

### More Scientific Discoveries.

The sun and the moon are the only heavenly bodies which exert a perceptible influence upon human affairs, and the influence of the moon, near though she is, is not great, except in the matter of the tides. In the sun, however, we find the main-spring, so to speak, of every form of earthly activity, all other sources of energy being insignificant compared with the solar heat. To this heat science traces more or less directly, but certainly, all the power of wind and water, of steam and electricity, and even the force of animals. The cessation of sunlight for even a single month would reduce our world to a frozen, inert and lifeless mass. Naturally the study of the sun's radiation has greatly occupied the attention of investigators.

It is reasonable to put first in importance, among the recent advances in solar science, the results obtained by Professor Langley, secretary of the Smithsonian Institution, in his researches into the total amount of solar energy received by the earth, and the distribution of this energy in the different parts of the spectrum.

The first measures of the quantity of heat received by the earth from the sun were made nearly fifty years ago by Sir John Herschel at the Cape of Good Hope, and almost simultaneously by Pouillet in France. Subsequent observations confirm, substantially, their estimate of the amount of heat which reaches the earth.

But in order to calculate truly the heat really emitted by the sun, we must allow for all that is stopped in passing through the earth's atmosphere. Just here a formidable difficulty is encountered, and an insufficient estimate of the loss was for a long time accepted. Professor Langley detected and pointed out this difficulty, and invented a new and exquisitely sensitive heat-measurer, known as the bolometer, with which he was able to secure the observations needed to correct the error.

By observations made at the sea level, combined with others made upon the summit of Mount Whitney at an elevation of more than fifteen thousand feet, he has proved that the amount of heat absorbed by the air is very much greater than had been supposed, and therefore that our estimate of the total quantity of heat radiated by the sun must be correspondingly increased by fully twenty per cent. at least.

Astonishing as were the former statements respecting the quantity and intensity of the solar heat, they were seriously inadequate; the solar fires are considerably more intense and powerful than we supposed.

The crust of ice which the sun could melt from its own surface in a single minute would be fully sixty feet thick instead of fifty; and if the solar heat were uniformly distributed over the surface of the earth, it would melt in a year a shell of ice one hundred and sixty-four feet thick, instead of one hundred and thirty-six feet thick, as stated in our recent text-books.

Professor Langley's demonstration of the extent of the solar spectrum is hardly less interesting. He has detected in the sun's rays a long range of ether-waves before unknown. Light is composed of minute "waves" or pulsations of extreme rapidity, transmitted to us from the sun, not by air, as sound-waves are, but by the "ether," the subtle substance which seems to fill all space, and constitutes the only medium of communication between the worlds.

The waves by means of which we see, and which we recognize as light, range in length from about one-thirty-five-thousandth part of an inch to one-sixty-thousandth part; but besides them the sunbeams contain others, some of them much longer and some much shorter pulsations, which though invisible, are yet extremely effective in the transportation of energy and heat.

Two or three years ago the greatest length of any heat-waves known was about one-tenth-thousandth part of an inch; but Langley has now detected, with his bolometer, waves fully twelve times as long; and these long, slow-swinging waves—slow, that is, in comparison with the shorter ones—are just those that are characteristic of the heat-rays emitted by a body of low temperature, a block of ice, for instance; for cold bodies radiate heat just as really as warmer ones, though less, of course, and the waves are of lower pitch. In the rays of the sun we now detect the whole range of such radiations as fully represented as in the moonlight.

Hardly less important than Professor Langley's results are those which have been attained by Professor Rowland, of Baltimore, in mapping and identifying the lines of the solar spectrum.

When sunlight is transmitted through the narrow crack or "slit" at one end of a

spectroscope, and examined by the eye at the other end of the instrument, the observer sees a long, vividly colored ribbon of light, which is red at one extremity and violet at the other.

If the instrument is not too powerful, he can take in the whole length of this "spectrum" at once; but with a large instrument the spectrum is so extended that only a small portion of it is visible at a time.

Now this spectrum is crossed by myriads of dark lines, some of them fine and black, others broad and hazy; and they always occupy the same positions, and are as capable of being mapped with accuracy as the roads and cities of a country.

They owe their interest to the fact that they are known to be due to substances in the state of gas present in the atmosphere, either of the earth or of the sun—mainly the sun. Their accurate charting and identification is a matter of high importance in the information it gives about the constitution of the sun.

It is worth nothing that certain recent, and still unpublished, investigations by Doctor Veeder, of Lyons, New York, appear to show beyond question that there is a distinct connection between the visibility of a solar disturbance from the earth and its effect upon the earth's magnetism; that is, that when an active sun-spot or solar prominence is brought by the sun's rotation to our side of the solar globe, then an effect is immediately felt which was not felt so long as the disturbed area, however active, was out of sight on the other side of the sun.

