ton barracks, commanded by the senior officer present. His pall-bearers were: General John M. Schofield, the ranking officer of the U. S. army; General Thomas L. Casey, chief of the U. S. engineers; General Holabird, General Horatio C. Wright, and Colonel Vincent, representing the army; Professor Samuel P. Langley, representing the National Academy of Sciences; and Dr. J. C. Welling, representing the Smithsonian Institution. M. B.

THE MASTODON.

The recent discovery of the lower end of the tusk of a mastodon, broken and fragmentary, in the excavation made for the Harlem ship canal, now in process of completion, brings to our minds very forcibly the great changes our island has undergone since that distant time when this huge *proboscidian* was a denizen of Westchester county, and the untenanted wilderness stretched to the waters of New York bay. Before the Indian canoe crossed the Hudson, rippling beneath the noiseless maneuver of the paddle of its stealthy occupant, the trumpet of this great "tusker" resounded along the shores of the beautiful river and its waters were invaded by its massive frame. The mastodon has become the most popularized monster of prehistoric times, and speculation as to his contemporaneity with man in the earliest days of man's existence on this earth lends to this late announcement of his presence on Manhattan island a different and higher interest.

The example given in our illustration is to be seen at the American Museum of Natural History in this city, and altogether may be regarded as the most instructive and impressive specimen of the mastodon now on exhibition in this country. In looking at him the spectator is struck by the great size of the bones, the immense head, with its broad surfaces, the formidable tusks and the powerful crested teeth. Between the forelegs of this specimen, which was taken out of a peaty morass near Newburg, lies the butt end of the huge tusk which the U. S. engineers have unearthed from the east end of Dykman's creek, where Broadway crosses the ship canal, at about 231st street. The teeth of the mastodon have served as the most important elements in making specific distinctions in this animal, and the name mastodon, meaning *nipple tooth*, is derived from the mammæ-like tubercles which unite to form their transverse crests. The mastodon's systematic position is among the proboscidian ungulates, and, like the elephant, it belongs to the uneven-toed groups of ungulate mammals (perissodactyls). Its most striking peculiarity is the horizontal succession of its teeth. Six teeth or molars appear in succession, the latter pressing forward from the back of the jaw and replacing their dislodged predecessors. In this series the first teeth are smaller and provided with fewer crests or transverse ridges, while their successors are larger and possess more ridges. A great deal of variety obtains in the construction of these teeth, and as the scheme, given hereafter, for the separation of the nine American species shows, the variations are extreme. Besides the horizontal succession which holds good for most species, in one, *M. oliroticus*, there seems also to have existed a vertical succession; that is, in the first three of the molar horizontal series there has been a replacement of these from below upward by other teeth displacing them, exactly as the milk teeth in the human species are dislodged by their subcutaneous successors. These have hence been designated as premolars, the true molars being the fourth, fifth, and sixth teeth in the horizontal succession. In other cases or species this vertical movement seems limited to the first tooth of the series, and in most it has not been observed or determined at all.

The mastodon we may believe for the most part ground his food by an up and down motion, somewhat reversing the sideways munching of the common elephant, though in the species where the valleys between the ridges are reduced there seems little reason to suppose that the ordinary left to right motion was entirely abandoned. The canine teeth in the mastodon and elephant are represented by the great outward-curving tusks in the upper jaw, and by smaller deciduous spikes projecting from the lower jaw. These latter are not always present. The head of the mastodon is enormously developed by a cancellated open bone structure, and upon the broad surfaces thus prepared the powerful muscles of the neck found attachment. These latter were required for the support of the huge tusks, thrown so far outward beyond the center of gravity of the head as to require these powerful and restraining bonds for their elevation. The skull of the elephant is much shorter and more columnar in appearance than in the mastodon, and is particularly distinguished by the reduced and shortened under jaw, which contrasts with the elongated symphysis of the mastodon. The mastodon, enjoying, like the elephant, a very limited range of motion of its head, was provided with a similar trunk, whose flexibility was an ample substitute for this restriction, and by which it supplied itself with food and water.

