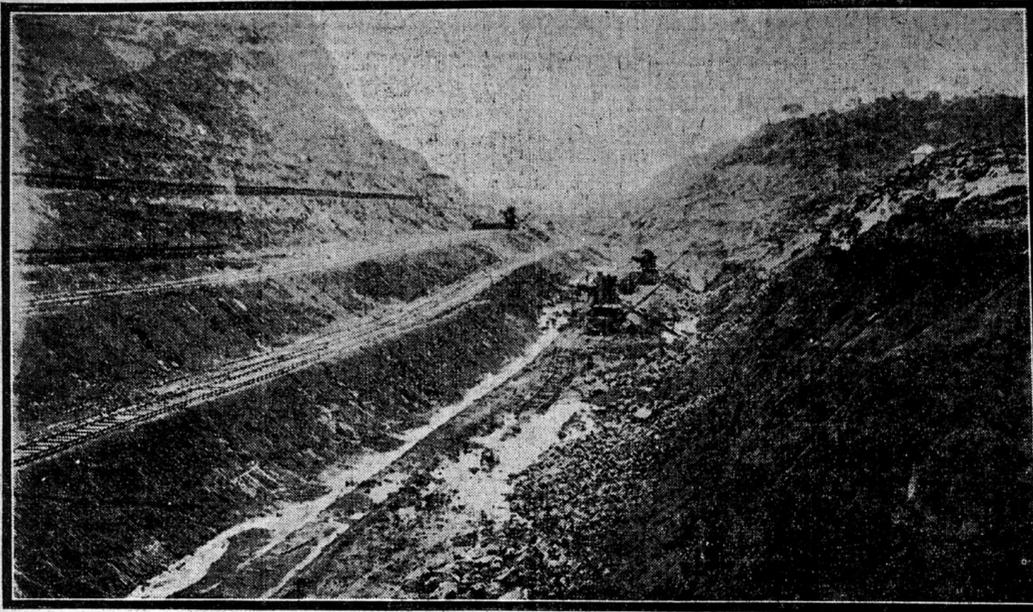


A JOURNAL CORRESPONDENT VISITS THE GREAT DITCH

Which Uncle Sam Is Building at a Cost of More Than a Hundred Million

\$\$\$ \$ \$ \$

A Graphic Pen-Picture of Conditions on the Isthmus



THE GREAT CULEBRA CUT.

Dauntless U. S. Engineers Lay Aside Their Coats and Begin Work Within Sight of 75,000 Graves Wherein Lie the Victims of Previous Attempts to Construct the Waterway Between Two Oceans.

By Charles H. Cochrane.

Copyright, 1905, by Charles H. Cochrane. Colon, Panama, Dec. 20. THE Panama canal has been a world's wonder for a number of reasons—it was world-wide in its conception and will be world-wide in its benefits when completed, and on account of its world-interest, it has caused more comment, speculation and prognostication, coupled with a wealth of hasty and deliberately false statements than any other work undertaken for the benefit of mankind during modern times.

A fifty-mile cut, half of it thru swamp, and nearly ten miles thru high ground, with an erratic, torrential river to control in times of flood, across a tropical country, where the temperature varies eighty degrees every twenty-four hours, and where turning over the swampy soil renders yellow fever epidemics certain—this work to be accomplished thousands of miles from the source of machinery and supplies—such is the problem that confronts the Panama canal commission. Unquestionably it is the most stupendous and difficult engineering work ever attempted, and the more thoroughly one studies the conditions, the more one realizes that altho possessed of an enormous appropriation of money, and plenty of ingenuity and ability, the old French companies were foredoomed to failure, and that with improved engineering methods and machinery, and honest and brainy men at the head, success is a far distant goal.

Conflicting reports regarding conditions and operations have been bandied about until the American people, who only want to "see the dirt fly," do not know what to think of this great work for which congress has already appropriated \$60,000,000.

It was with the idea of attempting to straighten out this mass of tangled ideas that the Journal sent me to the scene of operations, to make investigations in a careful and impartial manner.

