THE ECLIPSE OF THE MOON, SEPTEMBER 3, 1895.

BY WILLIAM R. BROOKS, M.A., F.R.A.S.

The accompanying photographs of the lunar eclipse of September 3, 1895, were taken at this observatory with the equatorial telescope of ten inches aperture with photographic corrector. The pictures are direct enlargements in the telescope, the diameter of the image of the moon in the principal focus of the telescope being one inch.

Fig. 1 shows the moon before totality, and Fig. 2 as it is passing out of the shadow after totality.

The night was very clear, and all the phenomena connected with the eclipse were the most beautiful ever witnessed by the writer.

Smith Observatory, Geneva, N. Y., Nov. 20, 1895.

THE TOTAL LUNAR ECLIPSE: ITS ASTRONOMICAL VALUE.

Celestial phenomena have ever excited in the unlettered mind a wondering interest; an interest which in the early ages was seasoned with a large admixture of superstitious dread. Eclipses of the sun and moon, more often than not, were interpreted as prophetic of approaching disaster and brought much unrest to the minds of men.

Science has changed all that; and these periodic phenomena are now eagerly anticipated, and closely observed, for the astronomical data which they afford. Formerly the chief use to which the total lunar eclipse was put by the astronomer was the determination of longitude.

The moment of total eclipse is the same for every station on that half of the globe which faces the moon; and the observation of this time of totality enables us to calculate the difference of longitude between any two points of observation. Such computations however lack exactness, owing to the fact that it is difficult to determine the precise moment of totality. The varying density of the earth's atmosphere causes a varying intensity in the sun's rays that pass through it. There is consequently no sharp, clearly defined edge to the umbra or shadow, and it is difficult to tell exactly when the edge of the moon has passed into it.

The most important observation is that of the occultation of the stars, or their passage behind the moon. At ordinary times the brilliancy of the moon is such that only the brightest stars can be seen as they approach it. During eclipse, and owing to the fact that the moon has no atmosphere, stars of very faint power can be observed up to the moment at which they pass behind the planet. In determining the place of the moon by this method the occultation of certain stars is observed simultaneously at different observatories, widely separated.

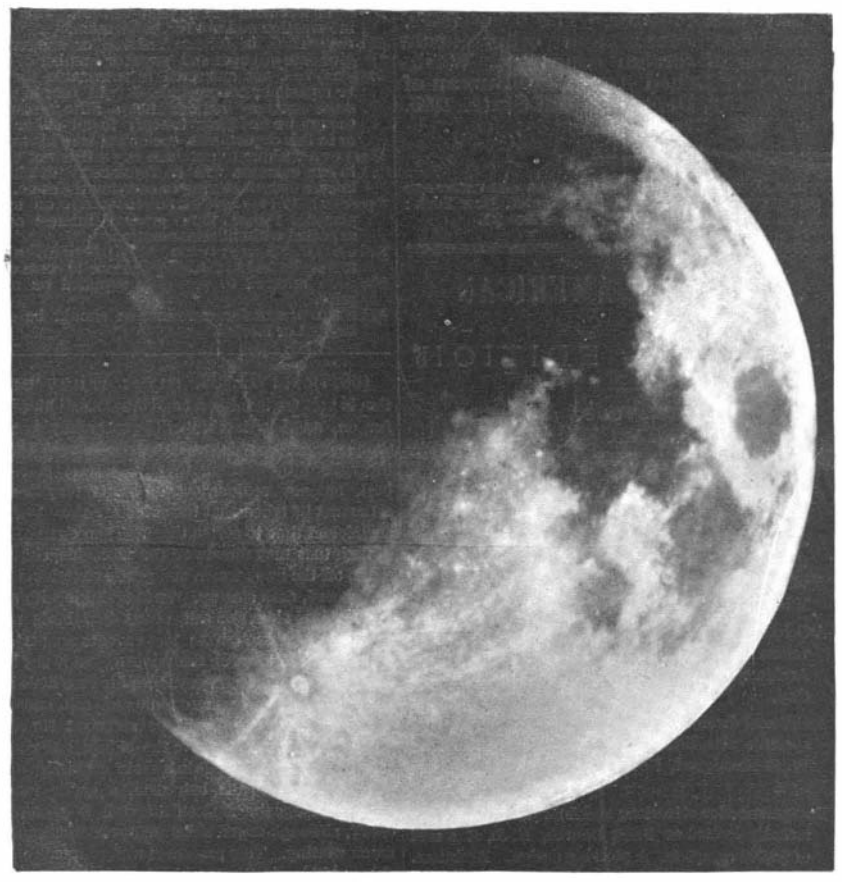
This siderial occultation, which, for the reasons above given, is very exact, is used for calculations of longitude, and to establish the diameter of the moon, its distance from the earth, and its right ascension and declination.

