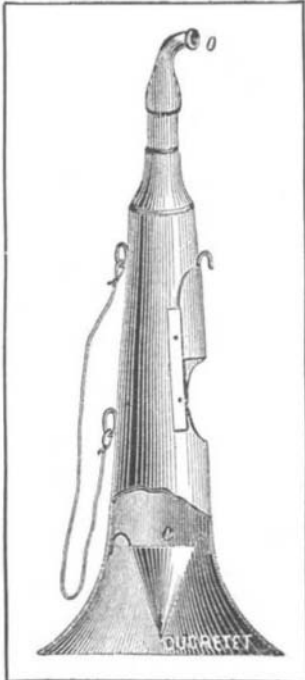


**DETECTING UNDERGROUND STREAMS WITH AN EAR-TRUMPET.**

BY THE PARIS CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

A new apparatus was presented to the Académie des Sciences during a recent meeting, by Messrs. Diénert, Guillerd, and Marrec, which is adapted to detect underground flowing water. The apparatus, which is shown in the accompanying views, is based on the principle of the "acoustele" or sound trumpet invented by Daguin, and it has now been modified and utilized in the researches for underground water which were made not long since by M. Diénert, engineer of the Paris water supply department. It consists of a large



ear trumpet which is set mouth downward upon the ground and has in the interior at the lower part an inverted metal cone C. The cone is centrally placed so as to leave an annular space between the upper edge of the reversed cone and the sides of the trumpet. The instrument is surrounded by a box stuffed with sound insulating material to prevent the noise of the outer air blowing against the instrument from being heard. On the upper end of the trumpet there is a rubber tube o terminating in a pair of ear-pieces which the operator puts in his ears.

**ACOUSTELE BROKEN AWAY TO SHOW THE CONE.**

The tests referred to above were made in the suburbs of the city in the neighborhood of the

aqueduct which brings the water of the Avre stream into Paris, between Vancresson and Garches, and the presence of the underground water could readily be detected by the noise which was heard in the acoustele. At a point near Vancresson there is an underground reservoir which lies at a depth of 230 feet below the surface of the ground. The reservoir is supplied with water from a spring which furnishes 30 gallons per minute. The water is brought into the reservoir by means of a pipe line which descends along the wall of the latter. The pipe line runs to a point below the water level of the reservoir 2 feet above the bottom. The total fall of the water is about 100 feet. Over this reservoir four different experiments were made, and the presence of the water was indicated by a rumbling noise heard in the instrument, and caused by the water flowing through the piping. The effect was observed even when the instrument was removed to a distance of 530 feet from a spot directly over the flowing water.

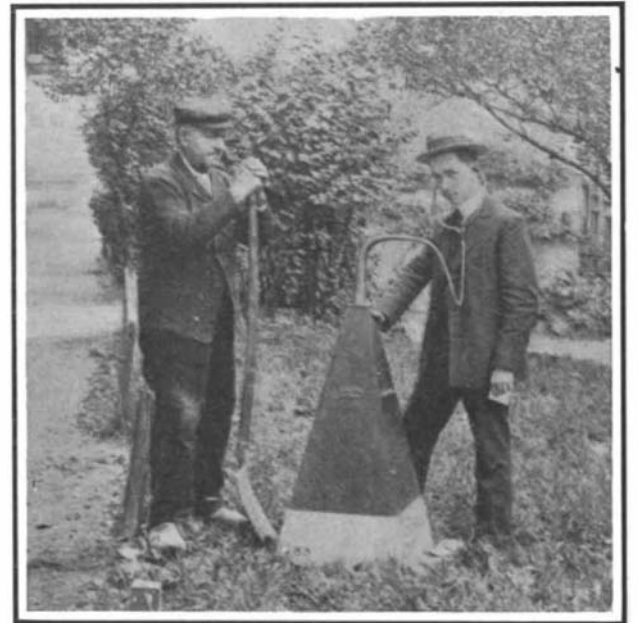
A second series of experiments showed the extreme sensitive ness of the instrument. In one case a water reservoir lies at a depth of 145 feet below ground, and it had a pipe line running into it as in the first case, with a total fall of 83 feet. The infiltrations of water from the earth into the reservoir could be perceived in this case, and it was observed that the water dropped from time to time into the basin. This effect was distinguished by the fact that the instrument

gave a sound which resembled that of the strokes of a bell heard at a distance. A third test of the acoustele was made at a point near Garches, where the water reservoir lies but 10 feet below the surface. It was interesting to notice in this case that when one of the party descended the shaft leading from the surface of the ground into the reservoir by the aid of a ladder fixed to the side of the shaft, the noise of his feet could be heard in the instrument, and when he whistled, while at the bottom of the shaft, he could clearly be heard through the intervening ground by means of the acoustele.

In all these cases the noise made by the running water was somewhat like that which is produced by the wind in the leaves of trees. To show that the sound was actually caused by the water and not due to any effect coming from the outside, the instrument was taken a much greater distance from the spot, and the noise could no longer be perceived. In order to make use of the apparatus under the best conditions it must be properly placed in the ground, and should be set up in the spots which lie at the lowest level. A hole is dug in the ground about 18 inches square and from 10 to 12 inches in depth, and the surface is well flattened off so that the acoustele can be fitted tightly upon the ground, and it should be placed as flat as possible. The base of the instrument is then sealed with earth to a depth of four inches, but without packing it down. The two tubes are placed in the ears and the observer remains in this position for about five minutes. Should there be a flow of water within a reasonable distance, the observer should hear the sound as described above. The instrument will probably not detect the presence of water when removed to a distance of 800 feet to one side, as was found by the above experiments. When it is desired to explore a piece of ground in order to locate an underground spring for the purpose of boring a well, a series of holes of the kind we just mentioned should be dug at different parts of the ground, and the point which is best for carrying out the boring will be the spot which shows the loudest sound. Should outside noises interfere with such operations, the apparatus as well as the head can be covered by a blanket to deaden the noise. Persons should not walk near the apparatus at the time, nor should the observations be made when near a road except when vehicles are at a great distance. While the above-mentioned experiments were made upon a spot where the presence of the flowing water was known in advance, it will be remarked that the latter was at a considerable depth below the surface, and it is believed that the instrument will be of service in a great number of cases in finding underground water.

