Astronomy. — Report of the Committee for the organisation of the observations of the solar eclipse on May 18th 1901 drawn up by Dr. H. G. VAN DE SANDE BAKHUYZEN.

At the meeting of May 27th 1899 the Academy appointed a committee to organise a Dutch expedition for the observation of the total solar eclipse on May 18th 1901, which will be visible almost exclusively in the Dutch-Indies.

This eclipse is of extraordinary importance because of its long duration, (in the central line on the west coast of Sumatra it will last $6^1/_2$ min. and on the east coast of Borneo $5^1/_2$ min.), so that a great number of accurate observations can be made. The photographic plates will probably show indications of details, of which nothing or only very little has been seen at former eclipses owing to the short time of exposure together with the faintness of the light.

The organisation-committees in Holland and in the Dutch-Indies.

The above mentioned committee appointed by the Academy, from some of its members and other scientific men not belonging to the Academy, consisted of by Messrs. J. A. C. OUDEMANS, J. C. KAPTEYN, W. H. JULIUS, E. F. VAN DE SANDE BAKHUYZEN, J. P. VAN DER STOK, A. A. NYLAND, J. H. WILTERDINK and H. G. VAN DE SANDE BAKHUYZEN. It was very desirable however to assure the co-operation of a committee in the Dutch Indies and in consequence of a correspondence with the Colonial Minister, the Indian Government asked the board of the "Natuurkundige Vereeniging in Nederlandsch-Indië" to take upon them the preparations for the observations. For this purpose the board appointed a committee formed by its President, our corresponding member Major J. J. A. MULLER, R. E. of the Staff, chief of the triangulation in Sumatra, Dr. S. FIGEE, acting-director of the Royal magnetical and meteorological Observatory at Batavia and A. C. ZEEMAN, Inspector of the Governmental navy, and of the beacons, lighthouses and pilotage.

The two committees, always working in collaboration, had a twofold purpose, first to prepare a Dutch expedition for the observation of the important phenomenon, secondly to gather data in order to be able to give information to foreign astronomers who intended to observe the eclipse in India.

Financial support.

A large sum of money was required for the preparation and sending out of an eclipse party, not only for the instruments and for the voyage and the maintenance of the observers, but also to enable some members of the expedition to take part in the observations of the total eclipse of May 28th 1900, and to visit some foreign observatories in order to prepare themselves for the task in India.

Already before the committee had been appointed Mr. NYLAND by means of private contributions had collected a considerable sum for this purpose. This sum, though large, was not sufficient and has afterwards been greatly augmented; in the first place by the resolution of the East-Indian Government, which, at the request of the "Koninklijke Natuurkundige Vereeniging in Nederl.-Indië", has allowed the yearly sum on the budget for scientific expeditions, to be used for the Dutch eclipse-party and moreover by the sum which his Excellency the Home-minister had placed at the disposal of the committee in 1900, and which, we expect, will be granted us again this year.

The "Hollandsche Maatschappij der Wetenschappen te Haarlem", the "Provinciaal Utrechtsch Genootschap" and the "Koninklijke Natuurkundige Vereeniging te Batavia", have also sent us considerable contributions, but we are especially glad to record the fact that several private persons, besides those who at the beginning had presented us with large gifts, were ready to give us financial support in the most liberal way.

Another important contribution was received by the committee from the Indian Government, which put at the disposal of the "Koninklijke Natuurkundige Vereeniging" at Batavia 30 copies of 27 maps of differents parts of Sumatra and Borneo. Lastly I have to express my indebtedness to the directors of the steam-navigation company "Nederland", who allowed a reduction in the fares for the members of the expedition and their luggage, and has done much to render the transport of the instruments safer and more convenient.

When it appeared that the financial conditions would allow the sending out of an expedition, one of the chief requirements was to find competent persons to make the observations. The committee was fortunate enough to find two of its members Mr. J. H. WILTERDINK, lecturer of astronomy and observer at Leyden and Professor A. A. NYLAND of Utrecht willing to take this task upon themselves, while Mr. J. J. A. MULLER in India was ready to officiate as chief of the expedition. His scientific abilities and his thorough acquaintance especially of the west part of Sumatra, of which the triangulation was made for the greater part under his direction, renders Mr. MULLER's collaboration of great importance for the success of our expedition.