A total eclipse affords a special opportunity of making a spectroscopic examination of the earth's atmosphere. The sun's rays, during eclipse, pass through the atmospheric envelope obliquely on their way to the moon. Their course at this time through the atmosphere is much longer than when they fall normally to the earth, as they do during the day time. After being reflected from the moon they again pass through the earth's atmosphere before they strike the spectroscope. In this way the earth's spectroscopic lines are obtained of greater distinctness than is possible in ordinary observations.

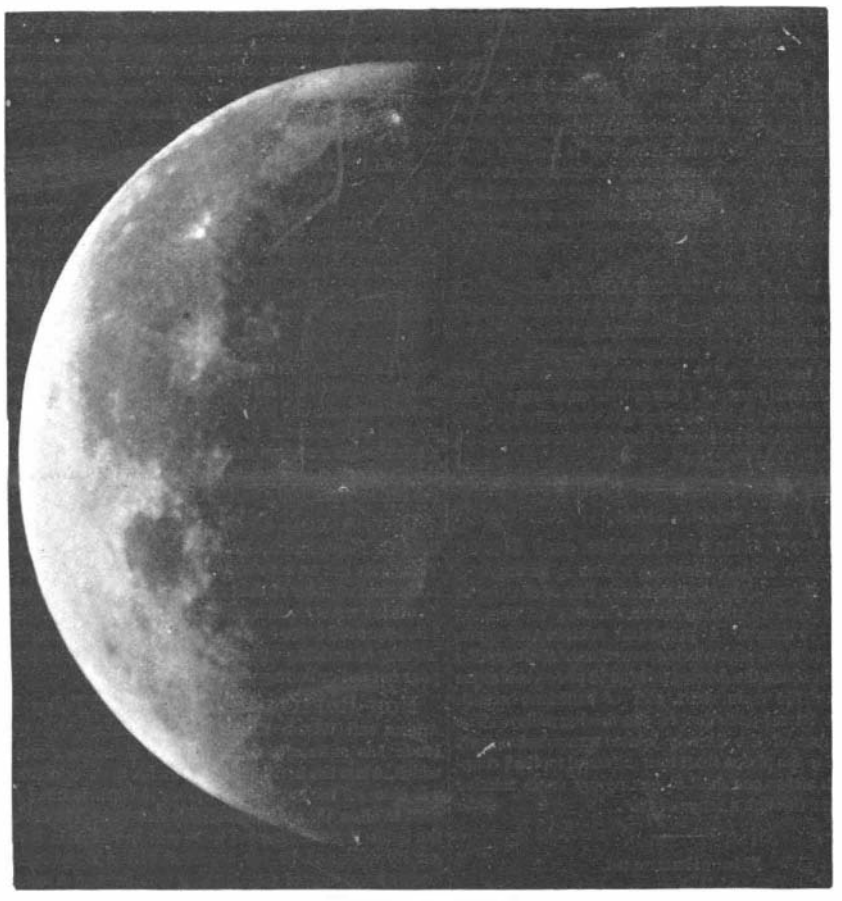
The total eclipse has been used to determine the amount of heat thrown out by the moon. During eclipse, for obvious reasons, the moon cannot give off reflected heat. Any heat that we then receive must be heat that has been absorbed from the sun, and is now being radiated. The observations show that as the light fails so does the heat; which proves that lunar heat is reflected, not radiated.

Many historical dates have been accurately fixed by means of calculations based upon the lunar eclipse. "The first olympiad, the beginning of the Christian era, and the death of Augustus are some of the events whose dates have been settled by the occurrence of lunar eclipses."

The value of the lunar eclipse is discussed in fuller detail in the November issue of Popular Astronomy by Caroline E. Furness, of Vassar College Observatory. The paper closes with an interesting description of the methods of observation adopted by the students of this college during the eclipse of September last.



