

THE NILE IN HARNESS

Egypt's Great Dam at Assouan, Which is to Be Raised Fifteen Feet.

(Special Correspondence of the Deseret News by Frank G. Carpenter.)

HEILAL, Nubia.—Within a mile or so of the red granite quarries, out of which Pompey's Pillar and the obelisks were taken by the ancient Egyptians, just below the island of Philae, with its stone temples built ages ago to the Goddess of Isis, far up the Nile valley, on the edge of Lower Nubia, I write these notes for American readers. I am in the heart of the desert, 200 miles south of the Mediterranean sea, at the point where the great river drops down over the first cataract. I have come here to describe the Assouan dam, which the British have built to harness the Nile, and thereby save Egypt from famine.

THE NILE IN HARNESS.

We all look upon this as the oldest of rivers, more ancient, for ages, than the Nile god of 1907 has been worshipping and "charging" his own sacred will, but he is now being harnessed and will have to work in the harness like an old plow mule. In the past, the Nile has been a wild, unbridled, and uncontrolled force, and at times has held back his supplies of water and mud, causing a famine. This was the case during the seven years of Joseph's time, and the fat years of that day were undoubtedly produced by high Nile. Such changes have occurred in Egypt from time to time since the days of the Pyramids, and it is only within the past generation that man has attempted to control the old river and by a system of dams to hold back the waters and let them out over the farms as needed. Within the past 20 years something like 100 great dams have been built in Egypt, and there are now great barges at Assouan, and more important than all, away up here at Assouan.

HOW EGYPT IS WATERED.

First let me tell you in a nutshell how Egypt is watered. The country is almost rainless and the Nile gives both land and people their food and drink. The Nile rises in the high mountains of the west, and flows into the Mediterranean sea. It is, with the exception of the Mississippi, the longest river of the world, so long that if it were stretched out in one straight line it could reach from the great lakes to the Gulf of Mexico, and then turning west our country from the Atlantic to the Pacific. It rises in Lake Victoria, in the heart of Central Africa, and drops a distance greater than the altitude of the highest of the Alleghenies before it flows into the Mediterranean sea. During the upper part of its course it is known as the White Nile, and this should be called the main stream of the river. At Khartoum, 250 miles from the Mediterranean, the Blue Nile, which rises in the Abyssinian mountains, comes in, and about 140 miles further north the Atbara, or Black Nile, which also is from Abyssinia, joins the main stream. From the mouth of the Atbara to the sea there is not a branch or stream of any kind connected with the river. It flows its way through the desert valley, and widens until a few miles below Cairo, where it divides into two great branches and flows off into the Mediterranean.

THE NILE FLOOD.

The volume of the Nile is enormous. At flood times, here at Assouan, 1,000,000 tons of water go by every day. The river then rises 25 feet at Cairo, 75 feet at Old Thebes, and almost 50 feet at the first cataract, where I now am. There is so much water then that no dam could hold it, and all of these great works have to be made so that the water can be let in and out and allowed to pass through at will. It is at flood time that the Nile valley gets its rich feed of Abyssinian

mud. This is brought down by the Blue Nile, but more abundantly by the Atbara or Black Nile. It is carried by the floods all over Egypt, and by means of irrigation canals and by various pumps, some worked by men, some by animals and some by machinery, it is conducted to nearly every farm. After the floods subside the waters grow clear again. The Blue Nile and the Black Nile become almost dry, and the white water of the main stream of the Nile is about all that is left. It is this white water that is stored up by the Assouan dam, and it feeds the country in much the same way as our irrigation canals do, with water only and not with a thick mixture of water and mud as in the times of the flood.

A VAST SERIES OF BASINS.

For thousands of years these rivers have been pouring down through this Nile valley; but whenever the rains have been scanty in the highlands of Abyssinia and in Central Africa, the main stream has not been high enough to reach the whole country. The most of the lands could be flooded only once a year, and if the Nile was especially low some could have no water at all. By the new system it is planned to give Egypt water all the year round, and to supply enough to make it produce two or three crops every year.

