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## THE NEW YORK WATER SUPPLY—A GREAT DAM DECIDED UPON.

Ever since the water supply of New York City actually commenced to flow through the splendid new aqueduct completed last July, the public interest in the projected great dam, which formed a part of the whole water supply enterprise, has manifested itself in many ways. At the time the aqueduct was decided upon, the plans and specifications were submitted for the immense complementary work since known as the Quaker Bridge dam,* which was to be about four miles below the present Croton dam, and give a total storage capacity of 34,000,000,000 gallons. The great dam, however, has not been commenced, and the water supply coming through the new aqueduct is still obtained from the old Croton reservoir, to which has been added, as sources of supply, some supplementary minor reservoirs which the topographical features of the Croton basin favored being made available at small cost.

The projected Quaker Bridge dam had many opponents, on account of its great cost, and the fear that a dam so high, holding such a vast body of water, might not be entirely safe. Its estimated cost was $4,087,000, and it was to be 180 feet in height above the river bed, below which the foundations would go down 91 feet. On account principally of these considerations the New York Aqueduct commissioners, in whom the necessary authority is vested, have decided upon the construction of a dam designed to be somewhat less expensive and at a location presenting fewer engineering difficulties, at Cornell.

The new dam, for which Chief Engineer Fteley has been instructed to prepare plans without delay, will rise 159 feet above the bed of the Croton River, the foundations going down 70 feet. Its length between flow lines will be 1,736 feet, and its cost is estimated at $3,650,000. Another dam, styled the Fteley, or Croton No. 2, had been projected, to be located about a mile below the present Croton dam, but this plan, although it would have been much less expensive, was laid aside, because it would have added but slightly to the present reservoir storage capacity. The estimated cost of the Fteley dam was put at $2,450,000 if built of masonry, and $1,750,000 if of earth, while its total capacity would have been 16,000,000,000 gallons.

The site selected for the Cornell dam is about one and a quarter miles above that which had been adopted for the Quaker Bridge dam, and two and three-quarters miles below the present Croton dam, and will give an additional drainage area of twenty-one square miles, and a storage capacity of 30,000,000,000 gallons. The engineer estimates that it will require five years to build the new dam.

## MR. CRAMP THE SHIPBUILDER, REPLIES TO HIS CRITICS.

The charge is often made that the ships of our new navy, though making fast time under the special and the abnormally favorable conditions of their trial trips, are unable to approach contract speed with such conditions as obtain in ordinary Atlantic weather. The work these ships have done lends color, if it does not actually sustain, the charge. Whether or no these ships, if pressed, can really repeat their initial performances is an interesting one, and, with a view of getting at the facts, the SCIENTIFIC AMERICAN recently sent to Mr. Charles H. Cramp, who is one of the best known and most skillful of American iron shipbuilders, for his opinion on the subject.

Mr. Cramp said:

"The statement has been made that the cruisers recently built for the United States government, while making good time on their trial trips, have been deficient in speed ever since. This statement, so far as the cruisers constructed by us are concerned, is absolutely false, as will be readily seen by referring to the recorded figures showing the speed our vessels made on the measured mile in their trial trips and in their later runs.

"The cases of the Yorktown and the Vesuvius will afford an illustration of the truth of my assertion. The Vesuvius, when submitted to the trial test by the government officials, registered a speed of 20·5 knots; and this after having had her displacement increased from nine hundred to one thousand tons. With her former displacement we made her register a speed of 21·65 knots. It is a well known fact that in most cases abroad, instead of an increase in the normal speed over the trial speed, there is a marked decrease.

"This falling off from the speed attained on the trial trip usually amounts to from 20 per cent to 25 per cent. This is a rule to which there are few exceptions; and yet, in spite of all this, our critics, many of whom are actuated by feelings of personal spite, will try to have it believed that the ships turned out of our yards are found wanting in speed after a short term of service. Look at the foreign-built vessels of the Vesuvius class, known as the Sharpshooter class. These vessels have been trying to reach a speed of 21 knots, forced draught, for nearly two years, without success. As yet they have not succeeded in making over 17 or 18 knots, natural draught. This falling off in speed of the foreign-built vessel is not due to any inefficiency of the officers, but to the fact that the engines of these vessels have not the quality of endurance, a defect which may be ascribed to the absence of good workmanship.

