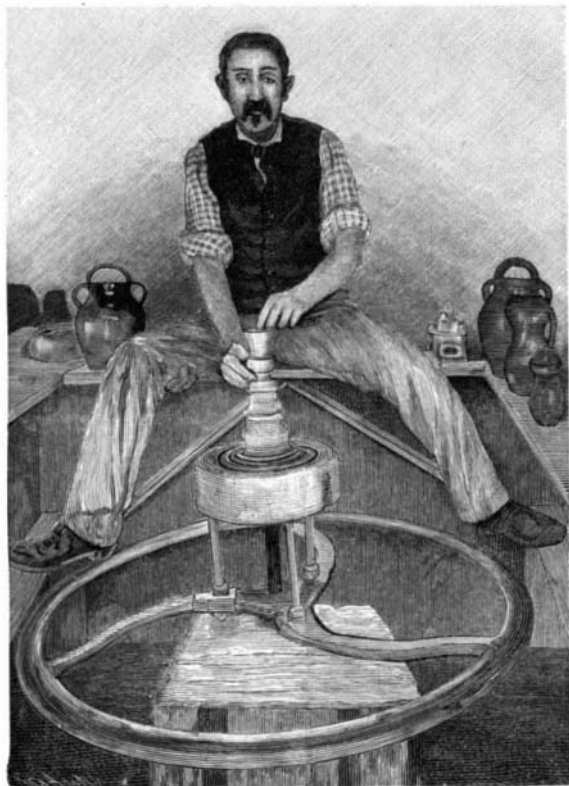


**THE POTTER OF "OLD BERRY" AT THE EXPOSITION.**

The tools of the potter have remained the same through ages, says Lectures pour Tous. It may be said that they are as old as the world. This is doubtless because, in their simplicity, they are admirably adapted for the use for which they are designed. The Egyptian potter who lived 2,000 years before Christ made use of nearly the same lathe and of the same wheel that was employed by the potter who was installed in



**THE POTTER OF "OLD BERRY."**

that part of the Exposition reserved for the exhibit of the French provinces of "Old Berry." A placard that swung from a nail in front of the shop gave the name of its occupant as:

"Alaphillipe, dit Charliton.  
Potier, à Verneuil (Indre)."

Upon entering, the potter was seen seated upon a wooden bench, in his shirt sleeves, and in trousers soiled with clay. He was in the act of working upon the wheel of his lathe (which was actuated with his foot) a large ball of clay that had previously been tempered with water and kneaded in such a way as to form a very homogeneous mass. Giving the wheel a rotary motion, he seized the ball of clay between his fingers, under the pressure of which it was seen to elongate, turn around, and assume thousands of varied forms. It became successively a pot, a cup and a slender flagon, and then again a large-bellied pot. It was with this last creation that he stopped. Then he arrested the motion of the wheel, detached the object with a spatula, and added handles to it.

After allowing it to dry for two or three days, he glazed it with a mixture of ashes and clay, and baked it for thirty-six hours in a kiln. Such pottery, when finished, is somewhat dull of aspect, but excellent for domestic purposes. The potter avoided giving it that brilliant aspect that attracts the purchaser, since to that effect it would have been necessary to employ harmful substances.

**A New Grain.**

A new grain which has been grown to a limited extent in Manitoba this year is called spelt. It is said to be a Russian grain, and is ground in that country and in Germany. The seed was obtained from a foreign settlement in Dakota. It was sold in Winnipeg last summer to a number of farmers, and they all speak favorably of it. Though the season was a try-

ing one, it produced good crops, as much as 50 bushels being obtained from one bushel of seed. It is claimed that spelt produces a heavy crop, is easily grown, and stands drought much better than most other grains, that it ripens early, and makes a superior feed grain for animals. The straw is also said to be better for feed than straw of other grains grown in Manitoba.