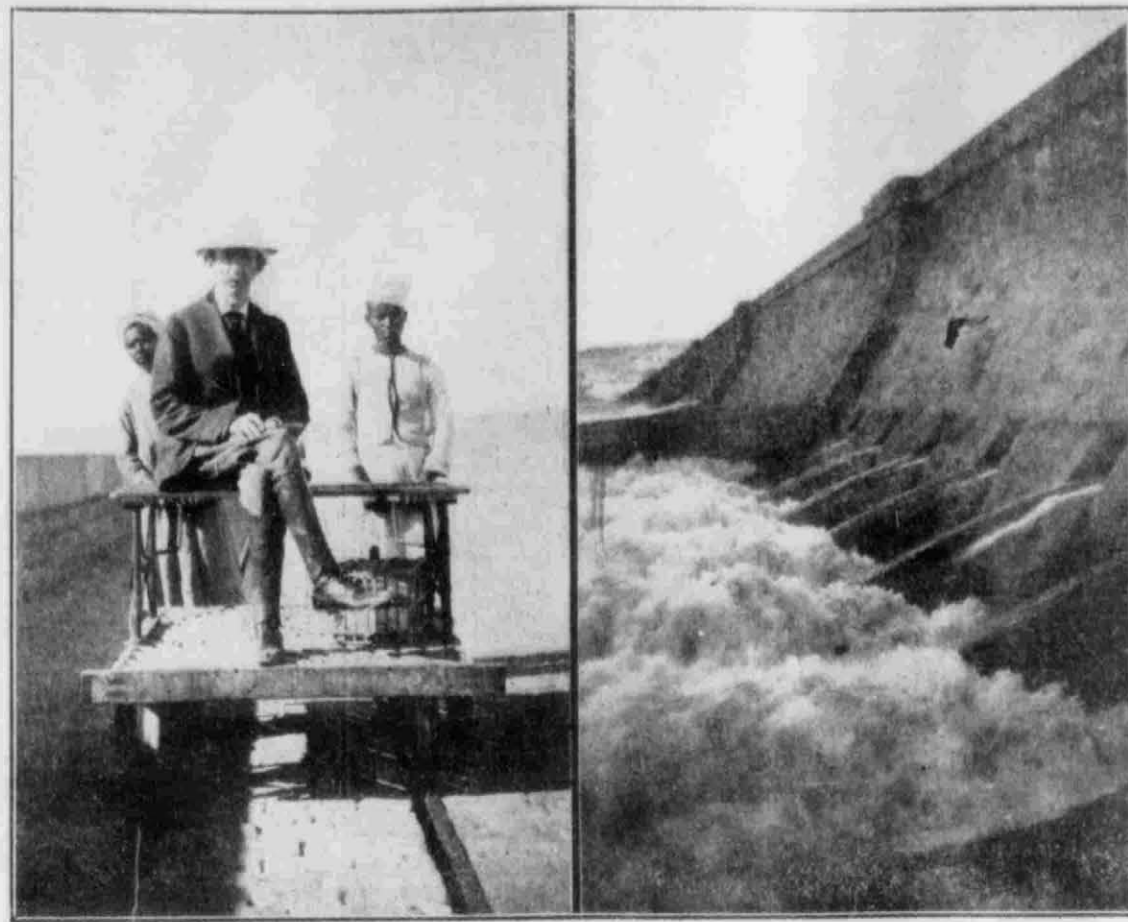
I have been much interested in the irrigation works of the past. The whole of the Nile valley above Cairo is cut up into a series of basins. For 500 or 700 miles north of this point the valley slopes very gradually and, in order to save the water, dikes have been made across it and embankments run parallel with the river, turning the whole country into a series of basin-like terraces. Each basin contains from 2,000 to 15,000 acres, and the dikes are such that the water has to flow from basin to basin between the Nile embankments and the walls of the desert so that none of it is lost. These basins are often subdivided, and they are so connected that the water flows from one to the other and finally passes out of the lower basin back into the Nile. When the floods come, the lowest basins are filled first and then these higher up, until at last all have become great ponds and Egypt is one vast inland sea cut up by the embankments and islands upon which the villages stand.

