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(Illustrated articles are marked with an asterisk.)

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Scientific American Supplement

No. 1157.

For the Week Ending March 5, 1898.

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THE "MAINE" INQUIRY.

The self-restraint and careful deliberation with which Congress is proceeding in the "Maine" investigation have been received by the public with feelings of great relief and entire satisfaction. There have been one or two hasty and illtimed outbursts, accompanied by the usual clamoring after "facts" and "correspondence," but such demonstrations have been quickly suppressed and the perpetrators have been sharply rebuked both within and without the halls of Congress. The administration, with its intimate knowledge of the condition of affairs in the Army and Navy Departments, and its knowledge of our strength and weaknesses, is in a better position to judge how the honor of the country can best be upheld in the immediate future than the members of Congress, the public at large, or even the sensational press.

Looked at in its most unfavorable, not to say tragic, light, if the report of the Committee of Investigation should disclose the fact that the great battleship had been destroyed by some agency external to herself, and could that agency be traced so as to leave the terrible responsibility at the doors of Spain, then we are brought face to face with the stern facts, how far are we prepared for war?

The warnings of our military experts regarding the unpreparedness of our fortifications are fresh in our ears. Have we not recently been told that we have artillery without artillerists, guns without mounts and emplacements without guns? These things, thanks to a prevailing activity in our arsenals and a belated but welcome liberality in Congress, are being rectified—but the rectification takes time.

Every reason, moral and practical, demands that there shall be no haste, and that the investigation shall be patient, detailed and absolutely impartial. What the country demands is that in due time and in its proper season the truth shall be reached.

> Thrice is he armed that hath his quarrel just,
> And he but naked, though locked up in steel,
> Whose conscience with injustice is corrupted.

If such a calamity should arise that we should be compelled to take up arms, it must be only after we have satisfied ourselves and the world at large beyond any question of doubt that the noble vessel was sunk by a deliberate act or with the connivance or through the criminal negligence of the people with whom we fight.

It is both insulting and unjust to suggest that those who are exhibiting self-restraint and deliberate judgment are lacking in sympathy for the poor fellows who have perished or that they do not feel keenly the loss of prestige in the sinking of one of our finest ships. The calmness with which this awful disaster has been received is an indication of the depth of feeling which has been stirred in the American people. Had they felt less, they would have said more. As it is, the government is proceeding in the matter with an absence of panic which is an evidence of strength and is thoroughly in keeping with the best elements of our national character.

RAILROAD TO THE YUKON.

A contract has been let for the opening of a rail and river route to the Yukon, and if the pledges of the contractors can be fulfilled, one hundred and fifty miles of railroad will be in operation by September 1 of this year. The proposed route is as follows: By ocean steamer to the mouth of the Stikeen River, near Fort Wrangel, Alaska; thence by river boats up the Stikeen River to Telegraph Creek; thence by railroad to the head of Teslin Lake—a distance of 150 miles. From this point a line of steamboats will run up the lake to the point where it discharges itself by the Hootalingua River into the Yukon.

The survey carried out by the Canadian Department of Railways showed that the Stikeen River is navigable for 150 miles from the sea, and it was estimated that a powerful steamer could make the passage to Telegraph Creek in two days. The cost of a steam railroad from this point to Teslin Lake is estimated at $4,000,000. The government engineer also sends in an estimate for an electric road 165 miles in length, which he states could be built for $2,850,000. Teslin Lake, which is 61 miles long, was found to be open for navigation on May 18, and froze over again on October 27.

The construction of 150 miles of railroad involving heavy excavation in such a remote country and within such a limited period seems to be a formidable undertaking, especially when the rigorous nature of the climate is considered. Nevertheless, it is a fact that there were several syndicates who were anxious to secure the valuable monopoly. The successful parties are Messrs. Mann and Mackenzie, two of the wealthiest and most experienced contractors in Canada, and it is likely that they will prove equal to the task. The government is to make a land grant, consisting of 25,000 acres of Yukon land for every mile of railroad built, or 3,750,000 acres in all. The land is to be taken in sections of eighteen square miles, alternate sections being reserved as public domain. In making its selections, the company must not infringe upon the rights already acquired by the miners. If the Yukon fulfills its present promise it can be seen that the contractors are receiving an enormously valuable grant; but it must be borne in mind that the scheme is a purely speculative one, and that the contractors' risks are heavy. As an instance of this it is already reported that they are finding great difficulty in transporting the four or five thousand men necessary to build the road from Vancouver to the Stikeen, the accommodation of the ocean steamers being all secured by the army of gold hunters making for the Yukon.