When afterwards it appeared desirable for the spectroscopic and polarimetric work, that a physicist should go with the expedition, we were happy to find the member of our committee Prof. W. H JULIUS ready to join the party. Mr. MULLER informed us that Captain WACKER at Batavia who has taken part in the triangulation of Sumatra and Dr. FIGEE, acting director and Dr. VAN BEMMELEN acting vice-director of the meteorological observatory will join the Dutch expedition whereby a valuable addition to the observing staff is secured.

In India moreover we hope to avail ourselves of the assistance and collaboration of some officers of the general staff and of the officers and the men of a man of war, which probably, thanks to the kindness of the commander of the navy, will lie during the eclipse in the neighbourhood of the observing station chosen by the committee.

Observations and instruments.

The observations which the members of the expedition expect to make are:

1. Photographs of the corona.
2. Spectroscopic observations of the corona.
3. Spectroscopic observations of the flash in the immediate neighbourhood of the sun.
4. Determinations of the polarisation of several parts of the corona.
5. Determination of the heat radiation from the corona.
6. Determination of the brightness of the corona.
7. Observation of the shadow-bands.
8. Determination of the electrical condition of the air during the eclipse.
9. Determination of the terrestrial magnetism.
10. Observations of temperature, atmospheric pressure and force of the wind.

For these observations the following instruments will be used.

1. *Photographs of the corona.*

As the brightness of the corona at different distances from the sun's limb is very different, it is impossible to obtain in the ordinary way a photograph, on which all parts are equally visible. If the image of the corona near the sun's limb shows distinct peculiarities, there will be no visible impression at a greater distance from the sun, and if those more distant portions are visible on the plate, the image of the inner part of the corona will show no detail at all. For this reason it has been resolved to use a number of different photographic cameras: *a.* of great focal length and accordingly with a small value of f/a (f=focal length a=aperture) giving large images of small intensity, and therefore suitable for the reproduction of the inner parts of the corona; *b.* of small focal length and with a great value of f/a giving small but very bright images, and showing the most remote parts of the corona; and finally *c*, a photographic telescope with an arrangement according to BURCKHALTER, where a specially shaped screen rotates with great rapidity directly in front of the sensitive plate and so diminishes artificially the intensity of the light of the coronal portions near the sun's limb. In this way a distinct image of a very great part of the corona may be obtained.

The photographic apparatus are then:

1. A photographic object glass lent by the Observatory at Washington of about 12 m. in focal length and about 11 c. m. in aperture. The proportion f/a is 1 : 92, and the diameter of the image of the sun is about 0.5 c.m.

By means of a light-tight tube of wood and cloth the object glass, firmly mounted on a pillar, is connected with the plate-holder also in a fixed position. A mirror sends the sunlight through the object glass into this telescope.

2. A photographic object glass of STEINHEIL, belonging to the Utrecht observatory, 3,45 m. in focal length and 27 c.m. in aperture; $f/a = 1 : 12{,}8$, giving an image of the sun of 3.2 c.m.

For this object glass an iron tube is constructed, which is fastened to a parallactic mounting from the Leyden Observatory, which by means of a clock follows the diurnal motion of the sun. Three of the above mentioned revolving discs of BURCKHALTER have been constructed after the indications of Mr. NYLAND to be used in conjunction with this object glass (one for each plate), the axes passing through holes in the sensitive plates are rapidly revolving by means of a clock. Mr. NYLAND had also a similar revolving screen of BURCKHALTER made for the long telescope of 12 m. focal length.

3. A photographic object glass of DALLMEYER lent us by "TEYLER's

Genootschap" 1.52 m. in focal length and 10 8 c.m. in aperture; $f/a = 1/_{14}$ with an image of the sun of 1.4 c.m.

4. A photographic double-lens of VOIGTLANDER und SOHN 0.87 m. in focal length and 10.8 c.m. in aperture; $f/a = 1/_8$ giving an image of the sun of 8 m.m in diameter.

