

northern and southern spot-zones in these two years. In deducing results the term "spot" is used to denote a discoloration whether single or in parts, provided the components are sufficiently near to indicate a common origin. As the largest eruptions are rarely spread beyond an area twenty degrees in diameter, a group scattered over that extent of surface is classed as one disturbance or spot. According to this classification, in 613 days when observations were obtainable, 263 spots appeared on the disk, 118 being in the northern hemisphere, 108 in the southern, while the positions of 37 were unascertained. On only six days was the disk unspotted in a four-inch lens. Of these 263 spots, 115 appeared from January 1 to September 30 of the present year (1905). This denotes an increase in the average number as well as in size during these tempestuous months. The proportion in the hemispheres was nearly preserved, 53 being north of the solar equator, 47 south, and 15 unlocated. As explained in the foregoing account, the northern tracts also had the larger share of the seven stupendous eruptions described. A comparison of those of lesser size—neither vast nor faint—shows that during this same critical period about 18 appeared north and 15 south of the equator, from latitudes 5 to 20 being the chief zones of activity.

When the great spot of October, 1903, heralded the beginning of maximum, widespread magnetic disturbance encompassed our globe, but it is a circumstance of much interest that during the past nine months, when tempest-tossed areas of still greater extent faced earthward again and again, neither auroras nor electrical phenomena were in notable co-operation with this climax of maximum spottedness.

CAPTIVE HIPPOPOTAMI.

While few menageries or zoological gardens include hippopotami among the members of the animal world which they contain, the general public is nevertheless quite familiar with the appearance and characteristics of the great ungulates. They have been described in word and picture by innumerable naturalists, historians, and writers, even of the earliest times. We find unmistakable reference to them in the records of the ancient Egyptians, and to-day there is little doubt that the behemoth of the Bible was identical with the hippopotamus. The Central Park Zoo, of New York city, is particularly fortunate in the possession of three splendid specimens, a pair of older animals and a young one. The pair, Caliph and Miss Murphy, are well known, not only to those directly interested in these matters, but also to the reading public, for the huge brutes have been repeatedly described and pictured in various publications.

Caliph, the great male which is the subject of the accompanying interesting engravings, has been in the Central Park Zoo since 1889, while his mate, Miss Murphy, has been included in the collection for a somewhat shorter period. These two have proven remarkably prolific, and have presented an admiring public with eight healthy offspring, and these, with the exception of the young one at present in the Park, have been sold to other menageries. This is not an exceptional case, for strangely enough these curious

beasts thrive well in captivity, and breed not infrequently. Were it not for the difficulty formerly experienced in securing original pairs, they would to-day be far more common in zoological parks. Needless to say, it is very difficult to capture the hippopotamus in a wild state and transport the animal uninjured to civilization, though if this be accomplished successfully, he takes kindly to captivity, and often lives contentedly for many years. In fact, a single specimen existed in the Zoological Park in London for over twenty-eight years.

Hippopotami in captivity do not require the excessive care and attention which are usually necessary for the well-being of tropical animals. One factor which is of considerable advantage in this respect is the fact that the animals lack the restlessness and nervousness so commonly found in wild creatures. Though terrible fighters if aroused, they are even-tempered and fairly intelligent, and learn to obey the word of command of their keepers. They appear to appreciate kindness, and seldom if ever require punishment.

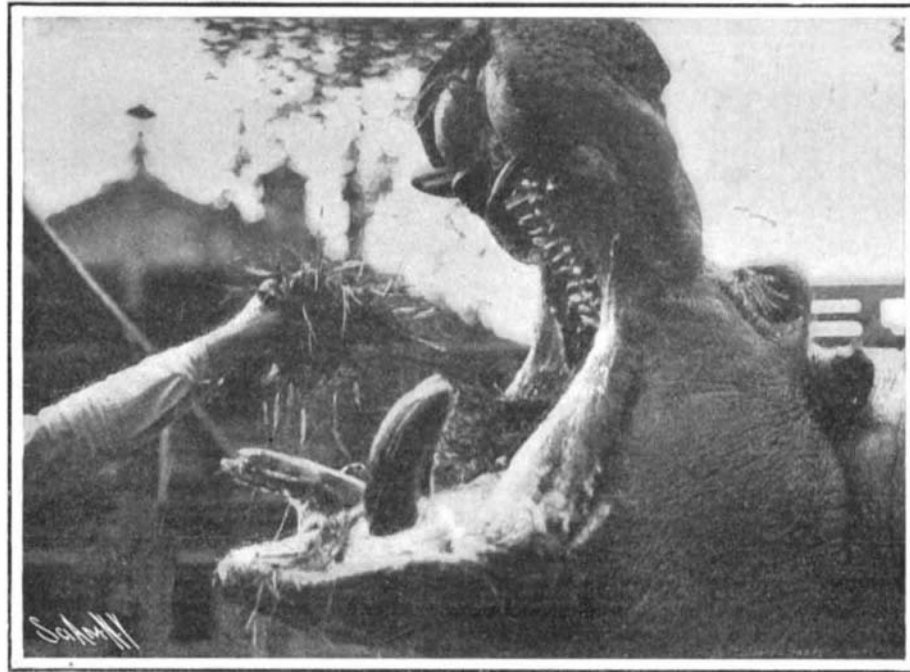
Hippopotami are purely herbivorous, and in the wild state feed upon grasses, various water plants, rice, millet, maize, and similar growths. This diet is approximated as nearly as possible in captivity. They are fed every day, usually early in the afternoon, on fresh grass or hay, various vegetables, and bread. They have very healthy appetites, and we can imagine the quantity of food that a "hippo" can consume, when we consider that the stomach of a large specimen will measure as much as eleven feet in length.

