



SMITHSONIAN ASTROPHYSICAL OBSERVATORY ECLIPSE CAMP AT WADESBORO, N. C.
The Yerkes Observatory camp is seen on the right.

PICTURES OF THE ECLIPSE.

RESULTS OF THE SMITHSONIAN EXPEDITION AT WADESBORO.

FINE PHOTOGRAPHS DEVELOPED WITH GREAT LABOR—THE FOREIGN ASTRONOMERS.

Washington, June 30.—The photographic plates taken of the eclipse by the Smithsonian Astrophysical Expedition have many of them been developed. The results, happily, repay the great labor and expense involved, and will be a valuable accession to the knowledge of the sun and its surroundings that has been so slowly acquired through the ages. The handling and developing of these plates was a difficult and delicate matter, because of their great size and weight and because of the care necessary to keep the thick gelatine films, with which both sides were coated from melting; this was prevented by using ice water and working on them in a room which had been cooled by artificial means. Some idea of the pains and work necessary can be gained from the fact that it took quite six hours to develop and clear each plate, and all day to wash them.

The Smithsonian party, headed by Mr. Langley, and comprising Mr. Abbot, Mr. Smilie, in charge of photography; Mr. Putnam, of the United States Coast Survey; Mr. Fowle, Mr. Mendenhall, Mr. Child, Mr. Draper, Mr. Kramer and Mr. Smith, made its camp at Wadesboro, N. C., where Professor Young, of Princeton; Professor Hale, of Yerkes Observatory; the Rev. J. M. Bacon, of the British Astronomical Association, and several smaller parties were also located, making the assembly at Wadesboro one of the largest parties of eclipse observers ever brought together for scientific purposes. The chief object of the Smithsonian party was the investigation of the corona; they planned to study the detailed structure of the inner corona with the camera, to determine by the bolometer whether appreciable heat reaches the earth from it, and to examine, if possible, the form of its spectrum energy curve. Mr. Langley, when observing the eclipse of 1878 from Pike's Peak, had remarked a wonderful and beautiful filamentary structure in the corona, never found in any photographs. He aimed at the last eclipse to study further this inner coronal region with a more powerful photographic telescope than any before used for this purpose, and to observe again the corona through the same telescope, the property of the Naval Observatory, which he had used on Pike's Peak, for purpose of comparison.

Through the courtesy of Professor Pickering, Mr. Langley secured the telescope belonging to Harvard University, with the new twelve inch achromatic lens of 135 feet focus, which furnishes a focal image of more than fifteen inches diameter. This instrument was mounted in such a way as to give a horizontal beam, and was used with thirty inch square plates before a coelostat clock-driven mirror, by Brashear, of 18 inches aperture. The Harvard telescope was supplemented by one loaned by Professor Young, a five inch lens of thirty-eight feet focus, which formed images upon 11 by 14 inch plates, moved in the focus of the lens by a water clock and was pointed directly at the sun.

The photographic work gives fine results, and while all the negatives have not yet been developed, those of the half second, two seconds, and four seconds exposure of the direct corona negatives, taken with the 135 foot telescope, show clearly the crossing and recrossing of filaments, which look like a field of waving grain, but not in such detail as observed by Mr. Langley on Pike's Peak, where the conditions were much more favorable. The prominences and polar streamers appear also in magnificent detail.

The apparatus used at the Smithsonian Insti-

tution to investigate the sun's spectrum was transported to Wadesboro for the bolometric work. With what difficulty these delicate instruments made the long journey only those who are familiar with them can appreciate. Mr. Abbot, in charge of this work, carried the galvanometer in his own hands, and at night placed it in his berth for safe keeping. It sustained no injury in transmission; even its suspending fibre, a thread of quartz crystal 1-15000 inch in diameter and ten inches long, was not harmed.

With these instruments, which were invented by Mr. Langley more than twenty years ago, Mr. Abbot, assisted by Mr. Mendenhall, detected the heat of the corona for the first time, and after careful observations found that the corona gave positive indications of heat as compared with the moon. This heat, while certain, was too slight to be subdivided by the dispersion of the prism with the means at hand.

Mr. Langley made a visual observation with the same instrument used by him at Pike's Peak in 1878, when he observed such a beautiful and wonderful structure, of which he gives a most interesting account in his "Popular Astronomy," but under less favorable conditions he was unable to discern the curious filaments then seen in such glorious detail. Structure was evident, but not in such minute subdivisions as had been remarked by him in 1878. One remarkable prominence was seen as well as several small ones, but the coronal streamers did not give the impression of being connected in any way with the prominences.

The other work undertaken by the Smithsonian party included the automatic reproduction of the "flash spectrum" by means of an automatic prism with the 135 foot lens, a photographic study of the outer coronal region, including provision for possible intra-mercurial planets; observations, both visual and photographic, of the time of contact, and sketches of the corona from the telescopic and naked eye observations.

The negatives of the outer corona show from three to four solar diameters the longest streamers. The equatorial wings become finer and finer as they recede from the sun, and are at last lost in the illumined sky, without showing in any way that they have come to an end.

The plates taken for intra-mercurial planets have not yet been developed, but stars to the twelfth magnitude—heretofore those only to and including the eighth magnitude have been discernible on photographic plates—can be clearly seen, and while no prediction can be made it is not improbable that some faint objects may be discovered.

