MR. GOLDING'S THEORY OF MISSISSIPPI FLOODS AND THEIR PREVENTION.

The Mississippi River Commission, to whom is allotted the planning of works for the improvement of navigation and the prevention of disastrous overflows along the Mississippi, are working on the theory that the existing channel of the river is ample for the discharge of all its waters, and needs only to be made uniform in breadth and depth, and kept within bounds by protected banks, to meet all possible requirements. Where the river is narrow the velocity of its flow enables it to carry a heavy load of silt, which is largely dropped in the wider places, where the flow is naturally less rapid. In this way vast sand bars are built up, at once a hinderance to navigation and a source of danger during floods. The commission believe that the proper work to be done is to confine the low-water width of the channel to about three thousand feet by systems of jetties wherever bars or shoals are found, thus compelling the river to scour out a deeper channel. In times of flood the spaces outside the corrected channel are expected to be built up by earthy materials dropped by the river, the ultimate effect being to develop new and stable shore lines, and secure conditions requisite for a uniform velocity for all stages of the river. This done, it is believed that the discharging capacity of the channel will increase so rapidly with the rising of the flood level, owing to the augmented rapidity of flow secured by uniform width, that any serious overflow will be practically impossible. This system naturally involves the restoration of the broken levees and the closing of all outlets save those at the river's mouth.

Our correspondent, Mr. William Golding, of New Orleans, argues that the work proposed by the commission will be mischievous rather than beneficial. The view he takes of the problems presented by the Mississippi and its overflows are novel, to say the least; and as an independent contribution to the discussion of those problems his argument, which we present substantially in his own words, certainly merits consideration.

There is, he insists, nothing peculiar in the Mississippi River. The power of the river is fixed by its height at Cairo above the level of the Gulf; and this power, whatever it may be, is entirely consumed in overcoming the friction of the river bed, which in length is eleven hundred miles. If there be made at proper places outlets by which the river may reach the Gulf by a shorter route, the friction of the bed will be reduced in proportion, and the rate of incline for the remaining portion of the bed will be increased. The dynamic store remaining the same, the discharging capacity of the river as a discharging trough, he thinks, will be greatly increased by such shortening.

In regard to scouring, he holds that for the river to scour or do any other work requires power, and as this power must be taken from the dynamic store of the river it must lessen the discharge.

In regard to contracting the river for the purpose of scouring, he holds that the first effect will be to lessen the inflow or pastflow at the point contracted. The next effect will be to raise the head until the increased velocity, due to elevation, will discharge the original quantity. Therefore, if we contract the river at an indefinite number of points we will have an indefinite number of steps, the aggregate of which will be an inclined plane extending from Cairo to the Gulf. And in the same proportion as we narrow or contract the river, we reduce the discharging capacity of the trough.

He also holds that to deepen the river by any means to a point lower than the outlet or gulf will not increase its discharging capacity, for the reason that the water which is below the outlet does not progress, but merely rolls over, just as the bed rollers of a sawmill carriage do.

For instance, the river in front of New Orleans is 130 feet deep, yet the surface is only 14 feet above the Gulf surface. Now, if the entire bed progressed like a block of marble, the friction to be overcome would be, first, the bottom, 3,000 feet, and two sides, 100 feet each—say 3,200 feet of contact surface. Whereas, if only the depth of the water above the Gulf be counted as progressing, the contact friction will be 14 feet on each side, and the bottom friction will be only that required to maintain, in a rolling motion, the bed water, which might be termed an anti-friction roller. Special stress is laid upon this feature of water moving in a trough.

In regard to levees he holds that nature has shown that to convey the Mississippi water and material 1,100 miles requires a fall of 322 feet. If we build levees as high as the land above and at Cairo, and taper them down to the Gulf, the river will not, at its present width, discharge a single cubic foot more water than it does at present. And if the river bed were deepened to a point 100 feet below the surface of the Gulf, for the entire distance from Cairo to the Gulf, the discharging capacity of the river would not thereby be increased. Therefore, to increase the discharging capacity of the river we must, in his opinion, widen the trough—not contract it; and to increase the velocity of the flow we must either raise the head or shorten the trough. The fact that the river water is muddy and bears with it to the Gulf a large quantity of soluble and insoluble material creates no new law; neither does it necessarily add to the complexity of the subject.

The theory that outlets cause the river to shoal below such outlets he disputes, as unsustained by fact.

