The receiver, or indicator, which is placed in the office, is somewhat similar in appearance and action, but more simple in construction, inasmuch as the nine plates above described are replaced by a numbered dial indicating from one to nine the percentage of fire damp as analyzed by the instrument in the mine. Just below each number on the dial is a hole in which plugs may be inserted that will make an electrical contact with the pointer. By placing a plug in the hole corresponding to a proportion of fire damp beyond which the mine is not thought safe, continuous ringing of a bell will result. The movement of the pointer is resultant from a contact effected when the contact rod of the instrument in the mine passes from one plate to another.

The mechanisms of the separate instruments of the methanometer are actuated by clockwork, operating the bellows supplying the analyzer with mine air, throwing the platinum wire of the analyzer into incandescence, and performing the other mechanical operations necessary to the operation of the different instruments.

At the time set for an analysis, a circuit is closed that drops a lever across the two tubes leading into the burner, crushing them flat, and thus shutting off the supply of air; a second later a circuit is closed, which brings the platinum wire into incandescence, lasting for fifteen seconds.

After a lapse of one minute, the platinum wire is again thrown into incandescence for another fifteen seconds. Five minutes later, during which five minutes the transmitter is recording the result of the analysis in the receiver, the lever closing the India-rubber tubes is lifted, thus permitting a fresh supply of air to reach the burner. The mercury therefore resumes its normal position, as also does the contact rod and pointer.

The reason for raising the platinum wire twice to incandescence for fifteen seconds, with an interval of one minute, is as follows: The wire being suddenly raised to a very high temperature dilates instantaneously the gas in the burner; one part of this gas escapes combustion, being drawn once more into the manometer during the minute allowed for cooling. During the second incandescence this gas returns to the burner, where its consumption is procured almost entirely.

Owing to the fact that the mechanism is actuated by clockwork, it is possible to connect at least six analyzers with one receiver, by arranging the analyzers to operate at intervals of ten minutes each. By reference to the time, it can easily be ascertained from which analyzer the report is coming.

YELLOW FEVER PREVENTED BY MOSQUITO EXTERMINATION.

Within the past few weeks there has been a gradual increase in the number of new cases and deaths by yellow fever in New Orleans, La., which is of so alarming a character as to cause representatives in adjoining States and in Havana, Cuba, to set up a quarantine against the city.

It is reported about twenty-five plague-infested centers have been located, the first and largest being near the French market, covering an area of forty city blocks. Frightened Italians, who would not consult physicians, scattered among friends in the outer portions of the city, and were there taken down with disease. It was noticed at these outside centers that the spread of the disease was curtailed because the patients were subjected to scientific treatment and kept perfectly screened, while the premises were cleared of mosquitoes. The city authorities favor the thorough cleaning of the streets of dirt and filth as the best means of checking the spread of the fever, but President Kohnke, of the city Board of Health (author of the well-known paper on "Mosquito Fever Propagation" in the SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 1518 and 1519, read before the American Society of Mosquito Extermination last winter) states: "Cleaning up streets and removing dirt from gutters is energy thrown away. You ought to put every man you can get hold of to screening cisterns and draining standing water from premises and ridding the city of mosquitoes."

This is a very quick and practical method of control which, if properly carried out, should aid materially in quelling the epidemic.

In New Orleans the situation as to water supply is different from most cities. In place of an underground pipe system, a double set of cisterns are erected alongside of or back of each residence for the collection of rain water. It is estimated there are 75,000 of these cisterns in New Orleans, which form so many pools of water suitable for mosquito breeding. It is to prevent the escape of the mosquitoes by covering the cisterns with screens that Dr. Kohnke so urgently recommends as one means of checking the spread of the fever.

The success in eradicating yellow fever from Havana, Cuba, is due to scientific methods, especially in preventing the propagation of mosquitoes, and in protecting suspected cases against contact with mosquitoes by suitable screens.

Large engineering plans for draining vast swampy areas are now being carried out in many States, notably New Jersey, for the very purpose of eliminating the sources of mosquito propagation, producing more healthful and comfortable conditions in the surrounding country.