"The cruiser Yorktown, built by us for the United States, is absolutely without a parallel so far as continued excellence of speed is concerned. The officers in charge of this vessel can make her register the speed she reached on her trial trip whenever they desire to do so.

"Compare this with the performance of the corresponding type of foreign-built vessels, known as the Archer class. These vessels are, without a single exception, 25 per cent slower in normal speed than the Yorktown. The Baltimore is the fastest cruiser in the world of her class, and the excellence of the performance of her engines is still maintained even up to their maximum efficiency. And it is the unanimous opinion of naval experts that the Philadelphia will maintain, if not exceed, the speed attained on her trial trip. The Newark, for the weight of her engines, is the best performing vessel of all the large vessels built by us for the government; the speed attained by her on her preliminary trips being greater than any yet attained abroad with a similar weight of engines and displacement. It is the opinion of experienced naval men that she, too, will continue to maintain the speed developed on her trial trips. An important element going to make up the superiority of American over foreign built ships is the excellence of the engines. The engines in the cruisers recently turned over by us to the government are more expensively constructed and fitted out than any engines ever built for a naval vessel abroad. This is true particularly of the boilers. Of the vessels built by us for the United States, there has not been a single instance of defective boiler. On the other hand, the reverse has been the case at all the official trials of foreign-built ships during the last eighteen months.

"In like manner, I could cite each one of our ships as an example, and comparing their normal speeds and sea-going qualities with those of foreign-built vessels of the same respective classes, we would find to be true of all what I have said of a few.

"These astute critics also harp on the statement that the first-class passenger ships built abroad can maintain, and do maintain, a rate of speed almost equal to that developed on the trial trips. They cite figures which they allege go to prove this statement, and then, for a climax, they ask what vessel the United States now possesses that could compete with these foreign-built passenger ships as commerce destroyers in the event of a war.

"Well, there never was a more misleading statement than that. It is one of those statements that are so hard to handle, because they take for granted something which does not exist. How absurd it is to compare an elephant with a greyhound, or a naval cruiser with a passenger ship! So in this instance they are comparing things which are essentially different in their nature. And, moreover, these foreign-built passenger ships have no trial record from which to fall short of, and no 'contract standard' from which to deteriorate. They are accepted without any such tests as is customary in this country; and there is no standard of performance on which depends the acceptance or rejection of the vessel.

"It is true, perhaps, that the government possessing the swift-sailing passenger vessels, like the City of Paris and the City of New York, would have an enormous advantage over us by employing these vessels as commerce destroyers. But this advantage would not be so great as might at first be supposed. For the United States having comparatively very little commerce to be destroyed, there would be correspondingly little work for commerce destroyers of the foreign powers; whereas with a good fleet of cruisers, such as the Yorktown, Baltimore and Philadelphia, the war would be largely one of defense by the foreign power, and offense by the United States. In short, I may say that the American navy is lacking, not in the quality of its vessels, but in the quantity.

"It has been also said that our ships have an insufficient coal capacity. That is another one of those slippery statements. I never saw a war vessel that could carry coal enough. This is, perhaps, a radical statement, but nevertheless a true one. And it is here that the armed merchant vessel will have such a great advantage over the war vessel, in its greater coal-carrying capacity, and hence its swift-sailing and enduring capacity. I say no war vessel has a sufficient coal-carrying capacity, because a war vessel is, above all things, 'a bundle of compromises.' The qualities which are called for in a first-class war vessel are so diverse, and of a nature so antagonistic, that each of these qualities must be modified by all the others. For instance, in a war vessel we need great speed, heavy engines, heavy guns and enduring power, that is ability to maintain the maximum rate of speed. But to secure great speed, the models must be fine and en-

*For illustration of proposed Quaker Bridge dam, building of new aqueduct, and map and profile of route, see SCIENTIFIC AMERICAN SUPPLEMENT, No. 558.

gines heavy, and hence the ship cannot be given such a large coal-carrying capacity.