This seems to indicate that the disturbing energy, whatever its mode of operation, is propagated like light; a result entirely in harmony with the recent remarkable experiments of Herz and others upon the transmission of electric induction.

As regards the solar "prominences," the great flame-like clouds of scarlet hydrogen and other gases, which are usually seen on the edge of the sun during a total eclipse—there is nothing new to report. They can be observed, at any time when the sun shines, by means of the spectroscopic, and they have now been assiduously observed for twenty years; but the last ten have added disappointingly little to our knowledge of them.

One or two unsuccessful attempts have been made to photograph them, the difficulty being due largely to the scarlet color of their light. But there is reason to hope that we may soon be able to photograph a red object as easily as a blue one, and when that time comes we may look for more satisfactory results. Photography would have great advantages in securing accurate representations of these objects, which change so swiftly as to defy the most rapid draughtsman.

With the corona, the beautiful halo of pearly radiance which surrounds the eclipsed sun, and is visible only during an eclipse, the case is, perhaps, a little better, and some real progress seems to be making toward an intelligent understanding of the subject.

While in recent years the eclipse expeditions have been unusually unfortunate in the matter of the weather, many photographs of the corona have been collected, taken under very different conditions; and there is reason to expect that the careful comparison and study of these pictures which is now in progress will soon give us a better insight into the real nature of this most lovely and most mysterious of all solar phenomena.

Two different theories are under special investigation, one proposed by Professor Bigelow, that the streamers of the corona are analogous to those of the earth's aurora borealis, and have their positions and directions determined by the sun's magnetism, just as the earth's magnetism determines the auroral streamers; the other proposed by Professor Schaeberle, of the Lick Observatory, that the streamers are projected radially from the sun-spot zones, and owe their apparent arrangement simply to perspective.

The two theories lead to distinctly different results as to the appearances that ought to be seen, so that a thorough discussion of the existing photographs will lead to a decision between them, or very possibly, it may result in showing that neither is right.

One thing is already clear; that there is a close connection between the corona and the sun-spots. When the spots are numerous and active, the corona is smaller and more brilliant than usual, and its longest streamers are found over the two sun-spot zones on each side of the sun's equator. In years of sun-spot scarcity, on the contrary, the corona is fainter, but larger; the portions near the sun's equator especially sometimes reach an enormous extension, while the shorter streamers which appear to issue from the regions near its poles are more conspic-

uous than usual from the clearness a sharpness with which they are defined.

In 1882 photographs were also obtained of the coronal spectrum, and they show that while in the lower portion of the spectrum there appears to be only a single conspicuous bright line, the well-known green "1474" line, discovered in 1869, the blue and violet regions are on the contrary very rich.

The great H and K bands, which form the boundary of the visible spectrum at its violet extremity, are especially conspicuous in the corona for their brilliancy and extent; the lines of hydrogen are also prominent, and there are many others which may or may not be due to the same mysterious "Coronium," as it has been provisionally called, which produces the "1474" line.

To sum up, we may say that while there has been no discovery relating to the sun within the last ten years that can be compared in importance with Kirchhoff's discovery of the elements that go to compose the sun, or with the discovery of the periodicity of the sun-spots, or even with that of the gaseous nature of the solar prominences, and the method of observing them with the spectroscopic, yet there has been a steady progress, and there is every reason to hope that before very long we shall reach the solution of some of the problems that have long defied us.—[Prof. C. A. Young.]

### Spring Dressmaking.

"Old clothes in winter are not as nice as new ones," sighs Rosabella; "but they are not an affliction. It is old clothes in summer that are the worst! Summer is different. You want everything new. You want everything fresh and dainty. You don't want to have to think and plan and worry about letting things out and making things in and mending things up. You hate the idea of a made-over dress."

"It is all out of harmony with the season to strew in a close room, ripping and hemming and running a tiresome sewing-machine, and then go and steam in the kitchen, pressing out seams with a horrid, hot, heavy flatiron; and then very likely have shabby spots in your gown that can't be hidden after all. How can anybody ever feel cool or fully satisfied in such a dress when it's done? If only clothes grew ready-made without a price-tag, what a blessing it would be!"

Most ladies have at one time or another shared poor Rosabella's mood of despair. Nevertheless, there are compensations to be found for the toil and wear of temper consequent on spring-dressmaking, even when it is done in the house and by the household. Perhaps when the dresses are finished they are less stylish than if a professional dressmaker had produced them, but there is an equal chance that they are better adapted to the individual tastes and peculiarities of the wearers.

Perhaps some of them cannot by any degree of skill and careful planning be so made that a keen eye may not discover a shabby spot, or guess at one from the arrangement of the trimming which conceals it. But how great the triumph if the effect is so tasteful and becoming that none mind the shabby spot, even when they know it is there!

Some people may recognize the reappearance of a long-enduring fabric for another season's wear. Perhaps a malicious one among them will really say,—though it is infinitely less likely than the owner of the garment imagines,—"Dear me! There is that same old pongee again! Let me see—is this the fourth summer she has worn it?"

