



Something about the SUN and as to how it heated the earth. I used the earth. I used to hold my hands up to it and wonder how it heated the earth. I used work in ord r to get means for my experi-to hold my hands up to it and wonder how it has a look back on it, I think is buy to be the earth could have been dropped and that solid models can be thus made to cal power now, but we have still got to ac-

SWEET MYSTERIES

16

Chat with Secretary Langley Concerning His Wonderful Discoveries.

NOT ALWAYS ON TIME FOR DINNER HOUR

Enormous Heat Generated Accurately Mensured-Suggestions for Applying it Mechanically-Study of Flying Machines.

(Copyrighted, 1895, by Frank G. Carpenter.) WASHINGTON, D. C. ,Dec. 14 .- For years again. Since then I have spent many the investigations of Mr. S. P. Langley, the secretary of the Smithsonian institution, have scientists of the world. What Edison, Telsa phere that covers it as the glass did the hotand Bell are to general invention he is to scientific invention. He has created new Langley?" I asked. 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 nillionth of a d gree. He has given us our best idea of the wonderful spots on the sun's body may practically affect the earth and eventually be better 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 upo bich aerial navigation, if it is ever r alized, the outset. must rest.

The most of these experiments and observa tions were made by Mr. Langley while he was the head of the observatory at Pittsburg though he was then constantly supplementing them by others which he carried on at hig altitudes all over the world. In the plains of Spain, on the edge of the crater of Mount ington. Aetna, in Sicily, upon Pike's Peak, in Colo rado, 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 his time and energies are necessarily almost wholly devoted to the administration of the great institution of which he is the

head. CHAT WITH SECRETARY LANGLEY.

This man is now 61 years young. His life has been packed with the hardest of work, but his eye is bright, his step is 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, fo 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 noth ing pedantic about him. He dropped for the time all technical language, and in everyday words, at my request, tried to convey me some idea of his wonderful work. asked him a number of questions about him He did not like to answer these. He wanted to put himself in the background

but 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 asking him when he was first attracted to the study of

the heavens, he replied: "I cannot femember when I was not in-terested in astronomy. I remember resulting and philadelphia from Pitteburg. To do this we had to have the electric wires to ourwhen I was quite a boy I learned how to when I was quite a boy I learned how to we had to have the electric wires to our-make little telescopes, and studied the stars selver, and it was so arranged that we were

how the heat came from. I asked many puestions, but I could get no satisfactory re-plica, and some of these childish questions for my litile observatory over \$60,000. This have occupied many years of my later life in I made out of nothing, as it were, and this the answering. I remember, for instance, one all went into books and into the means for scientific research " of the wonders to me was a common hot-

bed. I could not see how the glass kept it warm while all around was cold, and when I SUN OFTEN BEHIND TIME. "The obstrvatory clock was regulated by noked I was told that of course the glass kept the sun, was it not? in the heat; but though my elders saw replied Mr. Langley. "By the sun difficulty about it, I could not see why, if

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 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 benot give anything for a watch which should as irregular as the sun. The sun is som cause they grew larger, being in much the times fifteen minutes out of the way a arms condition as that of the lean mouse who erept through a hole in a barrel of grain and noon, sometimes ahead and sometimes be-bind time, and it is only by averaging its filled himself so full that he could not get out regularities that we know wher? to find it. Your studies have been largely devoted studying the way that that great the sun, Mr. Langley. What is the sun, bed, the earth itself on which we live, is, by a like principle, made warmer by the atmosanyhow ?"

"That question is a good deal easier to ask than to answer," was the reply. "I have spont years in watching it and trying "Was your father as astronomer, Mr.

