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Madras Observer

Trusty that
Govt of India
advised that
in the provision
the for establish
and Imperial
of the

For Letter

Reminding
in the proposals
establishing an
Observatory in
the

ORDER AGAIN ORDER OF GOVERNMENT, DATED

ENCLOSURES

CURRENT NO.

STATEMENT WITH DITTO.

ORDER, ACT, OF GOVERNMENT-A.

ORDER OF GOVERNMENT

LETTERS KEPT OUT OF FILE FOR DESPATCH IN ORIGINAL (not paged)

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ORDER. Paper No. 470/92 1664/92. 2038/92

No. 2243 2

FROM

J. W. P. MUIR-MACKENZIE, ESQ., C.S.,
Offg. Under-Secretary to the Government of India.

TO

The Secretary to the Govt of Madras

Madras, the 27th October 1891

Revenue and Agricultural Department.

(Meteorology) SIR,

REVENUE DEPARTMENT
16 NOV 91

In continuation of my letter No. 2048/2 dated the 1st instant, I am directed to forward a copy of a note drawn up by the Meteorological Reporter to the Government of India on the present position of the Madras Observatory and the Establishment in its place of an Imperial Astronomical Observatory in India and to request that the Government of India may be favoured

See file 1664/92
2038/92

25h
favoured at an early date with
the views of His Excellency the
Governor in Council on the re-
commendations and suggestions
offered by Mr. Eliot.

2. I am also to enclose for the
information of His Excellency the
Governor in Council a memoran-
dum which summarizes the
history of the various solar obser-
vations initiated at the instance
of the solar physics committee
to which allusion is made in Mr.
Eliot's note.

I have the honour to be,

Sir,

Your most obedient servant.

J. M. Macneave

Offg. Secretary.

*Note on the Actinometric and other observations made in India for the Solar Physics
Committee, London.*

In 1878 a Committee of leading astronomers in England was appointed by
Government (?) to consider and advise on the methods of carrying on observa-
tions on solar physics. In 1879 Mr. Blanford, then Meteorological Reporter of
India, received a letter from that Committee inviting his co-operation in the work
of solar research. In compliance with this request, observations were taken at
Alipore for one year with a Balfour-Stewart's actinometer (an instrument for
measuring the intensity of the sun's heating power at the earth's surface) and the
results were shortly afterwards communicated to the Committee.

A similar instrument was next supplied to Mr. Hennessey of the Great Trigo-
nometrical Survey of India who had for many years taken much interest in Solar
Physics, and offered to take observations. Shortly afterwards the Solar Physics
Committee suggested Leh on account of its elevation and supposed freedom
from cloud and dust as the most suitable place for observations of this
kind. Mr. Blanford supported this suggestion in a paper advocating their
reforms in his department; the necessity of which had been pointed out in
the Famine Commission Report. The project was sanctioned and a sapper
"Sergeant Rowland" was selected by the Solar Physics Committee as chief
observer; and after being trained in the special class of observations desired at
South Kensington was sent out to India at the end of 1882. As it was then too
late to proceed to Leh, he was first deputed to Mussoorie to carry on actino-
metric observations under the general superintendence of Mr. Hennessey.
Eventually he was in the summer of 1883 sent with an assistant observer Mr.
Shaw to Leh. Regular observations were taken for two years, but it was found that
the dust continually present in the air scattered the sun's heat in so irregular a
manner as to make the observations of little value for the objects for which they were
recorded. It was accordingly resolved to transfer the observatory to Mussoorie.
Both Sergeant Rowland and Mr. Shaw were recalled from Leh. Sergeant
Rowland's services, however, were not retained for the observatory and he was
transferred to the Survey Department. Mr. Shaw only was appointed actino-
metric observer with a native assistant. But Mussoorie was found equally
unsuited on account of the large amount of cloud in the cold weather and rains
and the frequent prevalence of dust in the hot weather. As an examination of
the observations themselves, about this period threw doubts upon the accuracy,
and it was reported that the Solar Physics Committee were endeavouring to
devise some more perfect and satisfactory instrument, it was decided to transfer
the actinometric observatory to Simla and utilize the observer in the Simla Office
during dusty or rainy weather when it is not possible to take actinometric
observations.

The observations are being carried out at Simla by the native observer and
assistant observer, and the results forwarded to the Solar Physics Committee.

The Solar Physics Committee suggested some years ago that photographs
should be taken frequently of the sun, in order that India might assist towards
securing a permanent record of the number and magnitude of the sun's spots
and other changes in the solar surface. The Surveyor General, who was con-
sulted, suggested that this work should be done at Dehra Dun. The services
of a properly qualified man were obtained, and this work has now been carried
on for some years. A short time ago the Solar Physics Committee suggested
that special spectroscopic observations might also be taken in India, and
Colonel Thuillier agreed that this work could also be carried on at Dehra Dun
which, however, also suffers from defects of cloud and dust. Stereoscopic in-
struments had also been in 1881 sent out by the Secretary of State to the
Elphinstone College at Poona. The Solar Physics Committee have recently
asked the Government of India if they cannot utilize these instruments at head-
quarters. The Bombay Government has been consulted on the subject.

Spectroscopic

the atmospheric conditions at Madras were not suitable, and secondly, because Mr. Pogson was so pressed with work and arrears of work that he had not time to introduce these observations. Hence, under instructions from the Secretary of State, the Government of India have had to make temporary and not very satisfactory arrangements for carrying out the classes of observations desired by the Solar Physics Committee. Those called for by that Committee up to the present date are—

- (1) Actinometric.
- (2) Photographic.
- (3) Spectroscopic.

The first were commenced at Leh, transferred to Mussoorie and then to Simla, where they are carried out under the superintendence of the Meteorological Reporter to the Government of India. The second are carried out at Dehra Dun under the superintendence of the Survey Department. As, however, the Survey Office at that station will probably be removed to Calcutta shortly, new arrangements will then be necessary.

The third have not yet been commenced, in consequence of the difficulty experienced in making the necessary arrangements.

Hence these observations are being carried out imperfectly. The observers are subject to the superintendence of officers who have not the leisure to control them properly. It would be far better as well as more economical to combine the whole work of these observations in one place, and to have it continuously and efficiently controlled by an officer specially acquainted with the work, and able to modify the observations as their examination and discussion suggested. The only way in which this can be done satisfactorily is to make it an integral part of the work of the one Astronomical Observatory maintained by the Government of India.

II.—Assuming that the work of the Astronomical Observatory will include solar physics observations as defined above, it would be necessary to locate the observatory at a hill-station. Messrs. Blanford, Pogson, Hennessey and others have urged the necessity of this for the solar physics observations. Mr. Pogson has also stated that much of the astronomical work could be done better at a hill-station than at Madras. The Astronomer Royal in his letter of the 22nd July 1891 also adopts this view when he says—"If a suitable hill-station could be found * * * it would, I think, be advantageous to move the whole of the Astronomical Observatory to that station, leaving the Magnetical Branch at Madras." Hence it may be concluded that it would be desirable to remove the Astronomical Observatory from Madras to a hill-station for the Astronomical work proper, and would be absolutely necessary if it is to include the classes of observations required by the Solar Physics Committee.

Such a change, it may be pointed out, would not only give more favourable atmospheric conditions for observation, but it would enable the European officers to work in a suitable climate and hence probably far more efficiently than in Madras.

III.—The selection of a suitable hill-station for the Astronomical Observatory is hence very important. Mr. Hennessey has suggested that it should be at an elevation of at least 10,000 feet. Leh (elevation 11,000 feet) was selected for the work of actinometric observation sometime ago, but was rejected after a trial of 18 months (on account of the amount of cloud and dust in the atmosphere). It is very doubtful whether there is any hill-station in the Western Himalayas over 10,000 feet where the atmospheric conditions would be superior to those of the Palnis and Nilgiris, and the difficulty of access would be a great barrier to its adoption.

The following hill-stations over 7,000 feet (in addition to Leh) have been suggested at various times:—

- (1) Mussoorie
 - (2) Simla
 - (3) The Palnis.
 - (4) The Nilgiris.
- } in the Himalayas.

There is much less cloud and dust in the atmosphere in the Southern India hills than in the Western Himalayas, and hence the former are undoubtedly to be preferred.

Finally, the Shevaroyas have been suggested as nearer to Madras. The highest point of the Shevaroyas is only 5,300 feet above sea level. There is, I am informed, more cloud and dust there than in the more southern hills in Madras. They are, I believe, not above fever height, and are hence, on that account, probably unsuited for the purpose.

The Shevaroyas are about 150 miles from Madras, the Nilgiris about 250 miles and the Palnis 270 miles. The highest points of the two latter ranges are about 8,000 feet high. The advantages gained by placing the observatory at an elevation of from 2,000 to 2,500 feet higher than the highest point of the Shevaroyas far outweigh the slight disadvantage of the greater distance of these hills from Madras.

Hence, I think, that the choice of a hill-station lies between (1) Kodaikanal on the Palnis, (2) Kotagiri on the Nilgiris.

Small temporary observatories have been established at these two stations to take temperature, cloud, and other observations and to record the amount of sunshine. The Government of Madras has also been instructed to request the Government Astronomer to arrange for special observations to test the clearness of the atmosphere at night. It is hoped that twelve months' observations will supply sufficient data to decide the relative advantages of these two stations as compared with Madras for the two classes of observations (*i.e.* star, &c., observations by night, and sun observations by day).