BEFORE TOTALITY.



AFTER TOTALITY.

ECLIPSE OF THE MOON, SEPTEMBER 3, 1895.—PHOTOGRAPHED BY WILLIAM R. BROOKS.

The Electrolysis of Milk.

In a somewhat lengthy paper by Mr. C. E. S. Phillips, the author, after referring to some of the tests adopted for ascertaining the purity of milk, proceeds to describe experiments undertaken to discover whether electrolysis would offer a more expeditious and reliable method than those in use. On electrolyzing a sample of milk between platinum electrodes, the anode became coated with a white, spongy-looking material which increased until so thick upon the plate that it ultimately became disengaged and floated to the surface of the milk; it was observed on making experiments in this way that the white deposit consisted principally of a mixture of caseine and fat, that the milk gave off a characteristic odor during the electrolysis, and it was found to be slightly alkaline after the operation.

The liberated caseine floating upon the milk seemed to show that, owing to alkalinity of the solution, it had become insoluble; it was, however, evidently due to the lifting power of the gas bubbles clinging to it. By continuing the electrolysis further it was possible to extract practically all the solids from the milk used (30 cub. cm.), leaving a transparent solution behind; at the same time no appreciable deposit of any kind took place at the negative electrode. Tests made with litmus paper during electrolysis showed that the action was extremely local; it was, however, noticed that the froth on the negative electrode produced by a too rapid electrolysis was strongly alkaline

The formation of caseine on the positive electrode was then studied in a miniature cell under the microscope. On making the circuit, bubbles of gas appeared upon each electrode, more of course at the negative one, but at the anode a yellowish deposit grew and spread uniformly out toward the opposite electrode, a dark ridge was built up about equidistant all along the electrode, and became more definite till the band widened out on either side, and concentrated at a point immediately opposite the cathode. Very peculiar movements could be made to take place in this band by making and breaking the circuit rapidly. Photographs showing these changes are given by the author. A drop of litmus used to stain the milk showed that an acid and an alkali were formed at the anode and cathode respectively, evidently accounting for the deposition of caseine at the former. The action would appear to be similar to that which takes place when milk is exposed to air for some days; lactic acid is formed, which throws down the caseine. By electrolysis, however, the action can be started and stopped as desired, so that any portion or all of the caseine can be removed from the milk.

Next a small vessel was divided into three compartments by means of two porous partitions, and the effects recently described by M. Andréoli were tried. About 10 cub. cm. of milk were poured into the center division, while the anode and cathode compartments contained a solution of sodium chloride. On the passage of the current a deposit was formed in the center compartment on the side of the partition separating it from the anode. When all three compartments contained milk, the deposit occurred on the sides of both partitions furthest from the anode. Under these circumstances it seems that an action takes place in the milk in the center compartment. No deposit took place upon metallic plates immersed in the milk in either case. Some experiments upon the preservation of milk by means of this electrical withdrawal of a portion of its caseine were made, but with no success so far. Mr. Swinburne mentions, however, that milk can be sterilized electrolytically.

In conclusion, the author states that platinum is the most suitable material to use for electrodes in the electrolysis of milk, as the lactic acid formed attacks most other metals. Aluminum can, however, be used in certain cases for the positive electrode, but it is eventually dissolved, and consequently of little use for quantitative work.—The Electrician.

Field Experiments with Potatoes

made by the New Jersey Agricultural College are, briefly, as follows: The results of recent field experiments with Irish and sweet potatoes are at least suggestive. Manure increases the scab and soil rot. Lime increases the scab, but diminishes the soil rot and tends to make sweet potatoes round. Kainit diminishes the scab, but increases the soil rot. Sulphate of copper diminishes both scab and soil rot. Corrosive sublimate diminishes greatly the scab and soil rot. Sulphur is, all things considered, the best remedy for the scab and soil rot that the experiments suggest.

For the Irish potatoes, it is suggested that the flowers of sulphur, costing two or three cents a pound, be used with the freshly cut seed in the hopper of the planting machine.

For sweet potatoes the sulphur might be mixed with five times its bulk of fine earth, and a spoonful of the mixture placed in the hill just before setting out the plant.

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