There are many anatomical peculiarities in the mastodon, and it has been remarked that it may have been able, from the construction of its fore limbs, to throw its legs up and stride over bushes, etc. (pronation), in a manner not permissible to the elephant, a rather unnecessary assumption, as the elephant is not so limited in this respect. The mastodon has a continental range, and its widely distributed remains over Asia, from India to Siberia, its representatives in South America, and its almost universal presence in North America, prove the elasticity of its adaptation to a variety of conditions. Its bones are usually found in or below peat, and underneath forest beds, and it seems often to have perished by sinking beneath the yielding surfaces of marshes, or to have actually drowned in waterways, and to have become entombed by the accumulation above it of vegetation, muck, and alluvial drift. It lived late after the glacial epoch, and traces a long ancestry back to the middle tertiaries. Its contemporaneity with man has often been discussed, and there seems no good reason to suppose that the American aborigine was not acquainted with this great beast. Dr. Koch's celebrated report to the St. Louis Academy of Science may be recalled:

"In the year 1839," says this explorer, "I discovered and disinterred in Gasconade county, Mo., at a spot in the bottom of the Bombeuse river, bones sufficiently well preserved to enable me to decide positively that they belonged to the *Mastodon giganteus* (?) The greater portion of the bones had been more or less burned by fire. The fire had extended but a few feet beyond the space occupied by the animal before its destruction, and there was more than sufficient evidence on the spot that the fire had not been an accidental one, but, on the contrary, that it had been kindled by human agency, and, according to all appearance, with the design of killing the huge creature, which had been found mired in the mud and in an entirely helpless condition. . . . It seemed that the burning of the victim and the hurling of rocks at it had not satisfied the destroyers, for I found also among the ashes bones and rocks, several arrow heads, a stone spear head, and some stone axes."

Dr. Koch also found arrow heads underneath the skeleton of a mastodon (*Missourium*).

We have elsewhere remarked (*American Antiquarian*) that the mere fact of the association of the remains of extinct animals with human relics does not necessarily establish a fabulous antiquity for the latter unless accompanied by geological evidence pointing to such a conclusion. The mastodon may have lingered on to comparatively recent times, and comparatively recent men may have intercepted and destroyed helpless individuals. The beds in the alluvial bottoms of the Bombeuse and Pomme de Terre rivers, as quoted by Dr. Koch, offer no indisputable indications of great age. Dr. Koch's discovery certainly affords grounds for such a presumption, but at the best that alone.

We subjoin the following important diagnosis of the mastodon species of North America, prepared by Prof. Cope:

I.

Intermediate molars with not more than three crests.

α Crests acute, transverse.

β Valleys uninterrupted.

Last superior molar with three crests and a heel; crests low, not serrate, *M. proavus*.

Last superior molar with four crests and a heel; crests elevated, not serrate, *M. oliroticus*.

$\beta\ \beta$ Valleys interrupted.

Edge of crest tuberculate, *M. serridens*.

$\alpha\ \alpha$ Crests transverse, composed of conic lobes.

β Valleys (?) uninterrupted.

Last inferior molar narrow, with four crests; no accessory tubercles, *M. shepardi*.

$\beta\ \beta$ Valleys interrupted.

Last inferior molar with four crests and a heel; symphysis short, smaller size, *M. euhypodon*.

Last inferior molar with four crests and a cingulum; symphysis longer, medium size, *M. productus*.

Last inferior molar with five crests and a heel; symphysis very long, largest size, *M. augustideus*.

$\alpha\ \alpha\ \alpha$ Crests broken into conic lobes; those of opposite sides alternating.

Last inferior molar narrow, supporting four crests and a heel, *M. obscurus*.

II.

Intermediate molars, with four transverse crests.

A long symphysis, *M. campester*.

A short symphysis, *M. nimificus*.

L. P. G.

Rock Drilling on the Mississippi.