We must concede, he continues, that the river will not leave its bed to follow a longer channel to the Gulf; and where an outlet is opened which offers a shorter route there can be no new phenomena in the course of the river in pursuing this new channel, nor can any new conditions arise after it enters the Gulf. The passes, as they are called at the mouth of the river, are neither more nor less than outlets, and there is no reason why another outlet should act differently or present new difficulties.

The periodical overflows to which the Mississippi is subject, Mr. Golding believes to be due to other causes than the malformation of its trough. Chief among these causes he places the attractive influence of the sun, moon, and the several planets when in conjunction. This planetary theory of Mississippi floods is decidedly novel; how well founded it may be in the nature of things may be left to astronomers and hydraulic engineers to determine.

The tides raised by solar, lunar, and planetary influence in open seas quickly subside for the reason that there is nothing to prevent the water's flow. Altogether different, Mr. Golding holds, is the effect of the planetary influence upon the river, in which the water is entrapped by the numerous bends and right angles, and in many places reverse curves, and its progress to obey the law of gravity is halted by the higher law of planetary attraction.

If the spring floods are released during the time that the several planets which produce the tides are approaching conjunction, the effect of the planetary attraction will be to impede the flow due to gravity to some extent each tide, and to gradually fill the banks of the river and tributaries at the point where the planetary influence is greatest, which he assumes from the experience of last spring to have been at Helena, Arkansas.

When the planets separate and change position the attraction gradually weakens, gravity again asserts its sway, thus precipitating the immeasurable accumulation of water upon the lower river.

To receive and bear away this avalanche the utility of properly constructed and properly located outlets cannot, he holds, be seriously questioned.

He does not maintain that the tidal water is drawn up from the Gulf, but that the inflow is retained by the bends in the river. Thus, supposing the "planetary" influence to be equal to the attraction of the water only one foot above the natural line, as soon as the influence is gone the water would have to run at two miles an hour twenty-two miles to get to its normal level, yet before this point could be reached the planetary influence would return and call it back, which condition would be repeated every day for fourteen days, when the influence would begin to weaken. At this stage the flood in the lower river commences.

This, he believes, is exactly the condition experienced last spring, and he is confident that if the flood water had flowed into the lower river fifteen days sooner, or fifteen days later, there would have been no flood to speak of.

To substantiate this position he cites the fact that the Atchafalaya, which is 1,200 feet wide, and usually a very sluggish stream, was conveying more water past Morgan City in the forepart of April than the Mississippi River conveyed past New Orleans, its depth then being 60 feet and its velocity estimated to be 7½ miles per hour.

In addition to this there was flowing over the Morgan Railroad bed, between New Orleans and Morgan City, a stream twenty miles wide by five feet deep, flowing with a velocity of three miles per hour, fully ten times more water than the Mississippi River conveyed past any point below Cairo. It was water which had been held back by planetary attraction.

Mr. Golding believes that the proper way to improve the river is to remove the levee in front of selected outlets during low water, and construct brickwork facings with alternate openings to receive the water and blanks to exclude driftwood. Suitable levees should conduct the flow from the outlets to the swamp. He would place these openings at every available place on both sides of the river between the mouth of Red River and the Gulf. The swamps all connect in some way with the Gulf, so that there would be no danger of filling the swamps unless by turning in too much at any one place. He would also restore the broken levees. The effect of these outlets would be, he thinks, equivalent to bringing the Gulf level to the mouth of the Red River. The slope of the river bed above that point would thus be made steeper and the flow of the stream much faster, the risk of overflow being correspondingly diminished.

TILE FISH.

During the past summer the United States Fish Commission has searched in vain for the tile fish (*Lopholatilus chamæleonticeps*), formerly so abundant along the inner edge of the Gulf stream, south of Long Island; and in the early fall the search has been continued without taking a single specimen.

It will be remembered that this valuable food fish was discovered in 1879 by the Fish Commission, by means of the method of deep trawling which the commission had newly introduced. During the two succeeding years large quantities were taken by the same means, the excellent quality of the new fish making it a most acceptable addition to our list of edible fishes.

