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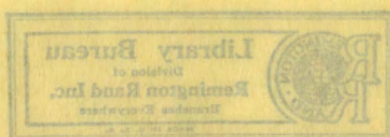
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Yerkes Observatory

Astronomy

Gifts



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University of Chicago
Kenwood Observatory.
Chicago, Sept. 23, 1892.

President W. R. Harper,

Dear Sir:-

The question of a suitable Astronomical Observatory for the University of Chicago has often been discussed between us, and I am sure you will be pleased to learn of an opportunity which now exists of securing the largest telescope and the largest and best equipped observatory in the world. The peculiar circumstances of the case are as follows:

Some years ago, when the largest telescope ever made had just been installed at the Lick Observatory, and had commenced to attract visitors to Mount Hamilton from all parts of the world, the people of Southern California came to the conclusion that a still larger instrument, if placed on Wilson's Peak (near Los Angeles) would add greatly to

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Barbara came to the conclusion that a
still larger instrument, if placed on Mount
San Antonio, would add greatly to

the attractiveness of this part of the State,²
and would draw there many tourists and per-
manent residents. A certain amount of money
was subscribed, and an order given to Mantois,
the celebrated maker of optical glass in Paris,
to furnish the two glass discs necessary for
the construction of an objective forty inches
in diameter. The resources of Mantois' factory
had been greatly taxed in the manufacture of
the glass for the smaller objective of the
Lick telescope, and the much greater difficulty
of carrying out the new order seemed almost
insurmountable. But the attempt was made,
and after many failures and several years
of labor, the two forty-inch discs were
successfully completed, and sent to the firm
of Alvan Clark & Sons, of Cambridge, Mass., to be
made into an objective. Meanwhile the
condition of things in Los Angeles had com-
pletely changed. Property had decreased in
value, the "land-boom" had subsided, and
the money necessary to carry out the
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months in Messrs Clark's shop, in wait of the

condition they were in when received from Mantois. I met Mr. Clark a short time ago, and he informed me there was not the slightest probability that the objective would be made for the Los Angeles people, who, he believed, would be quite willing to sell the glass discs.

You can readily see what an exceptional opportunity lies open to anyone with the necessary funds. The finished objective will cost about sixty thousand dollars. The amounting an equal sum, and the great iron dome, seventy-five feet in diameter, which will serve to house the instrument, will require an additional fifty thousand dollars. So for an outlay of one hundred and seventy thousand dollars the University could come into early possession of a telescope without an equal. If you will consider for a moment just what such a possession would mean to the University and to the city of Chicago, you will agree that no effort should be spared to secure this prize. I mentioned above that the

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4.

telescope under consideration will be larger than the great Lick telescope, which has an aperture of 36 inches. The difference between a diameter of 40 inches and one of 36 inches does not seem great, but when it is remembered that the efficiency of a telescope depends upon its light-collecting power, and hence upon the area of its objective, the advantage of the 40 inch at once becomes apparent. Its area is one-quarter greater than that of the Lick glass, and consequently it will gather 25 per cent more light. A higher magnifying power can be used with it, and in every way its advantage over the world's present ~~largest~~ instrument will be very marked.

The installation of such an instrument in the Observatory of the University of Chicago would immediately give it the first rank among the observatories of the world, and allow it to make most substantial contributions to the progress of astronomical science. It would become the Mecca of thousands of science-loving pilgrims, as the Lick Observatory, even in its isolated position, is to-day. And the donor could have no more

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5.

enduring monument. It is certain that Mr. Lick's name would not have been nearly so widely known to-day were it not for the famous observatory established as the result of his munificence.

A glance at the distribution of great telescopes throughout the world may not be without interest here. The universities are fairly well supplied with large instruments, the University of California leading off with the Lick telescope. The University of Cambridge, and the University of Virginia possess the next largest telescopes, the former a 25 inch given by the late Mr. Newall, and the latter a 26 inch, presented by Leander McCormick of Chicago. A 24 inch telescope of special design has recently been presented by Miss Bruce of New York to the Harvard University Observatory, which is one of the most active and best equipped observatories in the world. Yale has a small observatory, with no large telescope, but it is understood that funds have been provided for a 28 inch. Princeton has a 23 inch, which is employed by Professor Young for his solar investigations. The Chamberlin Observatory of

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6.
the University of Denver has ordered a 20 inch, but, though completed, it is not yet in position. Northwestern University at Evanston comes next with the $18\frac{1}{2}$ inch of the Dearborn Observatory, which at the time of its construction was the largest telescope in the world, and Chicago is well known among astronomers largely because of this instrument.

The telescopes (outside of the Universities) next in size to the 36 inch of the Lick Observatory are those of Pulkova, Russia, 30 inches, the private observatory established by M. Bessel at Alton near Berlin, 30 inches; the Royal Observatory at Greenwich, 28 inches; and Vienna, 27 inches. All of the instruments to which I have referred are refractors. None of these telescopes approach in size the proposed 40 inch of the University of Chicago Observatory, and it is evident to what extent the reputation of the University could be advanced by the possession of this great instrument.

As adjuncts to the great telescope, the following instruments will be necessary to complete the equipment of the Observatory:
Reflecting telescope of 3 feet or 4 feet aperture.

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Reflecting telescopes of 3 feet or 4 feet aperture.

Twin equatorial of 12 inches aperture, with photographic and visual objectives.

12 inch refractor.

6 inch meridian circle.

20 inch siderostat, with 24 inch horizontal reflecting telescope.

Spectroheliographs, concave and plane grating spectroscopes, clocks, chronographs, measuring engines, etc., etc.

Three hundred thousand dollars will be required for the instruments and buildings of the Observatory, and I am pleased to inform you that of this sum I have already secured a subscription of thirty thousand dollars from a resident of Chicago who desires his name withheld, on the condition that the University secure the entire sum of three hundred thousand dollars.

The emergency is an important one, for now that it is known that the 40 inch discs are obtainable many institutions will endeavor to raise sufficient money to secure the instrument. If an order for the mounting could be given at once it might

12 inch reflector.
 10 inch reflector.
 8 inch reflector.
 6 inch reflector.
 4 inch reflector.
 3 inch reflector.
 2 inch reflector.
 1 inch reflector.
 1/2 inch reflector.
 1/4 inch reflector.
 1/8 inch reflector.
 1/16 inch reflector.
 1/32 inch reflector.
 1/64 inch reflector.
 1/128 inch reflector.
 1/256 inch reflector.
 1/512 inch reflector.
 1/1024 inch reflector.
 1/2048 inch reflector.
 1/4096 inch reflector.
 1/8192 inch reflector.
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 1/32768 inch reflector.
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8.
be completed in time for exhibition at the Columbian Exposition, where, on account of its novelty and great size (its highest point would rise about 80 feet above the floor), it would be one of the most interesting exhibits. Chicago should not be lacking in a case like this, and I hope that you will not find it difficult to secure the money, if possible in a single sum.

In the early '60's the largest telescope ever made was on its way to the University of Mississippi. But the war broke out, and subscriptions at once secured in Chicago brought the great telescope to this city. Again we are confronted with a like opportunity, and, if indications do not deceive me, it will be improved.

Very respectfully yours

George E. Hale

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the Columbian Exposition, where, on account
of its novelty and great size (its highest point
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brought the great telegraph to this city.
Again we are confronted with a like
opportunity, and if inclination be not deemed
we, it will be improved.

Very respectfully yours
George E. Keck

PP 3711
Hale
University of Chicago
Kenwood Observatory.
Chicago, Sept. 23, 1892 -

President W. R. Harper,

Dear Sir:-

The question of a suitable Astronomical Observatory for the University of Chicago has often been discussed between us, and I am sure you will be pleased to learn of an opportunity which now exists of securing the largest telescope and the largest and best equipped observatory in the world. The peculiar circumstances of the case are as follows:

Some years ago, when the largest telescope ever made had just been installed at the Lick Observatory, and had commenced to attract visitors to Mount Hamilton from all parts of the world, the people of Southern California came to the conclusion that a still larger instrument, if placed on Wilson's Peak (near Los Angeles) would add greatly to

the attractiveness of this part of the State,^{2.}
and would draw there many tourists and per-
manent residents. A certain amount of money
was subscribed, and an order given to Mantois,
the celebrated maker of optical glass in Paris,
to furnish the two glass discs necessary for
the construction of an objective forty inches
in diameter. The resources of Mantois' factory
had been greatly taxed in the manufacture of
the glass for the smaller objective of the
Lick telescope, and the much greater difficulty
of carrying out the new order seemed almost
insurmountable. But the attempt was made,
and after many failures and several years
of labor, the two forty-inch discs were
successfully completed, and sent to the firm
of Alvan Clark & Sons, of Cambridge, Mass., to be
made into an objective. Meanwhile the
condition of things in Los Angeles had com-
pletely changed. Property had decreased in
value, the "land-boom" had subsided, and
the money necessary to carry out the
observatory project was not to be had. The
glass discs have now been lying for some
months in Alvan Clark's shop, in just the

condition they were in when received from Maistrois. I met Mr. Clark a short time ago, and he informed me there was not the slightest probability that the objective would be made for the Los Angeles people, who, he believed, would be quite willing to sell the glass discs.