IV. The Astronomer Royal has pointed out in his letter of 22nd July 1891, that Mr. Pogson's salary was not adequate for the post, and that he had no European Assistant qualified to take his place temporarily in case of illness or absence on furlough, &c. It would in my opinion be best to appoint two officers, one to superintend the Astronomical work and the other the Solar Physics work. This would cost little more than Mr. Christie's suggestion, and would not only secure the object Mr. Christie had in view, but also enable the extended work of the observatory to be carried on fully and satisfactorily. They should each have a pay of Rs. 700, rising to Rs. 1,200 in ten years. The Astronomer should be selected in England by the Observatories Committee and be engaged for a period of ten years. The Superintendent of the Solar Physics section should either be selected in England by the Solar Physics and Observatories Committees, or, as I would suggest, Mr. Michie Smith, acting as Astronomer at present, might be appointed. So far as I can judge he is fully qualified to carry on this section of the work satisfactorily, and his appointment would enable his services to be utilized in continuing the publication of the past star observations according to the intentions of Mr. Pogson.

If these arrangements were sanctioned, the staff of the astronomical observatory would consist of two Europeans and of Native assistants. The first European officer would superintend the astronomical observations and edit, with Mr. Michie Smith's assistance, the past astronomical observations yet unpublished. The second European officer (Mr. Michie Smith) would superintend the Solar Physics observations and also work up the previous actinometric observa-

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L. Public Act 3229/91
3
Pub. e. no 3584/91.

TO BE RETURNED
WITH REPLY.

Public DEPARTMENT.

19/10/91 U.S. 887 Pub.
7C 223472/91

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11/11

From

The Govt of India
Res. & Agri. DeptNo. 2243
2Dated 27 Oct
Received 4 Nov } 1891.
Enclosures

SUBJECT.

Forwarding for
opinion note by the Meteorologi-
cal Reporter to the Govt. of India
on the present position of the
Madras Observatory & the establish-
ment place of an Imperial Astro-
nomical Observatory in India.

Hos

[For order.
of 24th November
It is proposed to
refer this ^{officially} to the
Ag. Govt. Astronomer
for remarks. ^{from order}
[The reference in Mr
Eliot's Memorandum to
Mr Michie Smith's
appointment as Sup.
of the Solar Physics
Dept. need not
prevent this. Mr
Smith will of course
deal with the question
as general principle.

11/11 To the Govt Astronomer
with current & full M.S.
It is necessary to consult him I
suppose chiefly as to the arrangement
& requirements of the Branch Obser-
vatory to be maintained at Madras.
I am not aware that we have
been instructed to request or request
to instruct him to arrange for tempo-
rary observations at Kodaikanal
& Rohtak.
C. 14/11 Refer as proposed
U.S. 248
15 Nov 20/11

THE OBSERVATORY

358

Madras, 2nd December 1891

FROM

THE GOVERNMENT ASTRONOMER,

Madras.

To

The Honorable J. F. Price,
Chief Secretary to Govt.
Fort St. George.

SIR,

Adverting to your Reference,
dated 24th ultimo, on C. No. 3229 of '91
& herewith returned Public Department, I have
with 2 Enclosures the honor to submit the
following remarks on the papers commu-
ed with the future of the Madras Observa-
tory.

2. The general scheme suggested
by the Meteorological Reporter to the
Government of India seems to me on the
whole a good one. There is little doubt
that the only way to make the observa-
tory a really effective institution is to
combine in it all the regular astronomical
work

work carried on at present at different centres and to strengthen the staff of European Astronomers.

3. Mr. Eliot's suggestion that the work should be divided into two sections under two Europeans is in many respects a good one. The two classes of work contemplated differ widely from each other and especially in this - that the observations for the one have to be carried on at night, while those for the other have mainly to be carried on during the day. Most of the observations of both classes must be made by Europeans and one man cannot carry on a continuous series of observations both by day and by night.

4. The question of the location of the Observatory is one which I have already dealt with at considerable length in two letters to Sir M. E. Grant Duff (vide my letters of 13th April and

41
and 7th August /88 and G.O. 7th March /88, No. 542 Public) - and I need now add but little to what I have there stated. I still hold that the climate of Kodaikanal is the best that can be selected, but all decision on this point must be delayed till the promised observations have been completed. I would however point out at once that the station chosen (probably unavoidably) for the Meteorological observatory at Kodaikanal will give much less favorable results than a station nearer the proposed site of the observatory.

5. A question of some importance is whether it would be necessary in case a hill station is chosen for the Observatory, to continue the present Observatory for time determinations. For myself I do not think this would be in the least necessary. At present the Mean time clock which distributes time signals is compared every day by means of

of a Chronometer with the transit clock, but this could be done equally well by telegraph if the telegraph line from the hill station to Madras could be handed over to the Astronomer for ten minutes each day. In that case the observations required at Madras would be reduced to the Meteorological observations carried on at a second class station and the comparison and adjustment of the Mean time clock once a day. The Magnetical observations were given up many years ago.

6. With reference to the proposal to transfer the re-organized observatory from Provincial to Imperial control, it is unnecessary for me to offer any opinion, but I may be permitted to point out that the proposal to make the Observatory an adjunct to the Meteorological Department seems

9P
seems to be a rather remarkable one. The present head of the Meteorological Department is a gentleman of great scientific attainments and probably no Astronomer would have any hesitation in forwarding reports to Government through him, but a Meteorologist need not necessarily know anything about Astronomy, and, in the future, the proposed arrangement might cause much friction of a kind which the history of the Madras Observatory shows to be most detrimental to work. If the Committee suggested by Mr. Eliot is appointed the channel of communication might be through the President of that Committee who might be the Meteorological Reporter to Government, or any other suitable officer. This would avoid the appearance of subordinating Astronomy to

to Meteorology.

7. Of the other suggestions made by Mr. Eliot I approve, and I will gladly do anything in my power to assist in settling the question of the best situation for the Observatory.

I have the honor to be,

Sir
Your most obedient servant,

C. Michie Smith

Off. Asst. Astronomer.

Public (1891) Department

747-3-7-91
300-11-7-91
500-11-7-91

From
The Govt. Astronomer
Madras

Dated 2^d Decr/91
Recd
Enclos: Three



Offering certain re-
marks on the question of
the future of the Madras
Observatory.

DECEMBER 1891, No. , PUBLIC.

GOVERNMENT OF MADRAS.

PUBLIC DEPARTMENT.

READ—the following papers:—

From J. W. P. MUIR-MACKENZIE, Esq., C.S., Offg. Secretary to the Govern-
ment of India, Revenue and Agricultural Department (Meteorology), to the
Secretary to the Government of Madras, dated Simla, the 27th October 1891,
No. 2243—2.

In continuation of my letter, No. 2048—2, dated the 1st instant, I am directed to
forward copy of a Note * drawn up by the
* Dated 13th October 1891. Meteorological Reporter to the Govern-
ment of India on the present position of

the Madras Observatory and the establishment in its place of an Imperial Astronomical
Observatory in India and to request that the Government of India may be favoured, at
an early date, with the views of His Excellency the Governor in Council on the
recommendations and suggestions offered by Mr. Eliot.

2. I am also to enclose for the information of His Excellency the Governor in
Council a memorandum which summarizes the history of the various solar observations
initiated at the instance of the Solar Physics Committee to which allusion is made in
Mr. Eliot's note.

ENCLOSURES.

Note on the Actinometric and other Observations made in India for the Solar Physics
Committee, London.

In 18 , a Committee of leading astronomers in England was appointed by Government (?)
to consider and advise on the methods of carrying on observations on solar physics. In 1879, Mr.
Blanford, then Meteorological Reporter of India, received a letter from that Committee inviting
his co-operation in the work of solar research. In compliance with this request, observations
were taken at Alipore for one year with a Balfour-Stewart's actinometer (an instrument for mea-
suring the intensity of the sun's heating power at the earth's surface), and the results were shortly
afterwards communicated to the Committee.

A similar instrument was next supplied to Mr. Hennessey, of the Great Trigonometrical
Survey of India, who had for many years taken much interest in solar physics, and offered to
take observations. Shortly afterwards, the Solar Physics Committee suggested Leh on account
of its elevation and supposed freedom from cloud and dust as the most suitable place for observa-
tions of this kind. Mr. Blanford supported this suggestion in a paper advocating their reforms
in his department, the necessity of which had been pointed out in the Famine Commission Report.
The project was sanctioned and a sapper "Sergeant Rowland" was selected by the Solar
Physics Committee as chief observer; and after being trained in the special class of observations
desired at South Kensington was sent out to India at the end of 1882. As it was then too late
to proceed to Leh, he was first deputed to Mussoorie to carry on actinometric observations under
the general superintendence of Mr. Hennessey. Eventually he was in the summer of 1883 sent
with an assistant observer, Mr. Shaw, to Leh. Regular observations were taken for two years, but
it was found that the dust continually present in the air scattered the sun's heat in so irregular
a manner as to make the observations of little value for the objects for which they were recorded.
It was accordingly resolved to transfer the observatory to Mussoorie. Both Sergeant Rowland
and Mr. Shaw were recalled from Leh. Sergeant Rowland's services, however, were not retained
for the observatory, and he was transferred to the Survey Department. Mr. Shaw only was
appointed actinometric observer with a native assistant. But Mussoorie was found equally
unsuited on account of the large amount of cloud in the cold weather and rains and the fre-
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about this period threw doubts upon the accuracy, and it was reported that the Solar Physics
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decided to transfer the actinometric observatory to Simla and utilize the observer in the Simla
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The observations are being carried out at Simla by the native observer and assistant observer and the results forwarded to the Solar Physics Committee.

