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(Illustrated ar icles are marked with an asterisk.)

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SCIENTIFIC AMERICAN SUPPLEMENT

No. 982.

For the Week Ending October 27, 1894.

Price 10 cents. For sale by all newsdealers.

THE COMING TRANSIT OF MERCURY.

An interesting astronomical event will take place on the 10th of November next. We allude to the transit of the planet Mercury across the face of the sun. The phenomenon will be visible in North America, South America, Europe, and other quarters. It may be seen to advantage with the telescope.

A simple method whereby a number of persons may simultaneously observe the transit is to throw an enlarged image of the sun upon a sheet of white paper. This may be effected easily by using the telescope as a magic lantern in the manner illustrated in the engraving given on the next page.

A stick is tied to the end of the telescope; at the lower end of the stick is secured a block of wood in which a saw cut is made to receive the paper—stiff cardboard is the best. The paper sheet receives upon its surface the enlarged image of the sun, across which the shadow of the planet, in the form of a round black dot, will be seen to travel, at the rate of about one hundred thousand miles per hour. We advise our readers, especially the young people, to get out their telescopes and observe this most interesting phenomenon.

The coming transit will be visible from about 10 A. M. to 3 P. M. It will take the planet about 6¾ hours to move across the sun's disk.

The path of the transit is a little above the sun's center. The diameter of the sun's disk is estimated at 860,000 miles.

Of the family of planets visible to the naked eye, Mercury is the smallest and the nearest to the sun. His diameter is, in round numbers, 3,000 miles, and his distance from the sun thirty-five million seven hundred and fifty thousand miles (35,750,000). By reason of his nearness to the sun the planet escapes the observation of the majority of people. He is usually to be seen near the horizon, within a short time of sunrise or sunset. There is a lack of knowledge concerning the revolutions of Mercury; Schiaparelli concluded that Mercury revolves on his axis in the same time that he makes a revolution in his orbit; if so, he keeps the same side turned toward the sun; one side of the planet being always illuminated and intensely heated, the other side, more especially its central zone, being in constant darkness.

Whether Mercury carries an atmosphere is as yet not certainly determined. Some observers have, as they believe, seen evidences of an atmosphere. It is quite probable the question will be definitely settled by observations made with great telescopes during the coming transit.

The celebrated astronomer Leverrier made calculations in 1859 which accounted for certain anomalies in the movements of Mercury on the basis of the existence of another planet of about the same size as Mercury, and from it not far distant. Many searches have been made since Leverrier's announcement for this as yet unseen body, but so far without actual success, although some of the observers have claimed positively to have seen it.

Visibility of Torpedo Boats.

Some interesting experiments as to the visibility and audibility of torpedo boats at night have been made off Newport by the torpedo boat Cushing. The Cushing had been repainted with a color supposed to be least conspicuous. In the first experiment the Cushing steamed out from shore at night, having a powerful search light from the land directed upon her. At a distance of a thousand yards she passed out of sight of those on shore, and this, although it was light enough on the Cushing herself to read. For the second experiment, which was to determine the distance at which the boat could be detected by the noise of her engines and swash of water from the propellers, the night was very favorable, except for moonlight. The first thing observed was sparks from the funnel, and shortly afterward the swash of water was heard. The search light was then used, but it was several seconds before the boat was sighted, being then at a distance of 800 yards. The report upon the experiments observes: "Eight hundred yards is the maximum torpedo range, and a speedy craft would make great progress inside of this before guns could be trained upon her; so it is still questionable whether the search light is much of a safeguard against an attack from torpedo boats."

The Rapid Fire Gun Tests.

In our issue of June 30, 1894, we illustrated and described the test of rapid fire guns which was then being conducted at Sandy Hook. The Army Ordnance Board has now completed the test of these guns. The competing guns were the Driggs-Schroeder, Hotchkiss, Seabury, Maxim-Nordenfelt and Sponzel. All of the guns passed the test without material injury except the Sponzel gun. The honors were about equally divided between the Driggs-Schroeder and Hotchkiss guns. The heating of the guns after the firing of a number of rounds was considerable. After seventy-five rounds one of the guns melted soft solder placed on the chase. Another gun softened lead, indicating about 600 degrees F.

Genius and Degeneration.

