orders of Government above quoted, new and more reliable instruments, duly tested and corrected by the Government Astronomer, are in course of being issued to all Collectors. Already four Districts and the Commissioner of the Nilgherries have been supplied with these instruments; the requisite Raingauges for two more Districts will be issued in a few days, and the rest at an early date.

The Revenue Returns comprise the Registers kept at 206 places of observation throughout the whole Presidency, the area of which is 141,080 square miles; observations are, therefore, taken from an average area of 692 square miles.

(True Extract)

H. H. H. H.

Secretary.

The Secretary to Government

Revenue Department.

190

Sanjivall - Report to
Govt. relative to the
temple for repair -
being -

SOAL 514/18
1889
15
January 1889

Proceedings of the
Board of Revenue

Date No 14 July 1889 No 92-93
Revenue - 18 - 316-343
Sub - 28 July 1889 - 147-148
Revenue - 12 Aug 1889 - 235-236
1889
1889
1889

Mr. Popper is not likely to do
what is wanted, his hands, by his
own account being overfull, but not
a difficult - to determine before
whether or not
he is assigned -
are some very
persons charged
be reckoned in the
continued
N.B.

PROCEEDINGS of the MADRAS GOVERNMENT.

Public Department. 27

Read the ^{again} following letter ~~extract~~ from
the Prod of Govt of India No 36-260
Sept dated 20 June 1889 No 36-260
recorded in Prod of Govt dated
14 July 1889 No 823.

Read also - Sanjivall's statement - 15 March 1889.
Proceedings, Board of Revenue, dated 15 Aug 1889.
From the Ag. Secy. of the office - dated 1st Aug 1889 No 3864/1435

I have the
draft of the
report in two much
to give due attention to
the historical questions that
would be raised by the
proposed alterations
thereon 21st July 1889 No 514

The foregoing pa-
pers with a brief report
will be forwarded for the
information of the Govern-
ment of India.
I am, Sir, very respectfully,
Your obedient servant,
J. S. S. S.

to the Govt. of India
The Govt. of India
Revenue Dept.
Sanjivall of Police
The Govt. of India
Revenue Dept.
Sanjivall of Police
The Govt. of India
Revenue Dept.
Sanjivall of Police

Depd 27/11/11
Rev. Sec. 11/11/11

Public Department

No. 575

To

The Secretary to the Government
of India.

Home Department.

Sir,

I am directed to forward for the information of the Government of India the marginally noted paper, being the report submitted with reference to the Resolution of the Government of India dated 22nd June 1888 No. 36-2620, by the several authorities under whose supervision meteorological observations are taken in the Presidency. Of the 18 stations the re-establishment of which was sanctioned in the proceedings of this Government.

From Meteorological Suplt.
Madras Presidency 27th Jan/11.
Pro. of the B. of Rev. 27th Jan/11.
From the Ag. Suplt. Genl. Office
27th Aug. 1888 No. 3864/1435

In note on
draft S.O. A.A.

Govt. of India, Madras.

To

Public

Dated 27th Jan 11.
Recd. 1869, No. 574.

Nos. 189-193.

Accepting that the papers
relating to the meteorologi-
cal observations taken in
this Presidency be forwarded
to the Govt. of India with
a brief report.

Government dated 10 April
and 28 May 1867, twelve
are now at regular work,
and observations received
by the Meteorological
Superintendent (who is
also Government Astrono-
-mer) from the dates noted
in the margin are awaiting
reduction and publication.
Each of the observers ex-
-cept those of Trichinopoly
and Secunderabad are
employed on a course of train-
-ing at the Madras Obser-
-vatory before proceeding
to his station, and was
directed to go on observing
and transmitting his re-
-gisters unreduced to the
Meteorological Superin-
-tendent at Madras.

Madras	from Jan'y. 1861
Secunderabad	in July, 1863
Trichinopoly	" " 1866
Salem	" Decr. 1867
Bangalore	" July 1868
Belgaum	" Aug. 1868
Coimbatore	" Sept. 1868
Masulipatam	" Sept. 1868
Madras	Part of 1868
Thuruvai	but some help
Cochin	from what date,
Megaputun	sufficiently
	trustworthy for
	publication.

The Superintendent explains
that this course was necessary
as reduction of the observa-
-tions to daily means re-
-quires the application of
tropical hourly correction
tables, which have to be pre-
-pared at the Observatory
at Madras, and which,
with the instructions for their
use, are now being printed,
and nearly ready for issue.
These tables it is gathered
from Mr. Pogson's report,
will be factors dependent
upon the observed local daily
change of each meteorological
element, and proportional
to the corrections deduced
from a long series (twenty years)
of hourly observations
taken at Madras. Mr.
Pogson

Pagson explains that the severe pressure of his other scientific duties has been the cause of the delay in the preparation of the tables. The observations will be reduced to half monthly means. He states also that all the instruments in use at the Stations have been carefully compared with those in the Madras Observatory, and thus uniformity in the character of the results has been secured. The cost of the establishment at each station is 70 Rs per mensem, and the salary of the Meteorological Superintendent

Total monthly cost:
Twelve Stations - 840
Meteorological Dept 250
Postage, Stationery &c 167
1257

Superintendent with Rs 200 per mensem. Besides this a monthly outlay of Rs 100 for Stationery, postage and repairs has been found necessary, and it is supposed that the expense on this head will increase proportionately when the remaining six stations sanctioned are started. The reason assigned for the delay in the establishment of these stations is that neither instruments nor trained observers are ready. Mr. Pagson expresses doubt whether on the scale of Rs 70 sanctioned, it will be possible to get an observer to be stationed at Raipur. The only report received prior

to that now submitted
will be found in the Madras
Presidency Administration
Report, ^{for 1867-68} paras 467-471.

3. The registers of rainfall
kept at the revenue stations
throughout the Presidency
under the orders of the Board
of Revenue, are sent for
comparison and reduction
to the Government Astro-
nomer. Mr. Pagon states,
that he considers these regis-
ters of but little value,
both from the rude nature
of the instruments employ-
ed and from the ignorance
of the observers. On the former
point it will be seen that
steps have been taken to
provide instruments of a
more reliable character,
and on the latter, it is to

be observed that the obser-
vations are taken under
the superintendence of
the Taluk Sheristadars,
a class of Officers drawing
Rs. a month and presum-
ably competent to take
and register observations
of such simple character.
The observations are
taken at 218 stations and
93 of these have already
been supplied with improved
rain gauges.

4. In paragraph 5 of
his report Mr. Pagon states
his opinion of the existing
arrangements and dwells on the
importance of the adoption
of a uniform system thro-
out India.

J. B. Rao
21 April 1869

1869

186 . Department

No.

To
The Secretary to the
Government of
Department.

Dated

186

To the Secretary to the Government of the Department.

[Faint, illegible handwritten text, likely bleed-through from the reverse side of the page.]

Home 1869 Dept.

[]

From Government of

Fort St. George.

Dated April 21

No.

Enclosures

spare copies.

R.

D. No.

Progs.

D.

L. No.

575

No.

189. 193.

Forwarding the report called
for by the Govt. of India
relative to the meteorolo-
gical observations taken
in this Presy.