5. A photographic double-lens of VOIGTLÄNDER 0.38 m. focal length and 10.8 c.m. aperture; $f/a = 1/_{3\,5}$, diameter of sun's image 3.5 m.m. For each of the three last object glasses a teak-wooden tube has been constructed, carrying at its other end the wooden plate-holder.

6. An amateur-camera with the back-lens of a collinear object glass of VOIGTLANDER, 0.35 m. focal length and 35 m.m. aperture, which probably will be reduced by a stop. The image of the sun is 3.3 m.m. in diameter.

During the observations the four last photographic apparatus will be fastened to a square wooden case, provided at both ends with steel axes running on ball bearings, by which a very smooth motion is obtained. At one end of the case a wooden sector of about 2.7 m. radius has been fixed perpendicularly, and by means of a chord attached to the sector and clockwork, the case with the cameras rotates at the rate of the diurnal motion. If the axis of the case is adjusted in the direction of the polar axis and the cameras have once been pointed to the sun, they will remain in that position.

2 and 3. *Spectroscopic observations.*

For this purpose 4 spectrographs and one visual spectroscope will be used.

One of these spectrographs is a prismatic-camera of COOKE, consisting of an ordinary camera with an object-glass, COOKE's triplet, achromatized both for actinic and visual rays, of 16,2 c.m. aperture and 2.60 m. focal length; in front of the object-glass are placed two prisms with an angle of 45°, covering the whole aperture of the object-glass.

When this apparatus is directed towards the totally eclipsed sun, we obtain on the sensitive plate a series of images of the corona and of the ring immediately surrounding the sun's disc, of the different colours which compose the light of the corona and of the ring.

The dimensions and shapes of these different images, which probably will be very numerous, will show distinctly where the substances are situated, whose light forms the pictures on the sensitive plate. Moreover it will be possible to determine the refrangibility of those different kinds of light from the positions of the images although the accuracy of this determination will probably be less than that of the refraction-indices from the measurement of the spectra obtained by means of the slit-spectrographs.

Another spectroscopicinstrument is a slit-spectrograph, constructed by Mr. TOEPFER at Potsdam after the indications of Mr. WILTERDINK in consultation with professor SCHNEIDER of Potsdam.

The lens projecting the image of the sun on the slit is a photographic double-lens of VOIGTLÄNDER of over 10 c.m. aperture and 38 c.m. focal length; two photographic double-lenses of 36 m.m. aperture and 13 c m. focal length of ZEISS serve as collimator- and cameralenses. The dispersion is obtained with two large Rutherfurd prisms 60 × 35 m.m. from C. A. STEINHEIL of Munich.

We intend to use this spectrograph for the general corona spectrum and for the spectrum of the upper parts of the photosphere the so-called flash.

By accurate measurements of this corona-spectrum the uncertainty still existing about the refrangibility of the corona light will probably be removed. Moreover we hope to learn from its spectrum something more about the origin of the light of the flash.

The hypothesis, developed by Prof. W. H. JULIUS in his interesting paper read at the meeting of our Academy of February 24th 1900, that this light (flash) may be caused by an abnormal dispersion of the ordinary sunlight, has received new support by the investigations of Prof. WOOD of Wisconsin University. The determination of the refractive indices of the different lines in the spectrum of this light will probably prove to be an important contribution towards a judgment about this question.

The flash appears immediately after the second contact and as the layer which sends the light to us is thin, it disappears on the central line within one or two seconds. In order to obtain a photographic image of this spectrum, while the calculated moments of its appearance can be several seconds in error, the sensitive plate will be exposed some time before totality begins, and will be slowly moved by a clock, belonging to the Utrecht Observatory, until a few seconds after the second contact. The plate will then show next to each other the ordinary spectrum of the sun and the spectrum of the flash with its bright lines. This juxtaposition of the two spectra has the advantage that the situation of the dark and the bright lines in the two can be easily compared.

Another slit-spectrograph, also made after Mr. WILTERDINK's design by TOEPFER, has a greater dispersion than the foregoing.