There are 45 such systems of basins in upper Egypt, some large and some small. There are also basins higher up closer to the river which are filled with canals or shadows, made irrigation pumps worked by animals and men. When I tell you that the fall of this valley from here to Cairo is only seven inches to the mile you will see how carefully these basins must be graduated in order to take advantage of the flow of the river. They have to be so made that the water can be drained off as rapidly as it is let on. The Abyssinian mud contains a great deal of silt, and it is just as bad to have too much of it as too little. If the land is over-watered the silt dissolves from the soil and the over-saturated land becomes swampy and the crops are often sown too late. The red water, or that containing the silt, is allowed to stand on the land just about 40 days. During this time it drops a great deal of sediment and furnishes enough moisture for the crops.

EGYPT IN FLOOD TIMES.

Few people have any idea of the work the Egyptians do in irrigating and taking care of their farms. The task of keeping these basins in order is herculean. At the Nile rushes in the embankments are watched as the Dutch watch the dikes of Holland. They are patrolled by the village headmen and the least break is filled with stalks of millet and earth. The village officials have the right to call out the people to help, and no one re-

How Egypt is Watered—The Nile Floods and Their Load of Abyssinian Mud—A Vast System of Basins Which Have to be Filled and Drained—What the Assouan Dam Does—How It is Built—Its Mighty Force Equal to Two Million Horses, and How A Child Could Operate It—A Look at the Sluice Gates—It Has Added One-Fourth More Land to Egypt and has Made the People Rich.



"I CROSSED THE DAM ON A CAR."

SCENE BELOW THE DAM.

Photographed for the Deseret News.

fuses. If the Nile gets too high it sometimes overflows into the villages and the mud huts crumble. During the flood the people go about in boats from village to village. The donkeys, buffaloes and bullocks live on the dikes, as do also the goats and camels. The people sow their crops as soon as the floods subside. Harvest comes on within a few months, and without delay the wheat and the cotton are taken to the market. Outside the Nile floods, they must wait until the following year before they can plant again. If they can have a dam like this at Assouan the Nile can be kept high throughout the year and they can grow crops all the year round. This is already the condition in a great part of the delta, and it is aimed to extend it to the farms of upper Egypt.

THE ASSOUAN DAM.

The Assouan dam is one of the wonders of modern Egypt. It is in full sight of me as I sit here on the left bank of the Nile, with the desert at my back. It looks like a great stone viaduct crossing the rocky bed of the river joining the stony hills which wall the Nile on both sides and holding back a portion of its mighty waters. It is a great granite wall, 86 feet wide at the bottom and 24 feet wide at the top, rising 120 feet above the bed of the river, being a mile and a quarter in

length. There is now a roadway guarded by walls on its top, and there is a little car line, the wagons of which are pushed by men, which runs over it, from one side to the other. The dam serves as a bridge as well, and donkeys, camels and men are allowed to pass over it from bank to bank. I crossed on the car at a cost of 25 cents, my motive power being two Arab boys who came behind on the trail.

HOW THE DAM IS BUILT.

As I came over I stopped from time to time to examine the construction. The dam is made of great blocks of red granite as fine as that of any tombstone in the United States. They are beautifully cut and fitted as closely as the walls of a palace. On the upper side or north face the wall is perpendicular, forming a straight up and down barrier against the waters of the Nile. I climbed down a ladder on that side at one place almost to the river, and could see that the blocks are fitted so closely that the cement does not show. The wall seems almost one solid stone throughout, with the exception of where the great sluice gates are cut, to allow the river to flow through at the times of the flood, and as the floods subside to shut back the waters to form the great reservoir for the dry season.