You can readily see what an exceptional opportunity lies open to anyone with the necessary funds. The finished objective will cost about sixty thousand dollars. The amounting an equal sum, and the great iron dome, seventy-five feet in diameter, which will serve to house the instrument, will require an additional fifty thousand dollars. So for an outlay of one hundred and seventy thousand dollars the University could come into early possession of a telescope without an equal. If you will consider for a moment just what such a possession would mean to the University and to the city of Chicago, you will agree that no effort should be spared to secure this prize. I mentioned above that the

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slightest probability that the objective would
be made for the two Angles people, who,
he believed, would be quite willing to sell
the place here.

You can readily see what an exception
at opportunity has been to anyone with the
necessary funds. The finished objective will
cost about six thousand dollars. The
mounting an equal sum, and the great
iron base, recently five feet in diameter,
which will serve to house the instrument,
will require an additional fifty thousand
dollars. So far an outlay of one hundred
and seventy thousand dollars the University
could come into early possession of a
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a possession would mean to the University
and to the city of Chicago, you will agree
that no effort should be spared to secure
this prize. I mentioned above that the

4.

telescope under consideration will be larger than the great Lick telescope, which has an aperture of 36 inches. The difference between a diameter of 40 inches and one of 36 inches does not seem great, but when it is remembered that the efficiency of a telescope depends upon its light-collecting power, and hence upon the area of its objective, the advantage of the 40 inch at once becomes apparent. Its area is one-quarter greater than that of the Lick glass, and consequently it will gather 25 per cent more light. A higher magnifying power can be used with it, and in every way its advantage over the world's present ~~largest~~ largest instrument will be very marked.

The installation of such an instrument in the Observatory of the University of Chicago would immediately give it the first rank among the observatories of the world, and allow it to make most substantial contributions to the progress of astronomical science. It would become the Mecca of thousands of science-loving pilgrims, as the Lick Observatory, even in its isolated position, is to-day. And the donor could have no more

enduring monument. It is certain that Mr. Lick's⁵ name would not have been nearly so widely known to-day were it not for the famous observatory established as the result of his munificence.

A glance at the distribution of great telescopes throughout the world may not be without interest here. The universities are fairly well supplied with large instruments, the University of California leading off with the Lick telescope. The University of Cambridge and the University of Virginia possess the next largest telescopes, the former a 25 inch given by the late Mr. Newall, and the latter a 26 inch, presented by Leander McCormick of Chicago. A 24 inch telescope of special design has recently been presented by Miss Bruce of New York to the Harvard University Observatory, which is one of the most active and best equipped observatories in the world. Yale has a small observatory, with no large telescope, but it is understood that funds have been provided for a 28 inch. Princeton has a 23 inch, which is employed by Professor Young for his solar investigations. The Chamberlin Observatory of

6.

the University of Denver has ordered a 20 inch, but, though completed, it is not yet in position. Northwestern University at Evanston comes next with the $18\frac{1}{2}$ inch of the Dearborn Observatory, which at the time of its construction was the largest telescope in the world, and Chicago is well known among astronomers largely because of this instrument.

The telescopes (outside of the Universities) next in size to the 36 inch of the Lick Observatory are those of Pulkova, Russia, 30 inches; the private observatory established by M. Bessel on Mont Gros near Aix, 30 inches; the Royal Observatory at Greenwich, 28 inches; and Vienna, 27 inches. All of the instruments to which I have referred are refractors. None of these telescopes approach in size the proposed 40 inch of the University of Chicago Observatory, and it is evident to what extent the reputation of the University could be advanced by the possession of this great instrument.

As adjuncts to the great telescope, the following instruments will be necessary to complete the equipment of the Observatory:

Reflecting telescope of 3 feet or 4 feet aperture.

7.
Trin equatorial of 12 inches aperture, with photographic and visual objectives.

12 inch refractor.

6 inch meridian circle.

20 inch siderostat, with 24 inch horizontal reflecting telescope.

Spectroheliographs, concave and plane grating spectroscopes, clocks, chronographs, measuring engine, etc, etc.

Three hundred thousand dollars will be required for the instruments and buildings of the Observatory, and I am pleased to inform you that of this sum I have already secured a subscription of thirty thousand dollars from a resident of Chicago who desires his name withheld, on the condition that the University secure the entire sum of three hundred thousand dollars.

The emergency is an important one, for now that it is known that the 40 inch discs are obtainable many institutions will endeavor to raise sufficient money to secure the instrument. If an order for the mounting could be given at once it might

be completed in time for exhibition at the Columbian Exposition, where, on account of its novelty and great size (its highest point would rise about 80 feet above the floor), it would be one of the most interesting exhibits. Chicago should not be lacking in a case like this, and I hope that you will not find it difficult to secure the money, if possible in a single sum.

In the early '60's the largest telescope ever made was on its way to the University of Mississippi. But the war broke out, and subscriptions at once secured in Chicago brought the great telescope to this city. Again we are confronted with a like opportunity, and, if indications do not deceive me, it will be improved.

Very respectfully yours

George E. Hale

Put under
Sec. Estate

First - ditto -
Second - ditto.
Third - ditto -

Fourth.

I am to be appointed Director of the Astronomical Observatory of the University and to have general charge of all work done therein. It is agreed, however, that all work properly coming under the head of mathematical astronomy, or astronomy of position, shall be in charge of the professors in that subject. (See details in regard to this below.)

Fifth. Instruments and Work of the Obs'y.

When the \$250,000 for the Observatory shall have been secured, instruments shall be ordered as follows:-

1°. An equatorial refracting telescope of at least 30 inches aperture, to be fitted with a large spectroheliograph, which, on



competent experts.

3°. A meridian circle of at least six inches aperture, for investigations to be carried on under the charge of the professor of ~~experimental~~ astronomy of position.

4°. Minor instruments to complete the equipment for all classes of astronomical work.

Fifth. Ditto, except that (1.) shall be amended to read as follows:

1. To carry on original investigation, and direct the experimental and research work done in the Observatory, it being understood, however, that experimental and research work in mathematical astronomy or astronomy of position shall be under the charge of the professor in that subject.

constant contact.

and a number of circles of at least
one under aperture for investigation
to be carried on under the lamp
the presence of experimental activity
is possible.

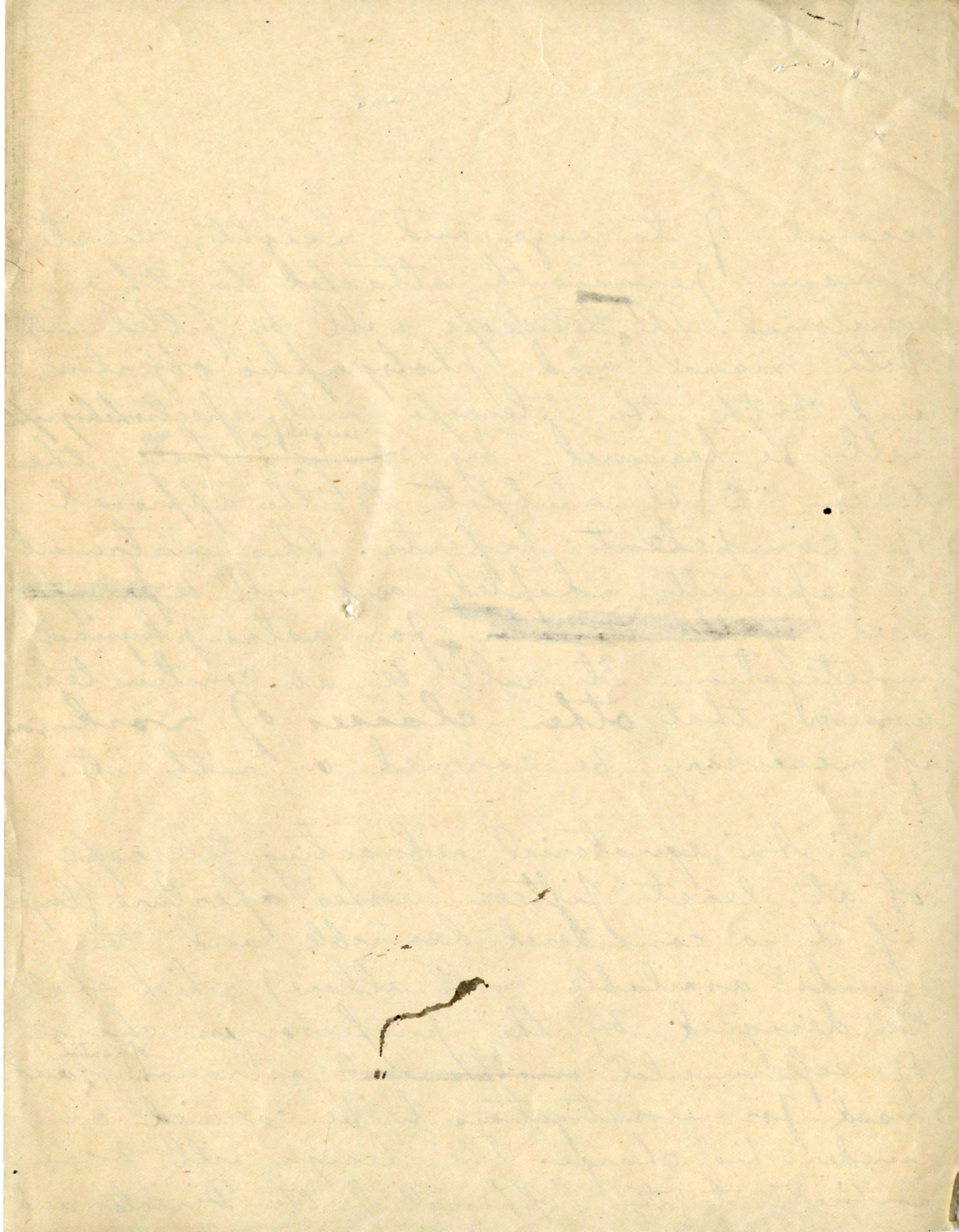
It is important to complete
the experiment for all classes of
investigation work.