to learn something about it. I have di covered some things, but I should have "No," was the reply. "My father was a know a great deal more before I could ade quately answer that question. I spent thre merchant, and I have no records of as-tronomers in my family. My father was years in the study of the spots on the sun before I was ready to make any announce ments concerning them, and during th not rich enough to give me an income sufficient to support myself and my hobby Astronomy, you know, is not a very profitwaking hours of those three years the sun's able science, and as I had to make a living for myself, I chose the profession of archi-tecture and civil engineering, but I never ace was almost constantly before me. Have you ever looked at it in a telescope? you appreciate what watching the sun is In the first place, the face of the sun in heartily liked it. After some years I went to Europe, and on my return from the trip, telescope is almost always quivering. Ou having a little money, I decided that I would take up astronomy and devote my life to it. I went to the Harvard university atmosphere makes it seem to move to and fro in waves, and looking at it is like looking at a flickering candle, so that if its surfact wore ever so near it would be hard to make at Cambridge and found a position for work and study there. That I had been occupying out the details. But then it is, of course really an enormous way off, so that these details are also lost from its remoteness." myself with astronomy pretty assiduously already was, I think, shown by the fact that although I lacked the experience that only "Can you give me an idea how far off i

observatory work could supply, 1 still knew enough to command a salaried position from ings to do that by a borrowed illustration." replied Mr. Langley. "For instance, you touch your finger to a candle, and in a frac-tion of a second your brain announces the 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 Allegheny observatory pain. The sensation has traveled along the near Pittsburg, where I spent a great part of nerve to the brain almost instantantously my professional life before I came to Washthe speed has been measured. Suppose you had an arm which would reach from the earth

"It was at Pittsburg, then, that most of your experiments were carried on, was it

'Yes," replied Mr. Langley, "There was a quite large telescope for those days at Pittsburg. It had been bought by a club of anatour astronomers, partially for cash, but mostly for credit. After the first en-thusiasm passed away the debt remained and the club became disorganized, so that the be sold at nuction telescope was about to all this almost all its brightes: surface is when the Western university secured in real actual motion, shifting here and there They invited me to take charge of the ob-servatory, and I came to Pitsburg and began my work. The first work, however, was provide the indispensable apparatus for the observatory, which, except for the single telescope, was one only in name. I found, how ever, a total lack of money."

HE ORGANIZES THE TIME SERVICE.

The secretary continuid: "My proposed investigations could not be made without books and instruments, and these could not be got without funde. 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 railreads and our cities are now regulated

raincads 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 rigulated by it. Before this each jeweler had his own time. Each of the rail-roads ran by different times, and there was ings ronds ran by different times, and th re was no certainty as to the arrivals or departures

into it without touching the sides. Each of those bright gossamer-like threads is about 6.000 miles long, and that spot covered more than 1,000,000,000 square miles of the sun's face. It had an area five times that of the whole surface of the earth. A little edge of it broke up and dissolved while I looked at it, which was bigger than the whole United

States. It was all in motion, and its steth-ing particles were flying about at the rate of fifty mlies a second along the surface, under which I could see probably some thousands of miles into the darkness below, ip from which came volumes of intensily ented, whirling vapor." "How could you look at the sun so long,

Mr. Langley, without hurting your eyes?" "I could not have done it," was the reply. had I used nothing but my eyes. I had first o invint an instrument to take the place of he incomplete means used by Sir William

Herschel in order to see the sun by reflection. The rays come to the focus of the telescope n blinding brightness, producing a heat suffijent to melt iron, but these rays have sides to them, and by mirrors placed at different birds weigh from five to ten pounds; are far heavier than the air which they disangles they can be so reflected that there is place; they are absolutely heavier to more heat and light than I choose to have. I have gazed at the sun for five hours at a stretch with this instrument, and have felt no more fatigue than I would have felt from

SUN'S ENORMOUS HEAT FORCE. "How about the heat of the sun, Mr. Lang-

Can you give me some idea of it?" "Putting it briefly, it is enormous beyond do how the buzzards do it. I am speak now, of course, not of birds which fly flapping their wings, but of those which conception, for there is enough to warm 2,000,000,000 worlds like ours, and every minute there is enough of the sun's heat falling on the earth to raise to boiling 37,000,000,000 ns of water. But this heat which falls on force. he earth is not a thousandth part of 1 per cent f what the gun sinds elsewhere, and all the "There is a good deal of misapprenension about my own investigations in this re-spect," Secretary Langley went on, "but what I have at least demonstrated is that

cal bids in Pennsylvania, for instance, though they can eapply the country for hundreds of years, would not keep up this heat during the me-thousandth part of a second. Now, when you-think that these enormous figures are not exaggrations, but within the truth, you have

give up the idea of grasping the amount the sun's heat as inconceivable. 'Will we ever be able to use this heat nechanically T

