

MISCELLANEOUS.

Written for this Paper.
OUR GREATEST ASTRONOMER.

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FOR YEARS the investigations of Mr. S. P. Langley, the secretary of the Smithsonian Institution, have been watched with absorbing interest by the scientists of the world. What Edison, Tesla and Bell are to general invention he is to scientific invention. He has created new methods in the study of the heavenly bodies. He has to the largest extent measured the heat of the sun, inventing for the purpose the bolometer, by means of which the temperature of a sunbeam can be tested to the millionth of a degree. He has given us our best idea of the wonderful spots on the sun's surface, and has best shown how this great body may practically affect the earth and eventually used to its advantage. It was Mr. Langley who originated the systematic time service by which the clocks of our cities are now regulated from the observatories of the country and by which the railroads still run their trains without danger of accidents through varying time. It is he who has made some of the greatest advances in the study of the problems of the air, and of the physical principles upon which aerial navigation if it is ever realized must rest.

The most of these experiments and observations were made by Mr. Langley while he was at the head of the observatory at Pittsburg, though he was then constantly supplementing them by others which he carried on at high altitudes all over the world. In the plains of Spain, on the edge of the crater of Mount Aetna, in Sicily, upon Pike's Peak, in Colorado, and on the snowy summits of the Sierra Nevadas, in California, he has been, not as a tourist for an hour, but spending long days and nights studying the heavens, catching the changes on the sun's surface, and trying to learn their practical applications for the uses of mankind. He is in a minor degree carrying on observation and experiment today, though his time and energies are necessarily almost wholly devoted to the administration of the great institution of which he is the head.

This man is now sixty-one years old. His life has been packed with the hardest of work, but his eye is bright, his step his firm, and he has today as much vitality as any of the younger officers of the institution. He is, I believe, the busiest man in Washington, for he carries on his scientific experiments only in the intervals of his administrative work, and it required a special appointment made some time in advance for me to secure a chat with him. I found him a charming talker, full of good nature and overflowing with apt quotations and fun. There is nothing pedantic about him. He dropped for the time all technical language, and in every-day words, at my request, tried to convey to me some idea of his won-

derful work. I asked him a number of questions about himself. He did not like to answer these. He wanted to put himself on the background, and I feel that the people will be interested in his personality, and in the story of how an ambitious boy "hitched his wagon to the stars" and got there. Upon my first asking him when he was first attracted to the study of the heavens, he replied;

"I cannot remember when I was not interested in astronomy. I remember reading books upon the subject as early as at nine, and when I was quite a boy I learned how to make little telescopes, and I studied the stars through them. Later I made some larger ones, and though they were, of course, nothing like those we use here, I think myself they were good for a boy. One of the most wonderful things to me was the sun, and how it heated the earth. I used to hold my hands up to it and wonder how the rays made them warm, and where and how the heat came from. I asked many questions, but I could get no satisfactory replies, and some of these childish questions have occupied many years of my later life in the answering. I remember, for instance, one of the wonders to me was a common hotbed. I could not see how the glass kept it warm while all around was cold, and when I asked, I was told that of course the glass kept in the heat; but though my elders saw no difficulty about it, I could not see why, if the heat went in through the glass, it could not come out again. I now know that the size of the rays changed after entering the glass, and that they could not come out because they grew larger, being in much the same condition as that of the lean mouse who crept through a hole in a barrel of grain, and filled himself so full that he could not get out again. Since then I have spent many years in studying the way that that great hotbed, the earth itself on which we live, is, by a like principle, made warmer by the atmosphere that covers it as the glass did the hotbed."

"Was your father an astronomer, Mr. Langley?" I asked.

"No," was the reply. "My father was a merchant, and I have no records of astronomers in my family. My father was not rich enough to give me an income sufficient to support myself and my hobby. Astronomy, you know, is not a very profitable science, and as I had to make a living for myself, I chose the profession of architecture and civil engineering, but I never heartily liked it. After some years I went to Europe, and on my return from that trip, having a little money, I decided that I would take up astronomy and devote my life to it. I went to the Harvard University at Cambridge and found a position for work and study there. That I had been occupying myself with astronomy pretty assiduously already was, I think, shown by the facts that although I lacked the experience that only observatory work could supply, I still knew enough to command a salaried position from the outset. I remained at Harvard for some time, and then was called to the Naval Academy at Annapolis to take charge of the observatory there. My next position was as the director of

the Allegheny Observatory near Pittsburg, where I spent a great part of my professional life before I came to Washington."

"It was at Pittsburg, then, that most of your experiments were carried on, was it not?"

"Yes," replied Mr. Langley. "There was quite a large telescope for those days at Pittsburg. It had been bought by a club of amateur astronomers, partially for cash, but mostly on credit. After the first enthusiasm passed away the debt remained and the club became disorganized, so that the telescope was about to be sold at auction, when the Western University secured it. They invited me to take charge of the observatory, and I came to Pittsburg and began my work. The first work, however, was to provide the indispensable apparatus for the observatory, which, except for the single telescope, was one only in name. I found, however, a total lack of money."

The secretary continued: "My proposed investigations could not be made without books and instruments, and these could not be got without funds. I then began to look around for something which I could do which would be commercially profitable to the observatory, and the result was the inauguration of the time service, which has since spread all over the country, and by which the clocks of our railroads and our cities are now regulated from an observatory at some central point. It is familiar enough now, but I had the hard work of first introducing it and persuading people of its utility. I had to interest the city councils and the railroads in it but I finally got an electric clock established at the observatory and soon had the time of the city regulated by it. Before this each jeweler had his own time. Each of the railroads ran by different times, and there was no certainty as to the arrivals or departures of trains. Soon after I started it, it was extended along the lines of the railways until we were regulating clocks as far as Chicago and Philadelphia from Pittsburg. To do this we had to have the electric wires to ourselves, and it was so arranged that we were allowed to use them for five minutes at 9 o'clock in the morning and at 4 o'clock in the afternoon of every day. The system soon spread to other cities, and it is now in use all over the world. I did all this to me ungrateful work in order to get means for my experiments; and as I look back on it I think I may claim that I did tolerably well in a business way, for a man chiefly versed in scientific affairs, for first and last I thus got for my little observatory over \$60,000. This I made out of nothing, as it were, and this all went into books and into the means for scientific research."

"The observatory clock was regulated by the sun, was it not?"

"Yes," replied Mr. Langley. "By the sun and the fixed stars. You cannot work by the sun alone. It is by no means a regular body, as many people suppose. You would not give anything for a watch which should be as irregular as the sun. The sun is sometimes fifteen minutes out of the way at noon, sometimes ahead and sometimes behind time, and it is only by averaging its irregularities that we know where to find it."

"Your studies have been largely devoted to the sun, Mr. Langley. What is the sun, anyhow?"