ideas were in substance confirmed by the spectroscope observations of Lockyer and subsequently of Huggins. The spots were proved to be owing to general absorption, to "something over the bright portions of the sun that eats away the light." Proctor has suggested volcanic action, intensified by the proximity of some planet as a cause; and in a paper read before the Astronomical Society, he considers that the closeness of the moon to the earth stimulates terrestrial volcanoes to renewed activity, and adds that in 1860 the belts of Jupiter were strongly disturbed during changes in the solar envelope.

The opposing theories, the discussion of which is now filling the columns of European scientific periodicals, are respectively those of Faye and Father Secchi. The latter has by far the strongest support, and appears to be sustained in his views by Lockyer, Huggins, Young, Zöllner, Spoerer, and Tacchini, besides many others of eminence. M. Faye's theories are briefly as follows: He supposes a nebulous or chaotic fluid mass, formed of gas and mixed vapors, raised to a very high temperature, animated with a movement of rotation and cooling by way of superficial radiation into space. Through the condensation of vapors of the external layer, the photosphere is formed and the chromosphere separated, the latter being composed of hydrogen, relatively cold but at a temperature superior to the point of dissociation of nearly all its compounds. By the peculiar mode of superficial rotation, the angular velocity of which decreases rapidly from equator to poles, the interior movements are reduced to simple ascending and descending vertical currents. These, by their play, maintain the photosphere at all points of the surface. The variation of velocity of rotation of these streams gives rise to their eddying movements, so that whirling phenomena or cyclones are produced. Viewed from above, from a point at some distance from the earth, ordinary waterspouts would scarcely appear except as simple points; but terrestrial cyclones, the diameter of which is sometimes hundreds of miles, would have the effect of circular cloudy spots in the form of funnels, variously lit by the sun and roving slowly over the earth. Evidently the special rotation observed in the sun would produce similar phenomena, giving rise to the appearance of pores and spots. An analogy is traced between solar and earthly storms, the latter of which are not formed in the polar or temperate regions, but in the torrid zone. The only difference lies in the fact that the solar cyclones remain in the regions where they are generated, between parallels 40° north and south, and have hardly any movement of translation but those of currents parallel to the equator. Under the action of these storms, M. Faye adds, there is a circulation of the exterior hydrogen which penetrates into the superficial red layers, to return immediately to the surface.

Father Secchi states that, in the interior of the spots, a peculiar spectrum is met with, disturbing the harmony of ordinary intensities and presenting enlarged and dilating lines in the position of those of the metals sodium, iron, magnesium, and calcium. In brief, he considers that the spots produced by eruptions abound in metallic substances, and especially in those just mentioned. The dark masses may accumulate at the orifice of the eruption and there unite in a single mass, condensed under the influences of currents from various neighboring orifices. The size, the duration, and the intensity of the spot depend on the quantity of eruptive matter; and an agglomerated mass may continue a long time after termination of the eruption, being fed by a slow successive eruption of the same substances. The mass sinks by gravity into the photosphere, cutting off a portion of the light of the sun, and appears black, although, according to Zöllner, the dark *umbræ* emits four thousand times as much light as that derived from a equal area of the moon. Both Faye and Secchi agree in the view that the sun is mainly gaseous, as it is only by such a hypothesis that the smallness of its density can be explained.

Professor Young, since the opening of the present session of the American Association at Portland, has presented some new suggestions on this subject, in which he considers that the phenomena of eruption indicate the existence of a crust which restrains the gases and through which they break their way. This crust may consist of a more or less continuous sheet of rain, formed of the materials shown, by the spectroscope, to exist in the solar atmosphere. As this tremendous rain descends, the velocity of the falling drops is retarded by the resistance of the denser gases underneath; and these drops coalesce until a continuous sheet is formed; the sheets uniting form a sort of bottomless ocean, resting upon the compressed vapors beneath and pierced by innumerable ascending jets and bubbles. In other words, the sun, according to this view, is a gigantic bubble, the walls of which are constantly thickening, while its diameter is decreasing at a rate determined by its loss of heat. Unlike other bubbles, however, its skin is continually penetrated by blasts from within.

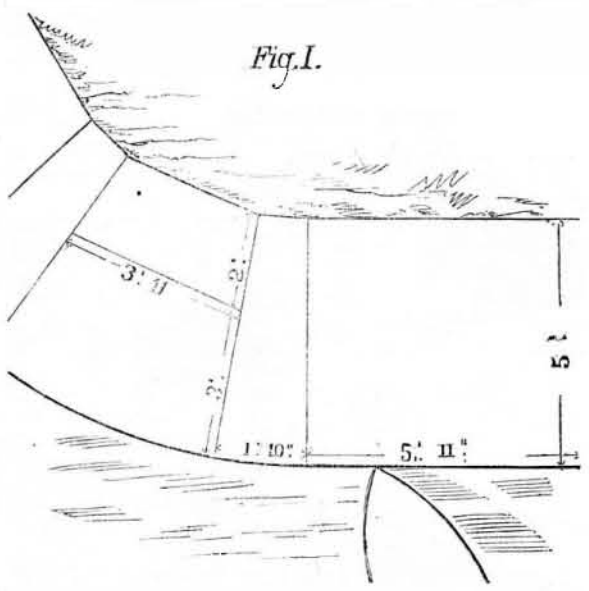
We may add that the eruptive theory is that now generally accepted by the majority of eminent astronomers. As Professor Young says, however, "we do not know what sun spots are: we do know what they are not;" so that, as is the case with all theoretical speculation, even this widely received view may be sooner or later abandoned, when, in the progress of science, other revelations are made.