An illustration of the tile fish, with an account of its characteristics and history, so far as known, appeared in our issue for April 29, 1882, about the time of the sudden and unexplained appearance of the fish, dead and dying, in vast multitudes upon the surface of the sea. According to the testimony of ship masters, compiled by Captain J. W. Collins, of the Fish Commission, the belt of dead fish—largely tile fish—extended along a line of at least 170 geographical miles, with a width of 25 miles, some accounts indicating a much greater extension of the drift of dead fish southward. It is hard to form a conception of the vastness of the multitude of dead fish reported, the area over which they were profusely strewn equaling that of the State of Connecticut, at least, and possibly that of the State of Massachusetts. The minimum estimate of the weight of the dead fish, made by Captain Collins, exceeds fourteen hundred million pounds; and it may have been twice or thrice that amount.

The cause of this general mortality appears to be beyond discovery. The effect is seen in the apparently total disappearance of the tile fish from its original haunts. Only time can tell whether they have been wholly exterminated. If any survive it is hardly possible that their former abundance can be restored for many years.

Heavy Work on the West Shore Railroad.

The construction of the Hudson River division of the New York, West Shore, and Buffalo Railroad involves some exceedingly heavy work. The contract for this part of the road is in the hands of the North River Construction Company. The Weehawken tunnel, 4,000 feet long, is to be completed December 1. Thence to Haverstraw, where the road comes in sight of the Hudson River again, the work is well advanced and will be ready for tracklaying by the time the tunnel is finished. The tunnel at Haverstraw, which is 1,600 feet long, will be blasted by October 1. The work from Haverstraw to Krum Elbow, along the west bank of the Hudson River, is of the heaviest and most expensive character. The profile has the appearance of huge saw teeth. West Point Tunnel, which is 2,700 feet long, will be ready for the track by the 1st of December. The line on this part of the road passes alternately from a high rocky point or projection to the water's edge of the river, where the water is from 10 to 125 feet in depth. In three places the great depth of the water and the steep slope of the bottom necessitate spanning the deep gorge with iron bridges; in one instance a 290 foot span bridge, which is probably the longest double track bridge ever built. For the other two places bridges of 200 and 137 foot spans are used. The numerous accidents from blasts along the Hudson River in this vicinity are occasioned by the haste and energy used in prosecuting the work. At Krum Elbow the road gradually ascends the sloping hillside sufficiently to leave the river again. At Rondout there is a tunnel of 350 feet, with a very high viaduct spanning Rondout Creek.

Boring with Bort.

In the course of some boring operations, which have recently been carried on by the Government of the Cape of Good Hope in the search for coal, it occurred to the geologist in charge to make trial of native bort in lieu of the Brazilian carbonado, which had, until then, been employed. The experiment proved a complete success. The last six crowns used were of three inches diameter, set with bort. It was found that these bored through 1,100 feet of sandstone and shale, part of it exceedingly hard, being indurated by contact with intrusive rock. The average boring per crown was therefore 183 feet, and the last crown is nearly as good as new. Of the above six crowns, one bored through 322 feet 7 inches, and was still usable; while another bored through 390 feet. In precisely the same class of country, eight crowns supplied from London and set with carbonado bored only 30 feet each. The boring effected with the latter cost at the rate of 27s. 6d. per foot; while the work done with bort, in the same class of rock, cost less than 2s. per foot bored. The advantage in the use of bort is increased by the fact that, owing to the greater depth bored by a single crown, there is less delay caused by the resetting of the stones. Great care is, however, necessary in the selection of bort for the purpose, as a very large percentage of the ordinary bort of commerce is unsuitable.

[The African "bort" here mentioned consists of small diamonds, not good enough for gems. They are used for polishing brilliant diamonds and other purposes. The Brazilian "carbonado" spoken of is a black diamond, that is, an impure carbon. It is extensively used in diamond drills and forms the cutting edges thereof. Black diamonds or carbonados look like bits of anthracite coal.]

A Panama Canal Projected in 1846.

Thirty-six years ago this month (September) the SCIENTIFIC AMERICAN contained the following paragraph on the projected Panama Canal:

"It has for several months, not to say years, been a matter of incomprehensibility to us that the French should persist in this project of constructing a canal from the Atlantic to the Pacific Ocean, while there has been such palpable demonstration that ship-railroads must inevitably take the preference; but certain recent developments throw much light on the subject, by representing that the mountains through which the canal is (or was) to be cut are supposed to abound in native gold. All probability of the completion of the great commercial enterprise is therefore ended."

[Exactly what idea was intended by the last few lines of this paragraph we do not recollect, but certainly the project of a ship-railroad was clearly foreshadowed in this paper thirty-six years ago.—ED.]