SIDE DOORS OR END DOORS ON RAILROAD CARS.

One esteemed contemporary The Railroad Gazette has called us to account for our statements regarding certain affairs which are matters of fact and matters of belief in the mind of its editor.

In our issue of February 5 we made two statements in reference to the London underground railways, the first of which was to the effect that they had decided to use electric traction and the second that, on account of the numerous side doors with which their cars are provided, the discharge of passengers is quicker and the stops at stations briefer than on our own elevated roads, where each car provides only two means of exit for the passengers.

The Railroad Gazette in quoting the above says, "We know that it contains some misinformation and we fear that it is all misinformation." The information which it "knows" to be untrue is that relating to the length of stops at stations; the information which it "fears" may be untrue is that relating to electric traction. The "fear" as to our inaccuracy is explained by the fact that our contemporary "has not" itself "learned that any decision to change the motive power has been reached;" and its positive knowledge of the inaccuracy of our statement as to stops is due to the fact that the editor has personally timed the length of stops on both systems and found them to be longer on the underground roads.

The Johnsonian self-complacency which underlies this editorial criticism prepares the reader for the unblushing statement, a few lines further down, that in The Railroad Gazette of 1894 "he will find four editorial articles" on the subject, "which will probably give him more accurate comparisons of conditions as to speed," etc., "than he will find collected anywhere else in the English language"! Verily, the writer has the courage of his convictions; and if he is somewhat lacking in that saving grace of modesty which is supposed broadly to distinguish the technical and professional press from its daily contemporaries, it is consistent with the fact that in the matter of self-advertisement he is thoroughly in touch with a notorious phase of modern journalism which is just now attracting much unwilling attention.

But, to return to the points at issue, we can assure our readers that our information regarding the change to electricity on the underground roads is derived from a source which we have good reason to believe is more reliable than any to which The Railroad Gazette has, or is likely to have, access. As to the relative length of stops on the two roads, our critic states that he has found by personal timing that the length of stops on the underground roads was 30 seconds and on the elevated roads 12 to 15 seconds. It was once our misfortune, during a visit to London, to have to travel for some weeks in the smoky atmosphere of one of these underground roads. Being curious to test the advantages of side doors in the matter of quick loading and unloading of passengers, we made it a point to time the stops on several different occasions. We have not the notes at hand and cannot give the exact figures; but the average time was somewhere in the neighborhood of 15 seconds. During the last few days we have timed the stops on the Sixth Avenue road in this city, between Franklin and Forty-second Streets, and found that they varied in duration from 10 seconds to 33 seconds, according to the hour of the day and the importance of the station, the highest average being 21 seconds and the lowest 13 seconds.

We have taken up this subject again at some length, because we are convinced that for city and suburban traffic, in which it is of the greatest importance to shorten the stopping time at stations, the car with several side doors is superior to the car with only a door at each end. The objections to this system are more sentimental than real. It would be possible to use the side doors (one to each pair of seats) on American cars, without in the least destroying the distinctive characteristics of the latter, such, for instance, as the great length, the central aisle, and the generally commodious proportions. By the use of steel underframing and truss rods with a deeper pitch, the loss of strength due to cutting through the sides of the cars could be fully compensated. With cars so constructed, having a door to each pair of seats, or better, one to each seat, the time of loading and unloading during the rush hours would be cut down fully 50 per cent. We say this after a perusal of the "four editorials" to which the attention of the general public has been directed and we find that they fully substantiate our position. Mr. Vreeland, president of the Metropolitan Street Railway Company of this city, who, surely, should know some-