1. H. Pitts, except that (1) will be
omitted to read as follows:
1. To carry on original investigation, and
first the experimental and observed work
done in the laboratory, it being understood
however, that experimental work is not
done in a systematic manner or according
to a plan, but is under the charge
of the professor in that subject.

2

account of its size and weight, must remain permanently attached to the equatorial. The ~~telescope~~ telescope will be fitted with both visual and photographic objectives, and both the telescope and spectroheliograph will be designed by ~~George S. Hale~~ ^{Ernest S. Hale}, the design to be subject to the approval of competent experts. This instrument is especially adapted and will be ~~used for~~ used ~~for~~ for astro-physical investigation. It will be so constructed, however, that other classes of work can, if necessary, be carried on with it.

2. An equatorial refracting telescope of at least fifteen inches aperture (larger if it is considered desirable, and the funds available will allow), which shall be designed by the professor in charge of experimental ~~mathematics~~ ^{of position,} astronomy, and used for investigations to be carried on under his charge. The design will be subject to the approval of the Director and



Chicago, May 30 1893

GH

President H. R. Harper,

University of Chicago.

My dear Sir,

In accordance with your request I present herewith a statement as to our proposed expedition to Pike's Peak.

As you are well aware, it is only on the occasion of a total eclipse of the Sun that the solar corona can be observed. Total eclipses suitable for observation occur only at rare intervals, and are of very brief duration, lasting on the average not more than three minutes. In 1887 American parties went to Japan and Russia for the purpose of observing a total eclipse, and in both cases were disappointed by clouds. In 1889 an American party went to the coast of Africa on a U.S. warship detailed for the purpose, and again clouds completely hid the Sun from view at the critical period. In April last American and English parties in South America and French and English parties in Africa were

LIBRARY AND MUSEUM
UNIVERSITY OF CHICAGO
500 EAST 58TH ST.

Department of History
University of Chicago

May 25 1893

22

President H. R. Harper,
University of Chicago.
My dear Sir,

In accordance with your request
I present herewith a statement as to our
proposed expedition to the West.
As you are well aware, it is not until
the close of the last century of the
that the other course can be observed.
Total extinction suitable for observation occur
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duration, lasting on the average not more
than three minutes. In 1887 American parties
went to Japan and Russia for the purpose
of observing a total eclipse, and in both
cases were disappointed by clouds. In 1889
an American party went to the coast of Africa
on a U.S. Navy expedition for the purpose,
and again clouds completely hid the sun for
view at the critical period. In April last
American and English parties went to Africa
and French and English parties in Africa were

fortunate enough to see an eclipse lasting four minutes.

I cite these cases in order to show what importance astronomers attach to observations made during total eclipses of the Sun. Not many years ago not only the corona, but the solar prominences (the great flames on the edge of the Sun) as well, could only be seen at times of total eclipse. At present, a method devised by myself, and now in daily use at this Observatory, permits these prominences to be photographed at any time, and the results are much better than those obtained at total eclipses.

There remains only the corona. If this could be photographed or observed apart from eclipses all the expense and trouble of these expeditions would be saved, and our knowledge of the Sun would be rapidly advanced. For this purpose I have devised a method which the most competent astronomers in this country and abroad agree with me

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a method which the most confident astronomer
admitted. For this purpose we have devised
our knowledge of the sun's position rapidly
of these positions would be saved, and
from which all the reference and work
could be photographed or observed apart
There remains only the corona. If this
were obtained at total eclipses.
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what importance astronomical interest to obtain
I cite these cases in order to show
for minutes.
fortunate enough to see an eclipse lasting

Chicago, 189

in thinking likely to prove successful. But experiments cannot be tried with any hope of success unless at a high altitude, far above the smoke and dust of the lower atmosphere. It is therefore my intention to make an expedition to the summit of Pike's Peak, provided the necessary expenses can be met. Arrangements have been made by which all expenses other than those of transportation will be met. If round-trip passes can be secured for the party from Chicago to Denver (or better, Chicago to Manitou) there will be no further difficulty on this score.

I am inclined to think that any of the railroads between Chicago and Denver would be willing to contribute in this way to the advancement of science. In many previous instances the railroads have generously assisted scientific expeditions. I need only mention the case of the expedition to Mount Whitney, California, in 1881, under the charge of the Director

in thinking likely to prove successful.
But experiment cannot be tried with any
hope of success unless at a high altitude
far above the smoke and dust of the
lower atmosphere. It is therefore my intent
to make an expedition to the summit of
Vicks Peak, provided the necessary expenses
can be met. Arrangements have been made
by which all expenses other than those
of transportation will be met. If some
trip, horses can be secured for the party
from Chicago to 2 mi. (or better, Chicago
to Austin) where will be no further
difficulty on this score.
I have decided to think that any of
the railroad between Chicago and Denver
would be willing to contribute in this way
to the advancement of science. In many
previous instances the railroads have generously
assisted scientific expeditions. I need only
mention the case of the expedition to Mount Whitney
California, in 1881, under the charge of the

Chicago, 189

of the Allegheny Observatory. A private car was furnished by the Pennsylvania Co., and, through the courtesy of the officials of that road, and those of the Union Pacific and Central Pacific Railroads, was taken from Allegheny City to California, bearing the observers and their instruments.

Our party will be constituted as follows.

George E. Hale, Director of the Observatory, University of Chicago.
Mrs. George E. Hale, Assistant Astronomer.

Prof. J. E. Keeler, Director of the Allegheny Observatory.

Mr. S. W. Burnham, Clerk U. S. Circuit Court, formerly Astronomer at the Lick Observatory.

Mr. J. A. Brashear, the celebrated maker of telescopes and spectroscopes.

Mr. R. W. Pike, Assistant Astronomer.

We wish to leave Chicago Thursday, June 8, or Monday, June 12. It will be possible for us to do so if passes for the persons named can be secured.

Very truly yours George E. Hale

the Chicago Observatory. A private car
was furnished by the Pennsylvania Co., and, through
the courtesy of the officials of that road, and
those of the Union Pacific and Great Pacific
Railroads, was taken from Alhambra City to
Berkeley, leaving the steamer and their
instruments.
Our party will be constituted as follows:

- George E. Hale, Director of the Lick Observatory, Ohio
- Mr. George E. Hale, Assistant Astronomer
- Prof. J. E. Keeler, Director of the Alhambra Observatory
- Mr. W. H. Brewster, Chief U.S. Signal Corps, former Astronomer
at the Lick Observatory
- Mr. J. A. Brinkman, the celebrated master of telescopes
and spectroscopes
- Mr. R. M. Pike, Assistant Astronomer

We wish to leave Chicago Thursday, June 5,
or Monday, June 8. It will be possible for us to do
so if passes for the persons named can be secured.
Very truly yours,
George E. Hale

Chicago, June 9 1893

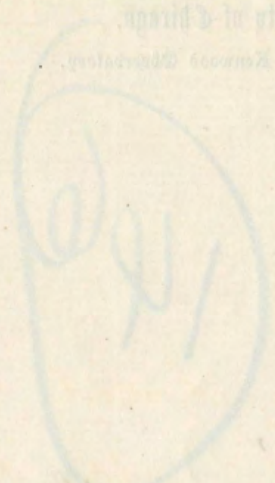
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President H. R. Harper,

University of Chicago.
My dear Sir,

Thank you very much for the tickets. As soon as I can learn definitely as to the number of our party I will write to President Cable, as you suggest, returning the tickets not absolutely required. At least two will be returned. Several specialists in different departments of work are going in order that various special investigations may be undertaken in addition to the attempt to photograph the corona. We wish to definitely settle the question as to the suitability of high mountain peaks for all classes of astronomical observations.

On account of Mr. Pullman's well-known interest in the advancement of science do you not think he would assist us by furnishing sleeping-car passes for four persons, going and returning, between Chicago and Colorado Springs? I should be very glad if you would kindly communicate



Chicago June 7 1892

President W.D. Hooper,
University of Chicago.

