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THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 258,

For the Week ending November 6, 1880.

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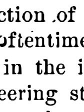
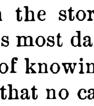
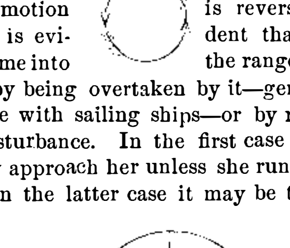
THE LAWS OF CYCLONES.

There seems to be no subject of equal importance so little understood as the laws governing the revolving storms of wind known as cyclones. That this should be the case among landsmen who rarely encounter them is not strange; but that sailors and *soi-disant* scientists should fall into gross errors in treating so simple a subject is not only unpardonable, but incomprehensible. The cyclone, as it is called in the northern hemisphere, or the typhoon, by which name it is known in the southern seas, is a revolving storm of wind, having a diameter of from 100 to 800 miles, and a spot of actual calm in the center. This storm revolves at a velocity increasing from the edges toward the center, where it sometimes attains a rate estimated at five miles a minute. The whole disturbance also moves forward at a speed varying between five to forty miles an hour. The great difficulty in understanding the phenomena of the cyclone is due to this double motion—a lateral movement of the whole storm over the face of the earth, and a revolving motion around its axis, or center. The general movement of the storm is confounded with the direction of the wind at any given point, and *vice versa*, so that oftentimes a captain, by putting his ship before the wind, in the idea of running away from the storm, is really steering straight into the track of its most dangerous part, namely, the center. Yet the means of knowing how to avoid this danger are so easily attainable that no captain nor mate ought to be allowed a berth on shipboard unless he is thoroughly acquainted with these simple rules.

Let us examine the conditions of the problem.

In the northern hemisphere the wind rotates "against the sun;" that is, opposite to the direction of the hands of a watch placed face upward, thus,  ; and in the southern hemisphere the motion is reversed, thus,  Now it is evident that a vessel may come into the range of a cyclone by being overtaken by it—generally the case with sailing ships—or by running into the area of disturbance. In the first case the cyclone center will steadily approach her unless she runs in the right direction, while in the latter case it may be that she will feel the influence of the cyclone less and less as it draws away from her. The vessel must come into its influence in one of the quadrants indicated by the letters A, B, C, and D, in the figure, the direction of the forward motion being shown by the arrow.



So long as a ship was anywhere in either quadrant, A or B, she would feel a constantly increasing power of the wind, and would be in a steadily increasing danger. If a steamer should run into either of these quadrants she ought at once to take such a course as would carry her away from the center; while a sailing ship should do likewise so long as the wind and sea were not too heavy, and then "lie to" on the proper tack. If a steamer entered either C or D quadrants she would be obliged to change her course very little, if at all, and a sailing ship could actually derive a benefit from the cyclone by keeping in its edge as long as the wind and sea permitted her to do so.

Now the great question to be determined is: How can a captain tell which quadrant he is in when he enters a cyclone? First of all, he must always observe the weather and the barometer so closely as to know at the earliest possible moment when a cyclone is coming. Having assured himself that the approach of a cyclone is certain, he should carefully watch the wind and notice in which direction the shifts occur. These gradual changes in the wind's direction constitute the most marked features of the cyclone, since there is only one position in which they will not be immediately observed, namely, if the ship lies exactly in the path of the center of the hurricane in its onward course. When these changes in the direction of the wind have become clearly marked, he should apply the following rule, which is invariable in both hemispheres: When the shifts of wind occur from right to left, that is, say from north to west, west to south, south to east, or east to north, the observer is in quadrant A or quadrant D, that is, on the left hand side of the cyclone's advance facing in the direction in which it is moving; but if the shifts come from north to east, east to south, south to west, or west to north, the observer is in quadrant B or quadrant C, on the right of the storm's track. Knowing on which side the storm center will pass, it is an easy matter to avoid it. The difference between quadrants A and B and quadrants C and D will soon be discovered by the fact that in the first pair the storm will steadily increase, while in the two latter the strength of the wind will diminish. When a sailing ship has run away from the center as long as the wind and sea will permit her to do so, she must invariably follow this rule in "lying to:" If she is on the right hand side of the storm center's track she must "lie to" on the starboard tack, and on the port tack if on the left hand side. She will thus escape the danger of being caught aback by a shift of wind which might result in her sinking stern foremost.