The image of the sun is formed on the slit by a photographic doublet of 8 c.m. aperture and 61 c.m. focal length, while two photographic double-lenses of 5.5 c.m. aperture and 42 c.m. focal length, like the first of VOIGTLANDER, served as collimator- and camera-lenses. The dispersion is obtained by three large Rutherfurd prisms made by STEINHEIL 60×55 m.m. We hope that it will be possible to determine with this spectrograph the motion of the particles which make up the corona, by a comparison of the spectra of the corona on both sides of the sun at the place where the greatest velocity of the particles in the direction towards and from the earth is to be expected.

The spectrograph will be pointed so that the centre of the image of the sun falls on the middle of the slit, and as the length of the slit is much greater than the diameter of the sun's image, the spectra of the two parts of the corona situated on both sides of the sun will be obtained on the sensitive plate.

In order to determine the mutual position of the corresponding lines in those two spectra, which on the plate are at a rather large distance from each other, a comparison spectrum of iron will be formed in the intermediate space by electric sparks between a pair of iron electrodes before the slit.

A fourth spectrograph on purpose to still better examine the bright line spectrum of the sun's limb, consists of a plane diffraction grating of ROWLAND, 37×55 m. m., of 14438 lines to the inch; the object glass has an aperture of 62 m. m. and a focal length of 1 m.

This instrument is to be mounted near the limit of the zone of totality, because there the moon's limb at the end of the sun's diameter, perpendicular to the direction of the lunar motion, moves along the sun's limb so that the duration of the flash will be very much prolonged.

Lastly visual observations will be made with a fifth apparatus, namely a slit-spectroscope with great dispersion belonging to the Utrecht Observatory; the condenser is an object-glass of STEINHEIL of 10.8 c. m. aperture, and 0.864 m. focal length.

All this spectroscopic apparatus will be mounted in an approximately horizontal stationary position and the solar light will be reflected into the instruments by means of silvered glass mirrors. As the sun moves on during the observation, the mirrors should move so that during the totality the reflected rays keep a constant direction.

With ROWLAND's diffraction grating this will be obtained by means of a coelostat with a mirror of STEINHEIL of 10 8 cm. in diameter, belonging to the Utrecht Observatory; while the prismatic camera, the two slit-spectrographs and the visual spectroscope will be used with siderostats made by GAUTIER of Paris.

These *consist each of an axis, mounted in the direction of the* polar axis rotating by means of a clock in exactly 24 hours; to each of the ends of this axis a mirror is attached, and this being once adjusted so that it sends the light of a given point of the sun's limb in the direction of the polar axis towards one of the spectroscopic apparatus, the direction of that reflected pencil will remain unchanged.

But it is the direction of this pencil only which is stationary, and which forms a single image, the reflected images of all the other points will rotate very slowly round the image of that fixed point. This slight movement does not influence the spectroscopic observations, but if the reflected image were required for obtaining a picture of the corona, its distinctness would be lessened by the motion.

If a stationary reflected image is desired, as for instance for photographing the corona with the above mentioned horizontally mounted long telescope of 12 m. focal length, the reflection must be brought about in an other way. For this purpose the coelostat of LIPPMANN is very suitable; in this apparatus the mirror, parallel to the polar axis is attached to a metal axis also adjusted in the same direction and rotating once in 48 hours. According to Mr. WILTERDINK's indications GAUTIER has in a simple manner attached such a coelostat to one of his siderostats, and its mirror reflects the sun's rays into the long telescope of 12 meter.

4. *Determination of the polarisation of the corona.*

Prof. JULIUS intends to make a number of polarimetric measurements in order to get to know, for as large a number as possible of well determined places on the corona, the percentage of the polarised light.