Mosquito prevention is a subject of pressing importance in every locality, and should be treated liberally by all public-spirited citizens and authorities.

HOW THE ANCIENT BABYLONIANS DRAINED THEIR CITY.

BY EDGAR JAMES BANKS, FIELD DIRECTOR OF THE BABYLONIAN EXPEDITION OF THE UNIVERSITY OF CHICAGO.

It is generally supposed that it is only modern man who has perfected a system of drainage and sewerage to carry from his house and city the overflowing rain water and the filth and garbage which accumulate. In the excavation of Bismya, the ancient Sumerian or pre-Babylonian city which flourished 4,500 years ago, a remarkable system of drainage, perfectly adapted to the alluvial plain of the Mesopotamian desert, has been discovered.

Babylonia is perfectly level; from Bagdad to the Persian Gulf there is not the slightest elevation, save for the artificial mounds or an occasional changing sand drift. In most places there is a crust of hard clay upon the surface, baked by the hot sun of summer time, so hard that it resembles stone. Parts of the desert are perfect for bicycle riding. Beneath the crust, which at Bismya is seldom more than four feet in thickness, and in places entirely lacking, is loose, caving sand reaching to an unknown depth.

Drainage in such a country, without sloping hills or streams of running water, might tax the ingenuity of the modern builder. In constructing a house, the ancient Sumerian of more than 6,000 years ago first dug a hole into the sand to a considerable depth; at Bismya several instances were found where the shaft had reached the depth of fourteen meters beneath the foundation of the house. From the bottom he built up a vertical drain of large, cylindrical, terra-cotta sections, each of which is provided with grooved flanges to receive the one above. The sections of one drain were forty-eight centimeters in diameter and sixty in height; others were larger and much shorter; the thickness of the wall was 2.7 centimeters. The tiles were punctured at intervals with small holes about two centimeters in diameter. The section at the top of the drain was semi-spherical, fitting over it like a cap, and provided with an opening to receive the water from above. Sand and potsherds were then filled in about the drain, and it was ready for use. The water, pouring into it, was rapidly absorbed by the sand at the bottom, and if there it became clogged, the water escaped through the holes in the sides of the tiles.

The temple at Bismya was provided with several such drains. One palace was discovered with four; a large bath, resembling a modern Turkish bath, and provided with a bitumen floor, sloping to one corner, emptied its waste water into one. The toilets in the private houses of 6,000 years ago were almost identical with those of the modern Arab house—a small oblong hole in the floor without any seat. Several found at Bismya were provided with vertical drains beneath.

In clearing out the drains, a few of them, whose openings had been exposed, were filled with the drifting sand; others were half full of the filth of long-past ages; in one at the temple, we removed dozens of shallow, terra-cotta drinking cups, not unlike a large saucer in shape and size. Evidently, it received the waste water of a drinking fountain, and the cups had accidentally dropped within.

In the Bismya temple platform, constructed about 2750 B. C., we uncovered a horizontal drain of tiles, each of which was about a meter long and fifteen centimeters in diameter, and not unlike in shape those at present employed. It conducted the rain water from the platform to one of the vertical drains. One tile was so well constructed that for a long time it served as a chimney for our house, until my Turkish overseer suggested that its dark, smoked end project from the battlements of the house, to convince the Arabs that we were well fortified; thus it served as a gun until the close of the excavations.

In other parts of the temple more elementary drains were employed to carry off the surface water from the slightly inclined platform. It consisted simply of a groove constructed of bricks, or arranged by omitting the bricks in the floor; frequently the groove was continued down over the vertical edge of the platform.

The Babylonians of a later period, who buried, instead of cremating their dead, carefully provided their cemeteries with drains. The graves were small house-shaped structures entirely or partly above ground, and whenever they were found upon the sloping side of a mound, they were protected above by a breakwater, while along the sides were square, open brick drains. The result was that some of the graves, although thousands of years old, and constructed of unbaked clay, are still in a perfect state of preservation.