It is a strange fact, however, and one not noticed by Lombroso or any other writer, as far as I know, that mechanical geniuses, or those who, for the most part, deal with material fact, do not, as a rule, show any signs of degeneration. I have only to instance Darwin, Galileo, Edison, Watts, Rumsey, Howe and Morse to prove the truth of this assertion. It is only the genius of æstheticism, the genius of emotions, that is generally accompanied by unmistakable signs of degeneration. Swinburne's poems show clearly the mental bias of their author, who is described as being peculiar and eccentric. Many of the men of genius who have assisted in making the history of the world have been the victims of epilepsy. Julius Cæsar, military leader, statesman, politician and author, was an epileptic. Twice, on the field of battle, he was striken down by this disorder. On one occasion, while seated at the tribune, he was unable to rise when the senators, consuls and prætors paid him a visit of ceremony and honor. They were offended at his seeming lack of respect, and retired showing signs of anger. Cæsar returned home, stripped off his clothes and offered his throat to be cut by any one. He then explained his conduct to the senate, saying that he was the victim of a malady which, at times, rendered him incapable of standing.

Many men of genius have suffered from spasmodic and choreic movements, notably Lenau, Montesquieu, Buffon, Dr. Johnson, Santeuil, Crebillon, Lombardini, Thomas Campbell, Carducci, Napoleon and Socrates. Suicide, essentially a symptom of mental disorder, has hurried many a man of genius out into the unknown. The list begins with such eminent men as Zeno, Cleanthes, Dionysius, Lucan and Stilpo, and contains the names of such immortals as Chatterton, Blount, Haydon, Clive and David. Alcoholism and morphinism, or an uncontrollable desire for alcohol or opium in some form or other, are now recognized as evidences of degeneration. Men of genius, both in the old world and in the new, have shown this form of degeneration. Among the men and women of genius of the old world who abused the use of alcohol and opium were Coleridge, James Thomson, Carew, Sheridan, Steele, Addison, Hoffman, Charles Lamb; Madame de Stael, Burns, Savage, Alfred de Musset, Kleist, Caracci, Jan Steen, Morland, Turner (the painter), Gerard de Nerval, Hartley Coleridge, Dussek, Handel, Gluck, Praga, Rovani and the poet Somerville. This list is by no means complete, as the well-informed reader may see at a glance, yet it serves to show, however, how very often this form of degeneration makes its appearance in men of genius. In men of genius the moral sense is sometimes obtunded, if not altogether absent. Sallust, Seneca and Bacon were suspected felons. Rousseau, Byron, Foscolo and Caresa were grossly immoral, while Casanova, the gifted mathematician, was a common swindler. Murat, Rousseau, Wagner, Clement, Diderot and Praga were sexual perverts. Genius, like insanity, lives in a world of its own, hence we find few, if any, evidences of human affection in men of genius.

Dr. Johnson, who was a sufferer from folie du doute, had to touch every post he passed. If he missed one, he had to retrace his steps and touch it. Again if he started out of a door on the wrong foot, he would return and make another attempt, starting out on the foot which he considered the correct one to use. Napoleon counted and added up the rows of windows in every street through which he passed. A celebrated statesman, who is a personal friend of the writer, can never bear to place his feet on a crack in the pavement or floor. When walking, he will carefully step over and beyond all cracks or crevices. This idiosyncrasy annoys him greatly, but the impulse is imperative, and he cannot resist it. Those who have been intimately associated with men of genius have notice that they are very frequently amnesic or "absent-minded." Newton once tried to stuff his niece's finger into the bowl of his pipe, and Rovelle would lecture on some subject for hours at a time, and then conclude by saying, "But this is one of my arcana which I tell to no one." One of his students would then whisper what he had just said into his ear, and Rovelle would believe that his pupil "had discovered the arcanum by his own sagacity, and would beg him not to divulge what he himself had just told to two hundred persons."

We must not confound genius and talent—the two are widely different. Genius is essentially original and spontaneous, while talent is to some extent acquired. Genius is an abnormality, but one for which the world should be devoutly grateful. Psychos, in the case of genius, is not uniformly developed, one part, being more favored than the others, absorbs and uses more than its share of that element, whatsoever it be, which goes to make up intellectuality, hence less favored or less acquisitive parts show degeneration. Why genius should exist is one of the unexplained phenomena of nature, but that it is the result of natural causes I have not the slightest doubt.—Med. Rec.