thing about rapid transit, once told the writer, in answer to his suggestion that double-decking the Broadway cars would relieve the congestion, that the capacity of his road when the cars were running under 10 seconds headway was determined by the rapidity with which passengers could be got on and off the cars. Other things being equal, this is also true of the elevated roads, and the figures given in the "four editorials" show the overwhelming superiority in this respect of the side door car. According to this self-accredited authority the underground trains consist of 9 cars seating 430 people and the elevated trains of 5 cars seating 240 people. The elevated trains discharge through 8 doors, an average of 30 persons to the door; the underground trains, according to the same authority, would discharge through about 48 doors, making an average of 9 persons to each door. To reach the exit each person would have to walk an average distance of 12 feet on the elevated and 4 feet on the underground cars.

If the speed of rapid transit is governed in large measure by the rapidity of loading and unloading, it is evident that three doors will do the work quicker than one, and this is the ratio, as shown by the unimpeachable authority of the "four editorials," in favor of the side door system. If the side door should be adopted for rapid transit—on long distance trains it is unnecessary—we may look for better results than are secured in London, where the roads are hindered by the existence of three different classes of cars. There is a slight delay, due to the passenger having to seek his own class car, which would not exist on our roads. The doors would all be opened and shut by a lever controlled by the brakeman, and instead of the 30 or 40 seconds' delay and crowding which is liable to occur at the end of each car at important stations during rush hours, there would be an instantaneous discharge at 6 or 8 doors per car evenly distributed along the length of the train.

THE HEAVENS IN MARCH.

BY GARRETT P. SERVISS.

The glory of the winter heavens lingers in the opening month of spring. Orion has not yet departed from the evening sky and Sirius still glows, with diamond brilliance, the brightest of the stars. But new constellations are gradually advancing from the east.

At 9 o'clock in the evening at the middle of March the visible arch of the Zodiac begins with Virgo rising, passes through Leo to Cancer on the meridian, and then declines through Gemini and Taurus to Aries setting. At the same hour the scarf of the Milky Way is flung across the sky from north to south, just west of the meridian. The Great Dipper, bowl downward, crosses the meridian about midnight.

THE PLANETS.

Mercury and Venus are the guests of the sun, and, as such, except to the licensed eye of science, withdrawn from mortal gaze. At the beginning of the month Mercury is in Aquarius and at the end in Pisces. It passes behind the sun (superior conjunction) on the morning of the 16th, and at the end of the month will begin to show itself in the sunset sky.

Venus pursues a course very similar to that of Mercury. Both move from Aquarius into Pisces. Venus is in the lead at the start, but swifter footed Mercury overtakes her on the 26th, after they have both arrived among the stars of Pisces, eastward from the sun. At the close of the month they may both be looked for over the western horizon on a clear evening, just after sunset.

Mars moves during March from the middle of Capricorn into the middle of Aquarius. At the opening of the month it rises about 5:30 A. M. and at the close about 4 A. M.

Jupiter will be the cynosure of all eyes that are turned to the starry heavens this month. The great planet rises about 8 P. M. on the 1st and before 6 P. M. on the 31st.

It is in Virgo, moving westward, from near the star Gamma toward Eta. No one who possesses a telescope, however small, will fail to turn it again and again upon Jupiter. The phenomena of his belts and moons have a perennial interest. They exhibit so much motion and such contrasts of color that the impression they make is of the liveliest description. In watching them one feels that it is indeed another world that he is looking upon, however different it may be from our world in its physical condition and environment. It is interesting to remark that recent studies of Jupiter, particularly those of Prof. Hough, continued almost without interruption for twenty years, seem to show that that planet possesses much more stability in its larger features than has generally been supposed. It is possible that we are on the eve of most interesting discoveries concerning the largest member of the planatary family.

On the night of the 8th Satellite I and its shadow may be watched crossing Jupiter's disk. The shadow will appear on the edge of the disk at 10:22 P. M. The satellite will follow at 10:47 P. M. The transit will last more than two hours.