To the student of architecture it may be surprising to learn that the arch, until recently supposed to have been unknown to the ancients, was frequently employed by the pre-Babylonians of more than 6,000 years ago. Such an arch in a poor state of preservation was, a few years ago, discovered in the lowest stratum, beneath the Babylonian city of Nippur. More recently an arched drain was found beneath the old city of Fara, which the Germans have excavated in central Babylonia. The city, although one of the earliest known, was built upon an earlier ruin, and provided with an arched drain constructed of small, plano-convex bricks. It measures about one meter in height, and has an equal width.

While delving among the ruins of the oldest cities of the world, we are thus finding that at the time when we supposed that man was primitive and savage, he provided his home and city with "improvements" which we are inclined to call modern, but which we are only reinventing.

SCIENCE NOTES.

Perhaps it is not wise to prophesy a time when enzymic diseases shall lose all their terror by reason of the discovery of effective antidotes to the poisons to which their ravages are generally due. It is reasonable, however, to look forward to the time when the terror of these diseases, namely, diphtheria, typhoid fever, typhus and kindred scourges shall be reduced to a minimum.

The decade from 1880 to 1890 may be called the golden age of ætiology, for in these years were discovered the hitherto unknown parasitic microbes of typhoid fever, tuberculosis, malaria, Asiatic cholera, diphtheria, and tetanus. The last decade of a century which has well been called "the wonderful," witnessed the discovery of antitoxins by Behring and the beginnings of serum therapy. With the single exception of the changes effected by the acceptance of the theory of organic evolution, there has been no modification of human opinion within the nineteenth century more wonderful, or more profoundly affecting the general conduct of human life, than that in our attitude toward the nature, the causation, and the prevention of disease—that is to say, toward public health science.

The determination of the presence of small quantities of foreign fat in lard is exceedingly difficult, and taxes the skill of the chemist to the utmost. Most fats which are suitable or available for mixing are so similar to lard in their physical and chemical properties that the determinations which suffice to detect their presence when they occur in large amounts or to identify them in their pure state are of little or no value in detecting the small amounts usually employed in adulterated lard. As a result, the chemist must depend to a large extent on certain qualitative or approximatively quantitative tests. Many of these tests are not based on any inherent property of the fat, but depend on some impurity, due perhaps to the method of manufacture, or, with animal fats, to the kind of food upon which the animal has been fed.

The absorptive systems of plants seem to be admirably adapted for their needs from a diosmotic point of view. Diffusion may, therefore, be sufficiently rapid to supply all demands of the absorbing cells or organs. Nevertheless, the assumption that ordinarily diffusion through the cell and plasmatic membrane is sufficiently rapid properly to provide for the translocation of metabolic products from cell to cell is certainly open to further inquiry. Present knowledge of the translocatory processes is insufficient. Plasmatic connections between cells are now known to be of common occurrence, and this fact has given further interest to the above inquiry. Brown and Escombe are of the opinion that the plasmatic connections are eminently adapted for all of those phenomena which they have found to belong, as subsequently mentioned, to multiperforate septa. They claim, further, that with slight differences of osmotic pressure the necessary concentration of gradient for increased translocation would be very simply effected.

The yield of oil and pomace that may be obtained from a given quantity or weight of castor beans varies according to the quality and condition of the beans and the climatic conditions under which they were produced. Beans of good quality contain about 45 per cent of oil, but 32 per cent is, on a general average, about the proportion of oil extracted by the process of manufacture used in the United States. The rather high proportion of about 13 per cent remains unexpressed in the pomace. The weight of imported castor beans as fixed by the United States tariff regulations is 50 pounds to the bushel, and consequently in the eastern mills it is customary to estimate the yield of oil and pomace, respectively, at 16 pounds (2 gallons) and 34 pounds to the bushel. In the West the weight per bushel of domestic castor beans is fixed at 46 pounds, and on this basis the yield of oil per bushel of beans would be 14.72 pounds (1.84 gallons) and of pomace 31.28 pounds.

Commander Peary sailed at two o'clock, July 26, from North Sydney, Nova Scotia, in his Arctic steamer "Roosevelt" on his quest for the Pole.