**POD CORN.**

Our engravings represents the sacred corn grown by a North American Indian tribe, the Abenikis. We are informed by the Division of Botany of the United States Department of Agriculture that this corn is well known under the name of pod corn, *Zea tunicata*. It has several vernacular names, such as California corn, cow corn, Egyptian corn, forage corn, husk corn, Oregon corn, primitive corn, Rocky Mountain corn, stock corn, in Africa "manigette," and in Buenos Ayres "pinsingallo." Each grain is completely covered by a separate husk. This kind of corn is not commonly grown, but our ordinary varieties, especially flint corn, often have one or more kernels covered with a separate husk. In rare instances, nearly all of the kernels on some ears have been covered in this manner. The origin of this corn, like that of our ordinary cultivated varieties of *Zea mays*, is not definitely known, but it is supposed to come from the region of Mexico or tropical America. In 1623 Bauhin obtained seed of *Zea tunicata* which was said to have come from Africa, but it is not at all probable that this plant is native on the eastern hemisphere. An account of this corn is contained in Bulletin 57 of the Office of the Experiment Stations of the Department of Agriculture.

**EXCAVATIONS AT NIPPUR.**

BY REV. ALBERT T. CLAY, PH.D.

The University of Pennsylvania in 1888 sent out an expedition to excavate Nippur, an ancient city of Babylonia. It is situated midway between the Tigris and Euphrates, about fifty miles to the southeast of Babylon. All that remains of the city is an extensive group of mounds, which rise on an average of about sixty feet above the plain. The mounds represent the accumulations of millenniums, the lowest stratum of which is found thirty feet below the present level of the plain, owing to the gradual filling in during the past ages.

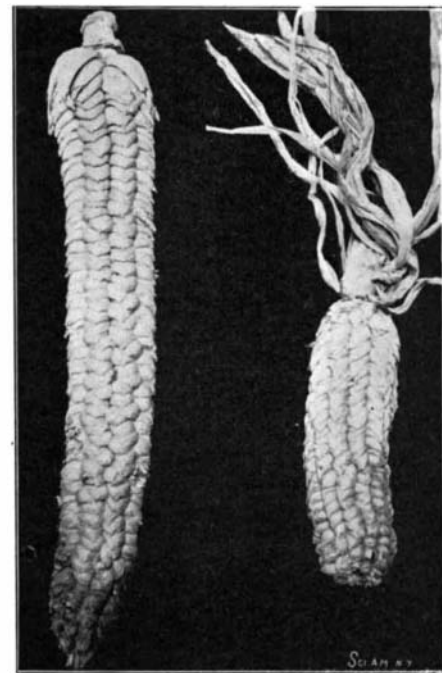
For eleven years, including interruptions, the "death-like stillness" which brooded over this ancient city (the probable site of Calneh, Genesis, 10: 10) with its treasures of long-forgotten millenniums has been dispelled, and the place has been the scene of much activity on the part of the American expedition. Though much has been accomplished in the laying bare of ancient buildings and the gathering of the exceedingly rich harvest of antiquities, yet at the present rate of operations, although on an average several hundred Arabs have been employed, it will require fully one hundred years to excavate thoroughly this ancient city.



**THE STAGE TOWER OF THE TEMPLE OF BEL—WORKMEN ON THE TEMPLE OF SARGON.**

The staff of the recent campaign, which has been the most remarkable for the richness of its finds and for the importance of its far-reaching results, consisted of Prof. H. V. Hilprecht, Ph.D., D.D., LL.D., Scientific Director; J. H. Haynes, Sc.D., Field Director; Messrs. Valentine Geere and Clarence Fisher, architects. Concerning the results of the campaign Prof. Hilprecht has been able to report that the most sanguine expectations have been realized.

City Wall.—Several years ago a trial trench was cut through the wall of the city, but recently a con-



**SACRED CORN GROWN BY A NORTH AMERICAN INDIAN TRIBE (ABENIKIS).**

Each grain is completely covered by a separate husk.

siderable portion of the wall was thoroughly excavated. It was ascertained that the first wall was built in the early pre-Semitic period (prior to 4000 B. C.). Upon this structure Naram-Sin (3750 B. C.) raised up his wall to a considerable height, using the characteristically large bricks of his period. Upon the remains of this splendid structure lie the bricks of Ur-Gur (2800 B. C.). The uppermost stratum contained the remains of a Jewish settlement, belonging to the late period. Rooms or shops for traders were built on the inside of the wall. From business records discovered Prof. Hilprecht infers that they were occupied during the third millennium before Christ.