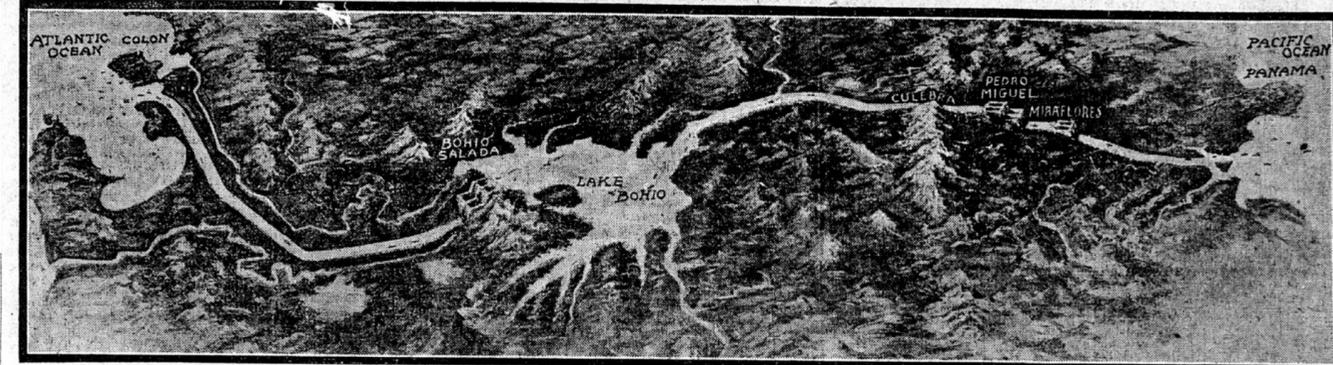
The Canal Region.

The crying need for the Panama canal is impressively apparent to one who approaches Colon for the first time by boat. Over the flat land, backed by slight ridges in the distance, one almost imagines a glimpse of the Pacific. The narrow strip of land which connects the two great continents, yet so effectually divides the world of commerce, makes the proximity of the great waterway, less than fifty miles away, and yet, many thousands of miles distant to the navigator, all the more aggravating to soldier, sailor and business man. One imbued only with the inspired and sentimental side of the picture wonders as Colon draws near, why someone doesn't get out with a shovel and tear away the few rods of offending land and declare the water gate of Panama open to the world. It is only when one gets down on to the level land, journeying out of Colon to the blue-topped hills in the distance that a full understanding of the task which the brightest men of modern times have enshrined as an idol, before which to sacrifice lives, fortunes and reputations, comes home with great force.

My first impression of the canal zone was embodied in a haunting desire to get back to civilization, and so must be the desire of everyone who has lived among the conveniences and comforts of the world. It is only when one gets down on to the level land, journeying out of Colon to the blue-topped hills in the distance that a full understanding of the task which the brightest men of modern times have enshrined as an idol, before which to sacrifice lives, fortunes and reputations, comes home with great force.

The climate of the region is tropical—always the same, except for the sudden and ferocious storms peculiar to such latitudes. The facilities of jungles and swamps in such localities for producing malarial and yellow fever germs are at their highest efficiency and the graves of the tens of thousands of victims scarring the hillsides in the region of Bobio sound a discouraging warning to the new arrival. Sleep out of doors seems almost impossible on account of the malaria, and sleep indoors is out of the question during the greater part of the year, altho in many locations preferable, from the standpoint of comfort, to the noxious vapors of the night. These two diseases are the scourge of Panama, and the terror of anyone who has spent his life in cooler latitudes.

When Americans can become acclimated to this country, consumption of



BIRD'S EYE VIEW OF THE COMPLETED LOCK CANAL—THE ROUTE WILL BE THE SAME IF A SEA-LEVEL CANAL IS BUILT.

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the canal project will be much nearer, but from the writer's observations, it looks as though the many good men will be sacrificed to the swamps and jungles of the isthmus.

Natives Troublesome.