There are 150 of these sluice gates in the dam, each of which has steel doors that can be raised and lowered to allow the whole river to flow through or to hold back as much or as little as the engineers will. The dam is thus a great stone wall pierced by these gates. The Nile never flows over the top of the dam, but always through the gates and the canal at one side. When the gates are closed during the dry season, enough water is held back by this structure of steel and granite to form a reservoir of water all summer through.

In order to appreciate the strength of the structure it is necessary to know the enormous weight it supports. When the reservoir is full the water in it amounts to almost a quarter of a billion gallons. It contains 25,000 million gallons and weighs over 1,000 million tons. It is so heavy that if it were all loaded upon wagons it would take two billion horses to haul the load. We have in the United States something like 18 million horses. One hundred times that many, all harnessed together and all pulling at once could not carry the weight which this masonry is required to hold back. If the water could be loaded on

freight cars at 100 tons to the car, it would take 10 million cars to carry it, and if each car were to go for six or eight months, and enough to supply Great Britain and Ireland all the year round. If the water were loaded on two-horse wagons, each team being given a width of eight feet and a length of 40 feet on a roadway, the line of teams required to carry it would be a half mile wide and would form a solid train of that width encircling the globe at the equator.

The weight is indeed stupendous and the force incalculable. Nevertheless, during the floods fully as much water runs through the dam every day as is stored up in the reservoir, and the structure has held its own made as that it would retain this huge lake and at flood time let a lake equal to it pass through every day.

GRANITE THAN THE PYRAMIDS.

Talk about the Pyramids! The Assouan dam is far more wonderful than they. The Pyramids of Cheops contained 10,000,000 tons and 20 years in its building. The Assouan dam was constructed by about 100,000 men in four years. The pyramid was made by forced labor and it impoverished the people. The dam cost altogether about \$2,000,000, and the men who worked upon it were better paid than any others who have ever labored in the valley of the Nile. Moreover, the dam has made Egypt the most prosperous country of the world. It has added to it more than 1,000,000 acres of tillable land and has increased its crops a value of more than \$10,000,000 per annum. It has more than paid for its cost every year. Since it has been built the wheat taxes have increased \$2,000,000, and the lands owned by the government have increased worth \$3,000,000 more. By the raising of the dam, as now planned, there will be an enormous additional increase. The sluice gates opened to raise the dam 15 feet. This will almost double the amount of water stored and double the benefit to Egypt.

A WONDER OF MECHANICS.

The Assouan dam is more wonderful than the Pyramids in its mechanical construction. Old Cheops is built on the edge of the desert at a high stone platform, and it is little more than the piling of one stone upon another. For the Assouan dam a trench a hundred feet wide and a hundred feet deep had to be excavated in the granite rock. It had to be bedded with concrete rubble, and it was upon such a substructure that the masonry was raised. The dam itself contains more than a million tons of steel, and the calculations of the engineers are such that they know just how much water every summer of stone and steel will hold back. They know the exact weight of the river at every hour of the day, and they have telegraphic reports which tell them what the Nile is doing in Abyssinia, in Central Africa and the Sudan. They have dispatches as to every great rain, and they know to a ton just how much water Lower Egypt is using, so that they can tell how much or how little to let out for the farms. They even estimate the force of the sun on the water and know how much it drinks up every day. When the reservoir is full Old Sol takes a million and a half tons from it every 24 hours, and the engineers estimate the evaporation not only at Assouan, but all along the great stream and throughout its swamps to its source in Victoria lake. I have had some talks here with Mr. McDonald, the engineer-in-chief of the dam, and am surprised at the wonderful intelligence bureau which Egypt possesses.

WHAT A CHILD CAN DO.

I am also amazed at the strength and

delicacy of the machinery of this remarkable structure. It is so arranged that a child can operate it. The great sluice gates are each as high as a two-story house, and so wide that you could drive a hay wagon through them and right through the granite dam, and are closed or opened by steel floors which move up and down inside the wall on rollers. Upon the top of the dam there are machines for moving these gates, and they are so made that a child could operate them. They are so arranged that they can be moved by electricity, but they are now worked by hand, and this mighty force so great that 2,000,000 horses would be required to move it, is now controlled at will by the muscular power of a single man.