"Another difficulty under which our navy is laboring is the lack of good sailors to man the vessels and operate the complicated machinery and apparatus. A few of our American sailors, it is true, are highly efficient, but we have not enough men capable of properly handling a modern ship. This, however, is a question of administration, and the defect will, without doubt, soon be remedied.

"The proposition to keep the engines in good condition and up to their maximum efficiency by employing the vessels in carying the mails, or in some similar work, is highly impracticable. In the first place, a cruiser is made to cruise, not to carry freight or passengers other than the crew, but to act in the event of war as a commerce destroyer, combining the quality of speed and a gun-carrying capacity. Now, to employ a cruiser for any such purpose as the one mentioned would be entirely subversive of the very end in view. It would result, not in the improvement of men or machinery, but in great detriment to the engines and apparatus. The simile comparing the proposed plan with putting a race horse through his paces is a faulty one. There can be no comparison between a living being and a machine. The former has the power of recuperation. It repairs itself automatically. The engine has not this power, and for every pound of work performed it is less efficient than before. So the cases are essentially different. With one the product is exercise, with the other it is wear and tear.

"In all the discussion concerning naval matters in general, and armed cruisers in particular, there is, I think, too much importance given to high speed as a factor. Now, if we bear in mind what I have said, that a war vessel is a bundle of compromises, and also the fact that the commerce of the world is carried in slow-going ships, it will be seen that continuous high speed is not the all-important factor in the construction of commerce destroyers."

## POSITION OF THE PLANETS IN FEBRUARY.

### JUPITER

is evening star until the 13th, and then becomes morning star. He comes to the front on the February annals, for an important epoch in his course takes place. This is his conjunction with the sun, on the 13th, at 10 h. 5 m. A.M. He is then in line with the sun and earth, the sun being in the middle, is at his greatest distance from the earth, and, passing beyond the sun, appears on the sun's western side, to commence his role of morning star. The giant planet is conspicuous by his absence from the sky during the month, for he is so near the sun as to be hidden in his light.

The new moon, when only three hours old, is in conjunction with Jupiter on the 9th, at 0 h. 32 m. A. M., being 4° 12′ south.

The right ascension of Jupiter on the 1st is 21 h. 38 m., his declination is 14° 59′ south, his diameter is 31″.4, and he is in the constellation Capricornus.

Jupiter sets on the 1st at 5 h. 54 m. P. M. On the 28th he rises at 6 h. 10 m. A. M.

### VENUS

is morning star. She reaches her greatest western elongation on the 13th, at 3 h. 40 m. P. M., and is 46° 51′ west of the sun. She then takes on a beautiful form, that of the moon in quadrature. Before western elongation her form is that of a crescent, after western elongation she becomes gibbous. Her decreasing size and brilliancy and her approach to the sun after elongation are worthy of note for observers who are up betimes to behold this peerless star, a glorious object in the morning sky during the month. The western elongation of Venus occurs about five hours after the conjunction of Jupiter with the sun, and as soon as Jupiter is far enough from the sun to be visible there will be two bright morning stars approaching each other.

The waning moon, about three days before her change, is in conjunction with Venus on the 5th, at 0 h. 34 m. P. M., being 5° 27′ south.

The right ascension of Venus on the 1st is 17 h. 48 m., her declination is 19° 19′ south, her diameter is 28″.8, and she is in the constellation Sagittarius.

Venus rises on the 1st at 4 h. 4 m. A. M. On the 28th she rises at 4 h. 13 m. A. M.

### SATURN

is morning star. His role in this character is nearly completed, for when the month closes he rises only a few minutes after sunset. He is, however, on the western side of the sun, and, according to astronomical classification, is ranked as morning star. He shines in the eastern sky, early in the evening, as a conspicuous star, southeast of Regulus, his close companion during the last year, but now far removed.

The moon, the day after the full, is in conjunction with Saturn, on the 24th, at 7 h. A. M., being 3° 4′ north.

The right ascension of Saturn on the 1st is 11 h. 12 m., his declination is 7° 27′ north, his diameter is 18″.4, and he is in the constellation Leo.

Saturn rises on the 1st at 7 h. 54 m. P. M. On the 28th he rises at 5 h. 58 m. P. M.