The Solar Physics Committee suggested some years ago that photographs should be taken frequently of the sun, in order that India might assist towards securing a permanent record of the number and magnitude of the sun's spots and other changes in the solar surface. The Surveyor-General, who was consulted, suggested that this work should be done at Dehra Dun. The services of a properly-qualified man were obtained, and this work has now been carried on for some years. A short time ago the Solar Physics Committee suggested that special spectroscopic observations might also be taken in India, and Colonel Thuillier agreed that this work could also be carried on at Dehra Dun, which, however, also suffers from defects of cloud and dust. Spectroscopic instruments had also been in 1881 sent out by the Secretary of State to the Elphinstone College at Poona. The Solar Physics Committee have recently asked the Government of India if they cannot utilize these instruments at head-quarters. The Bombay Government has been consulted on the subject.

It may be explained, in conclusion, that there are three classes or series of observations, now scattered at various places, which the Solar Physics Committee desire should be carried on systematically in India under satisfactory and uniform conditions for a series of years. These are—

(1) Actinometric observations. In order to ascertain any variations there may be in the sun's heating power at the earth's surface, to whatever cause they may be due.

(2) Sun spot photography. In order to accumulate data for a complete record of the sun's spots or the changes on the solar surface. It is evident this can only be done by a large number of observatories in different parts of the earth, co-operating and working on a common system.

(3) Solar spectroscopy. In order to collect evidence which will probably throw light on the constitution of the sun.

The first is being done at Simla, the second at Dehra, and the third has only been commenced under what are believed to be unfavorable conditions at Poona. The work at Dehra is, however, confessedly temporary, as the Survey office there will probably be shortly transferred to Calcutta. It will, therefore, probably be necessary shortly, if India is to assist in these observations, to determine when and under what conditions the work is to be carried out permanently in future.

Note by the Meteorological Reporter to the Government of India on the future organization of the Madras Astronomical Observatory.

The present position at the Madras Observatory affords a favorable opportunity of considering the future status of the one large Astronomical Observatory in India.

The Secretary of State, on the advice of the Astronomer Royal, has apparently decided that it is desirable, if not necessary, that an Astronomical Observatory should be maintained in India, the work at which should, as defined by the Astronomer Royal in his letter, dated 14th April 1883, consist of—

A. Astronomical work proper, including the determination of accurate positions of the sun, certain fundamental stars, the moon and planets.

B. Astronomical physics, more especially—

a. Daily observation of the solar prominences and other solar phenomena with the spectroscope.

b. Daily photographs of the sun.

The Government of India have accepted this outline of work, which hence forms the basis on which the following recommendations and suggestions are made.

The following appear to be the chief points that require careful consideration :—

1st.—The range and extent of work that should be carried out at the Astronomical Observatory, and more especially the desirability of including the series of observations of the sun required by the Solar Physics Committee.

2nd.—The desirability of removing the Astronomical Observatory at present located at Madras to a suitable hill-station, where the atmospheric conditions for the work of observation would be much more satisfactory than at Madras.

3rd.—The selection of the hill-station best adapted for carrying on the astronomical and solar physics work.

4th.—The changes and additions in the European staff of the observatory necessary to carry out the astronomical and solar physics work continuously and efficiently.

5th.—The changes in the control and inspection of the observatory necessary to secure the working of the observatory in the way desired by the Secretary of State, the Government of India, and the Observatories Committee in England. These points are dealt with *seriatim*.

I. The work hitherto carried on at the Madras Observatory consists of—

a. Astronomical observations.

b. Magnetical observations.

c. Meteorological observations.

The two latter classes of observations are subordinate to the first, and are not an essential part of the work of an Astronomical Observatory.

The Astronomer Royal has pointed out the necessity of the addition of observations in connection with astronomical physics. None have been hitherto taken at Madras, although Mr. Pogson recognized their importance, first, because the atmospheric conditions at Madras were not suitable, and, secondly, because Mr. Pogson was so pressed with work and arrears of work that he had not time to introduce these observations. Hence, under instructions from the Secretary of State, the Government of India have had to make temporary and not very satisfactory arrangements for carrying out the classes of observations desired by the Solar Physics Committee. Those called for by that Committee up to the present date are—

(1) Actinometric.

(2) Photographic.

(3) Spectroscopic.

The first were commenced at Leh, transferred to Mussoorie and then to Simla, where they are carried out under the superintendence of the Meteorological Reporter to the Government of India. The second are carried out at Dehra Dun under the superintendence of the Survey Department. As, however, the Survey office at that station will probably be removed to Calcutta shortly, new arrangements will then be necessary.

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Hence these observations are being carried out imperfectly. The observers are subject to the superintendence of officers who have not the leisure to control them properly. It would be far better as well as more economical to combine the whole work of these observations in one place, and to have it continuously and efficiently controlled by an officer specially acquainted with the work, and able to modify the observations as their examination and discussion suggested. The only way in which this can be done satisfactorily is to make it an integral part of the work of the one Astronomical Observatory maintained by the Government of India.

II. Assuming that the work of the Astronomical Observatory will include solar physics observations as defined above, it would be necessary to locate the observatory at a hill station. Messrs. Blanford, Pogson, Hennessey and others have urged the necessity of this for the solar physics observations. Mr. Pogson has also stated that much of the astronomical work could be done better at a hill-station than at Madras. The Astronomer Royal in his letter of the 22nd July 1891 also adopts this view when he says—"If a suitable hill-station could be found . . . it would, I think, be advantageous to move the whole of the Astronomical Observatory to that station, leaving the Magnetical Branch at Madras." Hence it may be concluded that it would be desirable to remove the Astronomical Observatory from Madras to a hill-station for the Astronomical work proper, and would be absolutely necessary if it is to include the classes of observations required by the Solar Physics Committee.

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III.—The selection of a suitable hill-station for the Astronomical Observatory is hence very important. Mr. Hennessey has suggested that it should be at an elevation of at least 10,000 feet. Leh (elevation 11,000 feet) was selected for the work of actinometric observation some time ago, but was rejected after a trial of 18 months (on account of the amount of cloud and dust in the atmosphere). It is very doubtful whether there is any hill-station in the Western Himalayas over 10,000 feet where the atmospheric conditions would be superior to those of the Palnis and Nilgiris, and the difficulty of access would be a great barrier to its adoption. The following hill-stations over 7,000 feet (in addition to Leh) have been suggested at various times :—

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(2) Simla }

(3) The Palnis.

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Hence, I think that the choice of a hill-station lies between (1) Kodaikānal on the Palnis, (2) Kōtagiri on the Nilgiris.

Small temporary observatories have been established at these two stations to take temperature, cloud, and other observations and to record the amount of sunshine. The Government of Madras has also been instructed to request the Government Astronomer to arrange for special observations to test the clearness of the atmosphere at night. It is hoped that twelve months' observations will supply sufficient data to decide the relative advantages of these two stations as compared with Madras for the two classes of observations (*i.e.*, star, &c., observations by night, and sun observations by day).

IV. The Astronomer Royal has pointed out in his letter of 22nd July 1891, that Mr. Pogson's salary was not adequate for the post, and that he had no European assistant qualified to take his place temporarily in case of illness or absence on furlough, &c. It would, in my opinion, be best to appoint two officers—one to superintend the Astronomical work and the other the Solar Physics work. This would cost little more than Mr. Christie's suggestion, and would not only secure the object Mr. Christie had in view, but also enable the extended work of the observatory to be carried on fully and satisfactorily. They should each have a pay of Rs. 700, rising to Rs. 1,200 in ten years. The Astronomer should be selected in England by the Observatories Committee and be engaged for a period of ten years. The Superintendent of the Solar Physics section should either be selected in England by the Solar Physics and Observatories Committees, or, as I would suggest, Mr. Michie Smith, acting as Astronomer at present, might be appointed. So far as I can judge he is fully qualified to carry on this section of the work satisfactorily, and his appointment would enable his services to be utilized in continuing the publication of the past star observations according to the intentions of Mr. Pogson.

If these arrangements were sanctioned, the staff of the astronomical observatory would consist of two Europeans and of Native assistants. The first European officer would superintend the astronomical observations and edit, with Mr. Michie Smith's assistance, the past astronomical observations yet unpublished. The second European officer (Mr. Michie Smith) would superintend the solar physics observations and also work up the previous actinometric observations at Mussoorie and Simla, and the previous meteorological observations at Madras, of which there are now a 30 years' series.

If the Astronomical Observatory was established at a hill-station and provided with the staff I suggest, it would still be necessary to continue the magnetical and meteorological observations at Madras (as has been suggested by Mr. Christie) and also probably to drop the time-ball at Madras and give the time signals to telegraph offices over India. It would hence be necessary to continue Madras as a small branch observatory and to provide it with a Superintendent (probably a half-time officer) and a small staff. It should, however, be subordinate to the chief observatory, and the latter part of the work might probably be partially and directly controlled from the chief Astronomical Observatory.