My dear Sir,
Thank you very much for the
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as to the number of our party I will
write to President Hooper, as you suggest,
returning the tickets not absolutely required.
At least two will be returned. Several families
in different departments of work are going
in order that various special investigations
may be undertaken in addition to the
attempt to photograph the coroner. We wish
to definitely settle the question as to the
necessity of high maintenance fees for
all classes of astronomical observation.
In account of Mr. Holman with known
interest in the advancement of science do you not think
he would assist us by furnishing sleeping cars
for our passage, going and returning.
Between Chicago and Colorado Springs? I should be
very glad if you would kindly communicate

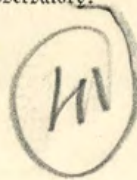
Chicago, 189

with him on this subject, as our expenses for instruments etc. will be very large, and the sleeping-car fares would considerably increase the cost of the expedition.

We hope to leave Chicago on Monday or Tuesday of next week.

Very respectfully yours
George E. Hale

My address from June 13 to July 1 will
be
of Iron Springs Hotel
Manitou, Colo.



Journal

Hale

Chicago, Sept. 4 1893

President H. R. Harper

University of Chicago -

Dear Sir,

In order that the building of the Yerkes Observatory may be no longer delayed through fear of excessive expenditure in maintaining it, I will personally guarantee that the expenses enumerated in the estimate sent you Sept. 2 shall not exceed six thousand dollars for the first year, provided that a economical power and heating plant (including a windmill) be established, and that every effort be made to secure funds for at least two more astronomers and for expenses of publication. It is understood that the amount of six thousand dollars does not include the salaries of Dr. Lee, Mr. Ellerman and myself, which would be paid whether the Observatory were built or not.

I trust that the site may be selected and the work undertaken without delay.

Very truly yours

George E. Hale

(N)

Journal

Chicago, Sept. 4, 1892

President H. R. Hooper

University of Chicago

Dear Sir,

In order that the building of
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Schlesinger and myself, which would be paid
whether the Observatory were built or not.
I trust that the site may be selected and
the work undertaken without delay.
Very truly yours
George F. Wall

^{sale} Schöneberger strasse 12^{II}

47 Berlin, Nov. 23, 1893.

My dear Dr. Harper,

He are now fairly settled in Berlin, after very pleasant visits to a large number of astronomers in England and France. He also had the pleasure of meeting your brother in London. I have given two illustrated lectures on my solar investigations since leaving Chicago - one before the Society of Arts in Boston, the other before the Royal Astronomical Society in London.

I write to inform you of a gift received by the Yerkes Observatory, for which the Board of Trustees may wish to return some acknowledgment. My friend

Dr. William Huggins was good enough
to move, at the last meeting
of the Council of the Royal Astronomical
Society, that the fine exhibit of
astronomical photographs sent
by the Society to the World's Fair
be given to the Yerkes Observatory.
This was carried, and our thanks
are due the Society for the gift.
I have already written my thanks
to Dr. Huggins, but on account of
the value of the gift the Trustees
may wish to pass a vote of
thanks. It should be communicated
to Dr. William Huggins, F.R.S. &c.

Foreign Secy Royal Astronomical Society
90, Upper Tulse Hill
London.

I am also glad to say that
the Observatory will probably receive
a large gift of books from the
Royal Observatory at Greenwich, as
the Astronomer Royal has kindly promised

to send them. Perhaps the Board might properly pass a vote of thanks to Prof. P. Tacchini, R. Osservatorio del Collegio Romano, Rome, for the valuable gift of (about 85) bound volumes presented to me last summer for the Observatory. I have asked Mr. Ellerman to remove these books and the photographs presented by the R. A. I. to the Kenwood Observatory where they will be kept until the Yerkes Observatory is ready to receive them.

I should be glad to hear whether you have formally accepted the site at Lake Geneva, and any other news would be very acceptable.

I learn from Mr. Hancock, who is studying mathematics at the University, that Mr. Rockefeller has given another \$500,000. I congratulate you most heartily.

My address for several months will be as above. I have already picked

^{many} points of importance in designing
the new Observatory, and feel
sure that my trip will prove
of value.

Will you kindly ask
Mr. Cobb to send me a tracing
of the preliminary plan of the
Yerkes Observatory as soon as
possible. There are many details
to be added, and some changes
to be made. I should be glad
to know when Mr. Yerkes wishes
to have my work on the plans
completed.

With kind regards, believe me

Very truly yours

George E. Hale

See enclosed note

Schoeneberg Strasse 12^{II} Hale
Berlin, Jan. 9, 1894. 9.2

Dear Dr. Hesper,

Wohl
I enclose a tracing of the plan of Yerkes Observatory similar to one sent to Mr. Cobb. The plan represents a large amount of study, and I trust it will be carried out in all its details. It is by no means my design, for many eminent astronomers have assisted me in preparing it. Principal among these is Professor Dr. Vogel, Director of the Imperial Observatory at Potsdam. To him some very important improvements in the original plan are due. I have visited and studied nearly all of the great observatories of Europe and America, and have embodied in the plan as many as possible of the peculiar advantages of each.

The building has been made as small as possible. It has but one story (in addition to a cellar) and its

considerable length is simply due to the requirement that the domes be so far apart as not to obstruct the sky ~~below~~ above a certain altitude. The 12 in telescope of the Kenwood Observatory has been placed in the northern of the two smaller domes, as it will be used principally on the Sun, and the obstruction of the southern sky by the dome for the 16 in telescope will not be very serious. You of course understand that what we have at the Kenwood Observatory will completely equip this tower—dome, spectroscopes, telescope and all.

Mr. Yerkes has not signified his intention to furnish a 16 in telescope but I hope he will do so. In any case the tower and dome must be provided for one, as the ordinary work of the Observatory could not be carried on without it. The same is true of the meridian circle. In case

of necessity an inexpensive transit instrument might be made to serve in place of the latter; some form of meridian instrument is indispensable and the small square house must therefore be provided.

You may remember that Mr. Yerkes offered Brashear \$10,000 for three spectroscopes, and that the offer was refused. Mr. Yerkes subsequently secured the stellar spectroscope for \$3,000. Shortly after reaching Berlin I learned from Professor Vogel that I could probably get the other two spectroscopes built here for \$7,000, the amount originally offered by Mr. Yerkes for them. I immediately wrote to Mr. Yerkes stating the circumstances, and asking permission to have bids prepared for the two instruments and sent to him on condition that they should not exceed (together) \$7,000. He replied "In regard to additions to the telescope I will say, that I do not care to obligate

myself any further, and prefer not doing so until it is in position". If this decision is not changed it means that we shall be unable to any work on the Sun with the large telescope. The instrument offers peculiar advantages for such work, and the special methods we intended to use with it would have enabled us to do far more in this direction than any other observatory. This is my favorite field of investigation, and I could surely promise good results if allowed to pursue it. As it is the great instrument will have to lie unused half the time.

I hope you may be willing to present the matter once more to Mr. Yerkes, as I do not think he fully appreciates the importance of having the spectroscopes constructed. They are by no means to be regarded as merely attachments to the great telescope. They are really vital parts of it, and without them the telescope,

powerful as it is, is useless for solar investigations. As the Observatory staff will probably be a small one for the first year it is important that those who comprise it work in those fields which will yield them the most important results and the most numerous discoveries. A continuation with the large telescope of the solar investigation which I have carried on at the Kenwood Observatory with much smaller instruments could not fail to be most productive.

I am quite sure the spectroscopes could be constructed in Germany for less than \$7000, but if they are not ordered at once I shall not be here to superintend their construction, and the expense of having them built in America would necessarily be much greater. If Mr. Yerkes doubts my honesty in the matter, as he seems to have done in connection with the dealings with Brashear, he can so arrange

the contracts that I will know
nothing whatever about any of the
business transactions. My only
desire is that, in some manner,
the spectroscopes be obtained. If
they were ordered by February 15 I could
superintend the earlier part of their
construction, and Professor Vogel would
see that they were carried out in
accordance with the working drawings
which I have partially completed after
many weeks of labor.

With kind regards, and trusting
that you will make a strong effort
to secure for us these important
instruments, I am,

Very sincerely yours

George E. Hale

powerful as it is, is useless for
solar investigations. As the Observatory
staff will probably be a small
one for the first year it is im-
portant that those who comprise
it work in those fields which
will yield them the most important
results and the most numerous
discoveries. A continuation with the
large telescope of the solar investigation
which I have carried on at the
Kenwood Observatory, with much suc-
cess, could not fail to be
of great importance.

I am quite sure the spectrometer
should be constructed in Germany
for less than \$5000, but if they
are not ordered at once I shall
not be here to superintend their
construction, and the expense of having
them built in America would
be much greater. If Mr. Yerkes has
any business in the matter, as he
to have done in connection with the
dealings with Brashear, he can arrange

the contracts that I will know
nothing whatever about any of the
business transactions. My only
dilemma is that, in some measure
the spectroscopes were obtained by
they were ordered by February 15th and
reprinted the earlier part of the
construction and Professor Vogt would
see that they were carried out in
accordance with the working plan
which I have partially completed
many weeks of the board.

With kind regards, and trust
that you will make a strong effort
to secure for these important
instruments that amount to most
of the I have to desire to
Very sincerely yours
George E. Nesbitt

~~Confidential~~
Dr. Harper
two more found
by M.C.

Schneckenburger Strasse 12
Berlin, Jan. 28, 1894.

Pres. ⁶⁷ H. R. Harper
University of Chicago.