But then how happy she feels when a friend remarks admiringly, "My dear, I do hope that pongee of yours will never wear out. You will never have anything else quite so becoming."

Variety has its charm in costume, but it is far less important than suitable, taste, becomingness, and in fact any of the other attractive qualities which clothes may possess. It is hardly possible for a dress that is truly beautiful and becoming to weary the eye, and the less it is changed to accord with the whim of fashion the better.

Indeed, to the persons who care most for the wearer, and whose opinion she could most value, time often lends an added charm, making it seem almost a part of herself, like her hair or the color of her eyes. They hate to have it finally discarded, and require time and coaxing to become reconciled to a new garment, which afterwards they may perhaps like better than the first.

Besides, after the heavy fabrics and soberer hues of winter, any summer dress is a variety, and needs no other charm than grace of outline and pleasing color. We do not say when the violets and roses come, "There are those same old purple flowers again! And the roses pink another year! Why can't they blossom blue or scarlet, for a change?"

### His Wife For a Pony.

A few months ago a man named Zimmerman arrived in Darlington, Beaver county, says a Pittsburg, (Pa.) correspondent, with a herd of ponies. Among those who looked longingly on a particular pony was George Davis, a young married man of that place. Davis had no money, but he possessed a wife, whom he offered to exchange for the animal and a money consideration. The wife was consulted, and after a few days, dickered Zimmerman agreed to give the pony and a deed to 144 acres of land in Montana in exchange for the woman. The papers were drawn up and Zimmerman took the woman and Davis the pony. The cowboy and Mrs. Davis went West, but she soon repented and asked to be taken back to her first love. By this time Davis discovered that Zimmerman did not own a foot of land in Montana or any other place. The innocent-looking pony turned out to be every thing that was bad and when Mrs. Davis arrived home the other day she was gladly welcomed by her rightful husband.

The case of Baron Fava is the first instance in the history of the United States of the recall of a foreign Minister to that country by his Government as a mark of displeasure. In several cases, however, the United States has demanded the recall of Ministers. The first is that of M. Genet, the French Minister, who in 1793 was asked to withdraw because he sought to destroy the neutrality of the United States with regard to the new French republic. In 1812 the British Minister was given his transports, and in 1871 the Russian Minister, Catagzy, was requested to leave the country. The most recent case is that of Lord Sackville-West.

The tension of feeling between the Emperor William and Bismarck is evidently very great. Of the exact status of the affair no one outside very intimate official circles probably has any knowledge, but the comments and reports constantly appearing in the newspapers, together with such other information as somehow leaks out, make it clear that something very like a crisis has recently been reached. Rumors have been in the air for some time past that there was to be a formal prosecution of Bismarck, although the precise offense charged against him has been only vaguely hinted at. The causes for the Emperor's irritation are matters of speculation. It is said, for instance, that Bismarck has refused to give up certain letters of the Emperor's in his possession. It is known, on the other hand, that the criticisms of the present imperial policy which have appeared in two leading newspapers, and which have given the Emperor the greatest possible annoyance, were undoubtedly inspired by the ex-Chancellor. The Emperor, who is a singular combination of autocratic temper with progressive tendencies, resents any criticism from any quarter, and no doubt has found it peculiarly galling to be subject to the fire of his late minister. The "Hamburger Nachrichten," one of these papers, declares that both it and the ex-Chancellor are prepared to meet prosecution in any form, and that the criticism of imperial policy which Prince Bismarck has allowed himself to make has been dictated solely by a sense of public duty. Altogether, the situation is a very uncomfortable one, and it is difficult to see how it can be made otherwise.

### The Bravest Act of the Year.

After fully considering the claims submitted to them as worthy of their honors for saving life from drowning during the past twelve months, the committee of the Royal Humane Society have unanimously bestowed the highest award—the Standhope gold medal—on Alfred John Cooper, fourth officer of the Peninsular and Oriental Company's steamship *Massilia*, who in the Gulf of Aden, known to be infested with sharks, saved a Lascar who fell overboard while on a voyage from Bombay to London. The ship was going at the rate of 13 knots an hour at the time of the occurrence. Mr. Cooper, who was in the saloon at the time, on hearing the cry of "Man overboard!" rushed on deck, and, without divesting himself of any of his clothing, jumped overboard, swam after the man, seized hold of him, and kept him afloat until a boat was lowered and went to their assistance.

The late Lord Rutherford was a very able lawyer, but exceedingly affected in his manner and speech, and when addressing either the Bench or a jury spoke extra-superfine English. When, however, he broke out in a passion, which was by no means an unusual occurrence, he expressed his feeling in the broad vernacular. Lord Cockburn said to him one day, "It is strange, Rutherford, that you should pray in English and swear in Scotch."