The great city gate, known as *abullu rabu* in the inscriptions, which was sought for, was discovered. It had been built originally by some pre-Semitic builder in a very substantial manner, who laid up his bricks in bitumen. It has three divisions or entrances; the

one in the center, which was the largest, was for animals, those on either side were for the people. While the whole structure was considerably above the plain, approachable by a gradual ascent, the middle entrance was lower than the side passageways, which were reached by steps.

Pre-Semitic Palace.—In tracing the southern limits of the city a large palace of the pre-Semitic period (prior to 4000 B. C.) was discovered. No mound marked its site. It was clearly below the present level of the plain. Only one façade of the building was cleared. It is nearly six hundred feet long, built with two stories, having small windows near the ceilings. A large open terra-cotta vase, several tablets of the earliest known period, a substantially constructed well, and many other antiquities were discovered. Prof. Hilprecht is of the opinion that the complete excavation of this

enormous palace will reveal many important antiquities as bronze and marble statues of the type of those discovered at Tello by De Sarzec. The fact revealed in connection with these and other investigations is that the city in the earliest known period had the same enormous extent as in the late Neo-Babylonian period, and the territory embraced within the walls was at that time more fully occupied.

**Temple of Bel.**—One of the highest points of Nippur is the conical mound, called *Bint-el-Amir* ("daughter of the prince") by the Arabs who live in the neighborhood. It rises about 95 feet above the plain and covers the ruins of the ziggurat Imkharsag, the stage-tower of the temple Ekur. About the tower on all sides are the buried rooms and collapsed walls of the temple proper. Considerable time in the past has been devoted to the excavation of this structure. The uppermost stratum of the mound, not unlike nearly all the others examined, was found to be a cemetery, where in the period from about 200 A. D. the residents of Nippur buried their dead over the place where their ancestors worshiped their gods. Beneath this stratum were found the operations of those who built during the Parthian period, when a complete change in the form and character of the structure was made, upon which Prof. Hilprecht will write in the near future.

Beneath this structure was found the temple that had been built by Ashurbanapal (668-626 B. C.). Whether out of his great regard for the Temple of Bel, or for some political reason we do not know, but this Assyrian monarch restored and greatly enlarged the temple which had existed prior to his time.

The next great builder, going backward in the order of time, was Kadeshman-Turgu (1250 B. C.). The work of Kurigalzu, Bur-Sin II., Ishme-Dagan, Bur-Sin I., Ur-Ninib and Dungi, of the third pre-Christian millennium was also cleared away after being examined in all details, when the ziggurat as it was seen in the time of Ur-Gur (2800 B. C.) was laid bare.

On the ruins of what preceded him Ur-Gur built a large pavement or platform, on which he built his temple and ziggurat. The base of the latter formed a right angled parallelogram 200 feet long by 130 feet wide. It was built with three stages or stories, the lowest being 21 feet, the second 13 feet high, while the third was so much ruined that it was impossible to secure its original dimensions. In their primitive conception the Babylonians spoke of such temple-towers as "reaching unto the heavens." Though they were not very lofty, yet in this very level country they had an imposing and mountain-like appearance. Surrounding this complex was built an immense wall called *Imgur-Bel*, or the inner wall of the city.

About eight feet below the level of Ur-Gur's pavement was found another consisting of two layers of burned bricks. They were 20 inches square by 4 inches thick, most of which were stamped with the legend "Naram-Sin, builder of the temple of Bêl," while a few were stamped with his father's name "Shargani-shar-ali (Sargon) King of Accad, builder of the temple of Bêl."