My dear Sir,

Thank you for your letter of Jan. 9. You may be certain I was glad to hear that through your prompt and energetic action the Yerkes Telescope was saved. I hardly like to think of what its loss might have meant to us.

Though I greatly dislike to refer to the matter again, it seems to me necessary to write you plainly in regard to Dr. Lee. In the summer of 1892 I met two gentlemen who had been fellow-students with Dr. Lee at the University of Berlin. I mentioned to them that he was coming to the University, at which they involuntarily expressed some surprise.

Of course I questioned them as to the cause, but they were very cautious, and would say little more than to express a hope that he would turn out well. They thought him a very capable fellow in certain directions, but considered him very peculiar. Knowing the high character of these gentlemen, and seeing how carefully they avoided saying anything against Dr. Lee, I naturally experienced a slight feeling of relief when you informed me a short time later that Dr. Lee was not to come to Chicago.

However, when he did come, I found him capable and quite agreeable, and my relations with him have always been of a very friendly nature. As I became better acquainted with him I discovered certain marked peculiarities, which might well be overlooked, were they not accompanied by a lack of judgment which in some

of the "Annual Register" the names of the officers of the Yerkes Observatory (given on p. 204 of the present Register) should include those of Mr. Burnham, Mr. Ellerman and myself. Dr. Lee and Laves, who are theoretical investigators, not observers, should be classed with the Dept. of Theoretical Astronomy.

I hope you will believe me when I assure you that I have written the above with only the interests of the University at heart, and with absolutely no personal feeling. I wish above all things to avoid personal difficulties in conducting the Observatory, especially after the sad example at the Lick. If Dr. Lee is not given to understand that he is to have no connection with the Observatory he may make demands which would lead to trouble if refused. After what the astronomers here have told me you will appreciate why I would fear to take the responsibility of allowing

him to use the large instrument.
This is my reason for writing a
letter which I very much regret
to send.

In a letter from Dr. Lee
I learn that part of Mr. Rockefeller's
recent gift to the University is to
be used to purchase books for the
Astronomical Department. Half of this
money could be used to advantage
in the purchase of books for the
work of Dr. Lee and Laves. The other
half I hope you will send to
me, as there are a large number of
standard works which are absolutely
necessary in my instruction and
in the Observatory, and I can obtain
them here very advantageously.

I have instructed Mr. Ellerman
to visit Lake Geneva frequently during
the building of the Observatory, as the
carrying out of certain details must
be watched with care. He will send
me frequent reports on the progress

of the work.

My studies and researches at
the University are going on nicely,
and I am more and more pleased
with Berlin.

With kind regards,

Very respectfully yours
George E. Hale

case is very evident. When I came to Berlin he was kind enough to give me the addresses of several astronomers of his acquaintance, among them Prof. Foerster, Director of the Berlin Obsev., and head of the astronomical department in the University. Dr. See also wrote at some length to Prof. Foerster, but though I have had the pleasure of meeting the latter several times he has not once referred to Dr. See. As he must have been well acquainted with Dr. See when the latter took his degree under him I ventured to ask him about Dr. See's work, but he would not commit himself. Other astronomers in the Observatory have warned me against allowing Dr. See to work in the Yerkes Observatory. They say (Dr. Marcus in particular) that Dr. See's abilities lie in the direction of theoretical astronomy and that he is not skillful in the use of instruments. As only skilled

observers can handle so large a telescope as the 40 in. without danger to the instrument it would seem better for Dr. See to confine himself to original investigation in theoretical astronomy, where he certainly shows marked ability.

I am fully convinced that Dr. See could be of great service to the University in the Department of Theoretical Astronomy, especially if a Prof. of Theoretical Astronomy could be appointed who would have charge of the work at the University, and under whose directions Dr. See would work. Under such circumstances I am sure he would give excellent instruction, and produce theoretical work of value. I do not expect him to have any connection with the Yerkes Observatory, any more than I expect to have any hand in the management of the astronomical work at the University. In the next issue

CHICAGO, Jan. 15th, 1895

Col. H. W. Jackson,
100 Washington St.,
Chicago.

My dear sir:-

As the special subject to which the Crerar Library is to be devoted is now under discussion, I take the liberty to write you, in order to urge the claims of science. While I fully recognize that there are many fields into which the Crerar Library might advantageously go, I feel assured that none would be so truly appropriate as science. By "science" I mean, not pure science alone, but the technical side of the subject as well. A collection of scientific books would have a double value; it would appeal to the scholar, and be of the very greatest value to the very large number of those who are pursuing ~~the~~ study and research work in Chicago and its vicinity. It would also be of the highest service to the manufacturer, the skilled mechanic - in fact to all those whose work is directly or in-directly connected with the applications of science to the art.

Those of us who have devoted ourselves to research work in science have sadly felt the lack of a large collection of scientific books in Chicago. The libraries now established are devoted in great part to subjects other-than those strictly connected with our work. I have seen it urged that a large scientific library is of small importance, because the student can always find the subject treated in its

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(2)

latest phases in the most recently published books. As a matter of fact this idea is altogether wrong; the papers which the student is constantly called upon to read are all published in the scientific journals, in the annals of Observatories and Laboratories, and in the proceedings and transactions of learned societies. The treatment of scientific subjects in text books is not only inadequate - it is in many cases inaccurate. It is evident then that the best scientific work cannot be done without a very large library of reference books within easy reach. The books needed are in many cases costly and difficult to obtain, and they are therefore wholly inaccessible to the student, except when they are provided in reference libraries. There are many other reasons why the Crerar Library should be devoted to science. In no city in the United States is there a large library having this specialty, and for this reason the Crerar Library would come into immediate prominence. The fact that Chicago has become an important center of scientific investigation is a weighty argument for the establishment of a reference library of this kind.

Should the Trustees of the Crerar Library wish to obtain a general expression of opinion on this subject from the scientists of Chicago, a meeting can no doubt be arranged for. I am

Very truly yours,

George E. Hale

Photostats of these letters sent
to Mrs. John Kaufman, 551 Hill Ave
Pasadena for biographical purposes.

CHICAGO, Jan. 17, 1895

Col. H. H. Jackson
100 Washington St.
Chicago.

My dear Sir,

In reply to your letter of Jan. 16 I beg to say that the needs of the various fields of science in reference to collections of books should be carefully investigated before choice is given to a few in preference to others. In Chicago very few books on astronomical or physical subjects are accessible to the student, in spite of the well known fact that interest in astronomy, in particular, is common among educated people. I believe that geology, botany, zoology etc. are rather better provided for, in connection with the various museums devoted to these subjects. Technical subjects are also partially represented in the Public Library and in the libraries of some of the engineering societies. The collections are in all cases so small that the Bureau Library might advantageously take up any of the

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subjects I have mentioned, and still not interfere with any existing collection. But as the funds will no doubt be limited, it would probably be best to take up first the subjects in which the need of books is greatest, and afterwards extend the scope of the Library so as to include other special subjects. In any case the publications of various Societies and Academies of Science, which would probably be among the first books purchased for the Library, would contain papers pertaining to all departments of science. I refer to such works as the Philosophical Transactions and Proceedings of the Royal Society, the Comptes Rendus of the French Academy, the Sitzungsberichte of the Berlin Academy, the Memoirs of the French Academy, etc.

As it is probable that the various museums in the city will collect small libraries bearing on their special subjects, and on account of the rapidly increasing importance of Chicago as a center of astronomical and physical research, I respectfully recommend that attention be first directed to collecting books on subjects of astronomy, physics, and perhaps chemistry as well.

Very truly yours George E. Hale

St. Catharines, Ont.
Canada, Apr. 25, 1895

Dear Sir:—

Your favour of the
23d inst. is to hand.

I regret to say that
the April No. of the Astrophysical
Journal has not reached me.

I have, however, received the
April No. of The Biblical World
(Chicago University Press), and
presume that this magazine
may have been sent by mistake
instead of the Journal. I will
of course, return this copy of
the Biblical World, if desired.

Hoping to receive my
copy of the Journal shortly,
I am

Yours very truly
J. M. Barr.

Prof. S. E. Hale.

Prof. J. E. Hale.

