

cytological research. A notable instance of what there is to be done is well indicated by the work of the late Dr. Timberlake on the division of plastids and the development of the starch grain.

[Concluded from SUPPLEMENT No. 1631, page 26134.]

THE NEW INLAND SEA.*

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THE RETREATING CATARACT.

THE deep channel in the Alamo River, which passed Holtville in August, was gradually approaching Sharp's Heading, and it was recognized that when this cataract reached the heading it would be very difficult and expensive, and perhaps impossible, to maintain that heading. This, however, was not the only peril to the water supply of the valley. The channel of New River had eroded to such an extent that where the two streams separated it was estimated that four-fifths of the water was running down New River and only one-fifth down the Alamo. While this proportion was favorable to the regimen of the Alamo and the safety

Volcano Lake is about 30 feet above sea level. Taking the mean annual discharge of the Colorado River at 9,000,000 acre-feet and the evaporation at 6 feet in depth per annum, the lake would fill in forty to fifty years and would flow a considerable stream perennially into the Gulf of California. But taking the more probable values of 8,000,000 acre-feet for the mean annual inflow and 7 feet in depth for the mean annual evaporation, the depression would never fill. It would rise to a point 8 or 10 feet above sea level and oscillate above and below this level in accordance with the fluctuating annual discharge of the Colorado River.

Either result, however, would have been destructive of enormous interests. It would have submerged 150 miles of the railroad track of the Southern Pacific road, and would have required extensive alterations of its alignment in the vicinity of Yuma. The rapid erosion of the channel leading to the Salton Sea would advance upstream slowly but surely. It has already cut the channel at Yuma two or three feet below the former level. This cutting would be continued until the 200-odd feet of excess fall in the channel had been distributed up the Colorado River, eventually, perhaps,

enced great difficulty in preventing the destruction of its bridge across the Alamo River, as the channel cut deeper and wider. The railroad company appreciated the gravity of the situation in the summer of 1905 and made a large loan to the irrigation company for the purpose of damming the channel. Repeated efforts to do this were unsuccessful, and the control of the irrigation company passed into the hands of representatives of the railroad company. About one year ago the construction of a dam across the new channel was in progress, and strong hopes were entertained by the railroad people of the success of the attempt, when a very large and unexpected flood came down the river, which carried away the works and left the situation more threatening than ever. As soon as the water subsided sufficiently the efforts were renewed and continued throughout the spring of 1906 without success. When high water came in May the company was obliged to abandon its efforts until after the flood season. The heavy discharge of the river during May, June, and July nearly all went down the Alamo and New Rivers and cut the channels larger and larger. The railroad south of the Mexican line was entirely washed away, the former site finally becoming a deep channel.

THE DESTRUCTIVE CATARACTS.

