

NO FLOOD IF NOAH HAD KNOWN HYDRAULICS.

Old Testament Story Viewed in the Light of Recent Surveys of the "Garden of Eden" in the Euphrates Valley.

IF Noah had understood hydraulic engineering instead of boat-building, an important chapter of history might have been written very different. A complete survey of the scene of the great flood has recently been completed, which throws an interesting light on it.

The skill of modern engineers, it has been found, could readily have prevented the inundation. The early engineers, although they brought great energy and perseverance to their tasks, knew nothing of hydrostatics.

The recent survey of this region of the valley of the Euphrates was made by the new Turkish Government, which purposes building a great system of irrigating canals throughout the historic region. The country was surveyed by Sir William Willcocks, K. C. M. G., assisted by twelve civil engineers.

This "cradle of the human race," probably the site of the Garden of Eden, has been carefully measured and plotted. It is proposed to utilize several of the ancient canals, or at least their courses, and, by extending them and introducing modern engineering methods, to irrigate a large area of land which has been neglected for thousands of years.

The peculiar formation of the rivers of this area is accurately described in Genesis, and the surveys have confirmed the records of the Bible. Exactly the same problem is faced by the modern engineers which confronted Noah.

This region was visited by Herodotus and Xenophone at a later date, and their detailed descriptions are amply confirmed by the recent investigations. For the student of either sacred or profane history, or from the viewpoint of the engineer, the present enterprise holds a peculiar interest.

The ancient wealth and productiveness of this valley is of course famous. It is traversed by the Euphrates and Tigris Rivers and their tributaries, which from the earliest recorded history were important highways. The land was productive

and means of communication easy. This traffic helped to build up the greatest cities the world had seen—Babylon, Ninevah, and many smaller centres of population. Much of the valley was naturally dry and arid in the early days, as it is at present, and a series of canals and a remarkable system of irrigation were prepared to render the valley productive.

After the fall of Babylon these artificial waterways were neglected, and in the course of centuries the sand covered the once fertile fields. For hundreds, even thousands, of years a great part of the valley has been a marsh or an arid desert, only fit for sheep pasturing. The new system of irrigation canals to be built by the Turkish Government will restore the region to its ancient fertility and prosperity. It is believed that the first series of canals planned will be completed in three years.

The geography of the valley is extremely simple. The cause of the flood and its course may be traced with remarkable accuracy.

The Garden of Eden, or the cradle of the human race, is supposed to have been on the banks of the Euphrates, near Hit, above the point where the Euphrates and Tigris so nearly join. It probably occupied a position near an outcrop of hard rock, above the reach of the highest floods. This country, along the Euphrates, has always been very fertile. It has changed little in all this time, and doubtless the fruits and flowers which grow there to-day were familiar to Adam, with the exception of the rice, which is of recent date.

The Euphrates had the habit of rising after the Spring rains, even in the earliest times, but its full force was only felt

below this section in the valley or delta of the two rivers.

Further down stream, near the point where the Euphrates and Tigris approach one another, the country is flat and at the mercy of the flood. Near this point the Euphrates divides into several tributaries, some of which actually reach the Tigris, although the main channels of the rivers are well apart. It is recorded in Genesis that "out of Eden came a river which watered a garden, and from thence it was parted and became four heads." The four heads have been definitely traced by Sir William Willcocks.

Now in time of flood, when the waters of the Euphrates rise each year, the water follows the river channel until it reaches this point, when it breaks its banks and inundates the great flat lands of delta below it. Noah's flood was an unusual uprising of this kind. To control this water and utilize it for irrigating purposes the early people built a series of dams at this point. They were built of earth and were primitive in form.

The population of the entire valley naturally needed water to cultivate their land. Those living up stream would therefore take what water they needed by building a dam, and the people below would thereby be deprived of their means of existence. There was no strong central government to regulate these irrigation projects, and constant anarchy and warfare resulted. To make matters even worse, when the dams broke, which was a common occurrence, the people living downstream were literally flooded out, and were obliged to flee for their lives.

This condition of open warfare between the various sections of the valley is recorded in Genesis in the words, "and the world became full of violence." There was

no Government to appeal to for protection. Each family was obliged to look out for itself. The more far-sighted of the inhabitants in the lower valley realized that some day when the Euphrates River rose unusually high the dams up stream would break, and they prepared for the worst. The situation may be compared to that at Johnstown, Penn., except that the country along the Euphrates was low and flat, and the water would rise more slowly.

Noah was one of the far-sighted ones who prepared for the coming flood. The ark was built, it is believed, of poplar wood, common in the region, and covered inside and out with tar and bitumen, much as the boats are built in the region to this day. Noah probably lived in the lower part of the delta formed by the Tigris and Euphrates, south of Kerbela, where the desert is low and flat, and would feel the full force of the flood.

The Bible records that the flood rose to a height of 15 cubits, or 22½ feet. Such a rise would be sufficient to inundate an immense area in this section. The rise of the Euphrates in ordinary years was about 16 feet, so that the discharge of the Euphrates at the time of the flood was nearly doubled.

Noah floated off, in all probability, near Kerbela, and was carried southward. The current and the wind both set in from the north to-day in these uprisings as they did 2500 B. C. He finally drifted among the Chaldean marshes and touched land near Ur, on the edge of the desert. It is believed that his family scattered widely, and gave the name of Arrarat to a mountain at a considerable distance from the point of landing. There are no considerable elevations in this general vicinity.

The same or similar floods rise from time to time and inundate this country to this day. In some regions it is customary to fire a gun as a signal on the approach of a flood, that the inhabitants may be warned in time to escape. The same open warfare between the tribes in the upper and lower valleys is still waged. It is to do away with these floods and bring the entire delta into bearing that the new irrigating canal is being built.

The ancient rulers of this country realized the difficulty of the situation and did all in their power to avoid it. Canals were built by Cyrus the Great, Alexander, and others, with this in view. The canals were called "Bridges of Blessings." The attempt was made to carry the water from the Euphrates to the Tigris at the head of the delta. These attempts were effective for the greater part of each year, but when an unusually high flood discharge came the banks of the dams were likely to break, and the country down stream would be inundated, as in Noah's time.

The ancient engineers had not discovered how to raise water from a lower to a higher level. They knew nothing about hydrostatic engineering. To the modern engineer the problem which confounded Cyrus and Alexander is a comparatively simple one.

The delta formed by the two rivers has an area of about 12,000,000 acres, of which 9,000,000 form a desert and 2,500,000 a fresh-water swamp. The entire delta is flat, and while it is at the mercy of a flood, as in Noah's time, it also lends itself well to irrigating enterprises.

The irrigating canals now being surveyed will bring immediately some 3,000,000 acres of land into cultivation in Mesopotamia, and eventually this will be increased to 6,000,000 acres. It is estimated that the great area over which Noah floated in the ark will soon be made to bear more than 2,000,000 hundredweight of cotton, and 1,000,000 tons of wheat a year.