Until recently these rulers, who lived about 3800 B. C., were regarded as legendary characters, largely on account of their great antiquity, but the excavations revealed the fact that the founding of the temple was several thousand years prior to their time. Down the excavators went through "the accumulations of debris from ruined buildings, partly preserved drains, broken pottery and many other remnants of human civilization" not less than 31 feet before virgin soil was reached. Above Naram-Sin's pavement were 36 feet of accumulations, representing over 4,000 years of Babylonian history. Below this pavement were 31 feet representing a period, how long? There are no reasons to think that the accumulations were more rapid prior to that period than later, and to add Prof. Hilprecht's words, "I do not hesitate, therefore, to date the founding of the temple of Bêl and the first settlements in Nippur somewhere between 6000 and 7000 B. C., possibly even earlier."

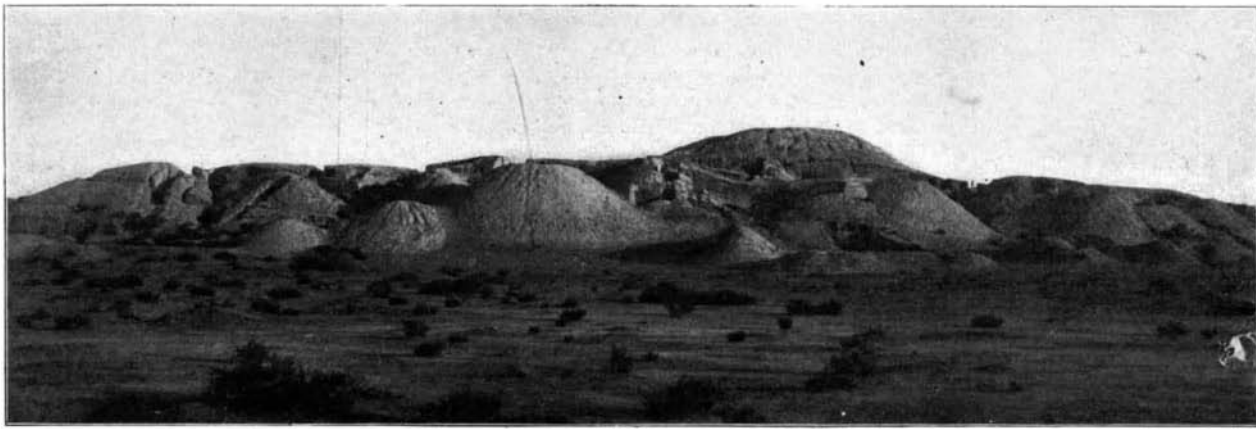
Belonging to the temple at different periods prior to Sargon's time were found in this early strata an altar covered with ashes of animal sacrifice; several large sacrificial vases made of terra-cotta; a perfect keystone arch, hitherto considered Roman, and many other interesting works of antiquity in bronze, stone, and clay.

To this early period belong the fragments of inscribed vases of about a dozen Babylonian rulers which have been translated by Prof. Hilprecht, and

again introduced by him into Babylonian history. The vases were used in the temple service for centuries until the time the Elamites went through the land under Kudur-Nakhundi (about 2285 B. C.), who sacked the temples, carried off to Elam what appeared favorable in their eyes, broke up and scattered what they did not desire. At that time the Temple library and other buildings were destroyed. Some cities were never rebuilt after this invasion. Nippur never fully recovered after this vandalism of the Elamitic hordes.

**Temple Library.**—On his first visit to the mounds of Nippur, about eleven years ago, Prof. Hilprecht pointed out the place where he thought the temple library ought to be found. In that identical place the library was found. During the recent campaign a portion of the mound was carefully excavated in addition to what had been cleared formerly. Altogether there have been taken thus far from the rooms of the library about 25,000 tablets, mostly unbaked. As only about one-twentieth part of this extensive group of hills has been excavated, in view of the peculiar topographical indications and the history of the temple, Prof. Hilprecht estimates the probable number of tablets yet buried in the library to be from one hundred to one hundred and fifty thousand. They are almost entirely of a didactic character, and belong to the third millennium before Christ. Of the manifold character of the tablets only an exhaustive examination can give a clear idea. Ledges or shelves were built in the walls of the rooms, upon which the tablets were laid in rows. As stated above, the Elamites threw the building into ruins the century prior to Abraham's birth. The importance of this find can scarcely be estimated at the present time, as it will throw so much light upon the history of this early period.