V. If these changes be effected, the Southern India Astronomical Observatory would be the only Government Astronomical and Solar Physics Observatory in India. It would therefore be a national, not a provincial, institution. Hence it is essential that the control of the institution should be imperial and not provincial. It should be directly placed under, and be subject to, the Government of India. When the control of such an institution is partially imperial and partially provincial, past experience shows that it is slow and ineffective and gives rise to much friction. The Government of India would probably utilize the Meteorological Reporter to the Government of India as the channel of communication with the observatory officials. The present arrangements by which the report of the astronomical work done annually is considered by the Observatories Committee should of course be continued and might be extended to the other section of the work (*viz.*, the solar physics observations), the services of the Solar Physics Committee being utilized in that case.

It would probably be desirable to have a Board of visitors of, say, four or five members to inspect the observatory annually and report on the actual condition of the observatory and instruments. Two or three of these might be appointed by the Government of India and two by the Government of Madras. Their report might also be taken into consideration by the Committees in England. These Committees might also be utilized to assist the Government of India in defining the general lines of work to be carried out at the observatory.

Assuming, then, that a suitable hill-station for the Astronomical Observatory can be found, the proposals may be summed up as follows:—

- (1) To establish an Astronomical and Solar Physics Observatory at a hill-station in Southern India with a staff of two European scientists and Native assistants.
- (2) To reduce the Madras Observatory to a branch observatory of the preceding and to confine its work to—

- | | |
|--------------------|-------------------------------------|
| a. Meteorological, | c. Time determination observations, |
| b. Magnetical, | |

and place it under a half-time officer with a small staff of Native assistants.

- (3) To place the observatories directly under the control of the Government of India, the work to be defined and criticised by the Observatories and Solar Physics Committee at home, and to appoint a small body of visitors to inspect the observatory annually.

If these suggestions be accepted, it would appear to be desirable to obtain the sanction of the Secretary of State to the programme, and to maintain affairs as at present at Madras for a year, before the end of which time the question of the relative advantages of Kōtagiri and Kodaikānal to each other and to Madras would be settled by the observations at present in progress.

(Signed) JOHN ELIOT,
Meteorological Reporter to the
Government of India.

SIMLA,
the 13th October 1891.

Reference, dated 24th November 1891.

Referred to the Acting Government Astronomer for remarks.

(Signed) J. F. PRICE,
Chief Secretary.

To the Government Astronomer, with current and enclosure.

From C. MICHIE SMITH, Esq., Offg. Government Astronomer, to Chief Secretary to Government, dated Madras, 2nd December 1891, No. 92.

Adverting to your reference, dated 24th ultimo, on C. No. 3229 of 1891, Public Department,* I have the honour to submit the following remarks on the papers connected with the future of the Madras Observatory.

* Herewith returned with two enclosures.

2. The general scheme suggested by the Meteorological Reporter to the Government of India seems to me on the whole a good one. There is little doubt that the only way to make the observatory a really effective institution is to combine in it all the regular astronomical work carried on at present at different centres and to strengthen the staff of European Astronomers.

3. Mr. Eliot's suggestion that the work should be divided into two sections under two Europeans is in many respects a good one. The two classes of work contemplated differ widely from each other, and especially in this, that the observations for the one have to be carried on at night, while those for the other have mainly to be carried on during the day. Most of the observations of both classes must be made by Europeans, and one man cannot carry on a continuous series of observations both by day and by night.

4. The question of the location of the observatory is one which I have already dealt with at considerable length in two letters to Sir M. E. Grant Duff (*vide* my letters of 13th April and 7th August 1883, and G.O., dated 7th March 1885, No. 572, Public), and I need now add but little to what I have there stated. I still hold that the climate of Kodaikānal is the best that can be selected, but all decision on this point must be delayed till the promised observations have been completed. I would, however, point

5. A question of some importance is whether it would be necessary, in case a hill-station is chosen for the observatory, to continue the present observatory for time-determinations. For myself I do not think this would be in the least necessary. At present the mean-time clock which distributes time-signals is compared every day by means of a chronometer with the transit clock, but this could be done equally well by telegraph if the telegraph line from the hill station to Madras could be handed over to the Astronomer for ten minutes each day. In that case the observations required at Madras would be reduced to the meteorological observations carried on at a second-class station and the comparison and adjustment of the mean-time clock once a day. The magnetical observations were given up many years ago.

6. With reference to the proposal to transfer the observatory to a hill station nearer

6. With reference to the proposal to transfer the reorganized observatory from Provincial to Imperial control, it is unnecessary for me to offer any opinion, but I may be permitted to point out that the proposal to make the Observatory an adjunct to the Meteorological Department seems to be a rather remarkable one. The present head of the Meteorological Department is a gentleman of great scientific attainments and probably no Astronomer would have any hesitation in forwarding reports to Government through him, but a meteorologist need not necessarily know anything about astronomy; and, in the future, the proposed arrangement might cause much friction of a kind which the history of the Madras Observatory shows to be most detrimental to work. If the committee suggested by Mr. Eliot is appointed, the channel of communication might be through the President of that Committee, who might be the Meteorological Reporter to Government, or any other suitable officer. This would avoid the appearance of subordinating Astronomy to Meteorology.

7. Of the other suggestions made by Mr. Eliot I approve, and I will gladly do anything in my power to assist in settling the question of the best situation for the observatory.

I don't put the same con-
 struction on Mr. Eliot's Vth.
 proposition as my Hon. Colleague
 Mr. Stokes or Mr. W. B. King.
 Mr. Eliot merely says, that
 "the fact of having a probably
 "scientific & historical
 "Report to the Gov. of India
 "on the character of some
 "with the Observatory officials"
 "is a very important matter
 "and that on the Observatory
 "officials has been the
 "fact of India sometimes they
 "do write to the Meteorological
 "Reports in reference to the
 "fact of fact with some
 "Dept. There is nothing objec-
 "tionable in this so long as the
 "Report does not criticize
 "the Astronomical work. &
 "it is clear from Mr. Eliot's
 "language at the end of
 "his letter that he is not
 "objecting that the criticism
 "definition of the work of the
 "Observatory officials is
 "becoming only the
 "Observatory officials. Mr. Eliot
 "is at home in

27/12/91

I agree with the remarks of my
hon. colleagues - but as regards
the question of subordination
(with wh. we shall have no
success) I view it in the same
light as the hon. Mr. Goschen.

W
30 Dec

Sudia, nearly done the
farmer practice.

But if the Govt. of India chose to make the Postmaster General subordinate to the Director of India Marine - which would be just as sensible - it would not be any concern of Govt., which need only pay regard to the position of officers under it; & it will be the same if the Astronomer is made an Impl. officer.

4. Attention may be called
to Mr Michie Smith's
remarks about Hadzibonik

MS.
1712

Exd. A. Raitt

21/12
23/12

See my remarks in 24/1

I think it would be much better
that the proposed observatory
should be entirely imperial and
thence an institution controlled
by the Govt of India. The fact that
the Observatory might be situated
in the Madras Presidency is a reason
why it should be under the Madras
Govt. or Government of India but
but I should, however, be in favor
if decided, of course do all in our
power to facilitate the work. I
quite agree that it is important to
subordinate the Observatory to the
Meteorological Reporter to the
Govt of India is a sensible one, but
we are hardly called on to express
an opinion on that point, and the
subordination would be impossible
if the Observatory were provincialized.
There would be some difficulty in
forming a Committee of position &
question the utility of Govt. It would
be better to select fully competent men
& leave them free. Subordination by a
body of men presumably amateurs
less competent than the selected
scientists would, I think be a failure.
The criticism of the Chief of Science
in Europe on the work done will be
much more valuable.

Forwarded Mr. Martin Smith's letter

23 Dec

Bill. & circulate.

For aiders.

It is submitted that
Mr Eliot's proposals
are on the whole very
good ones, & may
be supported by this
Govt.

2. There is no need for
maintaining the establish-
ment as Provincial,
& the Local Govt.
will be relieved of a
somewhat troublesome
department. If the
Observatory is made
an Imperial one.
3. Provided that this
is agreed upon, it
makes very little to
this Govt. whether the
Astronomer is placed
~~in subordination~~
in subordination
to the head of the
Meteorological dept
or not. Such an
arrangement is an
eminently feasible one,
& attempts to carry
it out when Mr. Parnell
was Astronomer, &
Mr. Blanford (whose
Scientific attainments
ended with Meteorology
was Meteorological
Subordinate to the Astronomer)

48. 10
THE OBSERVATORY,

Madras, 4th January 1892.

No 2.

FROM

THE GOVERNMENT ASTRONOMER,

Madras.

To The Honorable T. G. Price
Chief Secretary to Govt.
Fort St. George

SIR,

With reference to para 1
of my letter, No. 92 of the 2nd Decem-
ber 1891, I have the honor to request
permission to withdraw the objection
therein raised to the communication
between the Astronomer and the Govern-
ment of India being through the
Meteorological Reporter to Govern-
ment. I find that this proposal
is looked upon as one of considerable
importance as a part of a scheme
for the unification of the various
scientific departments (which is in
itself

211
itself highly desirable) and that it
will be worked in such a way that
no difficulties are likely to arise from
it. In view of the undoubted
advantages of the other parts of
the scheme which seem to be in-
volved in the acceptance of this
proposal, I think that the objec-
tion which is, after all, mainly
a sentimental one ought to be
withdrawn.