On the 9th a very interesting series of phenomena occurs. When Jupiter has got above the mists of the horizon two black spots will be seen on his face. The one furthest south is the shadow of Satellite III; the other is the shadow of Satellite II. At 8:05 P. M. Satellite II will itself enter on the disk, and at 8:28 Satellite III will follow its example. Both the shadows will pass off before 10 o'clock. At 10:14 Satellite I will reappear from occultation behind Jupiter. Still later Satellites II and III will pass off the disk.

Saturn remains in Ophiuchus near Scorpio, rising about 1 A. M. on the 1st and about 11 P. M. on the 31st.

Uranus is in Scorpio between two and three degrees southeast from the double star Beta.

THE MOON.

March opens and closes with the moon near first quarter. The new moon of March occurs on the 22d. The moon is full on the 8th and in last quarter on the 15th.

The lunar conjunctions with the planets occur as follows:

With Jupiter on the 9th, with Uranus on the 13th, with Saturn on the 14th, with Mars on the 19th, with Mercury on the 22d, with Venus on the 23d, with Neptune on the 28th.

The moon is nearest the earth on the 14th and furthest from it on the 28th. The greatest libration east occurs about 10 P. M. on the 7th, and the greatest libration west about 4 A. M. on the 22d.

MISCELLANEOUS PHENOMENA.

A minimum of the variable star Algol, which will then be well placed, high up west of the meridian, may be observed at 7 P. M. on the 1st.

There are six recognized meteor showers in March, but none of them is rich or brilliant. Their dates and the constellations from which they radiate are as follows: March 4th, Virgo; 14th, Draco; 18th, Cepheus; 24th, Ursa Major; 27th, Corona Borealis; 28th, Draco. All except the first are in the northern quarter of the sky.

The sun enters the sign Aries and astronomical spring begins at 9 o'clock on the morning of the 20th.

THE OPIUM INDUSTRY IN AMERICA.

BY C. F. HOLDER.

An attempt to raise the opium poppy has been in progress for several years in California. The hot days seemed altogether favorable for the production of the plant and drug, but the accompanying cold nights and the absence of cheap labor proved fatal to the project, and it has been given up as a failure. The value of the drug as a means of money making was, of course, the incentive, and the extraordinary and growing demand for opium in all countries tells a suggestive story of the habit that has obtained a firm hold among the people of all races.

In the very oldest books of the Arabs the poppy is mentioned, showing that the use of the gum is one of the most ancient of practices. The poppy used for the purpose is Papaver somniferum, a plant discovered, in all probability, by the Arabs and carried from Arabia by man over large portions of the globe. At first opium was used as a medicine. Theophrastus was familiar with it, and Dioscorides, in 77 A. D., wrote a learned paper on its properties. Up to the twelfth century Asia Minor was the source of supply, and from then on it was gradually distributed over the globe. The Chinese first obtained the drug in the thirteenth century, it being used purely as medicine; but gradually its insidious effects were realized and it became so important a drug in a commercial sense that in 1757 the great monopoly was secured in India by the East India Company. The business rapidly increased from one thousand chests in 1776 to nearly five thousand in 1790. At this time the emperor Kea King fully realized the effect the drug was having upon his people, and in 1786 its importation was forbidden. Chinese caught smoking were flogged and severely punished. This not having the desired effect, those who were found using it were transported or beheaded. Even this did not affect the sale, and in 1825 the importation of opium into China had increased to 16,877 chests.

In 1839 the Chinese government made a desperate effort to drive off the English opium sellers by ordering off the English opium ships. This not being complied with, nearly thirty thousand chests of opium were destroyed, entailing a loss of ten million dollars. This led to the war and final treaty of Nankin in 1842.

The Chinese government appreciates the dangerous nature of the drug and its effect upon the nation, and has never ceased its endeavors to stamp it out; but without avail, and to-day China is probably the largest poppy producing nation. The provinces famous for it are Chekeang, Yunnan, while southwestern China produces 224,000 peculs, against 100,000 peculs from India. To-day over half the provinces of China produce opium, and the habit of opium smoking seems confirmed. Turkey is noted for its production, and the best opium used in the United States by druggists comes from there.