J. H. H. writes to say that stramonium, known also as Jamestown (corrupted into jimson) weed, is an effective remedy for snake bites, and will cure them even some days after they are inflicted. The weed should be applied in the form of a poultice. In the absence of any other remedy, cauterizing the part with a live coal is good, especially for horses and cattle.

ACCIDENT TO THE NEW DOCKS.

The City of Limerick, one of the smaller steamers of the Inman line, through faulty navigation, recently rammed the bulkhead of pier No. 1, North River, with her bow, striking the stone near the angle and in the direction indicated by the prow in Fig. 1. The rate of speed of the ship at the time, we are informed, was fully four knots per hour. The material of

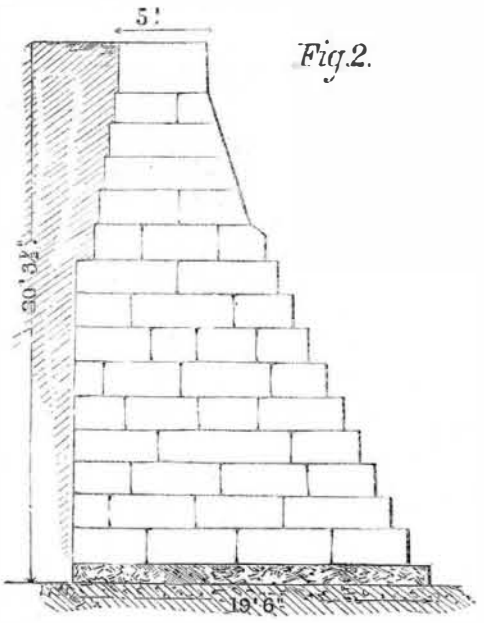
Fig. 1.



the structure is a coarse strong granite from Biddeford, Me., hewn in heavy blocks of various sizes. The effect of the blow was to wedge the stones apart. Little crushing was done, though an angular fragment from one block was split or torn cleanly off. The stones were shoved helterskelter in every direction, so that the damage consists in the displacement of the masonry not only at the point of contact but for a distance of 75 feet one way and 25 feet the other. The entire adjacent portion of the bulkhead, therefore, including the boat landing, will have to be rebuilt at an expense, it is estimated, of about $25,000.

The failure of the structure to withstand the blow is due, manifestly, to its insufficient backing. The uninjured masonry seems to be well set together with Portland cement, and, as shown in cross section in Fig. 2, is 4 feet 3 inches through at the top, 19 feet 6 inches at the bottom, and rests

Fig. 2.



on a bed of concrete and riprap. The hight is 30 feet 3½ inches. Behind this wall, however, is merely earth thrown in and not packed or rammed down,—a precaution, in fact, not as yet taken, because no craft larger than a ship's launch was expected to come near the work. The consequence was that the loose soil yielded, while the ship escaped with no other injury than some scratches and a lump of granite imbedded in her bow.

The impetus of a vessel such as the City of Limerick, displacing in the neighborhood of 4,000 tons, and moving at the rate of three knots per hour, or five feet per second, is stated to be nearly 3,000,000 foot pounds. This tremendous force concentrated in the stem of the vessel—a solid mass backed by the heavy iron skin and only some six inches in width—necessarily would produce no small effect on almost any masonry, however strong. It is well known that a large vessel can strike head on with hardly any injury to herself; and on this fact the use of rams in naval operations is based. In the present instance there is little doubt but that, had the wall been stronger, although it would have been badly damaged, the ship would have suffered the most. In such case the force would have been expended in crushing stem and stone, neither yielding instantly to the impact. As it was, the blocks of granite gave way, and the comparatively small amount of splintering which they suffered shows that they were easily driven backwards into the loose earth. Considering the degree of injury, it seems to us that the crushing and ruining of a number of stones in a solidly backed wall would have been less expensive to repair than the dislodging, which necessitates the replacement of about a hundred feet of finished wall.

The accident, we think, has demonstrated the necessity of a solid brickwork or other equally strong re-inforcement to the masonry; particularly, as it appears quite probable, judging from the extent and circumstances of the present damage as far as known, that even a tug striking the pier at ordinary speed might have inflicted a serious though less injury.