I have the honor to be,

Sir,

Yours most obed^t servant,

C. Nicolson Smith

Offg Asst. Astronomer

Public (1892) Report

C No. 35-84/91

CHIEF SECRETARY
25 JAN 92

From
The Govt. Astronomer

Dated 4th July/92

Publ. No. 53-54-23-192

Regarding permission
to withdraw the objection
raised to the communication
between Astronomer &
the Govt. of India passing the
the Meteorological Report

406
23/92
JANUARY 1892, No. 53, PUBLIC.
Proof 13/1

GOVERNMENT OF MADRAS.
PUBLIC DEPARTMENT.

READ—the following papers:—
From J. W. P. MUIR-MACKENZIE, Esq., C.S., Offg. Secretary to the Govern-
ment of India, Revenue and Agricultural Department (Meteorology), to the
Secretary to the Government of Madras, dated Simla, the 27th October 1891,
No. 2243—2.
In continuation of my letter, No. 2048—2, dated the 1st instant, I am directed to
forward copy of a Note * drawn up by the
Meteorological Reporter to the Govern-
ment of India on the present position of
the Madras Observatory and the establishment in its place of an Imperial Astronomical
Observatory in India and to request that the Government of India may be favoured, at
an early date, with the views of His Excellency the Governor in Council on the
recommendations and suggestions offered by Mr. Eliot.
* Dated 13th October 1891.
2. I am also to enclose for the information of His Excellency the Governor in
Council a memorandum which summarizes the history of the various solar observations
initiated at the instance of the Solar Physics Committee to which allusion is made in
Mr. Eliot's note.

ENCLOSURES.
Note on the Actinometric and other Observations made in India for the Solar Physics
Committee, London.

In 18 , a Committee of leading astronomers in England was appointed by Government (?)
to consider and advise on the methods of carrying on observations on solar physics. In 1879, Mr.
Blanford, then Meteorological Reporter of India, received a letter from that Committee inviting
his co-operation in the work of solar research. In compliance with this request, observations
were taken at Alipore for one year with a Balfour-Stewart's actinometer (an instrument for mea-
suring the intensity of the sun's heating power at the earth's surface), and the results were shortly
afterwards communicated to the Committee.
A similar instrument was next supplied to Mr. Hennessey, of the Great Trigonometrical
Survey of India, who had for many years taken much interest in solar physics, and offered to
take observations. Shortly afterwards, the Solar Physics Committee suggested Leh on account
of its elevation and supposed freedom from cloud and dust as the most suitable place for observa-
tions of this kind. Mr. Blanford supported this suggestion in a paper advocating their reforms
in his department, the necessity of which had been pointed out in the Famine Commission Report.
The project was sanctioned and a sapper "Sergeant Rowland" was selected by the Solar
Physics Committee as chief observer; and after being trained in the special class of observations
desired at South Kensington was sent out to India at the end of 1882. As it was then too late
to proceed to Leh, he was first deputed to Mussoorie to carry on actinometric observations under
the general superintendence of Mr. Hennessey. Eventually he was in the summer of 1883 sent
with an assistant observer, Mr. Shaw, to Leh. Regular observations were taken for two years, but
it was found that the dust continually present in the air scattered the sun's heat in so irregular
a manner as to make the observations of little value for the objects for which they were recorded.
It was accordingly resolved to transfer the observatory to Mussoorie. Both Sergeant Rowland
and Mr. Shaw were recalled from Leh. Sergeant Rowland's services, however, were not retained
for the observatory, and he was transferred to the Survey Department. Mr. Shaw only was
appointed actinometric observer with a native assistant. But Mussoorie was found equally
unsuited on account of the large amount of cloud in the cold weather and rains and the fre-
quent prevalence of dust in the hot weather. As an examination of the observations themselves,
about this period threw doubts upon the accuracy, and it was reported that the Solar Physics
Committee were endeavouring to devise some more perfect and satisfactory instrument, it was
decided to transfer the actinometric observatory to Simla and utilize the observer in the Simla
office during dusty or rainy weather when it is not possible to take actinometric observations.

The Shevaroyes are about 150 miles from Madras, the Nilgiris about 250 miles, and the Palnis 270 miles. The highest points of the two latter ranges are about 8,000 feet high. The advantages gained by placing the observatory at an elevation of from 2,000 to 2,500 feet higher than the highest point of the Shevaroyes far outweigh the slight disadvantage of the greater distance of these hills from Madras.

Hence, I think that the choice of a hill-station lies between (1) Kodaikānal on the Palnis, (2) Kōtagiri on the Nilgiris.

Small temporary observatories have been established at these two stations to take temperature, cloud, and other observations and to record the amount of sunshine. The Government of Madras has also been instructed to request the Government Astronomer to arrange for special observations to test the clearness of the atmosphere at night. It is hoped that twelve months' observations will supply sufficient data to decide the relative advantages of these two stations as compared with Madras for the two classes of observations (*i.e.*, star, &c., observations by night, and sun observations by day).

IV. The Astronomer Royal has pointed out in his letter of 22nd July 1891, that Mr. Pogson's salary was not adequate for the post, and that he had no European assistant qualified to take his place temporarily in case of illness or absence on furlough, &c. It would, in my opinion, be best to appoint two officers—one to superintend the Astronomical work and the other the Solar Physics work. This would cost little more than Mr. Christie's suggestion, and would not only secure the object Mr. Christie had in view, but also enable the extended work of the observatory to be carried on fully and satisfactorily. They should each have a pay of Rs. 700, rising to Rs. 1,200 in ten years. The Astronomer should be selected in England by the Observatories Committee and be engaged for a period of ten years. The Superintendent of the Solar Physics section should either be selected in England by the Solar Physics and Observatories Committees, or, as I would suggest, Mr. Michie Smith, acting as Astronomer at present, might be appointed. So far as I can judge he is fully qualified to carry on this section of the work satisfactorily, and his appointment would enable his services to be utilized in continuing the publication of the past star observations according to the intentions of Mr. Pogson.

If these arrangements were sanctioned, the staff of the astronomical observatory would consist of two Europeans and of Native assistants. The first European officer would superintend the astronomical observations and edit, with Mr. Michie Smith's assistance, the past astronomical observations yet unpublished. The second European officer (Mr. Michie Smith) would superintend the solar physics observations and also work up the previous actinometric observations at Mussoorie and Simla, and the previous meteorological observations at Madras, of which there are now a 30 years' series.

If the Astronomical Observatory was established at a hill-station and provided with the staff I suggest, it would still be necessary to continue the magnetical and meteorological observations at Madras (as has been suggested by Mr. Christie) and also probably to drop the time-ball at Madras and give the time signals to telegraph offices over India. It would hence be necessary to continue Madras as a small branch observatory and to provide it with a Superintendent (probably a half-time officer) and a small staff. It should, however, be subordinate to the chief observatory, and the latter part of the work might probably be partially and directly controlled from the chief Astronomical Observatory.

V. If these changes be effected, the Southern India Astronomical Observatory would be the only Government Astronomical and Solar Physics Observatory in India. It would therefore be a national, not a provincial, institution. Hence it is essential that the control of the institution should be imperial and not provincial. It should be directly placed under, and be subject to, the Government of India. When the control of such an institution is partially imperial and partially provincial, past experience shows that it is slow and ineffective and gives rise to much friction. The Government of India would probably utilize the Meteorological Reporter to the Government of India as the channel of communication with the observatory officials. The present arrangements by which the report of the astronomical work done annually is considered by the Observatories Committee should of course be continued and might be extended to the other section of the work (*viz.*, the solar physics observations), the services of the Solar Physics Committee being utilized in that case.

It would probably be desirable to have a Board of visitors of, say, four or five members to inspect the observatory annually and report on the actual condition of the observatory and instruments. Two or three of these might be appointed by the Government of India and two by the Government of Madras. Their report might also be taken into consideration by the Committees in England. These Committees might also be utilized to assist the Government of India in defining the general lines of work to be carried out at the observatory.

Assuming, then, that a suitable hill-station for the Astronomical Observatory can be found, the proposals may be summed up as follows:—

- (1) To establish an Astronomical and Solar Physics Observatory at a hill-station in Southern India with a staff of two European scientists and Native assistants.
- (2) To reduce the Madras Observatory to a branch observatory of the preceding and to confine its work to—

- a. Meteorological,
- b. Magnetical,

- c. Time determination observations,

and place it under a half-time officer with a small staff of Native assistants.

- (3) To place the observatories directly under the control of the Government of India, the work to be defined and criticised by the Observatories and Solar Physics Committee at home, and to appoint a small body of visitors to inspect the observatory annually.

If these suggestions be accepted, it would appear to be desirable to obtain the sanction of the Secretary of State to the programme, and to maintain affairs as at present at Madras for a year, before the end of which time the question of the relative advantages of Kōtagiri and Kodaikānal to each other and to Madras would be settled by the observations at present in progress.

(Signed) JOHN ELIOT,
Meteorological Reporter to the
Government of India.

SIMLA,
the 13th October 1891.

Reference, dated 24th November 1891.

Referred to the Acting Government Astronomer for remarks.

(Signed) J. F. PRICE,
Chief Secretary.

To the Government Astronomer, with current and enclosure.

From C. MICHIE SMITH, Esq., Offg. Government Astronomer, to the Chief Secretary to Government, dated Madras, 2nd December 1891, No. 92.

Adverting to your reference, dated 24th ultimo, on C. No. 3229 of 1891, Public Department,* I have the honour to submit the following remarks on the papers connected with the future of the Madras Observatory.

* Herewith returned with two enclosures.