The negroes of Panama and Jamaica are the laziest and most slovenly type of creature that ever claimed kin to the human race thru a slight similarity of image. They have made more trouble in the digging of the canal under the old regime than almost any other cause. There are perhaps 3,000 of them still at work on the job, all of them sick of the work and yet too lazy to throw it up and go somewhere else. Their wages average much less than a dollar a day and the effect of the enervating climate and the lesson of the 75,000 graves of victims to the isthmian climate, in sight of which they work, is rapidly demoralizing them.

In Cristobal Colon and Panama there is some little attempt at social gaiety. Many semi-wealthy Spaniards who have emigrated from Cuba, Mexico and the South American republics have settled in these cities and become the "grands" of the neighborhood. They are commonly a somewhat ignorant and gross set; but have established an aristocracy of their own, and already some little signs of education are manifest among the best of them. The canal commission has nothing but hindrance to expect from the men of this class. They are there to feed off the land for the benefit of themselves alone, and anything they can coin out of the project they consider legitimate spoil, due them on account of their foresight in settling down in the canal zone.

What the Commission Found.

The first discouragement to the engineers who were sent down to look over the ground by the United States canal commission must have come with their first glimpse of the chaos left behind by De Lesseps and the New French Panama Canal company.

The exact length of the canal as now laid out is 49.9 miles, of which seven-tenths on the Atlantic side and eight and one-half on the Pacific side are thru low, marshy ground. The remainder is more or less elevated. The French companies excavated about 80,000,000 cubic yards of earth, or four-fifths of the total dug at Suez. Extensive as this cutting and digging has been, about half being available for the present enterprise, yet it seems like a few spadefuls in proportion to the work lying before the commission.

At every point the extravagance of the officials in charge of former efforts is apparent. Lack of system, unbusinesslike methods, unfavorable conditions, insufficient preparation, and downright "hard-luck" crop out on every hand. The graves of 75,000 workmen, negroes, Americans, Frenchmen and Germans, men engaged in all classes of work, line the hillsides and fill the valleys as a mute testimonial of the conditions under which the work was first undertaken, and which will have to be overcome before its successful completion.

All along the fifty miles of the route of the canal is strewn machinery which it was dropped when the last French company stopped work. Much of this is well housed, but the profusion of valuable machines lying around everywhere without guard or care of any sort is amazing to the practical American. There were actually over \$29,000,000 worth of these machines, \$600,000 worth to the mile, lying in every conceivable position and locality. An enormous dredge, worth several hundred thousand dollars, was discovered at one point, resting peacefully on top of a small hill. How it ever got there is one of the unsolvable mysteries of

the situation. It is a standing joke in Panama that when an engineer has nothing else to do, he goes out in the bush and finds a few boilers, locomotives, or perhaps a dredging machine.

That the French company has maintained a force of workmen at Panama in spite of the overwhelming defeat of the plan is another of the marvels, but the fact remains that ever since the partial abandonment of the scheme over 4,000 men have been employed in the digging, in what seems like an almost aimless fashion. The later work has been confined to the Culebra cut, the highest land on the isthmus, and up to within ten months of the time the United States formally took over the franchise and property of the company at a cost of \$40,000,000, an average of 57,000 cubic yards of earth per month has been excavated; during the last ten months the work fell off gradually, and when the commission took hold of it but 25,000 yards per month were being removed. This earth was dumped a short distance from the ditch at a point which is within the possible limits of the projected canal, and may all have to be removed a second time. The charter of the New French company, which took over the property of the De Lesseps enterprise, and the arrangement with the receiver, whereby 40 per cent of profits from the undertaking were to accrue to the operating company, and the remaining 60 per cent should go to liquidate the obligation of the original company, is probably responsible for the continued work in the face of such hopeless obstacles as confronted the workers, and the lack of organization indicates that the excavation was being kept up more as a matter of form than anything else.

Difficulties of the Task.

In order to present a clear view of the magnitude of the undertaking, let us make a comparison with the three next largest canals in the world:

	Earth-Removal, Cubic Yards.	Length, Miles.
Panama (to sea level).....	275,000,000	\$250,000,000 50
Suez.....	69,400,000	\$3,000,000 99
North.....	104,000,000	\$9,000,000 22 1/2
Manchester.....	53,000,000	\$5,500,000 23 1/2
Chicago drainage.....	40,000,000	\$2,400,000 22

* Estimated.