Gas Headlights.

According to the Railway Review, in Europe and South America, principally on the German and Brazilian railroads, Pintsch gas has long and successfully been used in lomotive headlights in place of oil. Over 2,300 locomotives have been equipped in Germany alone, and in South America the Central Railroad of Brazil uses the gas headlights almost exclusively. Twenty five of the suburban locomotives which the Brooks Locomotive Works have nearly completed for this railroad are equipped with Pintsch gas signal and headlights of an improved pattern. On each of the locomotives, which are double ender, are two 20 inch gas headlights, fitted with powerful Argand burners, and four 14 inch gas signal lights, two on the forward bumper block and two on the rear end of the tender. In the cab is a small Pintsch lamp, the light from which is permitted to shine only on the faces of the gauges through a slot in the metal covered globe. The supply of Pintsch gas is carried in a tank suspended below the cab floor between the side frames of the tender. The system of piping is very complete, and the controlling cocks are so arranged with by-passes that the supply of gas to the lights at either end of the locomotive is easily and quickly adjusted.

It is the opinion of a number of locomotive engineers and other practical railroad men witnessing tests of a new improved Pintsch gas headlight recently made in the Delaware, Lackawanna & Western yards at Hoboken, N. J., that the light furnished is at least three times as powerful as that of oil headlights, while at the same time it met the very important requirement of not in any way obscuring the signal and other lights around the yard. This is one of the principal objections to the use of electric headlights, and one which the Pintsch gas headlights seem to have entirely overcome.

Trial of the Battle Ship Maine.

The official trial of the battle ship Maine took place in Long Island Sound October 17. The Maine is what is known as a composite built ship, that is hull constructed at a navy yard by the government and machinery furnished by contractors. The run was made in a stiff westerly wind. During the four hours' run under forced draught the general average of the steam pressure was 141 pounds, the propellers making 127 revolutions a minute. The average speed was 15·95 knots per hour. To this a tidal allowance of $1\frac{1}{4}$ knots must be made, so that the total speed was 17·2 knots or possibly 17·25 knots. The engines, which were built by the Quintard Iron Works, made from 400 to 600 horse power more than the 9,000 called for by the contract, so that a handsome premium may be expected. The temperature in the boiler and engine rooms was very high. In the engine room at the cylinders the thermometers registered at times 180 degrees, in the boiler room the temperature varied from 110 to 115 degrees. The Maine is the first completed battle ship of the new navy. She was launched November 18, 1890. She is 324 feet $4\frac{1}{2}$ inches long, has 57 feet beam and 21 feet 6 inches draught. Her displacement is 6,682 tons. She carries 12-inch armor and will mount four 10-inch guns, with a range of 9 miles, and six 6-inch rifles. She has a fine supplementary battery. The ship has twin screws, each 15 feet in diameter. She can carry 822 tons of coal, and with that amount can steam 4,250 miles at a 10 knot speed.

We have published illustrated articles on the Maine in the issues of the SCIENTIFIC AMERICAN for November 29, 1890, and September 29, 1894.

The Chinese Names of the Treaty Powers.