For reasons easily to be understood the use of a mirror had to be avoided; therefore a telescope of STEINHEIL-SCHRÖDER (belonging to the Leyden Observatory) equatorially mounted was arranged for these measurements. The object-glass has an aperture of 10.8 c.m. and a focal length of 275 c. m.; the diameter of the moon's image is therefore about 2.5 c.m. During the observation an assistant will keep the central point of the moon's image in the optical axis of the telescope, by means of a finder and of a system of rods. Instead of the eye piece a modified polarimeter of CORNU, is attached to the end of the tube so that the diaphragm with a square hole, 1 m.m.^{2}, (of which the polarimeter forms a double image) is situated in the focal plane. The whole polarimeter has two motions, one radially on a slide, so that the diaphragm may come at any desired distance from the axis of the telescope and secondly a rotatory motion round the optical axis of the telescope. The distances radial and angular of each chosen point of the corona can thus be read.

In order to be able to choose those places of the corona most fit for measurements of polarisation, the following arrangement is made: by a quick movement the small diaphragm will be easily removed, and a glassplate put in its place on which an etched square of 1 m.m^2. indicates exactly the spot, which afterwards will be taken up again by the hole in the diaphragm. If the place is chosen, an assistant reads the distance and position angle and the analyser is moved so that both images will have equal brightness. From the position of the analyser the quantity of polarised light may be derived.

The polarimeter with its accessories has been made in the physical laboratory at Utrecht.

Preliminary experiments, made by means of an artificial corona, showed that it will be possible under favourable circumstances to obtain in 6 minutes for at least 12 places of the corona trustworthy values for the ratio of polarised light.

5. *Determination of the radiation from heat of the corona.*

The investigation of the heat radiation from the corona, is also very important for the explanation of this phenomenon, the more so as a great uncertainty still exists, not only about the distribution of this radiation over the spectrum, but also about the question as to the order of magnitude of the total radiation, as appears from the contradictory results obtained on one hand by ABBOTT, on the other by DESLANDRES during the eclipse of May 28, 1900 and later. Prof. JULIUS thought it therefore best to try in the first place to express the amount of radiation of heat from the whole corona in absolute measure, by comparing it directly with the amount of the radiation from the uneclipsed sun, the sun's constant.

For the determination at the eclipse station of the latter radiation a pyrheliometer of KNUT ÅNGSTRÖM of Upsala will be used. Prof. ÅNGSTRÖM has been so kind to test himself the instrument destined for the expedition and to indicate some of its constants.

The pyrheliometer however is not constructed for very weak radiation, and cannot be used for it. Therefore Mr. JULIUS has made a very sensitive thermopile, which in connection with a resistance-box purposely made for it and a galvanometer of DU BOIS and RUBENS, will enable him to compare amounts of heat-radiation in all ratio's from 1 to 100000.

The thermopile is exposed directly to the radiation without mirrors or lenses, and each time the resistance is so adjusted that the galvanometer gives trustworthy indications. When disturbing influences are eliminated, we may accept without restriction that, when the amount of the radiation is very small, the current is proportional to the absorbed heat.

For strong radiations we can examine by means of the pyrheliometer, in how far the proportion still remains. As the difference in temperature between the junctures of the thermopile, when it is exposed to the sun's radiation in the tropics, will probably not exceed 30° C. it is to be expected that the deviation from the law of proportionality will not be very large; at any rate it can be accounted for. The plan of observation is to repeatedly measure the heat radiation during the whole time of the eclipse, from before the first till after the fourth contact, at well determined moments which comes to us from the sun and its immediate surroundings. The apparatus in which the thermopile is mounted, has been so arranged that the radiation is received only from a circular portion of the sky 3° in diameter.

As long as the radiation of the disappearing or the reappearing disc of the sun is strong enough, observations will also be simultaneously made with the pyrheliometer for testing purposes; it is expected that the thermopile will be able to give indications of the radiation during the whole eclipse. During the totality the apparatus is alternately pointed to the corona and to neighbouring places of the sky outside the corona; from the variations of the galvanometer readings, the amount of the corona radiation will be derived, as a suitable zero cannot be obtained by covering the opening with a screen.

A description of the arrangement of the thermopile and of the elaborate precautions taken to eliminate all disturbing influences, which cause difference of temperature between the junctures, will be given later. Here I record only that in October 1900 on the same day the radiation of the sun and that of the full moon was measured with a provisionarily constructed thermopile and galvanometer, both of which were much less sensitive than the instruments to be used for the eclipse. The radiation of the moon falling through a diaphragm (opening 5.5 m.m. in diameter) gave then a deviation of 4.5 divisions, with an error of about 0,5, the proportion of that radiation to the radiation of the sun at noon was found to be 1 : 80000. With the new instruments at least $^1/_{20}$ of the amount of the moon's radiation will be sufficient to make the galvanometer show measurable deviations.