"That remains to be seen. The force is The method of preserving and ap-it economically has yet to be inthere. plying it economically has yet to be in-vented. My experiments on Mount Whitney, in the Sierra Nevadas, showed that if we could save it all and use it for our steam to the sun, and you could put the tips of your plying it epeated in the open air. fingers on that glowing mass of fire. It would be a little more than one hundred years (if you could live so long) before you ingineer's for every square yardoof ground. We hear could know that your fingers were being burned. Well, the rays of the sun have to great deal about the immense power from come all that distance before they reach you. the recent utilization of Niagara, but the sun power which is, so to speak, wasted daily on this little District of Columbia is and the last miles of their journey are through waves of heated air, which makes the sun seem to flicker so, while beyond and behind hundreds and hundreds of times as great.

The heat on the surface of the island of Manhattan or that occupied by London could at noontide drive all the steam engines of with a velocity many hundred times that of a cannon ball. These real changes may last the world. So far there have been no prac-tical inventions for utilization of this enor-mous power. At the Paris exposition of 1878 there was a reflector which drove a for a second or a minute, and special phe-nomena may occur in the twinkling of an eye. In my studies of the sun spots I had o have a paper and pencil before me as I booked through the talescope to record three steam engine which worked a printing press Ericsson made a solar engine which it was changes as they went on, in order to catch thought might be used in the pumping up of the waters on desert lands. The proba-bility is that the day, will come when we

will use all this force: When it does the deserts of the world, iwith their enormous sun power, may become the great centers of manufacture and of civilization."

as to aerial navigation. He was distinctined to talk about the subject, and he gave me to understand that the statements made by what I the press concerning him in this connic-tion had been made without his authority. overed. It is well known, however, that in his pub lished scientific writings on aerodynamica Mr. Langiny has described his discovery of facts greatly alter our former which greatly alter our former supposed knowledge on this subject, and that shough he has not there undertaken to describe any

possible. Thus, by a proper application and direction of the force and the posed, he has to skate, this, though essential, is not enough till they have added the special sustained solid brass plates upon the air with make indice telescopes, and studied the stars through them. Later I made some larger ones, and though them were, of course, noth-ing like those were very good for a boy. One of the most wonderful things to me was the sun, the world. I did all this to me ungrateful

skim, as is were, along the viewless air, as a skater skims along the surface of thin ica: "But will that day ever come, Mr. Langthe faster you go in either case the less lev?" I asked. "As to that," replied Secretary Langley danger there being of falling down. As far as I could judge from my talk with him his experiments show that the soaring birds have

"I have so far spoken only of what I have ascertained to be fact, and I want to dis-tinguish between what is fact and what is intuitive knowledge of certain properties an intuitive knowledge of certain party de-of the air, which have been only recently deonly my opinion. Expressing only my per-sonal opinion, then, I am willing to answer that I believe it altogether probable that veloped through these experiments, and that by these they navigate the air almost without in the not very distant future, but how far distant I do not pretend to say, flying maeffort in a way which there is no reason to think that it is impossible we can do, if not by our unaided strength, at any rate chines, that is, not balloons, but heavy con means of such engines as are recently being built. With regard to this he spoke of the tructions actuated by machinery, propelled very rapidly through the air, prob fact that such birds even about Washington ably at first rarely and at great risk fur may be seen rising and falling, soaring up herance of the arts of war; later in and sailing down, and moving in circles with-

ducing a great change in all human affairs in the arts of peace." Said he: "Did you ever think what a phys-Frank G. Carpenter ical miracle it is for such a bird as one of our common turkey buzzards to fly in the way it does? You may see them sny day ----along the Potomac, floating in the air, with hardly the movement of a feather. These WHITHER MORMONS JOURNEY.

they

Their Mecca One of the Historic Spot of Kansas.