2. The general scheme suggested by the Meteorological Reporter to the Government of India seems to me on the whole a good one. There is little doubt that the only way to make the observatory a really effective institution is to combine in it all the regular astronomical work carried on at present at different centres and to strengthen the staff of European Astronomers.

3. Mr. Eliot's suggestion that the work should be divided into two sections under two Europeans is in many respects a good one. The two classes of work contemplated differ widely from each other, and especially in this, that the observations for the one have to be carried on at night, while those for the other have mainly to be carried on during the day. Most of the observations of both classes must be made by Europeans, and one man cannot carry on a continuous series of observations both by day and by night.

4. The question of the location of the observatory is one which I have already dealt with at considerable length in two letters to Sir M. E. Grant Duff (*vide* my letters of 13th April and 7th August 1883, and G.O., dated 7th March 1885, No. 572, Public), and I need now add but little to what I have there stated. I still hold that the climate of Kodaikānal is the best that can be selected, but all decision on this point must be delayed till the promised observations have been completed. I would, however, point

out at once that the station chosen (probably unavoidably) for the Meteorological Observatory at Kodaikānal will give much less favorable results than a station nearer the proposed site of the observatory.

5. A question of some importance is whether it would be necessary, in case a hill-station is chosen for the observatory, to continue the present observatory for time determinations. For myself I do not think this would be in the least necessary. At present the mean-time clock which distributes time-signals is compared every day by means of a chronometer with the transit clock, but this could be done equally well by telegraph if the telegraph line from the hill station to Madras could be handed over to the Astronomer for ten minutes each day. In that case the observations required at Madras would be reduced to the meteorological observations carried on at a second-class station and the comparison and adjustment of the mean-time clock once a day. The magnetical observations were given up many years ago.

6. With reference to the proposal to transfer the reorganized observatory from Provincial to Imperial control, it is unnecessary for me to offer any opinion, but I may be permitted to point out that the proposal to make the Observatory an adjunct to the Meteorological Department seems to be a rather remarkable one. The present head of the Meteorological Department is a gentleman of great scientific attainments and probably no Astronomer would have any hesitation in forwarding reports to Government through him, but a meteorologist need not necessarily know anything about astronomy; and, in the future, the proposed arrangement might cause much friction of a kind which the history of the Madras Observatory shows to be most detrimental to work. If the committee suggested by Mr. Eliot is appointed, the channel of communication might be through the President of that Committee, who might be the Meteorological Reporter to Government, or any other suitable officer. This would avoid the appearance of subordinating Astronomy to Meteorology.

7. Of the other suggestions made by Mr. Eliot I approve, and I will gladly do anything in my power to assist in settling the question of the best situation for the observatory.

From C. MICHIE SMITH, Esq., Officiating Government Astronomer, to the Chief Secretary to Government, dated Madras, 4th January 1892, No. 2.

With reference to paragraph 6 of my letter, No. 92, of the 2nd December 1891, I have the honour to request permission to withdraw the objection therein raised to the communication between the Astronomer and the Government of India being through the Meteorological Reporter to Government. I find that this proposal is looked upon as one of considerable importance as a part of a scheme for the unification of the various scientific departments (which is in itself highly desirable), and that it will be worked in such a way that no difficulties are likely to arise from it. In view of the undoubted advantages of the other parts of the scheme which seem to be involved in the acceptance of this proposal, I think that the objection—which is, after all, mainly a sentimental one—ought to be withdrawn.

ORDER—dated 23rd January 1892, No. 53, Public.

The Government of India will be addressed.

[Here enter No. , dated January 1892.]

(True Extract.)

To the Government Astronomer

Exd. A. Raitt.

*for no
23 JAN 1892*

23 JANUARY 1892, No. 54, PUBLIC.

PUBLIC DEPARTMENT.

LETTER—from

THE CHIEF SECRETARY TO THE GOVERNMENT OF
FORT ST. GEORGE,

To

THE SECRETARY TO THE GOVERNMENT OF INDIA,
REVENUE AND AGRICULTURAL DEPARTMENT.

SIR,

Your letter, No. 2243-2, 27th October last, was forwarded to Mr. Michie Smith for his remarks on the proposals for establishing an Imperial observatory, and I am now directed to enclose a copy of his letter, dated 2nd December, on the subject.

2. It appears to this Government that the observatory which is to take the place of that at Madras should be regarded as Imperial, and therefore should be an institution under the direct control of the Government of India. The accident that it will be at a station in this Presidency affords no reason for its administration by the Madras Government or the provincialisation of its finance. The existing grant can at the proper time be placed at the disposal of the Government of India, but until then His Excellency in Council will gladly do all that is in his power, ~~at the cost of Provincial funds, for facilitating the work.~~

3. I am to invite attention to Mr. Michie Smith's remarks regarding Kodaikānal, and also to those in respect to magnetical observations. It is not known what has given rise to the prevalent idea that any observations of the kind have been carried on at the Madras observatory in recent years.

4. As the administration of the new observatory will not be under this Government, the Governor in Council does not propose to refer to the subject to which the sixth paragraph of Mr. Smith's letter of the 2nd December and his subsequent communication, dated 4th instant, relate.

5. In conclusion, I am to observe that this Government cannot advise the appointment of a Committee of Visitors. There would always be difficulty in forming such a body, and its utility may be questioned. The Governor in Council considers that fully competent men should be selected to occupy the posts of Astronomer and Superintendent of Solar Physics and that they should be given perfect freedom—subject to the criticism of the leaders of astronomical science in Europe; inspection of their work and of the instruments by a body of men presumably amateurs would certainly might be resented, and could lead to no useful results.

I have the honour to be,

Sr,

Your most obedient servant,

FORT ST. GEORGE,
23rd January 1892.

Exd. A. Raitt.

Chief Secretary.

*where are the notes on which
this draft is based and the
originals of these printed papers*

*1890
1891*

GOVERNMENT OF MADRAS.

PUBLIC DEPARTMENT.

READ—the following papers:—

From J. W. P. MUIR-MACKENZIE, Esq., C.S., Offg. Secretary to the Government of India, Revenue and Agricultural Department (Meteorology), to the Secretary to the Government of Madras, dated Simla, the 27th October 1891, No. 2243—2.

In continuation of my letter, No. 2048—2, dated the 1st instant, I am directed to forward copy of a Note * drawn up by the Meteorological Reporter to the Government of India on the present position of

the Madras Observatory and the establishment in its place of an Imperial Astronomical Observatory in India and to request that the Government of India may be favoured, at an early date, with the views of His Excellency the Governor in Council on the recommendations and suggestions offered by Mr. Eliot.

2. I am also to enclose for the information of His Excellency the Governor in Council a memorandum which summarizes the history of the various solar observations initiated at the instance of the Solar Physics Committee to which allusion is made in Mr. Eliot's note.

ENCLOSURES.

Note on the Actinometric and other Observations made in India for the Solar Physics Committee, London.

In 18 , a Committee of leading astronomers in England was appointed by Government (?) to consider and advise on the methods of carrying on observations on solar physics. In 1879, Mr. Blanford, then Meteorological Reporter of India, received a letter from that Committee inviting his co-operation in the work of solar research. In compliance with this request, observations were taken at Alipore for one year with a Balfour-Stewart's actinometer (an instrument for measuring the intensity of the sun's heating power at the earth's surface), and the results were shortly afterwards communicated to the Committee.

A similar instrument was next supplied to Mr. Hennessey, of the Great Trigonometrical Survey of India, who had for many years taken much interest in solar physics, and offered to take observations. Shortly afterwards, the Solar Physics Committee suggested Leh on account of its elevation and supposed freedom from cloud and dust as the most suitable place for observations of this kind. Mr. Blanford supported this suggestion in a paper advocating their reforms in his department, the necessity of which had been pointed out in the Famine Commission Report. The project was sanctioned and a sapper "Sergeant Rowland" was selected by the Solar Physics Committee as chief observer; and after being trained in the special class of observations desired at South Kensington was sent out to India at the end of 1882. As it was then too late to proceed to Leh, he was first deputed to Mussoorie to carry on actinometric observations under the general superintendence of Mr. Hennessey. Eventually he was in the summer of 1883 sent with an assistant observer, Mr. Shaw, to Leh. Regular observations were taken for two years, but it was found that the dust continually present in the air scattered the sun's heat in so irregular a manner as to make the observations of little value for the objects for which they were recorded. It was accordingly resolved to transfer the observatory to Mussoorie. Both Sergeant Rowland and Mr. Shaw were recalled from Leh. Sergeant Rowland's services, however, were not retained for the observatory, and he was transferred to the Survey Department. Mr. Shaw only was appointed actinometric observer with a native assistant. But Mussoorie was found equally unsuited on account of the large amount of cloud in the cold weather and rains and the frequent prevalence of dust in the hot weather. As an examination of the observations themselves, about this period threw doubts upon the accuracy, and it was reported that the Solar Physics Committee were endeavouring to devise some more perfect and satisfactory instrument, it was decided to transfer the actinometric observatory to Simla and utilize the observer in the Simla office during dusty or rainy weather when it is not possible to take actinometric observations.

The observations are being carried out at Simla by the native observer and assistant observer and the results forwarded to the Solar Physics Committee.