6. *Determination of the light-intensity of the corona.*

It will be possible to derive the relative photographic brightness of the different parts of the corona from the photographs made. But there will be made also observations of the total visual intensity of its light, by means of a photometer of WEBER (comparison with a benzine flame at a variable distance) belonging to the meteorological Observatory at Batavia.

7. *Observation of the shadow-bands.*

The direction and the velocity of these shadow-bands during the eclipse will be determined by observing their motion across horizontal and vertical screens suitably placed.

8. *Determination of the atmospheric electricity.*

An electrometer of the meteorological Observatory at Batavia will register the atmospheric electricity, first on the ordinary rotating cylinder, and then during a period of 6 hours (from 3 hours before till 3 hours after totality) on a cylinder of which the period of rotation is only $^1/_4$ of the former, so that it will be possible to determine the variations during the eclipse with greater accuracy, and to investigate whether the electric potential decreases during the totality.

9. *Terrestrial magnetism.*

The observations of the three elements of terrestrial magnetism will be made at Buitenzorg or Batavia. At Padang the declination and horizontal intensity will be measured by a self-registering ESCHENHAGEN's intensity-variometer and other variation-instruments, to be provided by the observatory at Batavia.

10. *Determinations of temperature, atmospheric pressure and force of the wind.*

The temperature will be determined by AHSMANN's aspiration thermometers of the Observatory at Batavia, and further by means of a thermograph (large pattern) of RICHARD.

The atmospheric pressure will be determined by ordinary barometers and further by a barograph (large pattern) of RICHARD. The pressure of one millimeter mercury is represented on the scale by 3 millimeters.

The direction and force of the wind will also be determined in order to know whether at this eclipse, as in former cases, a sudden eclipse-wind will be observed.

Selection of the observing station.

For almost all the observations it is necessary that the observing station should be in the neighbourhood of the central line, because there the totality lasts longest and the sun is covered by the moon symmetrically to the direction of its axis. This central line runs from about west to east a few degrees south of the equator. In our East-Indian colonies it passes over Sumatra, a little south of Padang, over Borneo south of Pontianak, and then over Celebes south of the gulf of Tomini, over Boeroe and Ceram and over New Guinea. On the central line the duration of the totality decreases from West to East, at the west coast of Sumatra it lasts 6 min. 30 sec., in New Guinea about 3 min. 30 sec.

Besides the duration of the phenomenon the selection of the astronomical site depends for a great part on the convenience for the transport of the many heavy boxes with instruments, the state of the ground with a view to the mounting of the instruments and on the possibility of getting assistance in the transport and the preparatory work. The examination of these circumstances and the advice to be given accordingly, had to be left to the care of the Indian committee.

For the determination of the weather to be expected, the meteorological Observatory at Batavia could dispose of rain-observations over a long period in a great number of places in our East-Indian colonies and further of general records on the cloudiness in differents parts of the Indian Archipelago.

But as it was important to know the cloudiness and the duration of the sunshine especially at different points on the line of totality, the meteorological Observatory at Batavia has in twelve places organised observations on the cloudiness and the sunshine during the months April, May and June 1900.

The results of all the meteorological observations, which are important for the selection of the observing station, have been recorded by Mr. J. J. A. MULLER and Dr. S. FIGEE in a paper "Information for observing parties and climatological conditions along the track of the moon's shadow", in which also information is given about the character of the different regions, the means of transport, residence etc., which will have special interest for foreign astronomers, who will go out to observe the eclipse.

The meteorological condition near the equator is on the whole not very favourable; at the several meteorological observing stations hardly any day in May 1900 was perfectly cloudless. But then the clouds do not cover the whole sky, and in the cloudless parts the air is clear and very transparent.