many flatirons. I suppose if men saw cannon During the past two months hundreds of balls floating through the air like soap bub-bles they would look on it as surprising, if not as a miracle. The only reason that we formons residing near Independence, Mo., Nauvoo; Ill., and in Lee county, Ia., have are not surprised at the soaring bird is that been making their annual pilgrimage to the sien it from our childhood. Perhap old Mormon crossing of the Big Blue river if we had seen cannon balls floating in th in Marshall county. Near this historic spot air from our childhood we should not stop to inquire how they did it any more than we are the Alcove springs, where so many of I am speaking their people were massacred by the Indians fly ty in 1846 as they were making their way across the Great American desert to Salt without flapping their wings, or very rarely, and with almost no visible expenditure ci Lake. They have been visiting the old crossing in small numbers since the 1st of

their forefathers did, and resting a few days near the springs, where religious services were regularly held in commemoration of the early pioneers who braved the dangers and opened the way to the new Mormon

historic spots in Kansas, says the St. Louis Republic. It has been visited by thousands of Mormons since the days of 1846, and the people who new live in the vicinity look forward to the pilgrimage of these people every year as one of the incidents of spete in Marshall county. It is the beautiful and romantic spot in all Kansas.

crystal, and the Alcove springs are located a sequestered nook, which stenis to have been made by nature for such gatherings as these.

at this now historic spot there scarcely a vestige of civilization in was that region of country. For ages its prairies had been covered with a waving wild grasses; vast herds of buffalo had for num berloss years wandered almost unmolested across them. Nothing disturbed its militude save an occasional band of nomadic Indians in search of prey or plunder, and the hardy frontiersman who is always found far in ad-

vance of civilization. As early as 1820 Major Stephen H. Long crossed that part of Kanzas now known as Marshall county in

command of an expedition from Pittsburg to the Rocky mountains. General Fremont on his expedition to the Rocky mountains in 1842-44 passed through that section of the state and mentions in h's travels several im-

1874 that John Smith, the Mor-It was in first that some smith, the stor-mon aposile, with his band of followers from Illinois, opened his way through this country, crossing the Big Blue river at the old - "Mormon." Independence." or "Call-fornia" crossing. This was six miles brow the present town of Marysville, the crunty set of Marshall county. For the vacuum the ands of times heavier than the air itself. People who ask, if this is so, why such ma-chines are not made at once to actually fly with the human freight, since we have now got mechanical power, may be re-minded that hough they themselves have got plenty of strength to ride a bicycle or to skate, this, though essential, is not is not were several elders of the Mormon faith s special who were going to the western home to look

C. P. Wilson in New York Sur Slowly the seeds in the garden are growing. Glad homilies! Tides, set in motion by winds briskly blowing.

blowing. Pause ere they rise; The nestling shall rise and aspire to heaven's gate. And the hutterfly, though in a shroud he

must wait In dim surmise; For all things shail rise.

Gently kind spring has awakened the flowers, Sweet mysteries!

Swiftly the grub on the wing, with new powers,

To happiness files: Ever with refluent wave and strong motion Landward now march the forces of ocean; Grand auguries! For all things do rise.

In the world visible lurks the invisible, Teiling of blessed truths plainly perceptible To love-lit eyes. Teiling of blessed truths plainly perceptible To love-lit eyes. Teiling of Heaven and happy Tomorrow, Teiling of Joy with no vestige of sorrow. And of bright skies,

Where love never dies. SHORT STORIES.

Detroit Tribune: With a gesture the savage monarch commanded silence. "My people," he said, "I take great pleasure in introducing this neted traveler. I am sure I speak for all when I tell him we shall be glad to have him in our midst. I take this occasion to caution the children not to eat too much, since he is reputed to b Whereupon it plainly appeared that hip majesty was not only witty, but schooled in the finer shades of meaning of the English tongue.

Cincinnati Enquirer: "For the life of me colonel, I don't see why you persist in maintaining that whicky is of any value in the cure of snake-bites. Why, all the modern scientists-'

'Young man," answered Colonel Bluegrass; turning purple. "It stands to reason, sah, that good whisky, being beneficial in every other complaint, must be of benefit in snake bites. When there is a universal law in nature, sah, it does not vary for a mero snake, sah."

Chicago Tribune: "Shadbolt, if a man should circulate a report that you were a deadbeat and a man without a particle of honor, what would you do?