Associated with Mr. Langley's party were the Rev. Father Searle, who directed the assembled telescopes for the outer coronal region; the Rev. Father Woodman, who, with a four inch telescope of four inch focus, observed contacts and made sketches; Professor Hale, in charge of the Yerkes Observatory, and Mr. Clayton, of the Blue Hill Meteorological Station. The co-operation and counsel of these associates Mr. Langley much appreciated and counted of great value. The party representing the British Astronomical Association, headed by the Rev. J. M. Bacon, who were camped near the Smithsonian Expedition, were cognizant of the many courtesies shown them by the American scientists, one of their number giving evidence of his enthusiasm for the country in which he was a guest by wearing a helmet covered with the Stars and Stripes, from the top of which a miniature flag floated in the wind.

For more than a year Professor Hale has been planning to measure the heat radiation of the corona at this time with the bolometer, an instrument with which Professor Langley has been able to map out the invisible part of the spectrum below the red. This is an exceedingly delicate bit of apparatus, and has detected differences in temperature of only a millionth part of a degree. Professor Hale's instrument suf-

fered in transportation to Wadesboro, and he thereupon made a new one, which worked well in the preliminary tests given it. However, just as the eclipse began an accident in his observing house threw the bolometer out of adjustment, and by the time it was again balanced the opportunity was gone. Professor Barnard and Mr. Ritchey, also of the Yerkes Observatory party, got some fine photographs of the corona and the spectrum of the chromosphere. These were shown at the meeting of the Astronomical and Astrophysical Association of America in New-York last week, and evoked hearty admiration. Within the last few years Professor Hale has undertaken a number of researches into the nature and condition of the corona along original lines, and those who have watched his work sympathized warmly with him over his mishap at Wadesboro.

Among the visitors to the Smithsonian were the Dutch astronomers, who were thorough and in earnest about all they undertook, as is the custom of their race. These eminent men were conspicuous because of the white clothes they invariably wore, and the fact that they walked in the middle of the street instead of on the sidewalk. Upon one occasion the Dutch visitors were seen to stop in front of the town clock that adorns the top of the Town Hall, which is only a "fake" clock, having hands and no works, and gravely taking out their watches set them at 10:30, the time the lazy hands marked and have marked for years without change, which happened in this instance to be two hours later than the actual time, 8:30. Whether the astronomers ever discovered the mistake is not recorded, but it is to be hoped they noted it before the totality; if not, that interesting event might have passed without their observing it.

The members of the Smithsonian Expedition pay warm tributes to the hospitality of the people of Wadesboro. They were welcomed with open arms, speeded at parting with good wishes, and nothing was left undone that could in any way contribute to their comfort and pleasure. Before separating, all of those who had gathered in the little Carolina town to study the eclipse met at the house of Mr. Bennet, a former member of Congress from North Carolina, where, after comparing notes and partaking of the good things prepared for their enjoyment, the National songs of those represented were sung with loud enthusiasm, the hospitable Wadesboroites proposing even to sing "Yankee Doodle," which test of patriotism was not required of them.

FISH SKIN LEATHER.

From The New-England Grocer.

The United States Fish Commission has been making a collection of leathers made from the skins of fish and other aquatic animals, especially of those which promise to be of practical utility. Several varieties of fishes have skins that make an excellent leather for some purposes. Salmon hide, for example, serves so well in this way that the Esquimaux of Alaska make waterproof shirts and boots out of it. They also cut jackets out of codfish skins, which are said to be very serviceable garments. In the United States frog skins are coming into use for the mounting of books where an exceptionally delicate material for fine binding is required. There are certain tribes of savages who make breastplates out of garfish skins, which will turn a knife or a spear. A bullet will pierce this breastplate, but it is said to be impossible to chop through the material with a hatchet at one blow. Together with such a breastplate, these savages wear a helmet of the skin of the porcupine fish, which is covered with formidable spines. Fastened upon the head, this helmet serves not only as a protection, but in close encounters it is used to butt with.

The Gloucester Isinglass and Glue Company recently manufactured some shoes of the skins of the codfish and cusk. On the lower Yukon, in Alaska, overalls of tanned fish skins are commonly worn by the natives. Whip handles are made of shark skins, and instrument cases are commonly covered with the same material, it being known under the name of shagreen. Whale skins are said to make admirable leather for some purposes, while porpoise leather is considered a very superior material for razor

strops. Seal leather dyed in a number of different colors is included in the collection of the Fish Commission. This leather is obtained from the hair seal, and not from the fur bearing species, and is used to a considerable extent in the manufacture of pocketbooks. The hair seals are still very plentiful in the North Atlantic Ocean, and as it is not difficult to kill them they afford a very promising source of leather supply. Walrus leather has come into the market recently, but as the animals are being exterminated rapidly it will hardly amount to much commercially. Another kind of leather now seen on sale is that of the sea elephant. Up to within a few years a species of sea elephant was found on the Pacific coast, ranging as far north as Lower California, but the animals have been so nearly exterminated that they are now rarely seen. Another species is to be found in the Antarctic seas, chiefly on Kerguelan Island.



SOUTHWEST PROMINENCE AND INNER CORONA.

One-half second exposure, 135 feet focus. Taken at beginning of totality with 12-inch lens. Reversed by reason of coelostat. Only about one-sixth of whole inner corona shown.