The number of days on which at noon (the moment of the eclipse), the sun was visible near the central line in Sumatra and Borneo, in May 1900 varies from 10 to 30; in most places the number is more than twenty; but it is not allowed to derive general conclusions from these numbers as they represent the results of one month only.

The difference between the meteorological conditions in May 1900 at the different stations was not large, except in a single case.

Perhaps in the interior of Borneo the probability of bright weather is a little greater than in Sumatra, but in Borneo the transport and the mounting of the instruments would give more difficulties.

In order to obtain as much certainty as possible for their report about the most suitable observing station, Messrs. J. J. A. MULLER and S. FIGEE visited many places in Sumatra from 16th September to 1st October 1900. As the result of their considerations they have recommended to us for our observing station a place in the neighbourhood of PAINAN, on the West-coast of Sumatra, south of Padang; and for the present this point has been chosen as the station of the expedition.

It offers the advantage of being in the neighbourhood of Padang, the seat of the government of the West-coast of Sumatra and the residence of the director of the railway in Sumatra and of the workshops belonging to it, of which much use can be derived for the arrangements of the observing camp.

Information for the observers of the eclipse.

As I have mentioned already, one of the purposes of our committee was to give information to persons who wanted to observe the eclipse in India, in the first place to foreign astronomers. And it is especially for them that Messrs. MULLER and FIGEE have published the above mentioned "Informations etc.", which have been sent by them and by the Dutch committee to those societies and astronomers who were thought to have an interest in them.

As I have mentioned we have received from the "Koninklijke Natuurkundige Vereeniging" at Batavia 30 copies of 27 maps chiefly of different parts of Sumatra and Borneo, put at their disposal by the Indian government.

We have distributed a great number of those maps among the astronomers who intend to observe the eclipse, so that they will be able to find their way in the stations they have selected. When these astronomers apply to the local authorities on their arrival in India, they will there obtain any assistance and information they require.

The following foreign expeditions, as far as we know, will go to the Dutch Indies :

1. Mr. NEWALL from Cambridge and Mr. DYSON from Greenwich.
2. Mr. LOCKYER from London.
3. Count DE LA BAUME PLUVINEL from Paris.
4. A Russian expedition.
5. Prof. BARNARD from Yerkes Observatory near Chicago.
6. Prof SKINNER from the U. S. Naval Observatory in Washington.
7. Prof. JEWELL from the John Hopkins University.
8. Prof. BURCKHALTER from California.
9. Prof. PERRINE with some assistants from Lick-Observatory.
10. An expedition from the technological Institute of Boston.
11. Mr. TODD from Amherst Observatory.

Probably still other English observers will join these.

Besides the information mentioned, especially for the use of astronomers, some members of the committee have given a list of instructions for eclipse work for amateurs not provided with great astronomical instruments. These instructions were sent to India some time ago.

At the end of this report the committee would like to express their indebtedness to all who have helped them in their task and have enabled them to send out the expedition.

To His Excellency the Home minister, the "Hollandsche Maatschappij der Wetenschappen", the "Provinciaal Utrechtsch Genootschap", the "Koninklijke Natuurkundige Vereeniging" at Batavia, and especially to the various persons who have given financial support.

To His Excellency the Colonial Minister, who has supported our requests to the Indian government; to the Indian government itself who not only gave us a considerable contribution, but who also enabled Messrs. MULLER and FIGEE to make the above-mentioned expedition in September 1900, and allowed them and other Officers of the General Staff and of the Observatory at Batavia to join the expedition, and who in May will send a man of war to Padang, of which the officers and men will assist in the observation of the eclipse. Our last but not our least thanks is due to the East-Indian eclipse committee, who have taken every pain and trouble to prepare things in such an excellent way in India.

After this report was written tidings are received that according to a royal decree of February 16th 1901 N°. 33 Dr. W. H. JULIUS and Dr. A. A. NYLAND, professors at the University of Utrecht and Mr. J. H. WILTERDINK lecturer and observer at the University of Leyden are charged to go to India with a view to the university interest, in order to observe the total eclipse on 18th May 1901.

This new proof of the interest shown by our government in this expedition is received with much thanks.

(March 22, 1901).