The electric drilling at Rock Island was done under the terms of a contract made with the government of the United States by F. B. Badt, Western manager of the Thomson-Van Depoele Electric Mining Company. The government, which owns Rock Island, where it has established the largest arsenal in the country, has for some time been engaged in the work of deepening a portion of the southern channel of the Mississippi, which here flows from east to west. This is done with the twofold purpose of securing a more plentiful supply of water power, which is used at the shops on the island, and to provide a navigable channel at Moline, which has heretofore been debarred by shallow water from sharing in the commerce of the nation's greatest river. A coffer-dam has been erected at the head of the island at a cost of \$25,000 or \$30,000, and the government is now deepening a channel four hundred feet wide to the extent of four feet: that is, it is doing so as fast as the congressional appropriations will allow. The coffer-dam is not, of course, absolutely water-tight, and it may be mentioned here, as an interesting fact, that much trouble is caused by muskrats, who do considerable damage by burrowing under the dam. The watchmen are paid premiums for shooting the troublesome little animals.

The particular portion of the work on which electricity was employed is a strip of limestone rock about 600 feet long and of an average width of fifty feet. The remainder of the rock is a much softer sandstone, and can be profitably drilled by hand. It has been shown, however, that electric power only costs about half as much as hand drilling in the harder rock. Nine drills were used on the work. Eight of these were mounted on weighted tripods in the usual manner, while one, somewhat larger in size, was mounted on a carriage, and wheeled about on a temporary track. The machines used were the regular Van Depoele reciprocating drills, which have heretofore been described in this journal.

Current was obtained from a generating plant installed in a temporary power house erected on the island. This building was an addition to a rough pumping station put up by the government for the purpose of clearing the bed of the river from water coming from leaks in the water-dam and from springs. This pumping engine is of the vertical type, and was built in the government shops, being rated at 25 horse power. It was utilized in driving the generators, steam being furnished by a 40 horse power boiler. The government gave the use of the engine and boiler, when not used for pumping, as a part of the contract. The generating plant consisted of two Thomson-Houston dynamos, with revolving brushes, one of 20 and the other of 10 kilowatts capacity. The arc lights were rigged up near the drills to enable the work to be carried on after dark. An incandescent circuit served to furnish light for the interior of the power house, which was adequately supplied with suitable switches and measuring instruments.

It was found convenient to utilize the dynamos and circuit of the drilling plant to explode the dynamite with which the holes were charged.—*Western Electrician.*

Preparation of Rice.

The milling of rice, briefly stated, embraces the following processes:

1. The "screening" or second thrashing gives the rough rice or "paddy" designed to remove trash, stalks and foreign particles.

2. The removal of the outer husk by the "milling stones."

3. The separation of the chaff and other substances by the "screen blower" and "chaff fan."

4. The removal of the yellow cuticle of the grain by pestling in mortars, which is the most laborious and expensive of the several processes.

5. The separation of the rice bran from the rice grain by sifting, and the separation of the small and large grain of rice by the "brush screen."

6. Polishing, which is accomplished by a horizontal revolving drum, covered with leather and surmounted by a cylinder of wire gauze.

The friction by the constant rubbing of the grains of rice against each other and against the drum produces the "rice polish," otherwise called rice dust or rice flour, which is not rice bran, but a part of the grain itself worn by attrition.

Don't Turn the Exhaust into the Sewer.

Steam should never be put into a brick or cement sewer, as it has an injurious effect on the same, causing disintegration and collapse within a very short time; neither should it be led into a brick chimney, for the same reasons. In some places it is the practice of engineers to turn the exhaust from pump or small engine into the sewers, but this is bad practice, and, we believe, an illegal act in some cities, for it will not only destroy the sewers, but the heat of the steam makes the malarial gases more active, while at the same time it produces a certain amount of pressure that will force the gas back into buildings through the water traps commonly in use. In these traps there is seldom more than three inches of water, and very little pressure is necessary to force the gas through them. Wherever gas is forced back through buildings in this or a similar manner, the death rate in that locality will certainly be greatly increased.—*The Stationary Engineer.*

An Antiseptic Adhesive Pomade.

The following is employed in the Hopital Saint-André, in place of adhesive straps, to keep the protective dressings in close apposition to the skin:

R.	Oxide of zinc	gr. x.
	Chloride of zinc	gr. xlv.
	Gelatin	ʒ x.
	Water	℥ ij.

It is also found very serviceable in dressing wounds of the face.