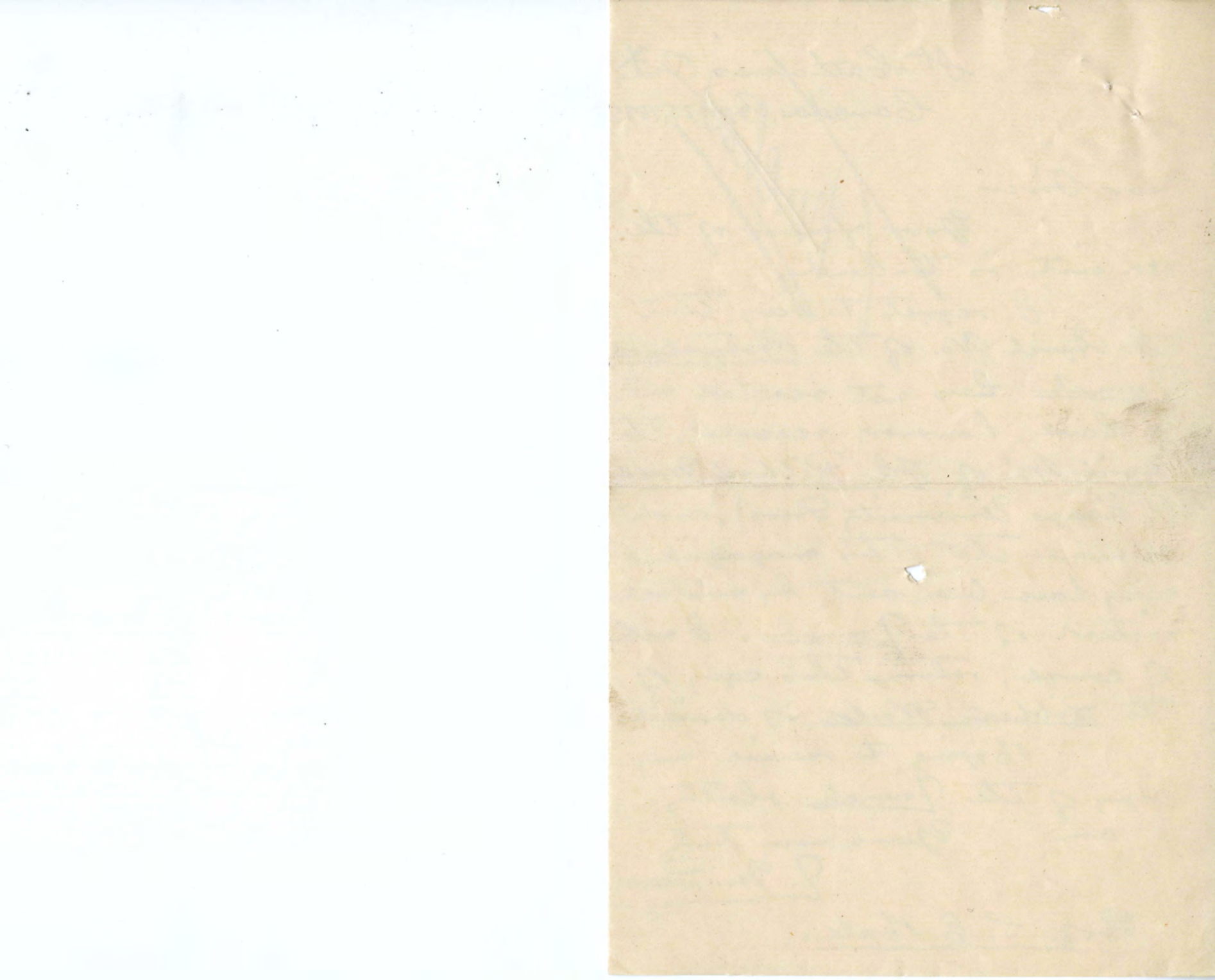
I am
glad to hear that
you have
received the
Journal of the
Boston Society
of Music.

The Boston Society of Music, of course, return this copy of
the Journal of the Journal. I will
very soon have sent a number
to you. I am sure that this
will be of great interest to you.

(Chicago University Press), and
I have, however, received the
Journal for not received one
of the No. of the Boston Society
of Music.

I regret to say that
the copy of the Journal
sent to you is the last.

Yours truly,
J. E. Hale.



CHICAGO, April 27 1895

President Mr. R. Harper,

University of Chicago.

Criticisms

My dear Sir,

I think you will be interested in the following example of the business methods of the University Press:

On Feb. 14 Mr. J. M. Barr of St. Catharines, Ontario, Canada, wrote to request that the February number of the Astrophysical Journal be sent to him, and enclosed stamps to pay for it. I replied that it would be sent at once, and the University Press was instructed to this effect immediately after Mr. Barr's letter was received. On Feb. 23 Mr. Barr wrote to say that the Journal had not reached him, and it was only after the matter had again been brought to the attention of the Press that I succeeded in getting the copy mailed. The necessity of repeating such instructions had even in February become so

THE ASTROPHYSICAL JOURNAL
AN INTERNATIONAL REVIEW OF SPECTROSCOPY
AND ASTRONOMICAL PHYSICS
GEORGE E. HALE
JAMES E. KIRBY
EDITORS

THE UNIVERSITY OF CHICAGO
KENWOOD OBSERVATORY

CHICAGO, April 27, 1897

President Mr. R. R. Harper.
University of Chicago.

My dear Sir,

I think you will be interested in the following example of the methods of the University Press:
On Feb. 14 Mr. J. M. Barn of St. Catherine, Ontario, Canada, wrote to request that the February number of the Astrophysical Journal be sent to him, and enclosed stamps to pay for it. I replied that it would be sent at once, and the University Press was instructed to this effect immediately after Mr. Barn's letter was received. On Feb. 22 Mr. Barn wrote to say that the Journal had not reached him, and it was only after the matter had again been brought to the attention of the Press that I succeeded in getting a copy mailed. The manuscript of the February number had even in February been sent

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common that I was not surprised at the delay, but my attention has recently been forcibly directed to the matter. On Mar. 28 Mr. Barr sent me 50 cents to pay for the April number of the Journal, which he requested me to send at once. I wrote him that the desired copy would be mailed early in April, and at once gave the order to the University Press. On April 17 Mr. Barr wrote to say that the Journal had not reached him, and offered to remit price of another copy, if necessary. On April 20 the University Press informed me that the Journal had been mailed not more than three or four days before - over two weeks after they received the order. I wrote to Mr. Barr, explaining the matter as well as I could, and apologizing for the delay. This morning I received a letter from Mr. Barr, which I enclose. He received the Biblical World instead of the Astrophysical Journal. This time I have not left the matter in the hands of the

common that I was not surprised at the
delay, but my attention has recently been
forcibly directed to the matter. On Nov. 20
Mr. Barn sent me so much to pay for the
April number of the Journal, which he
requested me to send at once. I wrote
him that the desired copy would be
mailed early in April, and at once gave
the order to the University Press. On April 10
Mr. Barn wrote to say that the Journal
had not reached him, and offered to
remit price of another copy, if necessary.
On April 20 the University Press informed
me that the Journal had been mailed not
more than three or four days before - over
two weeks after they received the order. I wrote
to Mr. Barn, explaining the matter as well
as I could, and apologizing for the delay. His
reply I received a letter from Mr. Barn, which
I enclose. He said the Journal had not
of the Astrophysical Journal. This time I have
not left the matter in the hands of the

CHICAGO, _____ 189__

Press, but I have myself mailed him one of my own copies.

I have received a great many letters from subscribers complaining that copies of the Journal have failed to reach them. The last (received yesterday) was from the Smithsonian Institution, which received the January and April, but not the February or March numbers. How many complaints of this nature are received by the Press, and what attention is paid to them, I have no means of knowing. A very large number of the subscribers are my personal acquaintances and friends, and as they know no one in the Press by name I am constantly exposed to blame for delays and mistakes for which I am in no degree responsible. To say that it is annoying is to put the matter very mildly.

Yours very respectfully
George E. Hale

CHICAGO, 1890

Dear Sir, I have very much enjoyed
one of my own copies.
I have received a great many letters
from subscribers complaining that copies
of the Journal have failed to reach them.
The last (received yesterday) was from
the Smithsonian Institution, which used
the former and April, but not the
February or March numbers. Now my copies
of this volume are received by the Press, and
what attention is paid to them, I have
no means of knowing. A very large number
of the subscribers are very far from
and friends, and as they know no one in
the Press of name I have hesitantly expected to
blame for delay and mistakes for which I am
in no degree responsible. To say that it is
surprising is to put the matter very mildly.
Yours very respectfully,
George F. Hale

1892

~~July~~ June 13th

Washington,

Dear Dr. Harper:

After our
interview a short time ago a
couple of things came to my
knowledge which I think you
ought to know.

In the first place it was
said that the ground near the
Chicago University is not well
suited for an Observatory of
precision. It is possible however

that it may offer a good
site for an astro-physical
observatory, which might be
established in connection with
your department of physics.

Again it was said that you
have in Chicago a young man,
Mr. George E. Hale, who is
devoted to this branch of
astronomy, and who has already
shown good ability. It was said
also that Mr Hale's father is

a man of great wealth, and
is very generous in the support
of his son's investigations. It
may be well for you to know
Mr. Hale.

I had a very pleasant visit
in Wisconsin, in spite of rain
and mud, and on my return
trip just escaped the politicians.

Yours truly
A. Hall

Chicago,

July 1st 1892

file under
Hale

sent

W. R. Harper President
University of Chicago

Dear Sir
If the first year's
services of my son, George E. Hale,
in connection with your University,
prove satisfactory to you and agree-
able and pleasant to him, I will,
at that time, agree to give to the
University, the movable apparatus
and instruments, at the Kenwood
Observatory, estimated to be worth
\$25,000, on condition, that within
^{two} one year from that time, the
University shall secure good sub-
scriptions to an Astronomical fund,
to be expended for an Observatory, of
not less than two hundred and fifty
thousand dollars, including the twenty
five thousand to be given from the
Kenwood Observatory.