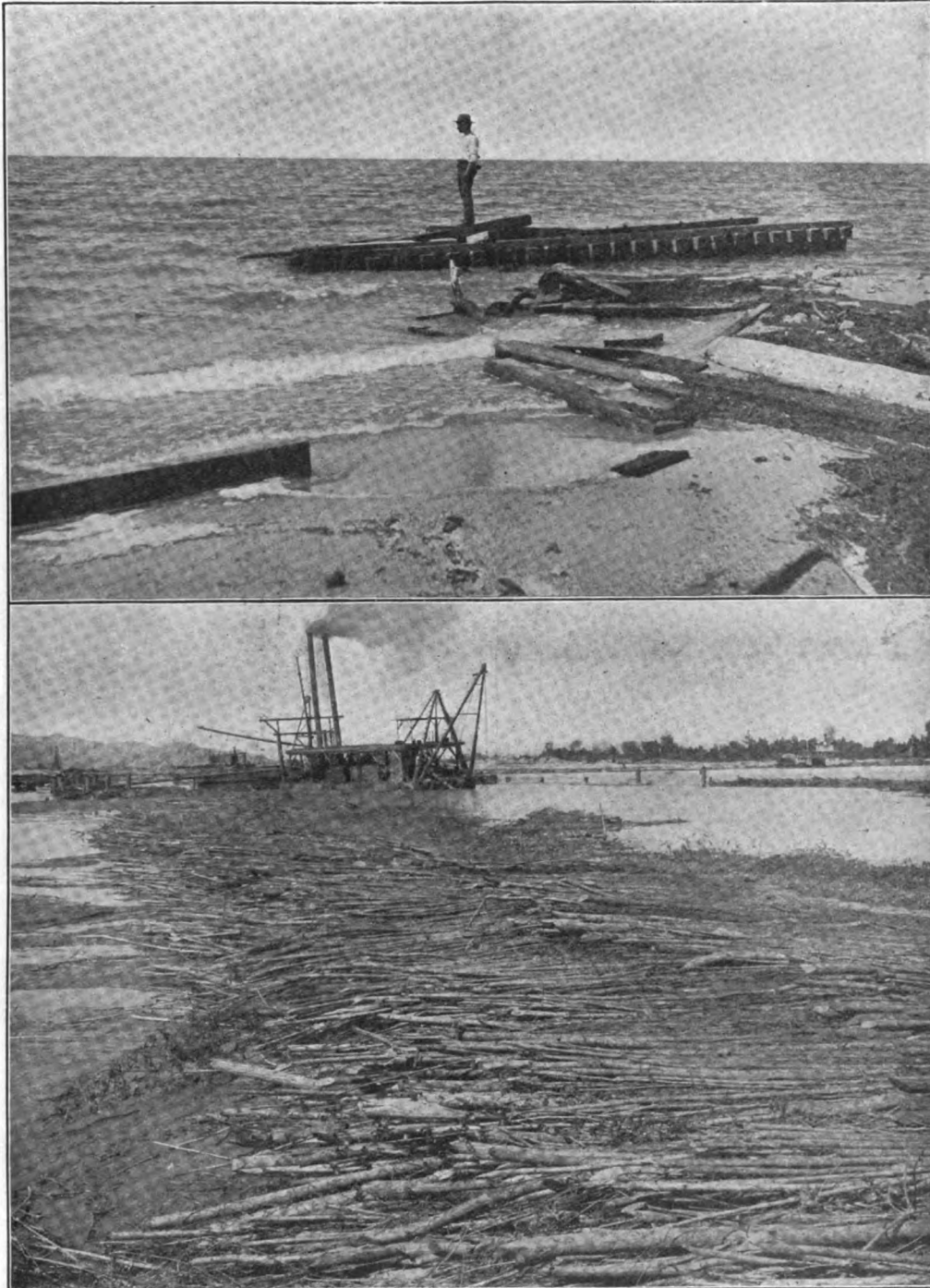
The cataract in New River advanced upstream past Calexico, took away some of the buildings of that town, and nearly all of the buildings of the Mexican village of Mexicala, and continued to advance eastward at a threatening rate. The Alamo River cut back similarly, and in August, 1906, the cataract had passed the town of Holtville and caused the temporary shutting down of the power plant at that place. In the endeavor to prevent the destruction of valuable buildings and farms, the people made strenuous attempts to guide the cutting of the water by the use of dynamite to assist the cutting where it would do less damage than if left to its own inclinations. It is not apparent, however, that any great benefit resulted from these attempts. During the high-water season of 1906 the irrigation company made two plans for the diversion of the destructive waters. One of these, the success of which was relied upon, was the construction of large headgates, at the foot of Pilot Knob, substantially as originally planned by the engineers. It was planned to dig a channel from the river above these headgates large enough and deep enough to divert the water without very much obstruction and carry it to the Alamo River below its junction with the Colorado. This would leave the new channel dry and permit a dam to be built there and levees along the river to close the disastrous break. This work, however, required a very large amount of excavation, estimated to cost nearly a million dollars. The headgates were built, but no sufficient machinery was available for the excavation, and the construction of a mammoth dredge was undertaken at Yuma. This dredge, mounted upon an enormous pontoon, was to have a capacity of lifting about six tons of material at once, and is now finished and at work.