**Court of Columns.**—Considerable time has been devoted in former years to the excavation of the so-called "Court of Columns." It is situated on the western side of the Shatt-en-Nil in an upper stratum of the highest mound. It belongs to the late occupation of Nippur, about 300 B. C., as determined by Prof. Hil-



MOUNDS AT NIPPUR.

precht. It was a government building. There were many rooms on three sides of the building around an open court of columns. Some of the rooms were used for the storage of grain and other kinds of merchandise, doubtless representing the tithes or taxes of Nippur's inhabitants. Architectural plans of this building as well as the others excavated have been prepared by the architects who accompanied the expedition.

**Additional Results.**—Important inscriptions on clay and stone belonging to all periods of Babylonian history were found during the last campaign in great numbers. In removing the upper stratum of mounds over one thousand sarcophagi, mostly of the slipper-shaped pattern characteristic of the late period (300 B. C. to 700 A. D.) were opened. In these were found gold and silver jewelry in the shape of bracelets, finger rings, nose rings, brooches, clasps; also pottery and many other things. Quite a number of representative specimens of the different burial modes were preserved for exhibition in the museum. Seals and seal cylinders, such as the Babylonians used in their business transactions; several hundred inscribed Hebrew and Mandaic bowls, showing the influence of Babylonian wizardry upon the Jews who continued to live at Nippur as late as 700 A. D., great numbers of vases in enameled and plain pottery, images of gods; playthings in terra-cotta; bass-reliefs, weights; utensils and coins in bronze and iron, etc., were found. Another important feature was the studying of all types and forms of pottery with a view to determining the age of many specimens excavated in former years. As regards portable antiquities of every description having special archaeological value for the restoration of Babylonian history this expedition stands prominently in the lead of those at the present time engaged in Babylonia.

These are a few of the important finds without mentioning the numerous minor facts ascertained, and the many questions solved through the personal inspection and study of Prof. Hilprecht while in the trenches

which have important bearing upon the religious ideas and customs of the daily life of the Babylonian people, upon which he will write in the near future.

What science owes to the labors and undertakings of all on the staff and the unselfish generosity and interest of the gentlemen who furnished the means to carry on the work can only be properly estimated by posterity. It is expected at no distant date to resume the operations in this land of primitive civilization—the cradle of the universe.

#### Electro-Capillary Action.

The Constantin Zahrzewski describes in the Bulletin of the Academy of Cracow a series of experiments which he has recently made upon the electromotive force produced by capillary action. He uses for this purpose an apparatus consisting of two large glass vessels united by a capillary tube of glass, silvered on the interior. The vessels were half filled with water; each vessel contained a metal electrode placed in the water at a short distance from the opening of the tube. The movement of the water through the capillary tube was produced by compressing the air in one of the vessels. The experimenter found that the movement of water through the tube gave rise to an electric current, the direction of this current depending upon that of the water. It was found that the electromotive force depended upon the difference of pressure at the ends of the tube and also upon the distance of the electrodes from the opening; when the electrode contained in the vessel toward which the current flows is removed farther from the end of the tube the effect is diminished. The thickness of the layer of silvering seems also to have an effect upon the electromotive force, this being diminished as the thickness of the layer is increased.

#### Windmill Electric Plants.

M. Gustave Conz, who has recently been making a study of the winds in the northern coasts of Germany, finds that the utilization of windmills for small electric plants will be practicable in these regions. He has already set up a small plant at Kappeln, in Schleswig-Holstein. The windmill is of the Neumann type, having a diameter of 35 feet and a surface of 90 square yards. The speed of rotation of the wheel is regulated automatically and reduced to 11 revolutions per minute; with a current of air of 8 feet per second the windmill will give about 30 horse power. It is connected to a dynamo running at 700

revolutions and giving 120 amperes at 160 volts; a storage battery is connected in parallel with the dynamo. When the wind reaches a speed of 8 feet per second the dynamo runs at normal charge. The tension of the lighting circuit is maintained constant by a rheostat with automatic regulation. To provide for a plant of larger size, capable of furnishing light at a considerable distance by the use of a storage battery, M. Conz recommends using a number of windmills similar to the above, each operating its own dynamo; the dynamos are to be grouped in parallel and are connected to a common storage battery.