The estimated total of 275,000,000 cubic yards of earth and rock from the Panama cut would be sufficient to build a wall ten and a half feet high and six feet thick encircling the earth; or a causeway a little more than one yard in cross section reaching from the earth to the moon. These figures show that the Panama canal, as an engineering enterprise, outclasses anything ever before attempted by man. Even the work of reclaiming a large portion of the Zuyder Zee from the ocean to dykes and pumping, at a cost of \$79,000,000, sinks into insignificance before the gigantic task of severing North from South America.

As difficult as it may be for one born and bred in the temperate climate of this country to fully understand the difficulties presenting themselves in tropic Panama, it is still more difficult to pick out any one difficulty among the host of those arrayed against the enterprise and declare it paramount. The writer was impressed, and depressed, by the magnitude of the obstacles on his first sight of the ground, and understood at once the discouragement which has sent many official investigators back to Washington with pessimistic reports. First, possibly, comes the problem of housing the workers, for the best of care must be taken of the men upon whose shoulders the great undertaking rests. Adequate quarters must be provided, with every possible convenience, and all modern

sanitary devices—a small task in itself. Until it is done it will be impossible to get a force of men, of the class necessary to carry the work thru successfully, to move to the isthmus. The problem of the food supply is also momentous. Insufficient food of execrable quality has been responsible for much of the fatal sickness at the isthmus, and altho this condition is being improved, the arrangements are still inadequate.

The Home Opposition.

Home opposition is another setback which strikes direct to the vitals of the enterprise. There are two classes of persons, to be found both in official and civil life, who seem determined upon thwarting the project. One is the crowd of "grafters," and political puppets, who for selfish reasons of their own, or those they represent, seek to delay, if not prevent, operations, looking, of course, for financial gains. As might be expected, officials and representatives of several big continental railroads are to be found in this class, and they exert a tremendous influence at Washington.

The other class is composed of the chronic pessimists, and "calamity howlers," who, the doing more than anyone else to bring about the failure of the project, are still sincere in their actions. Between these two an anti-canal bureau has been actually established at Washington for the purpose of discouraging in every possible way the work on the canal.

While the engineering problems are not insuperable, because of the magnitude of the work, and the conditions arising, yet with time, money, energy and the ability now engaged, these can be overcome. The moral difficulty of satisfying engineers to remain and work in such a God-forsaken country, where one is roasted by day and chilled by night, as well as deprived of civilized society and means of recreation, to say nothing of the dangers of yellow fever, which no known means can suppress when the swamps are laid open, is much more serious and would seem to deserve more attention than it has yet received.

However, American engineers and contractors have pride in accomplishing what they set out to do, and succeeding where others have failed, and national and professional pride may keep the heads of departments at work where money considerations would fail.

Making the Zone Healthful.

That the work of sanitation in the canal zone was given the first consideration is good evidence that the commission is going at the task in the right, methodical, business-like way. Complete systems of water mains and sewers which are being installed in all the cities and wherever practicable along the line of the canal seem to be the only guard against the tropic pestilences of the unsanitary lowlands of Panama. The matter of hotels, lodging and mess houses has also received early attention, with the result that two hotels and seven mess houses have already been erected and some six thousand men are being fed by the government.

Present State of the Work.

When the Panama canal commission began work a year ago with no set ideas as to what they would do, determining most wisely to be guided by their later judgments, they found a canal about one-fifth dug, and nearly \$30,000,000 worth of machinery rusting along the route besides enough champagne bottles to build a pyramid to the extravagance and high living of the men in actual charge of the spectacular failure of De Lesseps. Today digging is in progress at several points on the canal, dredging of harbors is beginning,

and test borings are being made in all important localities; yet it has not been decided whether the canal is to be a sea-level waterway, or whether it shall have an elevated section, with locks across the high ground of the isthmus. The settling of innumerable minor points rests on this main decision, and until the commission itself knows what it will do, the public must await more definite information.