Some idea of the importance of the trade and the amount used can be obtained from the following: In Macedonia the crop is estimated at 140,000 pounds per annum. In Bengal, where it is a government monopoly, the output is equal to about 90,000 chests, valued at $55,000,000. Persia produces about 10,000 chests; Egypt about $10,000 worth annually, and Mozambique has 60,000 acres under cultivation. Opium has been raised in Virginia and Tennessee, as well as California, but owing to the lack of cheap labor and the uncertainty of the crops, due to frosts, the business is unprofitable.

Nearly all the opium smoked by the Chinese in this country comes from the Fook Hing-Company, of Hong-Kong, which pays the government $300,000 per year for the privilege of carrying on the business. The opium is packed in five-tael tins, which bring in San Francisco $8 each. Some excessive smokers use from four to eight dollars' worth a week.

It has been estimated that in San Francisco thirty per cent of the Chinese are addicted to smoking and that ten per cent of the entire population of Chinatown are habitual "opium drunkards." The drug is smoked as freely as tobacco. First, there are the opium dens. There are scores of these dens in the Chinese quarter of every large city. There the Chinaman can buy his pipe and smoke in peace. In San Francisco white people are forbidden to visit these dens, but they have such places of their own, which are well known to the police, and the vice is ever spreading and increasing.

It is somewhat difficult to determine the amount of opium received in San Francisco, but during the past decade about 600,000 pounds has been taken into that port. In one year the importations for smoking purposes amounted to 100,000 pounds. Previous to 1883 the duty was but $6 per pound. At that time it was increased to $10 per pound on the smoking extract and $1 per pound for crude opium. This had little or no effect upon the trade, as consumers were obliged to have the drug at any price. In 1889 the McKinley bill raised the duty to $12 per pound on opium of all kinds which contained less than nine per cent of morphia. Even under this restriction, and despite the fact that the exclusion bill was in full force, over 63,000 pounds of opium were legitimately introduced in that year, and probably twice as much more smuggled in, the government receiving nearly a million dollars from the duties.

At the present time the importation of crude opium is decreasing. This is due to the law of 1889, which states that only native Americans can legally manufacture the extract, and the law also demands a tax of $10 per pound. The duty on the best Patna opium is $12 per pound, and as it requires two and one-half pounds of this to equal one of the extract, this would make the latter cost about $30 per pound. To this would have to be added $10 per pound revenue tax, which makes a total of $40 per pound on American made opium extract. It need not be said that very little is made, as the Chinese preparation can be had for $18 per pound. The great demand for the extract has induced smuggling, and illicit stills were started everywhere. Opium was and is still smuggled in at the Canada and Mexican lines. It is landed at the islands off shore and brought in by Chinese fishermen, smuggled in on steamers, dropped into the bay and the law evaded in numerous ways familiar to the "heathen Chinee."

In San Francisco hundreds of "opium kitchens" were started. These were extremely difficult to find. Some were established in boats, others in dark cellars, others in the rear of private dwellings. Scores have been closed up by the police, yet some undoubtedly thrive, just as the whisky distillers escape the law in the wilds of Kentucky and Tennessee. The city of San Francisco has aided the government in restricting the sale. In 1881 the city passed a bill declaring it unlawful for any one to sell opium for smoking purposes without a license, the amount of the license being gaged by the amount of business. Thus if a den did a business of $5,000, the owner was charged $150 for the privilege. In 1889, at the earnest request of reformers, an ordinance was passed making it illegal to sell opium without a physician's prescription. There is also a law which makes it illegal for any one to keep or even visit an opium house. Three months' imprisonment is the punishment, but this has no effect. The dens are crowded, as every tourist who goes through Chinatown knows, and the only result is that whites are not found in the Chinese dens; they start dens of their own.

The difficulty of conviction lies in the universality of the habit, as it pervades the home and business. Wherever the Chinese are found there will be the odor of opium. They smoke it as Americans do tobacco. Nearly every well regulated Chinese home has its opium smoking outfit, where the guest is invited to smoke. Many of the merchants have such a retreat in the rear of their shops, into which a customer may be asked to smoke as an American merchant is invited to take a cigar. The difficulty, then, lies in the impossibility of drawing the line between professional and private opium dens.