Yours Truly
W. E. Hale

Chicago

Vol. 1

1892

W. F. Gifford, President
University of Chicago
of the first year
courses of my son, George F. Gifford
in connection with your University
from satisfactory to you and your
able and pleasant to him, I think
at that time agree to give to the
University, the movable apparatus
and instruments at the University
Observatory, estimated to be worth
\$25,000, on condition that within
five years from that time, the
University shall secure good and
satisfactory to an astronomical fund
to be expended for an Observatory
not less than the amount and
thousand dollars, including the building
five thousand to be given from the
University Observatory

Chicago, *July 3* 1892

President W. R. Hooper

University of Chicago.

Dear Sir :-

In the course of our conversation a few days since you remarked that the instruction which I proposed to give in the University ought to be definitely formulated. I therefore give below a partial statement of the proposed courses. I have divided the matter into two parts, that under "Instruction" naturally preceding that under "Original Research." A much more complete and detailed statement could easily be made, but this will serve to give an idea of the nature of the work. I think you will readily see that there would be practically no chance for class-room work in addition to so much in the Observatory.

Chicago, July 3, 1892

President H. A. Harper
University of Chicago

Dear Sir:

In the course of our conversation a few days since you remarked that the instruction which I proposed to give in the University ought to be definitely formulated. I therefore give below a partial statement of the proposed courses. I have divided the matter into two parts, the number "Instruction" naturally preceding that under "Original Research". A much more complete and detailed statement could easily be made, but this will serve to give an idea of the nature of the work. I think you will readily see that there would be practically no chance for change now work in addition to assumed in the University.

Instruction.

- A. 1. Photography of solar faculae, spots, chromosphere and prominences with the spectro heliograph.
2. Photography of spots and photospheric granulation on a large scale with the 12 inch photographic telescope and amplifying lens.
3. Photography of the visible and ultra-violet spectra of faculae, spots, chromosphere and prominences, with method of reducing wave-lengths of lines and measuring motion in the line of sight, employing the 12 inch photographic telescope and grating spectrograph.
4. Visual observations of faculae, spots, chromosphere and prominences and their spectra, with the 12 inch visual telescope and grating spectroscopes.

Introduction.

1. Photographs of solar faculae, spots, chromosphere and prominences with the spectrohelioscope.

2. Photographs of spots and photospheric granulation on a large scale with the 12 inch photographic telescope and coupling lens.

3. Photographs of the visible and invisible violet spectra of faculae, spots, chromosphere and prominences, with violet reflecting wave-lengths of lines and measuring motion in the line of sight, employing the 12 inch photographic telescope and grating spectrograph.

4. Visual observation of faculae, spots, chromosphere and prominences and their spectra with the 12 inch visual telescope and grating spectrograph.

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5. Photography of the solar spectrum with the concave grating, and determination of the chemical constitution of the Sun.

B. 1. Photography of stars and nebulae with 12 inch photographic telescope.

2. Photography of stellar and nebular spectra with 12 inch photographic telescope and prism or grating spectrograph, and determination of the chemical constitution of stars and nebulae.

3. Photographic and visual method of measuring motions of stars and nebulae in the line of sight.

4. Visual observations of stellar and nebular spectra, with 12 inch visual telescope and prism or grating spectroscope.

Chicago, 1891

5. Photography of the solar spectrum
with the concave grating, and deter-
mination of the chemical constitution
of the sun.

B. 1. Photography of stars and nebulae
with 12 inch photographic telescope.

2. Photography of stellar and nebular spectra
with 12 inch photographic telescope
and prism or grating spectrograph,
and determination of the chemical con-
stitution of stars and nebulae.

3. Photographic and visual method of mea-
suring motions of stars and nebulae in
the line of sight.

4. Visual observations of stellar and nebular
spectra, with 12 inch visual telescope and
prism or grating spectrograph.

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C. 1. Photography of the Moon and planets with the 12 inch photographic telescope and amplifying lens.

2. Visual observations of the Moon and planets with the 12 inch visual telescope.

3. Photographic and visual observations of the spectra of the Moon and planets, with determination of their motions in the line of sight.

D. Laboratory spectroscopy. With methods of observing and photographing solar, metallic, gaseous and absorption spectra with the concave and plane grating, and prism spectroscopes, and instruction in the use of the electric arc and spark, oxy-hydrogen flame, blast-

1. Photography of the Moon and planets with the 12 inch photographic telescope and amplifying lens.

2. Visual observations of the Moon and planets with the 12 inch visual telescope.

3. Photographic and visual observations of the spectra of the Moon and planets, with determination of their position in the line of sight.

4. Laboratory spectroscopy. With methods of observing and photographing solar, nebular, gaseous and absorption spectra with the coronae and flares, gratings, and prisms spectroscopes, and instruction in the use of the electric arc and spark, very high flame heat

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lamp, Bunsen burner, etc. for electric and flame spectra, and in the use of the mercury pump for vacuum tube work.

Original Research.

Note - On account of the fact that the instruments of the Kenwood Observatory are the only ones in use which allow all varieties of solar phenomena to be studied in their completeness, and as many questions can ~~only~~ be investigated only by means of the photographic processes devised and employed at this Observatory, it is desirable that particular attention be paid to solar work. The following are some of the investigations which will be undertaken with the twin equatorial and spectroheliograph.

lamp, Remond burner, etc. for electric
and flame spectra, and in the use of
the vacuum pump for vacuum tube
work.

Original Research.

Note - In account of the fact that
the instruments of the Remond Observatory
are the only ones in use which allow all
varieties of solar phenomena to be studied
in their completeness, and as many questions
can only be investigated only by means
of the photographic processes devised and
employed at this observatory, it is desirable
that particular attention be paid to solar
work. The following are some of the
investigations which will be undertaken
with the new apparatus and spectrographs

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the concave grating, and other instruments
of the Observatory -

1. The relations which exist between the
faculae, spots and prominences.
2. The relation between solar disturbances
and terrestrial magnetic phenomena.
3. The relation between the distribution
of faculae and the average separation
of the photospheric granules. (To test Faye's
theory.)
4. The laws of ascent in solar eruptions.
5. The cause of the réseau photosphérique.
6. The distribution in heliocentric latitude
of the faculae, spots and prominences.
7. The variation in mean daily area of
faculae, spots and prominences in connection
with the eleven year period.

the course of the day, and other instruments of the Observatory.

1. The relations which exist between the phenomena of the day and phenomena of the night.

2. The relation between solar distance and terrestrial magnetic phenomena.

3. The relation between the distribution of forces and the average separation of the photogenic pencils (to the focus theory).

4. The laws of variation of solar distance.

5. The cause of the various photogenic pencils.

6. The distribution in terrestrial latitude of the forces, of the day and phenomena.

7. The variation in mean daily area of forces, of the day and phenomena in connection with the eleven-year period.

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- 7.
8. The time of ^{axial} rotation of the Sun as determined from photographs of the faculae.
9. The time of axial rotation of the Sun as determined by displacements of the K line in prominences without proper motion.
10. The possible existence of a law connecting motions of the chromosphere in the line of sight with the heliocentric latitude of the point of ~~observation~~ observed.
11. Examination of present theories of the Sun in the light of the new photographic results.
- etc. etc. etc.

I enclose a paper giving my degrees, etc, which you asked for a few days ago.

In regard to the American Association meeting in 1893, could you not have passed an invitation from the Board of Trustees to hold the meeting in Chicago in 1893?

8. The time of rotation of the sun as
determined from photographs of the faculae
9. The time of axial rotation of the
sun as determined by displacements of the
K lines in Fraunhofer's spectrum
rotation.
10. The possible existence of a law
connecting rotation of the chromosphere
in the line of sight with the latitude
latitudes of the part of observation observed.
11. Examination of present theories of the
sun in the light of the new photographs
results.
etc. etc. etc.

I enclose a paper giving my paper
which you asked for a few days ago.
In regard to the American Association
meeting in 1893, could you not be present
an invitation from the Board of Trustees
to hold the meeting in Chicago in 1893.

The Astronomical and Astrophysical Society of America

ECLIPSE COMMITTEE

SIMON NEWCOMB, Chairman
 GEORGE E. HALE, Secretary
 E. E. BARNARD
 W. W. CAMPBELL

OFFICE OF THE SECRETARY
 YERKES OBSERVATORY, WILLIAMS BAY, WIS. }

DEAR SIR:

In response to a circular letter issued by this Committee on February 10, 1899, preliminary statements have been received from many astronomers regarding the work which they expect to undertake in connection with the total solar eclipse of May 28, 1900. The Committee's expression of a desire for some measure of coöperation met with favorable consideration. The more important suggestions for eclipse observations offered by these astronomers may be found in the preliminary report of the Committee, which was published in the *Astrophysical Journal* for October 1899.

With these and other suggestions in mind the Committee now begs leave to offer the following remarks:

(1) Observations made without a definite purpose, and not based upon a careful consideration of the end to be attained, will rarely be of scientific value. The more important observations which may be undertaken are enumerated in the paragraphs below.