The actual new work on the canal began in the summer of 1904. To an engineering corps was given the work of completing and deepening the northern end of the canal, covering six miles, up to the point where the canal encounters the Chagres river. They also have in charge the dredging of the harbor of Colon and the erection of breakwaters for its protection. The second body of engineers control the territory from the junction with the river at Gatun on the Bobio, including the possible erection of a dam at Gatun. Their chief work is the choice of a route, as the old digging here is quite serpentine, and a new and shorter way is planned. The third set of engineers has in charge the proposed great dam at Bobio, and they have been making borings all along the river, in that vicinity to test the bed rock. The fourth party of engineers, who are the continental divide at the summit of the Corderillas, the proposed dams at Gamboa and Alhajuela, and a possible seven-mile tunnel for carrying off surplus water to the Atlantic. The Culebra cut was assigned to the fifth party of engineers. The work beyond on the Pacific side, together with the terminal harbor facilities at La Boca, was placed in charge of the sixth engineering corps.

The dams erected on the Chagres are to serve a double purpose. It has been figured that the Gamboa dam alone will yield a minimum of 25,000 horse-power, and that during most of the year 56,000 horse-power can be had from this source. By erecting the dams with as little delay as possible, and installing turbines and dynamos, electric power can be delivered to operate machinery all along the canal. Nor is this all. A line of great arc lights can be hung from ocean to ocean, enabling the contractors to operate with two or even three shifts of men, thus expediting the work materially. Night is better than day for labor in that torrid climate.

In the various departments of sanitary preparation and construction there were 4,200 men employed at the time of my visit. The payroll rolls of the commission contained 13,380 names in September.

A Sea-Level or a Lock Canal?

The engineering problems involve a decision as to whether the canal shall be at sea level, or whether it shall have locks, and if so, how many. The board of consulting engineers voted Nov. 18 in favor of recommending a sea-level canal, and this is unofficially reported to have been the opinion of the majority; these conditions, if carried thru, will involve a cost of \$100,000,000 more than a lock canal. But the question must be settled by the decision of congress. Cutting thru the swamp land at sea

level is practicable enough, but the strip of elevated land at Culebra is 320 feet high at places, and better adapted to locking. The control of the Chagres river is another serious enigma, as yet unsolved, but just now is receiving more earnest attention than any other problem on the isthmus, with the exception of the sanitary arrangements.

The question of locks is important. The suggestion for a sea-level canal seems to have come from De Lesseps, who strongly favored the idea. It is known to be impossible to build the canal without at least one lock on the Pacific side, since the tide rises and falls there twenty feet on an average, as against less than two feet on the Atlantic side. A twenty-foot tide could not be allowed to flow in and out of any canal. The building of enormous canal locks has become an exact science, and there is nothing in the way of constructing them of any required capacity.

All questions on this point are being considered by the force of eminent engineers stationed at the isthmus, and those at Washington who have looked over the ground. The actual work on the canal, in fact, is waiting only upon the decision, and when it is rendered, the American people will doubtless see the "dirt fly."

How the Canal Will Be Dug.

One has only to look over the scene of future operations at Panama, and inspect the gigantic machines left strewn along the swamps by the Frenchmen to appreciate the enormous interest the work will have from an engineering standpoint. New records will be established; new methods introduced; new inventions and machines tested, and new theories proven—all of which will be of greater importance to the engineering lore of the world than any enterprise ever yet undertaken by man.

New machines, costing thousands and thousands of dollars, have commenced arriving at Colon already, and several were unloading at the wharves during my visit. Much of the machinery abandoned by the French company is being repaired, and will be brought into use. The hundreds of small French locomotives are to be utilized.

Nearly all the actual work of digging and dredging will be done by contract, after the commission's engineers have laid out the various sections and determined the nature of the soil, as to relative proportion of earth, rock, etc. For the deep heavy work, such as in the Culebra cut, 70-ton steam shovels, similar to those used in the Lake Superior open-cut iron mines, will be the main dependence. Several of these machines now are averaging over 1,000 cubic yards of broken rock daily. There have also been ordered two of the largest size steam shovels ever made, ninety-five tons weight, and one of these has a record of over 800 cubic yards removed in one hour, the enormous dipper picking up five yards at each lift. In order to form a better idea of what rapid work this is, let us compare it with manual labor. One good man with a good shovel can dig about a yard of rock out of a bank and throw it in a car in one hour; therefore this great shovel, with a crew of only three men, did the work of 800 men, and it will average the work of 500 laborers the year round.