On the same pier at which the above described accident took place, we noticed, out of range of the effects of the shock, stones displaced and open cracks between them; while parts of the concrete flooring have broken joints and sunk below the level. The difficulty was explained by the fact that the stone had settled on its riprap foundation.

HAY FEVER.

At this season of the year, there are many suffering from this tormenting trouble; and to them it would no doubt be a gratification to learn of a sure cure. But unfortunately there is none yet known, except that which, to the majority of sufferers, is impossible from want of time or means, namely, a temporary change of residence. There are, however, palliative remedies which often bring great relief. One of the best is a tea made of poppy heads.

The poppy is so generally cultivated as a garden plant that it is quite easily obtained; if not in our own, it may be in our neighbor's garden. The tea should be made to boil in an ordinary tea kettle, and the steam, issuing from the nozzle, breathed deep into the lungs; and this should be continued until relief is obtained. If the poppy heads cannot be had, half a teaspoonful of laudanum may be added to a pint of water, and the steam from this mixture inhaled. At the same time attention should be given to the general health; only digestive and nutritive food should be eaten, because an attack is much aggravated by overloaded stomach or bowels.

In conclusion, let us add, for the benefit of those who are subject to yearly attacks, that much good is done by preparing the lungs for the coming hay season. If a teaspoonful of alum be dissolved in a pint of water, and the spray from this mixture be breathed into the lungs for several minutes every day for a month before the expected onset, it will brace up the lungs and make them less susceptible to the irritation of hay dust.

S. H. C., M. D.

SCIENTIFIC AND PRACTICAL INFORMATION.

A NEW ANILINE BROWN.

A new dye, called cannelle, produces upon silk, wool, and cotton a lively brown color, and, by admixture with blue, red, or yellow aniline dyes, is capable of assuming every possible shade and variation of brown. For silks and woolens, no mordant is required; but, like all other aniline colors, it refuses to attach itself to cotton without a mordant. Silk is dyed in a lukewarm bath to which is added a sufficient quantity of the dye, which has first been dissolved in hot water, and, when cold, filtered through flannel. The dye bath is made slightly acid by the addition of tartaric acid. Wool is dyed in a boiling solution of the dye, to which is added half a pound of Glauber salt and 2 ounces sulphuric acid to 10 lbs. of wool. Cotton is mordanted with tannin by placing in a solution of 3 lbs. sumach or ¼ lb. good tannin to 10 lbs. of cotton. After being mordanted, the goods are unrolled and put in a cold bath of pure cannelle.

Cannelle is prepared from one of the products used in making fuchsin, and is essentially the double acid salt of chrysotoluidine. This latter base is formed from toluidine by the removal of hydrogen, just as the base of fuchsin is prepared from a mixture of aniline and toluidine, and its composition is represented by the formula $C_{21}H_{21}N_3$. Its formation from toluidine is thus represented · 3 C_7H_9N (toluidine)— 6 H = $(C_7H_7)_3 N_3$ (chrysotoluidine).

This dye is also very similar to fuchsin in its nature. The free base is insoluble in water, and therefore may be thrown down as a bright yellow precipitate by the addition of an alkali to an aqueous solution of its salts. Chrysotoluidine is very soluble in alcohol, and can be used in this form for dyeing, while rosaniline and its derivatives are colorless, except as neutral salts. The neutral salts of chrysotoluidine dissolve with difficulty even in boiling water, and are decomposed thereby into insoluble basic salts and soluble acid salts. The solutions of the soluble acid salts have a pale yellow color with a brownish tinge, while free chrysotoluidine gives pure yellow shades. The same pure colors are obtained by dyeing with the acid salts, provided some alkali is added to the dye bath. Cannelle is at present manufactured, so far as we know, only in Stuttgart, Germany.

MUSCULAR FORCE OF INSECTS.

M. l'Abbé Plessis, in an article in *Les Mondes* on the above subject, says that, by way of experiment, he placed a large horned beetle, weighing some fifty grains, on a smooth plank; and then in a light box, adjusted on the carapace of the insect, added weights up to 2·2 pounds. In spite of the comparatively enormous burden, being 315 times its own weight, the beetle managed to lift it and move it along. A man of ordinary muscular power is fully a hundred times feebler in proportion; and had an elephant such comparative strength, it could run away with the Obelisk of Luxor, a load of 5,060,000 pounds. Similarly, the flea, scarcely ·03 of an inch in hight, manages to leap without difficulty over a barrier fully 500 times its own altitude. For a man six feet is an unusually high leap; imagine his jumping 3,000 feet in the air, over three fifths of a mile!

NEW PROCESS OF PRINTING WITH INDIGO.

M. Lalande reduces indigo by means of hydrosulphite of sodium; and to the white indigo thus obtained, he adds an excess of the salt, to produce a suitable consistence. With this preparation, he prints fabrics, and afterwards exposes them to the air. The excess of hydrosulphite causes the rapid oxidation of the indigo.