#### A Curious Copyright Decision.

A curious decision as to the right to rebind books, which also involves the question of copyright, was recently given by the United States Circuit Court of Appeals. The court announced that to trim old books, to cut off the edges of the leaves and to rebind them is no invasion of the rights of the person holding the copyright of the books. The court in its ruling put in a proviso that a book so rebound, recovered and offered for sale should have prominently displayed and stamped upon its cover notice that the book was a second-hand copy. The American Book Company have complained that the defendants were selling old school books on which they owned the copyright. They were then revamped and sold. The court in its decision says: "We think that, so far as respects the copyright laws of the United States, no legal right of the appellee was invaded by so doing. What was done was merely the restoration of the books to their original condition when sold by the appellee, or so nearly so as could be done."

An Austrian medical paper states that a physician named Jaz has discovered an anti-typhoid serum which has been applied successfully in fifty cases. The serum is not injected, but is drunk by the patient.

# SCIENTIFIC AMERICAN

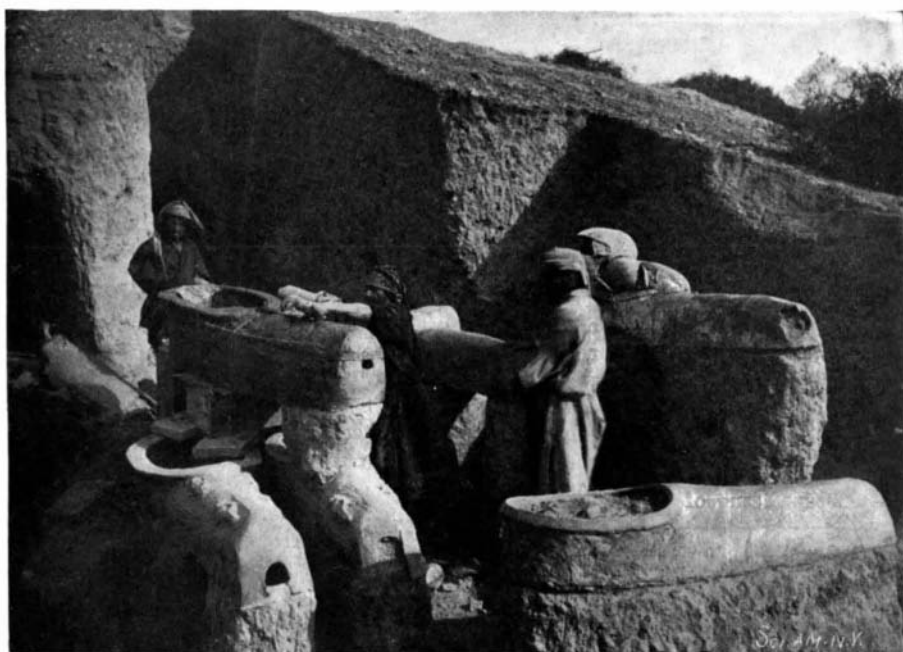
[Entered at the Post Office of New York, N. Y., as Second Class Matter. Copyright, 1901, by Munn & Co.]

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. LXXXIV.—No. 9.  
ESTABLISHED 1845.

NEW YORK, MARCH 2, 1901.

\$3.00 A YEAR.  
8 CENTS A COPY.



Excavation of Slipper-Shaped Coffins.



Excavations in Pre-Sargonic Strata to Water Level.



View of the Temple Area and Inclosure, 2800 B. C.—Excavations in Pre-Sargonic Strata in Foreground.

RECENT EXCAVATIONS CARRIED ON BY THE UNIVERSITY OF PENNSYLVANIA AT NIPPUR, BABYLONIA.—[See page 133.]