(2) *Relative Position of the Sun and Moon.* (This will require the observer's position and the time to be known.) (a) From visual observations of contacts, especially contacts II and III, made at stations near the central line, and at stations near the boundaries of the shadow path. (b) From photographs of the solar crescent obtained with long-focus instruments at stations on the central line, within one minute of the contacts, the exact moments of exposure being noted. The program of exposures should be symmetrical with reference to the middle of the eclipse. Snap shots of the solar crescent taken a moment before the Sun is entirely covered, and the moment after it reappears, with a large camera, may also be useful if the photographer can give the moments to the nearest second of standard time. The slowest plates should be used, and the exposures given by automatic shutters. With a camera ratio of $\frac{a}{f} = \frac{3}{480}$, an exposure of 0.001 second is abundant. Excessive exposures cannot be expected to yield results comparable to visual observations of the contacts.

(3) *Drawings of the Corona*, made at the telescope. Attention should be directed to the structure of the inner corona (especially the regions near large prominences) and to the general outline of the corona. Drawings of details should not attempt to cover large areas.

(4) *Color of Prominences.* Compare prominences seen with a telescope and determine relative degree of redness of each. Slight variations in tint may not be important, as from the Purkinje phenomenon the brightest prominences should seem the reddest. White prominences may perhaps be seen. Provision must be made for determining the position angles of the prominences observed.

(5) *Photographs of the Corona.* Attention may be called to three classes of camera lenses used for recording the corona. (a) Lenses for which $\frac{a}{f}$ is $>$ or $= \frac{1}{6}$, especially adapted to recording the details of the outer corona and the extensions. A wide range of exposures, from $\frac{1}{100}$ second up, should prove useful. The greatest extent of corona hitherto recorded was on triple-coated plates, exposure 20 seconds. Some observers consider that long exposures on very slow plates, fully developed, should be effective in distinguishing the long streamers on the bright-sky background.

Some also believe that the faint extensions will be best photographed with lenses for which $\frac{a}{f}$ is considerably less than $\frac{1}{8}$. (b) Lenses in which $\frac{a}{f}$ is about $\frac{1}{16}$, especially adapted to recording the details of the mid-corona. The rear lens of a photographic doublet may be used alone to give a long focus. With rapid plates, exposures of $\frac{1}{100}$ second should easily record the prominences, $\frac{1}{10}$ to $\frac{1}{8}$ second the inner corona, and a range of longer exposures the mid-corona. (If equatorial mounting and clock-work are wanting, exposures should not exceed one or two seconds for $f=60$ inches, and similarly in other cases.) (c) Objectives of relatively great focal length, giving details of structure in the inner corona. The objective may be pointed directly at the Sun and used with a moving photographic plate; or it may receive light from a suitable heliostat. With $\frac{a}{f}=\frac{1}{96}$, an exposure of $\frac{1}{4}$ second, on slow plates, has recorded the prominences. Revolving diaphragms immediately in front of the photographic plate and concentric with the Moon's image, may be used to reduce the equivalent exposure time of the inner corona.

Before and after the total phase it will be interesting to repeat, and extend as far as possible, the successful experiments made at the Chile and Indian eclipses, of photographing the corona many seconds before and after totality.

In all photographic work care must be taken to provide for the accurate orientation of the coronal image. A satisfactory method consists in exposing a plate to the sky on a dark night, allowing the stars to trail across the plate. For cameras in which $\frac{a}{f}$ is large, β *Herculis* will give a suitable trail. *Mercury* and ϵ *Tauri* will appear on most photographs of the corona, and will also serve as an excellent means of orientation.

(6) *Photographic Search for an Intra-Mercurial Planet.* The lenses recommended for this purpose in Harvard College Observatory *Circular* No. 48 have an aperture of 3 inches and a focal length of 11 feet 4 inches. It is stated in the *Circular* that with such lenses stars as faint as the eighth magnitude can be photographed during the eclipse in an exposure of one minute. Portrait lenses of large aperture and rapid rectilinear lenses may also be used. The sky surrounding the Sun may well be divided among several observers, as few individuals will be provided with enough lenses to cover the whole region. At least two comparable photographs of a given part of the sky should be made by each observer. The length of exposure which can advantageously be employed with each lens must take into account the strength of the bright-sky background; and while the brightness of the sky varies at different eclipses, some idea of the requirements of the problem may be gained by photographing a portion of the evening sky in which a second magnitude star, whose position is known, is just visible.

(7) *Distribution of "Coronium."* Observations of the corona with a direct-vision prism in the eyepiece of a field glass, or with an objective prism or grating attached to a telescope used either visually or photographically, should show whether the image corresponding to the green line of this gas has a well-defined structure, or a nearly uniform intensity. The *dispersive power should be strong* in order to reduce the strength of the continuous spectrum background.

(8) *Position of the Green Coronal Line.* The wave-length of the line can best be determined from photographs taken with a powerful prismatic spectrograph. Direct visual observations with a suitable spectroscope and telescope will, however, suffice to show whether the line coincides with the chromospheric line at 1474 K. Accurate determinations of the wave-lengths of the bright lines near λ 399 and λ 423 are also desirable.

(9) *The Spectrum of the "Flash"* may be photographed with an objective prism or a spectrograph used in conjunction with a telescope. A concave grating spectroscope or an objective grating might also be employed. For this work stations should be selected not far from the northern and southern

boundaries of the shadow path. If possible the observations should include a study of the dark line spectrum, before the flash at second contact and after the flash at third contact, and a study of the coronal spectrum.

(10) *The Heat Radiation of the Corona* should be measured in the streamers and rifts, and at various distances from the Sun's limb.

(11) *Photometric Observations of the Corona* at various distances from the limb should be made photographically, in view of the brief duration of totality.

(12) *Photometric Observations of Mercury* during the total phase are recommended by Professor Müller in an article published in the *Astrophysical Journal* for March 1900.

Eclipse photographers cannot be too strongly cautioned against a dense development of the plate. This has been the great fault with most of the negatives at previous eclipses. The image should be slowly developed and kept as thin and transparent as possible.

All photographic plates used in the eclipse problems should be "backed" to prevent halation. Water-color lampblack, reduced to the consistency of paste and applied to the back of the plate, will answer well for this purpose. Or the back of the plate may be flowed with a mixture of normal collodion 100 parts, chrysoïdine 3 parts.

For valuable information regarding probable weather conditions, local time and duration of totality, etc., reference is made to *Weather Bureau Bulletin* No. 209 and the Supplement to the *American Ephemeris* for 1900.

In some of the work outlined above, notably that referred to in paragraphs (3) and (6), it is desirable that there should be coöperation among observers. It is also of great importance that the eclipse stations should be distributed along a considerable length of the path of totality, so that local cloudiness may not affect all parties. For the purpose of securing for general publication accurate information regarding proposed observations, and in the hope of bringing about some degree of coöperation, the Committee requests that replies be sent to the following questions:

1. Do you intend to observe the eclipse?
2. If so, what site do you expect to occupy?
3. If any other location would be equally convenient, kindly state in what region.
4. If possible, kindly name the members of your party.
5. What observations will be made by the members of your party? What instruments will be employed?
6. If your present plans do not prevent, are you willing to coöperate with other parties, especially in undertaking observations such as those named in paragraphs (3) and (6) above?

Please be kind enough to send replies at your earliest convenience to the Secretary of the Committee.

Very respectfully,

SIMON NEWCOMB, <i>Chairman</i>	} Eclipse Committee.
GEORGE E. HALE, <i>Secretary</i>	
E. E. BARNARD,	
W. W. CAMPBELL.	

MARCH 29, 1900.

Hale

gift

~~Green~~

CHICAGO

Dec. 6

1895

Dear Dr. Hooper,

I enclose herewith a letter which I trust you will read at the next meeting of the Board of Trustees. I think you will also be glad to announce at the same time that Miss Catharine W. Bruce, of New York, has presented a check for one thousand dollars to the Astrophysical Journal, to be used to pay for illustrations. I suppose this will bring to the University a like sum from Mr. Rockefeller.

Very truly yours

George E. Hale

THE ASTROPHYSICAL JOURNAL
AN INTERNATIONAL JOURNAL OF SPECTROSCOPY
AND ASTROPHYSICAL PHYSICS
GEORGE E. HALE
JAMES E. KELLER
EDITORS

THE UNIVERSITY OF CHICAGO

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CHICAGO, ILL. 1907

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Very truly yours

George F. Johnson

William Bay,
April 1, 1900.

Dear Dr. Warfen,
I have just received this letter. If it is still possible to grant Mr. Curtis a \$320 Fellowship I greatly hope it will be done. It would be much more important for us to get him to take a Ph.D. at the University than to give fee fellowships to Messrs. Beale and Hilson.

Yesterday I secured a contribution of \$250. to the Schiffee Fund from Mr. O. W. Potter. He thinks the rest can easily be obtained from

William Lloyd
April 11, 1900.

Dear Dr. Cooper,
I have just
received this letter. If it is
at all possible to grant Mr.
Curtis a \$250 Fellowship I
greatly hope it will be done.
It would be much more
important for me to get
him to take a Ph.D. at
the University than to
give for fellowships to
other men. Best and kindest
regards I remain a
devoted friend from W. L. L.
P.S. He thinks the rest
can easily be obtained from

April 1, 1900

Lake Geneva people, and
I shall at once endeavor
to raise the entire amount.

Very truly yours
George S. Hale

April 1900

the General people, and
I shall at once endeavor
to raise the entire amount.

Very truly yours
Charles F. Hale