than a man's thumb, swallowed a full-grown pigeon. We put the pigeon in the cage at night, thinking that an Indian python seven or eight feet long would take it, but a great swelling in the body of the little boa showed what had become of the bird. As no snake chews or rends his prey, we knew that it passed his head and throat entire. The enlargement did not disappear for a week.

"Long Tom," a giant reticulated python, fed on a pig weighing forty-five pounds. We wanted to get some photographs of the monster reptile taking large prey, so the pig was put in the den alive; but as his prey had been killed for him in captivity, the snake got frightened when the pig began to move about and squeal, and backed away. When the pig was killed



**ACOUSTELE BOXED AND IN POSITION FOR LOCATING UNDERGROUND WATER FLOW.**

and he smelled the blood, he took the animal at once, and in twenty-five minutes it had disappeared. The pig is, however, an easy object to swallow, compared with a dense pelage of fur or feathers.

For two or three days the stomach was enlarged to almost the size of a beer keg, but on the third day the swelling began to diminish, and by the end of the fifth the body had returned to its normal diameter. Contrary to common belief, these big snakes will generally soon learn to take their prey after it has been killed. We usually feed them chickens or rabbits, killed, but while still warm. We have, however, fed them with cold-storage rabbits that were killed in Australia. Miss Grace Clark, the snake charmer, says that she once had a snake that would take a chicken after it was dressed and cut into pieces, receiving the pieces one at a time. A few months ago we wanted to feed a very large pigeon to a very small Indian python. In order to save him

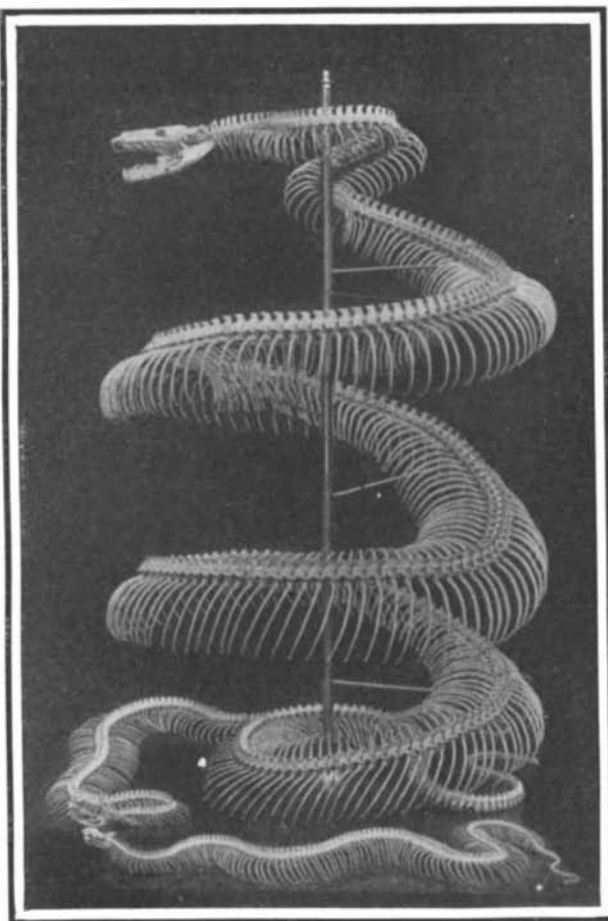
the trouble of working over the shoulders, we cut off the wings. After gorging the bird, we offered him the wings, which he took and swallowed.

The python which swallowed the pig was received from Carl Hagenbeck of Hamburg, Germany, in July, 1907. He has a photograph of it in the act of swallowing an Indian antelope weighing over ninety pounds. He had another reticulated python, which swallowed a ninety-seven pound ibex. A python in the Cincinnati zoological gardens swallowed a goat weighing forty-two pounds. All of

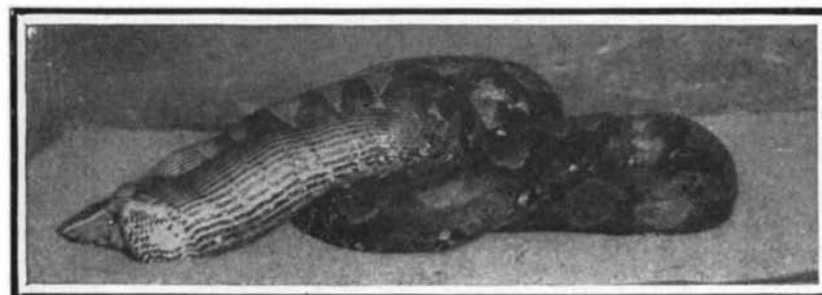
**PYTHONS AND THEIR PREY.**

BY W. HENRY SHEAR.

The ability of snakes to perform feats of swallowing their prey is astounding. Recently a small boa, scarcely four feet in length, with a head no larger



**Skeleton of python reticulatus. Skeletons of a rattlesnake and a moccasin on the base.**



**The pig is in the python's throat.**