This thought was impressive as I sat below the dam night when the eight central sluice gates opened by the motion of a turn of water being behind them, pouring forth their mighty flood. I had climbed down the steps at the north side of the center of the great structure to make a photograph of the sluice gates opening. They came down with a rush as great as that of Niagara, and as I sat there I could see the water rushing over the rocks in that force that might generate clouds of smoke or steam. The noise is like a roar, and the water is like a solid mass of white foam. I could see the sluice gates opening and closing, and the water rushing over the rocks in that force that might generate clouds of smoke or steam. The noise is like a roar, and the water is like a solid mass of white foam. I could see the sluice gates opening and closing, and the water rushing over the rocks in that force that might generate clouds of smoke or steam. The noise is like a roar, and the water is like a solid mass of white foam.

FRANK G. CARPENTER.

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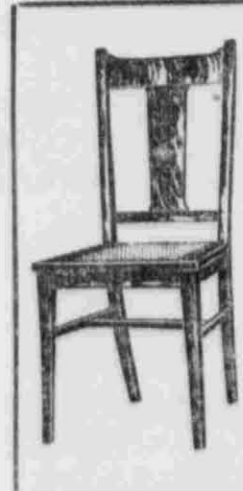
Capers.

Of all the various articles that enter into almost constant use in hotels, clubs, and restaurants, there is none that is probably less known about by the average steward or chief than capers.

These are the unexpanded flower buds of caparris spinosa, prepared with vinegar for use as a pickle, which is much esteemed. The caper plant is a trailing shrub, belonging to the Mediterranean region, resembling in habit the common borage and having handsome flowers of a pinkish white, with four petals, and numerous long, tassellike stamens. The leaves are simple and ovate, with spiny stipules. The plant is cultivated in Sicily and the south of France, and in commerce capers are packed according to the period at which the buds are gathered and preserved. The first are the young, tender buds, called "mousserons," after which, gradually increasing in size and becoming in value come "young ones," "one," "caper," and "capot." They possess valuable stimulant, acid and anti-scorbutic properties, similar to the cruciferous. Other species of caparris are similarly employed in various localities, and in some cases the fruit is pickled.—From the Steward's Bulletin.

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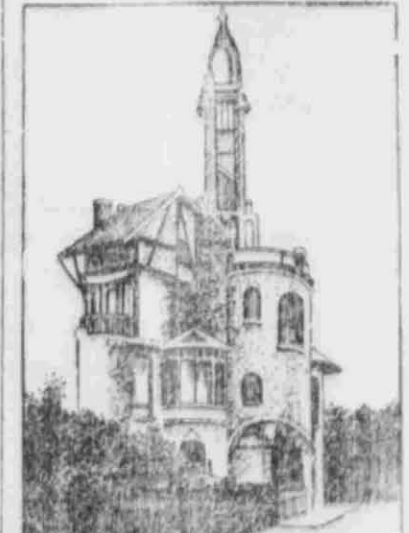
A SLANDERED CROWN PRINCE. For some time Prince George of Serbia has been exploited in the press as one of the most degenerate royal youngsters—he is not yet twenty—in Europe. He has recently paid his first visit to England, and according



to the British standard of morality, he has been found to be nothing of the kind. On the contrary, he proves to be a very good looking and well behaved young fellow, with an abundant supply of high spirits.

A FREAK VILLA.

The villa pictured in the cut is the inspiration of a French architect, who determined to build a residence which would combine every style of architec-



ture, ancient and modern, in the smallest space possible. It is at Nervè, the town which contains the famous stone works.

The greatest known depth of which any great stream is from water is 300 feet, by a mile called 'Tasmanian' has been recently discovered in the south of the lake of Geneva.

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