If the weather and the barometer both clearly indicate a cyclone, but there are no shifts of wind, the captain may consider it certain that he is exactly in the path of the hurricane; and during the first few hours of the storm there is a direct relation between the rapidity with which the wind changes its direction and the proximity of the vessel to the cyclone's track: the slower that the shifts occur the nearer the vessel is to the path of the center, especially if the increase in the wind's strength is great; but if the shifts occur rapidly and steadily without a very great increase in force, the center will not pass very near. A careful seaman, consulting his experience and his barometer to discover the approach of a cyclone, observing carefully the foregoing rules to determine on which side of and how near him it is going to pass, and using a prudent discretion in avoiding its center, ought never to lose his ship.

THE C LTIVATION OF THE SUMAC.

There are thousands of people who wander through the woods in autumn picking the beautiful scarlet and yellow leaves of the sumac bush to decorate their rooms, without knowing that there is any other use for the plant. Yet the importation of the sumac into this country this year will amount to about 11,000 tons, costing about $1,100,000. The leaves of the sumac, dried and ground, are largely used in tanning and dyeing, and in Sicily and other parts of Italy the plant is carefully cultivated and treated. In view of the fact that the American sumac contains from 6 to 8 per cent more tannic acid than the Italian, and remembering that the plant grows wild in profusion throughout this country, it seems reasonable to believe that it might be made a very profitable crop. At the present time the amount of native sumac brought into market does not exceed about 8,000 tons yearly, and its market price is only $50 per ton, just half the price of the Italian product. This large difference in the market value of the foreign and the domestic article is due to the fact that the American sumac, as at present prepared, is not suitable for making the finer white leathers so much used for gloves and fancy shoes, owing to its giving a disagreeable yellow or dirty color. The many attempts that have been made to avoid this difficulty by care in collecting and grinding the leaves have not resulted in success, and it has long been supposed that this objectionable quality was inherent in the American plant; but Mr. Wm. McMurtrie, in a report to the United States Commissioner of Agriculture, shows that this difficulty can be surmounted and the American product made even superior to the foreign.

Mr. McMurtrie made a number of tests to learn the relative amounts of tannic acid found in the leaves at different periods of their development, and while the amount was found to be greatest in the leaves gathered in July, he found that those gathered in full development in June were even then more than equal to the best foreign leaves in this respect. But further, he found that the deleterious coloring matter (due to the presence of quercitrin and quercetin) was not yet developed, and that therefore the American leaves gathered in June were superior to the Italian for all purposes. The importance of this discovery may be seen by the fact that the cultivation of the plant may be carried on most profitably in this country as soon as manufacturers and dealers recognize the improvement thus obtained in the domestic article, and by classifying it according to its percentage of tannic acid and its relative freedom from coloring matter, advance the price of that which is early picked and carefully treated.

In Italy the sumac is planted in shoots in the spring in rows, and is cultivated in the same way and to about the same extent as corn. It gives a crop the second year after setting out, and regularly thereafter. The sumac gathered in this country is taken mostly from wild plants growing on waste land, but there is no reason why it should not be utilized and cultivated on land not valuable for other crops.

THE COLOR OF OZONE.

A paper recently read before the French Academy of Sciences contains some interesting facts relative to the liquefaction of ozone. A reservoir containing oxygen, at a temperature of 9·4° below zero (Fah.), is charged with ozone, and pressure applied by a column of mercury acted upon by a hydraulic press. Immediately the gas begins to turn to an azure blue color, deepening the shade as the pressure increases. The liquefaction of ozone was obtained by applying a pressure to the ozonized oxygen of 75 atmospheres, while 300 atmospheres of pressure would have been required for pure oxygen. The fact was also established that ozone is an explosive gas, since, unless compressed slowly and at a low temperature, it exploded with a yellow flame. Its heavenly blue color was rendered manifest not only under heavy pressure, but under all circumstances.

UNTIMELY SNOWS.

The retreating winter of the southern hemisphere goes out like a lion, while the first showings of our coming winter are by no means lamb-like.

A dispatch from Buenos Ayres says that a terrific snow storm occurred in that province September 18, causing the death, it was estimated, of 700,000 cattle, 500,000 sheep, and 250,000 horses.

On the 15th of October a furious storm fell upon Western Iowa, attended by a heavy fall of snow, which drifted seriously during the following day. On several railroads trains were blockaded by drifts from five to seven feet deep. The snow fell heavily in Southern Minnesota, causing great interruption of travel and telegraphic communication. The storm moved eastward slowly, raging with greatest fury over Lake Michigan, wrecking a number of vessels and causing a