"I'd sue him for slander, Dinguss, I'd give him a chance to prove "Then that's exactly what I'll do to Old

Wipedunks. I'll make him-"" "O, has anybody been saying those things abou: you? Don't do it, Dingues. That's different."

Detroit Free Press: "I don't mind est-ing biscuit made with baking powder," said the tramp, "but I draw the line at bread

"I'd like to know why?" said the woman of the house, as she drew back the half-load of white bread.

"The yeast that made that bread worked," answered the tramp, "and I cannot consist-ently affiliate with it."

Washington Star: "Look here," said the editor, "you included in this poem a line shout the earth cycling around the sun." "

"Yes," replied the post, confidently; "and Fi stand by it. That line, sir, is not only an example of polished expression, but it is astronomically correct."

"Mebbe so, but it won't go here. "Cycling around the sun," he repeated scornfully, "Why don't you take the earth and put bloamers on it, and be done with it?"

Chicago Post: "I don't believe you are & woman," said the detective, who was on the trail of a forger. "Don't I look like one?" asked the sum-

pect. 'Yes, you look like one," returned the

detective. "And don't I act like one?" "Yes, but-"

"Well, what is it that makes you doubt

When you asked for a pencil I gave you one with the point broken off and you were able to sharpen it yourself." Then the forger realized that he was dim-

covered and confessed.

September, crossing the Big Blue where

heavy machines, not balloons, can be made which will produce enough mechanical power to support themselves in the air, and to fly. settlement at Great Salt Lake. though this is not saying that we have yet got the skill to manage this power so as to rise, advance and descend safely. What is The old Mormon or "Independence" rossing of the Big Blue is one of the most actually demonstrated rests on actual experi-ments, repeated hundreds of times in the

laboratory, but under conditions not ao easily "These experiments are in the nature of an measurements, giving things in ounds, feet and horse power, and by them have shown that an expenditure of one horse The Big Blue river is a stream as clear as power (if we can only regulate it so as to make the flight horizontal) will support

When the first immigrant trains carrying the Mormon people and their belongings to the Great Salt Lake crossed the Big Blue

"I know it is dangerous for any one to make any statement except in positive facts and figures about such matters. The people have, ever since the days of Darius Green

and his flying machine, until very lately, put such a one down as a visionary, without investigation of what he has to offer. As for me. I have never said that man could state and mentions in his travels are migrant wagons enroute to Oregon. migrant wagons enroute to Oregon. lished the details of any flying machine,

out any flapping of their wings.

HE TELLS OF HIS DISCOVERIES.

have not only demonstrated by actual speriment, is that there is no doubt that machines can be made powerful enough to support hodies in the sir which are thousof times heavier than the air itself.

flying machine, as he is popularly supposed to have done, he has made experiments which show that mechanical flight is far from im-

abou' 200 pounds, and at the same time carry it at the rate of fifty miles an hour through the air. "Now, there have recently been built steam engines which, with fuel and water for a short flight, will give a good deal more than a horse power and weigh a good deal less than twenty pounds, so that we have a ery large margin. 'What I am trying to do is to establish by direct experiment the underlying principles of this future art or science, and, having found the exact amount of force required. If possible, to learn next how it is to erted, directed and controlled.

AERIAL NAVIGATION.

eir varying expressions on the sun's face. "I cannot describe to you the wonders which are going on there. I found, however, that in order to do my work will, I must learn something more than the mechanwork well, I

I next asked Mr. Langley some questions

ical drawing which was all I knew, and as there studies went on. I learned to draw and paint sufficiently well to make my records. Since then I bave drawn hundreds of sun spots, and the works which I have published have been illustrated with my own

drawings of them." LOOK AT A SUN SPOT.

A: this point in the conversation Secre-tary Langley had one of these former drawof a sun spot laid upon the table, was, in fict, a beautiful painting about 12x14 inches in size, of what seemed to be a snowy surfac, with a large black area in the mid-

die, crossed by strange lines of light, blendoutlines like the frost figures ing in fantastic "That," said he, "is a spot which I saw in 1573. It remained about twenty minutes in the field of the telescope, and it looks just as I saw it. You notice all around it is white. on a pane of glass.

"I have tried in one of my popular writ