The Solar Physics Committee suggested some years ago that photographs should be taken frequently of the sun, in order that India might assist towards securing a permanent record of the number and magnitude of the sun's spots and other changes in the solar surface. The Surveyor-General, who was consulted, suggested that this work should be done at Dehra Dun. The services of a properly-qualified man were obtained, and this work has now been carried on for some years. A short time ago the Solar Physics Committee suggested that special spectroscopic observations might also be taken in India, and Colonel Thuillier agreed that this work could also be carried on at Dehra Dun, which, however, also suffers from defects of cloud and dust. Spectroscopic instruments had also been in 1881 sent out by the Secretary of State to the Elphinstone College at Poona. The Solar Physics Committee have recently asked the Government of India if they cannot utilize these instruments at head-quarters. The Bombay Government has been consulted on the subject.

It may be explained, in conclusion, that there are three classes or series of observations, now scattered at various places, which the Solar Physics Committee desire should be carried on systematically in India under satisfactory and uniform conditions for a series of years. These are—

(1) Actinometric observations. In order to ascertain any variations there may be in the sun's heating power at the earth's surface, to whatever cause they may be due.

(2) Sun spot photography. In order to accumulate data for a complete record of the sun's spots or the changes on the solar surface. It is evident this can only be done by a large number of observatories in different parts of the earth, co-operating and working on a common system.

(3) Solar spectroscopy. In order to collect evidence which will probably throw light on the constitution of the sun.

The first is being done at Simla, the second at Dehra, and the third has only been commenced under what are believed to be unfavorable conditions at Poona. The work at Dehra is, however, confessedly temporary, as the Survey office there will probably be shortly transferred to Calcutta. It will, therefore, probably be necessary shortly, if India is to assist in these observations, to determine when and under what conditions the work is to be carried out permanently in future.

Note by the Meteorological Reporter to the Government of India on the future organization of the Madras Astronomical Observatory.

The present position at the Madras Observatory affords a favorable opportunity of considering the future status of the one large Astronomical Observatory in India.

The Secretary of State, on the advice of the Astronomer Royal, has apparently decided that it is desirable, if not necessary, that an Astronomical Observatory should be maintained in India, the work at which should, as defined by the Astronomer Royal in his letter, dated 14th April 1883, consist of—

A. Astronomical work proper, including the determination of accurate positions of the sun, certain fundamental stars, the moon and planets.

B. Astronomical physics, more especially—

a. Daily observation of the solar prominences and other solar phenomena with the spectroscope.

b. Daily photographs of the sun.

The Government of India have accepted this outline of work, which hence forms the basis on which the following recommendations and suggestions are made.

The following appear to be the chief points that require careful consideration :—

1st.—The range and extent of work that should be carried out at the Astronomical Observatory, and more especially the desirability of including the series of observations of the sun required by the Solar Physics Committee.

2nd.—The desirability of removing the Astronomical Observatory at present located at Madras to a suitable hill-station, where the atmospheric conditions for the work of observation would be much more satisfactory than at Madras.

3rd.—The selection of the hill-station best adapted for carrying on the astronomical and solar physics work.

4th.—The changes and additions in the European staff of the observatory necessary to carry out the astronomical and solar physics work continuously and efficiently.

5th.—The changes in the control and inspection of the observatory necessary to secure the working of the observatory in the way desired by the Secretary of State, the Government of India, and the Observatories Committee in England. These points are dealt with *seriatim*.

I. The work hitherto carried on at the Madras Observatory consists of—

a. Astronomical observations.

b. Magnetical observations.

c. Meteorological observations.

The two latter classes of observations are subordinate to the first, and are not an essential part of the work of an Astronomical Observatory.

The Astronomer Royal has pointed out the necessity of the addition of observations in connection with astronomical physics. None have been hitherto taken at Madras, although Mr. Pogson recognized their importance, first, because the atmospheric conditions at Madras were not suitable, and, secondly, because Mr. Pogson was so pressed with work and arrears of work that he had not time to introduce these observations. Hence, under instructions from the Secretary of State, the Government of India have had to make temporary and not very satisfactory arrangements for carrying out the classes of observations desired by the Solar Physics Committee. Those called for by that Committee up to the present date are—

(1) Actinometric.

(2) Photographic.

(3) Spectroscopic.

The first were commenced at Leh, transferred to Mussoorie and then to Simla, where they are carried out under the superintendence of the Meteorological Reporter to the Government of India. The second are carried out at Dehra Dun under the superintendence of the Survey Department. As, however, the Survey office at that station will probably be removed to Calcutta shortly, new arrangements will then be necessary.

The third have not yet been commenced, in consequence of the difficulty experienced in making the necessary arrangements.

Hence these observations are being carried out imperfectly. The observers are subject to the superintendence of officers who have not the leisure to control them properly. It would be far better as well as more economical to combine the whole work of these observations in one place, and to have it continuously and efficiently controlled by an officer specially acquainted with the work, and able to modify the observations as their examination and discussion suggested. The only way in which this can be done satisfactorily is to make it an integral part of the work of the one Astronomical Observatory maintained by the Government of India.

II. Assuming that the work of the Astronomical Observatory will include solar physics observations as defined above, it would be necessary to locate the observatory at a hill station. Messrs. Blanford, Pogson, Hennessey and others have urged the necessity of this for the solar physics observations. Mr. Pogson has also stated that much of the astronomical work could be done better at a hill-station than at Madras. The Astronomer Royal in his letter of the 22nd July 1891 also adopts this view when he says—"If a suitable hill-station could be found . . . it would, I think, be advantageous to move the whole of the Astronomical Observatory to that station, leaving the Magnetical Branch at Madras." Hence it may be concluded that it would be desirable to remove the Astronomical Observatory from Madras to a hill-station for the Astronomical work proper, and would be absolutely necessary if it is to include the classes of observations required by the Solar Physics Committee.

Such a change, it may be pointed out, would not only give more favorable atmospheric conditions for observation, but it would enable the European officers to work in a suitable climate and hence probably far more efficiently than in Madras.

III.—The selection of a suitable hill-station for the Astronomical Observatory is hence very important. Mr. Hennessey has suggested that it should be at an elevation of at least 10,000 feet. Leh (elevation 11,000 feet) was selected for the work of actinometric observation some time ago, but was rejected after a trial of 18 months (on account of the amount of cloud and dust in the atmosphere). It is very doubtful whether there is any hill-station in the Western Himalayas over 10,000 feet where the atmospheric conditions would be superior to those of the Palnis and Nilgiris, and the difficulty of access would be a great barrier to its adoption. The following hill-stations over 7,000 feet (in addition to Leh) have been suggested at various times :—

(1) Mussoorie } in the Himalayas.

(2) Simla }

(3) The Palnis.

(4) The Nilgiris.

There is much less cloud and dust in the atmosphere in the Southern India hills than in the Western Himalayas, and hence the former are undoubtedly to be preferred.

Finally, the Shevaroyis have been suggested as nearer to Madras. The highest point of the Shevaroyis is only 5,300 feet above sea level. There is, I am informed, more cloud and dust there than in the more southern hills in Madras. They are, I believe, not above fever height, and are hence, on that account, probably unsuited for the purpose.

The Shevaroyes are about 150 miles from Madras, the Nilgiris about 250 miles, and the Palnis 270 miles. The highest points of the two latter ranges are about 8,000 feet high. The advantages gained by placing the observatory at an elevation of from 2,000 to 2,500 feet higher than the highest point of the Shevaroyes far outweigh the slight disadvantage of the greater distance of these hills from Madras.

Hence, I think that the choice of a hill-station lies between (1) Kodaikānal on the Palnis, (2) Kōtagiri on the Nilgiris.

Small temporary observatories have been established at these two stations to take temperature, cloud, and other observations and to record the amount of sunshine. The Government of Madras has also been instructed to request the Government Astronomer to arrange for special observations to test the clearness of the atmosphere at night. It is hoped that twelve months' observations will supply sufficient data to decide the relative advantages of these two stations as compared with Madras for the two classes of observations (*i.e.*, star, &c., observations by night, and sun observations by day).

IV. The Astronomer Royal has pointed out in his letter of 22nd July 1891, that Mr. Pogson's salary was not adequate for the post, and that he had no European assistant qualified to take his place temporarily in case of illness or absence on furlough, &c. It would, in my opinion, be best to appoint two officers—one to superintend the Astronomical work and the other the Solar Physics work. This would cost little more than Mr. Christie's suggestion, and would not only secure the object Mr. Christie had in view, but also enable the extended work of the observatory to be carried on fully and satisfactorily. They should each have a pay of Rs. 700, rising to Rs. 1,200 in ten years. The Astronomer should be selected in England by the Observatories Committee and be engaged for a period of ten years. The Superintendent of the Solar Physics section should either be selected in England by the Solar Physics and Observatories Committees, or, as I would suggest, Mr. Michie Smith, acting as Astronomer at present, might be appointed. So far as I can judge he is fully qualified to carry on this section of the work satisfactorily, and his appointment would enable his services to be utilized in continuing the publication of the past star observations according to the intentions of Mr. Pogson.

If these arrangements were sanctioned, the staff of the astronomical observatory would consist of two Europeans and of Native assistants. The first European officer would superintend the astronomical observations and edit, with Mr. Michie Smith's assistance, the past astronomical observations yet unpublished. The second European officer (Mr. Michie Smith) would superintend the solar physics observations and also work up the previous actinometric observations at Mussoorie and Simla, and the previous meteorological observations at Madras, of which there are now a 30 years' series.