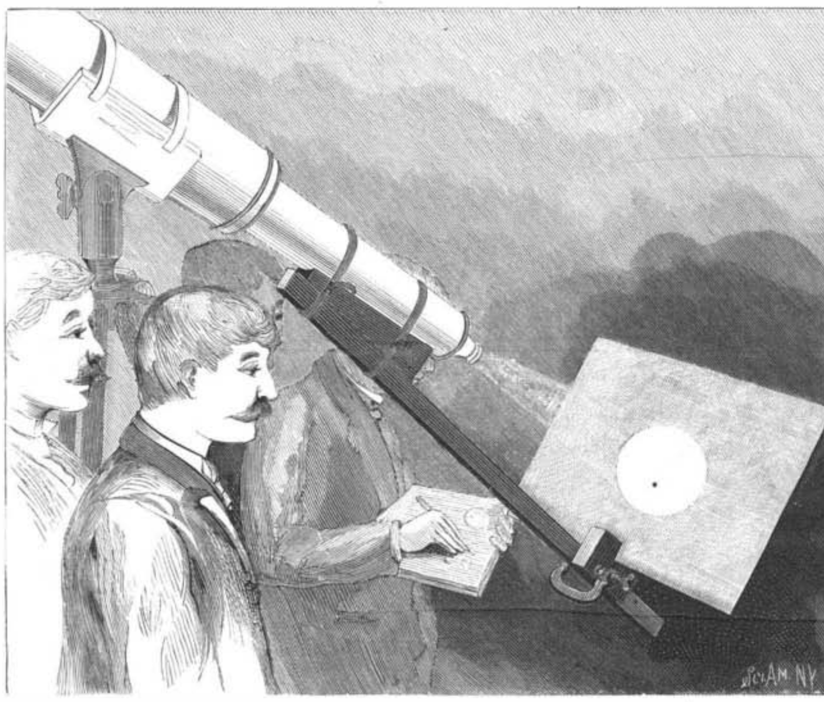
The Chinese, when they first knew their eastern neighbors who are now exhibiting such a restless war spirit, named them Wa people. In their histories this single word was sufficient. By change of vowel during two thousand years Wa has become Wo. In the imperial declaration of war of August 1 this is the term used, and it is brief and sufficient. The Chinese like monosyllabic names for countries. The various foreign nations have, when making treaties, usually chosen the monosyllables which form their names. England, Ying kwo, means "the flourishing country," for ying, the treaty character for Great Britain, has that sense. Fa means law, and France, Fa kwo, is the "law abiding country." Germany, known as Te kwo, is the "virtuous country." The United States republic is the Mei kwo, or "beautiful country." Italy is the "country of justice," I kwo. Each treaty nation has chosen its own name for moral effect. It has been a matter for international diplomacy, and the Chinese government has invariably given way to the wishes of each of the treaty powers as represented by its minister and his Chinese secretary. From the time that the ministers of the treaty nations had residences in Pekin the name of the country made use of in diplomatic correspondence has been, of course, that which was satisfactory to the treaty powers. The same was the case with Japan. Japan, there can be no doubt, prefers Ji pen, the Land of the Rising Sun, because it is more poetical than the name Wo, which means "submissive," "winding and twisting." On the whole Japan wishes to be known as the land of the sun, Ji kwo, but she also likes Ji pen, which is the same as Japan, and she has not made the use of the term Wo a matter of complaint.—North China Herald.

The Street Railway Journal.

Our enterprising contemporary the Street Railway Journal has lately issued a splendid example of artistic typography in the shape of a souvenir number, published in honor of its tenth anniversary, and of the Atlanta meeting of the American Street Railway Association. This superb issue contains a 16 page article on Atlanta, a 10 page article on the association, a 30 page article on the street railway systems of the Southern cities, and a 20 page article on the history of street railway industry. All of these are handsomely illustrated—containing over 400 illustrations, among which are more than 125 portraits of street railway men. The whole forms a body of rare and useful information, indicative of the substantial character of trade journalism.

Atmospheric Resistances of Balls.

At a recent meeting of the Engineers' Club, Philadelphia, Pa., Professor Walter L. Webb read a series of notes on the results of some experiments to determine the resistance of the atmosphere to the free fall of spheres, which he had made when an instructor at Cornell University. The very thorough series of experiments that was contemplated was never completed, but the results that were obtained evidenced such a degree of accuracy that the author believes a description of the methods used and of the conclusions that can be drawn from the results will be of value to those interested and may lead to a continuation of the investigation.



HOW TO VIEW THE TRANSIT OF MERCURY.

The apparatus was described in detail, and the calculations from the data obtained were written out in full on the blackboard. The results obtained from six sets of experiments were also tabulated in a chart which was exhibited.

The balls that were compared were of iron and wood, both finished by careful grinding to exact sphericity and diameters to within one one-thousandth of an inch. The volumes of air displaced and the shapes of the resisting surface were, therefore, identical for both balls. The grinding of the balls polished the surface of each of them and the skin friction was, therefore, practically the same in both cases. The heights dropped through were exactly the same, but the results show a much larger coefficient of resistance for the iron ball and a material increase in the coefficient for both balls in case of a short fall than with a longer one.