The hippopotamus is heir to few troubles. Mutual attrition keeps his teeth, which grow throughout his lifetime, within proper bounds. One of the accompanying illustrations clearly portrays the molar characteristics of the animal. As he not only spends most of his waking hours in the water, but often sleeps there also, the frequent immersions keep his thick skin in a healthy condition. The water must have a temperature of not less than fifty-five degrees, and must be maintained at this point the year around. With the exception of the usual attention regarding the cleanliness of the habitation, other necessary care includes merely the proper preparation of his food and the regulation of the temperature.

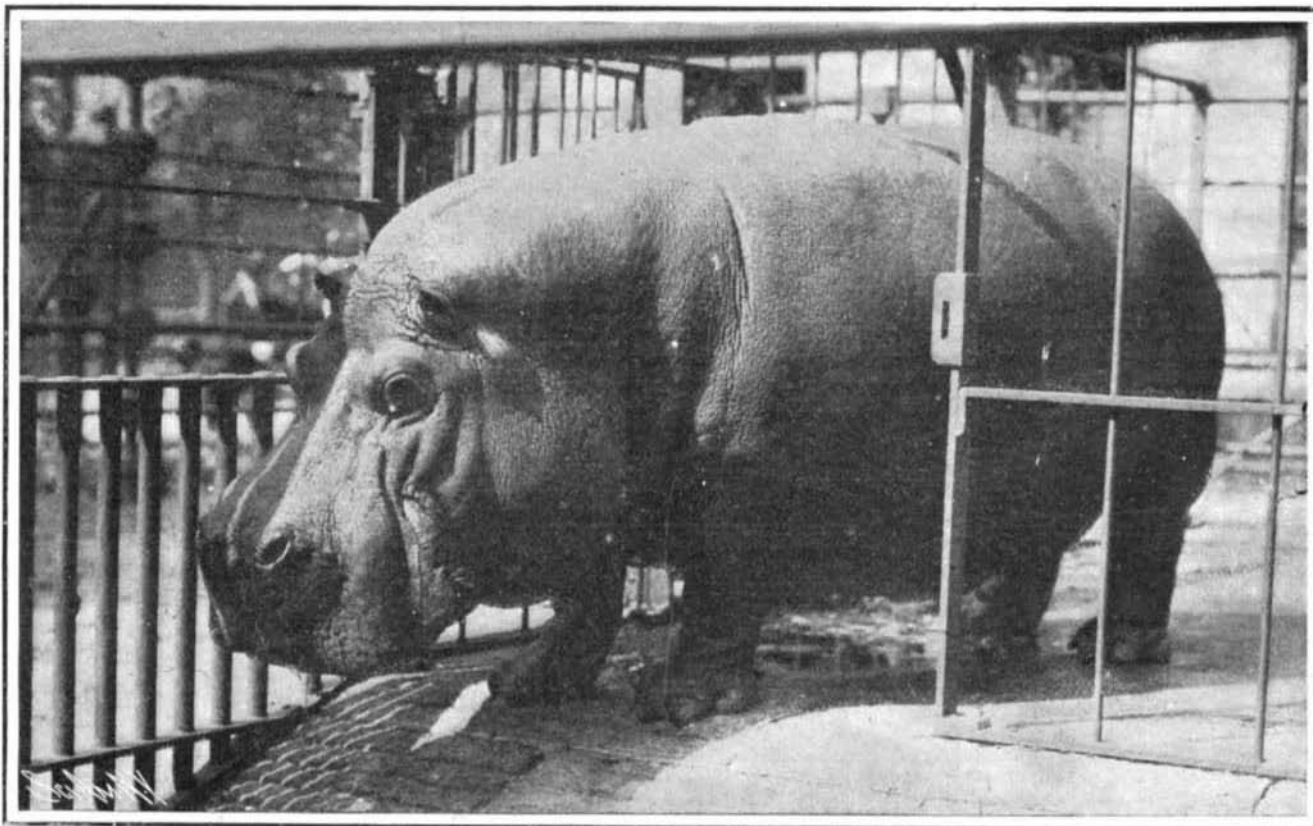
A large gas company of Paris has lately bought three patents for the commercial manufacture of a gas which is rich in methane, and this will allow the gas works to utilize the gas-carbon which is not easy to dispose of. Methane has a high calorific power and when used in connection with the incandescent gas mantles it gives a better light than is obtained with ordinary coal-gas. One of the patents provides for suppressing the carbon monoxide which may remain in the gas,

so that it can be employed generally and will not meet with the opposition which water-gas encounters in France and which prevents its extensive use. The principle of the process consists in making hydrogen react in a catalytic manner on oxide of carbon in the presence of nickel. To produce the right quantity of methane, CH₄, we need a greater amount of hydrogen than ordinary water-gas contains, so that the new method seems to be summed up in the production first of water-gas, then of an excess of hydrogen, and the two gases are put in the presence of the catalytic agent in the right proportion. As yet the process is in the experimental stage. Tests made at Lyons show that the reactions on which it is based occur as was predicted, and it now remains to operate it on a large scale and find whether it has all the superiority that is claimed for it.

The use of tantalum as a filament for electric lamps is deprecated on account of its tendency to soften.



Feeding Time.



"Caliph," the Giant Hippopotamus of the Central Park Menagerie, New York City.



"Caliph" Musing
CAPTIVE HIPPOPOTAMI.