If the Astronomical Observatory was established at a hill-station and provided with the staff I suggest, it would still be necessary to continue the magnetical and meteorological observations at Madras (as has been suggested by Mr. Christie) and also probably to drop the time-ball at Madras and give the time signals to telegraph offices over India. It would hence be necessary to continue Madras as a small branch observatory and to provide it with a Superintendent (probably a half-time officer) and a small staff. It should, however, be subordinate to the chief observatory, and the latter part of the work might probably be partially and directly controlled from the chief Astronomical Observatory.

V. If these changes be effected, the Southern India Astronomical Observatory would be the only Government Astronomical and Solar Physics Observatory in India. It would therefore be a national, not a provincial, institution. Hence it is essential that the control of the institution should be imperial and not provincial. It should be directly placed under, and be subject to, the Government of India. When the control of such an institution is partially imperial and partially provincial, past experience shows that it is slow and ineffective and gives rise to much friction. The Government of India would probably utilize the Meteorological Reporter to the Government of India as the channel of communication with the observatory officials. The present arrangements by which the report of the astronomical work done annually is considered by the Observatories Committee should of course be continued and might be extended to the other section of the work (*viz.*, the solar physics observations), the services of the Solar Physics Committee being utilized in that case.

It would probably be desirable to have a Board of visitors of, say, four or five members to inspect the observatory annually and report on the actual condition of the observatory and by the Government of Madras. Their report might also be taken into consideration by the Committees in England. These Committees might also be utilized to assist the Government of India in defining the general lines of work to be carried out at the observatory.

Assuming, then, that a suitable hill-station for the Astronomical Observatory can be found, the proposals may be summed up as follows:—

- (1) To establish an Astronomical and Solar Physics Observatory at a hill-station in Southern India with a staff of two European scientists and Native assistants.
- (2) To reduce the Madras Observatory to a branch observatory of the preceding and to confine its work to—

a. Meteorological,
b. Magnetical,

c. Time determination observations,

and place it under a half-time officer with a small staff of Native assistants.

- (3) To place the observatories directly under the control of the Government of India, the work to be defined and criticised by the Observatories and Solar Physics Committee at home, and to appoint a small body of visitors to inspect the observatory annually.

If these suggestions be accepted, it would appear to be desirable to obtain the sanction of the Secretary of State to the programme, and to maintain affairs as at present at Madras for a year, before the end of which time the question of the relative advantages of Kōtagiri and Kodaikānal to each other and to Madras would be settled by the observations at present in progress.

(Signed) JOHN ELIOT,
Meteorological Reporter to the
Government of India.

SIMLA,
the 13th October 1891.

Reference, dated 24th November 1891.

Referred to the Acting Government Astronomer for remarks.

(Signed) J. F. PRICE,
Chief Secretary.

To the Government Astronomer, with current and enclosure.

From C. MICHIE SMITH, Esq., Offg. Government Astronomer, to the Chief Secretary to Government, dated Madras, 2nd December 1891, No. 92.

Adverting to your reference, dated 24th ultimo, on C. No. 3229 of 1891, Public Department,* I have the honour to submit the following remarks on the papers connected with the future of the Madras Observatory.

* Herewith returned with two enclosures.

2. The general scheme suggested by the Meteorological Reporter to the Government of India seems to me on the whole a good one. There is little doubt that the only way to make the observatory a really effective institution is to combine in it all the regular astronomical work carried on at present at different centres and to strengthen the staff of European Astronomers.

3. Mr. Eliot's suggestion that the work should be divided into two sections under two Europeans is in many respects a good one. The two classes of work contemplated differ widely from each other, and especially in this, that the observations for the one have to be carried on at night, while those for the other have mainly to be carried on during the day. Most of the observations of both classes must be made by Europeans, and one man cannot carry on a continuous series of observations both by day and by night.

4. The question of the location of the observatory is one which I have already dealt with at considerable length in two letters to Sir M. E. Grant Duff (*vide* my letters of 13th April and 7th August 1883, and G.O., dated 7th March 1885, No. 572, Public), and I need now add but little to what I have there stated. I still hold that the climate of Kodaikānal is the best that can be selected, but all decision on this point must be delayed till the promised observations have been completed. I would, however, point

out at once that the station chosen (probably unavoidably) for the Meteorological Observatory at Kodaikānal will give much less favorable results than a station nearer the proposed site of the observatory.

5. A question of some importance is whether it would be necessary, in case a hill-station is chosen for the observatory, to continue the present observatory for time determinations. For myself I do not think this would be in the least necessary. At present the mean-time clock which distributes time-signals is compared every day by means of a chronometer with the transit clock, but this could be done equally well by telegraph if the telegraph line from the hill station to Madras could be handed over to the Astronomer for ten minutes each day. In that case the observations required at Madras would be reduced to the meteorological observations carried on at a second-class station and the comparison and adjustment of the mean-time clock once a day. The magnetical observations were given up many years ago.

6. With reference to the proposal to transfer the reorganized observatory from Provincial to Imperial control, it is unnecessary for me to offer any opinion, but I may be permitted to point out that the proposal to make the Observatory an adjunct to the Meteorological Department seems to be a rather remarkable one. The present head of the Meteorological Department is a gentleman of great scientific attainments and probably no Astronomer would have any hesitation in forwarding reports to Government through him, but a meteorologist need not necessarily know anything about astronomy; and, in the future, the proposed arrangement might cause much friction of a kind which the history of the Madras Observatory shows to be most detrimental to work. If the committee suggested by Mr. Eliot is appointed, the channel of communication might be through the President of that Committee, who might be the Meteorological Reporter to Government, or any other suitable officer. This would avoid the appearance of subordinating Astronomy to Meteorology.

7. Of the other suggestions made by Mr. Eliot I approve, and I will gladly do anything in my power to assist in settling the question of the best situation for the observatory.

From C. MICHIE SMITH, Esq., Officiating Government Astronomer, to the Chief Secretary to Government, dated Madras, 4th January 1892, No. 2.

With reference to paragraph 6 of my letter, No. 92, of the 2nd December 1891, I have the honour to request permission to withdraw the objection therein raised to the communication between the Astronomer and the Government of India being through the Meteorological Reporter to Government. I find that this proposal is looked upon as one of considerable importance as a part of a scheme for the unification of the various scientific departments (which is in itself highly desirable), and that it will be worked in such a way that no difficulties are likely to arise from it. In view of the undoubted advantages of the other parts of the scheme which seem to be involved in the acceptance of this proposal, I think that the objection—which is, after all, mainly a sentimental one—ought to be withdrawn.

ORDER—dated 23rd January 1892, No. 53, Public.

The Government of India will be addressed.

[Here enter No. 54, dated 23rd January 1892.]

(True Extract.)

Chief Secretary.

To the Government Astronomer.

Exd. A. Raitt.

Gobt. of {1892} Madras.
PUBLIC.

—

Issued

Recd.

Encl.

G.O., 23rd January 1892, No. 53.

JANUARY.

Madras Observatory.

Directing that the Government of India be addressed regarding the proposals for establishing an Imperial Observatory in place of the —.

23RD JANUARY 1892, No. 54, PUBLIC.

PUBLIC DEPARTMENT.

LETTER—from

THE CHIEF SECRETARY TO THE GOVERNMENT OF
FORT ST. GEORGE,

To

THE SECRETARY TO THE GOVERNMENT OF INDIA,
REVENUE AND AGRICULTURAL DEPARTMENT.

SIR,

Your letter, No. 2243-2, 27th October last, was forwarded to Mr. Michie Smith for his remarks on the proposals for establishing an Imperial observatory, and I am now directed to enclose a copy of his letter, dated 2nd December, on the subject.

2. It appears to this Government that the observatory which is to take the place of that at Madras should be regarded as Imperial, and therefore should be an institution under the direct control of the Government of India. The accident that it will be at a station in this Presidency affords no reason for its administration by the Madras Government or the provincialisation of its finance. The existing grant can at the proper time be placed at the disposal of the Government of India, but however this point be decided His Excellency in Council will of course gladly do all that is in his power to facilitate the work.

3. I am to invite attention to Mr. Michie Smith's remarks regarding Kodaikānal, and also to those in respect to magnetical observations. It is not known what has given rise to the prevalent idea that any observations of the kind have been carried on at the Madras observatory in recent years.

4. As the administration of the new observatory will not be under this Government, the Governor in Council does not propose to refer to the subject to which the sixth paragraph of Mr. Smith's letter of the 2nd December and his subsequent communication, dated 4th instant, relate.

5. In conclusion, I am to observe that this Government cannot advise the appointment of a committee of visitors. There would always be difficulty in forming such a body, and its utility may be questioned. The Governor in Council considers that fully competent men should be selected to occupy the posts of Astronomer and Superintendent of solar physics and that they should be given freedom—subject to the criticism of the leaders of astronomical science in Europe; inspection of their work and of the instruments by a body of men presumably amateurs might be resented, and could lead to no useful results.

I have the honour to be,
Sir,

Your most obedient servant,

FORT ST. GEORGE,
23rd January 1892.

Chief Secretary.

[Appendix.

APPENDIX.

From C. MICHIE SMITH, Esq., Offg. Government Astronomer, to the Chief Secretary to Government, dated Madras, 2nd December 1891, No. 92.

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Exd. A. Raitt.

1892.
PUBLIC DEPARTMENT.

*From the Government of
Fort St. George.*

Issued

Recd.

Encl.

Letter, 23rd January 1892, No. 54.

JANUARY.

Madras Observatory.

Remarking on the proposals for establishing an
Imperial Observatory in the place of the —.