The earth-spreader is another typical American machine of which a number are being ordered for the isthmus. The largest size, weighing 100,000 pounds, will do the work of 1,000 men, and consists of a heavy flat car, bearing a powerful engine and operative mechanism, and carrying a great wing or spreader on each side. It runs along a track, and the spreaders level the piles

of earth that have been dumped on the sides.

When Will We Have a Canal?

How much time will be required to build the canal? This question is often asked, and cannot be answered with certainty. It is possible, however, to figure how long it may take. Let us assume that the Culebra cut is to be reduced to sea level, and that the remainder of the work can be completed by the time this tremendous ditch is finished. In addition to the work already done at Culebra, there remain in this section of territory 100,000,000 cubic yards of earth and rock to be removed, or the equivalent of the total removal at Suez. About thirty-five average steam shovels could best work on this division without interference. Working on one shift ten hours a day and making due allowances for stoppages, accidents and delays usual to large contracting work, they should average 300,000 yards a year per shovel, or say 10,000,000 cubic yards a year for the thirty-five shovels. With two shifts they could double this speed. It will be at least a year before thirty-five shovels can be set to work; two years more may expire before the lighting system will be in order to permit of double shifts. Therefore, the best that can be hoped for is about 25,000,000 yards removal in the next three years, and 20,000,000 per year afterwards, or a total of seven years of cutting with the steam shovels, supplemented by two years' more work in completing the canal ready for transportation. This would make 1913 the earliest date at which the canal could be completed, and some enthusiasts have declared that it will be opened in that year. But these do not reckon with serious accidents and interferences, which are practically certain, not to mention the dreaded yellow fever, which has heretofore proved the most serious obstacle, and against whose ravages no practical remedy has even been suggested. Conservative men say that the commission will do remarkably well if they are able to complete the canal by 1917, and that there should be no cause of complaint if it is not finished before 1920.

Certain Washington officials declare that from twenty to one hundred years will be required to complete the work, but these men are suspected of an alliance with the "calamity howlers," which, if anything, will delay the completion of the enterprise beyond fifty years, and their estimates are not taken seriously by any one.

The Financial End.

Up to the present moment the Panama canal has cost the United States \$60,000,000, of which two-thirds went to buy the rights and property of the French company, \$10,000,000 to satisfy the Republic of Panama, and the remaining \$40,000,000 has been spent in the work on the isthmus. The probable expense of completing the canal can be calculated approximately. The former isthmian canal commission estimated that the rock and earth removal would cost 80 cents a yard. Actual work in Culebra the past year shows that the cost will be only 50 cents a yard, so that the simple digging of this greatest ditch in the world will involve an expenditure of \$125,000,000 if carried to sea level, and about \$65,000,000 if the canal is constructed with locks.

Harbor dredging has been done in the United States in many places for nine cents a yard or even less, but at such a distance and under the conditions that will govern work at Panama, it may well cost 25 cents a yard. The test borings have been sufficiently extensive at this time to show to practical men about what is to be encountered in both harbor dredging and swamp reclamation, and therefore these costs are known with a close approach to accuracy. However, a great part of the expense may come with the unforseeable conditions growing out of yellow fever epidemics and general demoralization of both laborers, contractors and the engineering corps.

A review of the entire project, as it stands today, gives one faith that America will add one more laurel to the national brow, by completing this truly stupendous work, and thus multiplying the world's commerce. Let us hope that it may be accomplished without any of the financial scandals that swamped the previous undertaking, and that are so apt to creep in where so much money is being spent; also that the terrible loss of life that accompanied De Lesseps' abortive endeavor may not find a repetition in the history that will be made in the coming decade.

King Edward is turning his attention to beautifying Windsor Park, which, since the death of the prince consort in 1861, has been sadly neglected.