### MARS

is evening star. There is nothing new or interesting in his course as he makes his way toward the sun, and increases his distance from the earth, but, indifferent to terrestrial observation, he plods on in his appointed course, and little heeds the sensation he may create when he returns to our nearest neighborhood in 1892.

The moon is in conjunction with Mars on the 12th, at 5 h. 46 m. A. M., being 4° 38′ south.

The right ascension of Mars on the 1st is 0 h. 17 m., his declination is 1° 34′ north, his diameter is 5″.6, and he is in the constellation Pisces.

Mars sets on the first at 9 h. 33 m. P. M. On the 28th he sets at 9 h. 28 m. P. M.

### MERCURY

is morning star. He reaches his greatest western elongation on the 6th, at 4 h. 48 m. A. M., and is 25° 40′ west of the sun. He is then, and for a few days before and after, visible to the naked eye, but is not in favorable condition for observation on account of his southern declination.

The right ascension of Mercury on the 1st is 19 h. 18 m., his declination is 20° 55′ south, his diameter is 7″.2, and he is in the constellation Sagittarius.

Mercury rises on the 1st at 5 h. 42 m. A. M. On the 28th he rises at 6 h. 1 m. A. M.

### NEPTUNE

is evening star. He is in quadrature with the sun on the 22d at 5 h. P. M., is then 90° east of the sun, and is on the meridian at sunset.

The right ascension of Neptune on the 1st is 4 h. 9 m., his declination is 19° 22′ north, his diameter is 2″.6, and he is in the constellation Taurus.

Neptune sets on the 1st at 2 h. 28 m. A. M. On the 28th he sets at 0 h. 42 m. A. M.

### URANUS

is morning star. His right ascension on the 1st is 13 h. 58 m., his declination is 11° 27′ south, his diameter is 3″.6, and he is in the constellation Virgo.

Uranus rises on the 1st at 11 h. 45 m. P. M. On the 28th he rises at 9 h. 58 m. P. M.

Mercury, Jupiter, Venus, Uranus, and Saturn are morning stars at the close of the month. Mars and Uranus are evening stars.

## Tricks of the Imagination.

BY H. C. HOVEY.

The delusions and hallucinations of insanity have been remarked upon by all writers on mental derangement. But my intention now is to give a few authentic cases where the excited imagination of people with seemingly sound brains has played them singular tricks.

A report has gone the rounds to the effect that a certain lady residing in Bridgeport, Conn., called her physician in mortal agony because she had, as she supposed, swallowed her false teeth. She could feel them far down in her throat and was actually choking to death. Eminent doctors consulted and agreed to resort to tracheotomy, to which they were about to proceed when one of them happened to step on some object under the edge of the bed, which on examination proved to be the missing molars. As soon as they were exhibited to the patient her convulsions ceased, and she recovered her normal condition. Sifting the facts from the sensational accompaniments, there remains the delusion as to the teeth, the calling for medical aid, and the finding of the teeth before the doctor arrived on the scene. But even thus modified the case was quite remarkable. It suggests instances of somewhat the same nature.

During the war an officer had to send a messenger across an opening where the bullets were flying dangerously. He selected a very brave men and cautioned him as to his peril, telling him to ride for his life on reaching the open field. The officer watched him through his field glass, saw him fling himself behind the flank of his horse for safety, and finally saw him drop from the steed as if mortally wounded. A second man was sent safely on the same errand, while the wounded soldier was cared for. He had merely fainted. On coming to he found the surgeon at work over him, and anxiously inquired as to the precise nature of the wound. He was told by the surgeon that he had been squarely hit, and that the injured part could never be made whole again. "But rest easy," said the doctor, "for the shot only took effect—in the *canteen!*" The man had not been injured in the least, but had been deceived by the flowing of the contents of his cherished canteen, which under the circumstances he naturally mistook for his heart's blood. The soldier is living yet to laugh over his ludicrous mishap.