Conclusions were deduced from these experiments for the relations between mass, acceleration, resistance, etc., and the results showed that atmospheric resistance does not vary as the square of the velocity.

Aluminum Paper.

The surface of the paper is coated with adhesive matter, and the latter covered with laminated or powdered aluminum, or powdered aluminum is mixed with adhesive matter and spread on the surface of the paper by brushes or any other manner convenient.

Attar of Roses.

Le Genie Civil gives an interesting account summarized in the American Architect of the manufacture of attar of roses, which, since the emancipation of the Balkan Provinces, has become a great industry in Bulgaria, and has been taken up on a large scale in Germany. We have all been accustomed to connect the fabrication of attar of roses with Persia and Syria, and, even now, India and Constantinople furnish probably the largest markets for it; but, although the art of making it was discovered in Persia, the manufacture has now nearly or quite died out, and the center of the business is now the country about Kazanlik, on the south slope of the Balkans, close to the Shipka, or Wild Rose Pass, famous in the history of the Russo-Turkish war. The rose-growing belt is situated at an average altitude of a thousand feet above the sea, and extends to a length of about seventy miles, with an average breadth of ten miles. On this ground are produced annually from five to six thousand million rose blossoms. The number of varieties cultivated is very small. Ninety per cent of all the blossoms are taken from a bushy variety of the Rosa Damascena, or damask rose, known to our gardeners mainly as the ancestor from which the infinite variety of hybrid perpetual roses derive a large part of their blood. Of the remaining ten per cent, a part are gathered from the white musk rose, which is frequently planted as a hedge around the fields of pink Damascena; while the rest are furnished by a dark-red variety of Damascena. Other sorts of roses have been tried, but some yield no attar at all and others give an essence having the perfume of violets, or pineapples, or hyacinth, rather than of roses; so that the growers have returned to the original kind.

In order to obtain the precious perfume in the largest quantity, and in its best condition, the flowers must be cut while the dew is still on them, and every morning, during the season of bloom, which lasts from about May 20 to June 20, troops of boys and girls climb the mountain slopes, long before sunrise, to gather the freshly opened flowers. The blossoms are thrown into baskets, and taken immediately to the distillery, it being important to finish the operation on the day that the flowers are gathered. As the baskets are received their contents are piled in cool, dark storerooms, from which theyare taken for distillation. The stills are of the simplest construction, of tinned copper, each of about the capacity of a barrel. About twenty-five pounds of roses are put in each still, which is then filled about three-quarters full of water. The top of the still is put on, and the fire lighted. The worm is cooled with running water, and in about forty-five minutes, when about one-fifth of the contents of the still has been drawn over, the distillation is stopped, the still emptied, and the process repeated with a fresh charge, until all the morning's crop of roses has been treated. The product of this first distillation is rosewater, exactly like that which our grandmothers manufactured in the same way. To separate the attar, a second distillation is necessary. The rosewater is put again into the stills, and about one-third its bulk of what is called "second rosewater" is drawn over. This is now a highly perfumed liquid, turbid with suspended globules of an oily substance, which is the precious attar. To allow the attar to separate, the distillate is put into bottles with long necks, which gradually become filled with the oily essence. When the separation is complete, the attar is removed with a spoon, which has a small hole in the bowl. The water runs off through this hole, leaving the oil, which is put into the well-known ornamental bottles for sale. The attar sells for about six dollars an ounce, so that the industry is remunerative, although sixty thousand roses are required to make an ounce of attar. It is curious that the Bulgarian roses, although the mountain frosts make the crop a rather precarious one, produce much more essence than do the same roses elsewhere. After the war of 1878, the Turkish government, having lost its Balkan province, and with it the rose gardens, undertook to transfer the industry to Asia Minor and planted great numbers of rose bushes in the vicinity of Broussa. The bushes grew and produced plenty of flowers, but so little attar could be extracted from them that the experiment was abandoned. The explanation appears to be that the rose, for the full development of its perfume, requires a cool climate; for within the last two years extensive plantations have been made in the neighborhood of Leipsic, and a manufactory established, which is said to treat now, during the season, three million roses a day, extracting from them about eight hundred pounds of attar per year. The distillery is placed in the middle of the rose garden, so that the flowers reach the stills within a few minutes after they are cut.