Realizing the large amount of time that would be required for this excavation, and in the face of the heavy cost of repeatedly moving its track onto higher and rockier ground along the Salton Sea, the company concluded to make a preliminary attempt to dam the new channel by constructing a by-pass around the proposed dam site, through which the water could flow as the dam raised it higher and higher. Wooden headgates were built in the by-pass, and in August the construction of the dam was commenced.

DESPERATE ATTEMPTS TO REGAIN CONTROL.

At this period the situation looked very gloomy; every condition was unfavorable; the river, instead of coming down to its normal low water, was discharging nearly twice as much water as it ordinarily does at that time of year. The large amount of construction in progress in the Southwest made it extremely difficult to obtain and keep laborers in the hot climate and primitive surroundings of a construction camp. The great heat also made it extremely difficult to employ animals to advantage in excavation or transportation of material. The heavy demands made upon rolling stock made it very difficult and expensive for the railroad company to transport materials for this construction; but, in spite of all these difficulties, the officials, with commendable energy, poured money and men into the breach with an unstinted hand, with the determination to make this effort successful. It was recognized that the work was daily becoming more difficult; the channel was cutting deeper and deeper, and if the river were not controlled during the present low-water season it probably never could be, as another high-water season would cut the channel so deep that, without rock foundation or any means of holding a large structure, it would be impossible, or at least enormously expensive, to accomplish the work the following or any subsequent year.

A railroad was built from the main line to the proposed dam site and continued across the river on piling; a large camp was constructed and laborers assembled; huge pile drivers and dredges were brought to the ground, and piles were driven at intervals across the channel where it was proposed to build the dam. At points about 500 feet apart in the river and along the located line of the trestle, two bulkheads were built, one composed mostly of rock and brush on the south side, and the other almost entirely of fascines, on the north side. A mat 100 feet long, up and down stream, was placed on the bottom between these abutments, the piles of the trestle pinning the mat to



THE GREAT SALTON SEA, 205 FEET BELOW SEA-LEVEL AT THIS POINT, NEAR THE SALTON STATION ON THE SOUTHERN PACIFIC RAILROAD.

Brush dam at the headworks of the California Development Company's dam in the Colorado River, just below the old river bed.—From the National Geographic Magazine.

THE NEW INLAND SEA.

of Sharp's Heading, it was very threatening in another respect. It accelerated the cutting of the New River channel, in which was a great cataract four or five miles below the separation of the two streams, and this was, of course, advancing upstream. It was well recognized that when this cataract reached the Alamo the channel would be so deep that all of the water would run down New River and leave Sharp's Heading on dry land, without any water for the irrigation of the Imperial Valley. Threatened first with inundation, and next with the destruction of their entire water supply, the inhabitants of the Imperial Valley have naturally been almost in a state of panic for several months.

THE SAFETY OF \$100,000,000 IN THE BALANCE.

The continuation of the flow of the Colorado River into the Salton Sea meant the gradual inundation of the entire Imperial Valley. Whether the lake would ever rise high enough to actually flow out through Volcano Lake to the Gulf of California is problematical.

* An address to the National Geographic Society, published in the National Geographic Magazine.

as far as The Needles. It certainly would have cut a deep channel up to Parker—so deep that it would probably have been entirely impracticable to dam and divert the Colorado River at any point below Bill Williams Fork, and thus it would have become impossible to irrigate the great valleys of the Colorado River. These valleys aggregate about 400,000 acres. It is estimated that there are 300,000 acres of fertile irrigable land in the Imperial Valley and twice as much more in the Colorado delta in Mexico. The lands referred to are now settled by a population of 12,000 to 15,000 people, most of whom would have had to abandon their homes.

It may be said, therefore, that during the past year the fate of 700,000 acres of fine irrigable land, in a semi-tropical climate, the homes of over 12,000 people, and 150 miles of railroad track have been trembling in the balance. It is impossible to assign definite values to all these elements, but \$100,000,000 would not be an overestimate.

The railroad company spent immense sums of money in repeated removals of its tracks, as the shores of the Salton Sea grew higher and higher, and also experi-