As names are not mentioned, I may be pardoned for narrating an incident in the experience of an evangelist of renown, and as remarkable for his common sense as for his piety. He came to a sudden pause in an impassioned discourse to fully 5,000 people. As I happened to be near him, he beckoned to me to accompany him to a private room, while the choir should entertain the astonished audience during the interim. My clerical friend solemnly assured me that he was about to die, and that sensations of mingled pain and rapture had seized him such as he had never felt before, and that convinced him that his time had come to depart. With some difficulty he was led to submit to an examination, when it appeared that a vial of aconite which, for some reason, he carried in an inner pocket, had been broken by one of his more vigorous gestures, and the pungent contents flowing over his chest had caused the peculiar burning sensations described. After a process of sponging the saint decided to tarry among sinners for a while longer, and resumed without special explanation his interrupted sermon.

A gentleman who is now the admired editor of a popular scientific magazine was some years ago made the victim of a practical joke that narrowly escaped a serious termination. He entered a room where some of his jovial friends were having good cheer. Being himself, at that period of his life, of a convivial turn, he readily joined his comrades in cracking a fresh bottle. Presently one of them anxiously looked at the label, that had been modified for the occasion, and exclaimed that they had been drinking poison. The visitor grew alarmed, manifested dangerous symptoms, took to his bed, and his comrades themselves becoming frightened, sent in haste for a physician, whom it took a long while to satisfy his imaginative patient that he was not perishing from a deadly potion.

An eminent New York physician, who was fond of experimenting, told a friend that he had compounded some wonderful pills, a single one of which would cause certain described symptoms. His friend volunteered to take one. The symptoms followed exactly as foretold; but the pill was afterward noticed in the tangles of a very full beard, not having been swallowed at all. The doctor's faith in the potency of his pills was such as to make him think that their mere proximity to the mouth might prove to be efficacious. But we bystanders attributed the unquestioned symptoms to the influence of an excited imagination over the physical condition.

To the foregoing authentic instances now first published might be added a long list of recorded cases with every variety of delusional fancies, the victims being of sound mind and in ordinary health. These phenomena cannot be classed as morbid, nor can they readily be explained by hypnotism. But they certainly have a value in the delicate task of determining the significance of bodily symptoms. They teach that acute pain, great discomfort, deadly wounds, and also the beneficent effects of curative medicines may be simulated by experiences that in reality are purely mental. To make light of such ills would be cruel. To treat them physically would seem to be absurd. Their remedy, like their cause, must be mental. Herein is the secret of the "bread pill" system. A sidelight is also thrown upon the marvels of faith cures, mesmeric healing, mind cure, and, if we may say so, of so-called Christian Science itself. And spurning quackery and imposture, there certainly is room, in a wise and sensible system of healing, for an agency known to have such amazing power as the imagination.

A caution is also in order of an educational sort. Constant appeals are being made to the imaginations of children, some of which may be temporarily beneficial, but most of which are harmful first or last. The bold climber is warned that he will fall; and giddiness follows, provoking the very evil shunned. Shout to the careless swimmer that he is beyond his depth and cannot possibly reach the shore, and he may fancy that his case is really desperate and be drowned, when considerate encouragement would have strengthened him to gain the strand. Cram a young mind with a horror of mad dogs, and in later years nervous symptoms may follow the bite of a non-rabid animal almost as serious as hydrophobia itself. The physical effects of pernicious literature are deplorable, as well as the depravation of morals. In short, the imagination is not to be trifled with. Its wonderful power should be used only for good. Thus used, it is the handmaid of science and of virtue, the helpful servant of the healing art, and the fountain of happiness. A clean, sound, wholesome imagination, as contrasted in its effects with one that is foul, depraved, and disordered, is probably what the wise man had in mind in saying, ages ago, "Keep thine heart with all diligence, for out of it are the issues of life."

## Agricultural Electricity.

M. Comille Gonzy, the proprietor of numerous small farms in the commune of Millas (Western Pyrenees), having an area altogether of nearly 1,500 acres, has, for some time past, been utilizing a neighboring stream for electric lighting purposes. He has now applied electric power to the working of a wine-crushing plant. Besides providing the power for lifting and driving purposes, electricity is made to work the pumps for irrigating the vines. The 180 16-candle power lamps employed are distributed over all the farms, and the area which they cover may be judged from the fact that the length of telephone wire connecting the buildings is 62 miles.