accurate, can ever hope to secure a parallax. It is time now to put in the term "next to nothing" again for all things terrestrial. That is, the thickness of a spider thread would obscure the entire orbit of the earth in its mighty sweep around the sun, as seen from the distant stars. And all agree that a spider line is next to nothing, so the astronomer Tycho rejected the true order of Nature simply because of its mind-crushing magnitude and splendor. He had not the fortitude to admit the infinitesimal dimensions of the earth and man. All kinds of estimates have been made as to the probable radius of that part of the universe visible in the greatest telescope. Opinions vary between the limits of 4,000 to 15,000 light years. That is, with a radius of 15,000, the diameter would be so immense that light would require 30,000 years to traverse it. The opinion of the writer is for the 30,000 yet no positive proof is possible. This opinion is based on photometric grounds. The word millions has for long been used in telling the number of the stars. But billions now appears to be more appropriate. Each one is a hot sun, and each may be attended in many cases by inhabited worlds.

The Best Cat Story Yet.

BY DR. JOHN NICOL.

Without attempting to decide as between heredity, imitation, or reasoning, or what part each or all or any of them played in enabling the cat to perform the feat of which I am about to tell; merely premising that I can vouch for its truth, as can many others who had frequently seen it done.

The cat belonged to my brother-in-law, the owner of Hazeldell farm, near Ulster, Pa., and that it might go out and in at its own sweet will, the usual cat-hole was cut in the door between the kitchen and the wood-shed. Besides the cat referred to, which may be called the house cat, there were several others who remained mostly in one or other of the barns and were not encouraged to enter the house, although shortly before the time of which I am about to speak they began to come in more than the mistress cared for.

To prevent this, a swing door was placed on the outside over the cat-hole. It was simply a piece of board a little larger than the hole, and fastened by leather hinges at the top, so that by pushing her head against it from the inside the cat could get out, but could not by such pushing get in again.

For a time the cat did not appear to understand the new arrangement, but "meoued" persistently each time she wanted to go out, till some one taking her in his hands and pushing her head against the door showed her what to do, and *she did it herself ever afterward.*

This went on for some time, always getting out herself, but always calling loudly whenever she wanted to get in, till the letting of her in began to be considered a trouble, and she was often allowed to call in vain. Just how long this continued I do not know, but it did cease, and the cessation of one trouble threatened to bring about another. The cat was found in the house when those whose duty it was to put her out and not let her in again asserted that they had been true to their trust. This was "by some believed and some misdoubted," and, like other trifles, was likely to bring trouble in the household, when those that blamed the cat were found to be more correct than the cat blamers generally are; *the cat had discovered a method of opening the door for herself.*

The accused member of the family, strong in the justice of her cause, determined to watch, and this is what she saw: The cat, on coming to the door, lay down on her back, and with both her front paws raised the hinged board considerably above the level, and then, with what I cannot find a better expression for than a wriggle, rapidly turned on her belly and drew her body inside.

I may add that this was seen not once but perhaps hundreds of times, as it got to be one of the show things at the farm, the cat not being in the least shy, but always ready to perform the feat in the presence of visitors.

While heredity can have had nothing to do with this operation, I may take the opportunity of recording another in which heredity alone was the active agent. It is well known that Manx cats have no tails, only slight stumps, and that the offspring of such in other parts of the world, in the first generation at least, are in the same abnormal condition. While living in Scotland some thirty years ago we had a Manx kitten given to us, which, although born there, was tailless. The door of our breakfast room was spring-shutting, something like most of the screen doors in this country, but opening only toward the inside. Before the kitten was full grown he had learned to let himself in by pushing from the outside, but never learned, although we often tried to teach him, to pull it open from the inside. It was not, however, the opening of the door from the outside to which I wish to call attention—any cat could have easily learned to do that; but the fact that invariably, after he had so pushed it and got his body partially in, he made a rapid turn or whirl to prevent the tail that was not there (but heredity impressed on him the fact that it ought to have been) from being caught between the closing door and its frame. This he did dozens of times every day so long as we had him, and was always willing to show off before our visitors, as he never seemed to recognize the fact that he had not a tail like his neighbors.

Correspondence.

The New Process of Resuscitation Proves to Be Old.

To the Editor of the SCIENTIFIC AMERICAN:

I notice in the SCIENTIFIC AMERICAN for October 7, 1905, an article entitled "A Novel Process of Reanimation."

It might be interesting to you to know that there is in the Proceedings of the American Association for the Advancement of Science a record of an address by Dr. Alexander Graham Bell, presenting over twenty years ago an idea substantially the same as that of Dr. Gradenwitz. I beg to quote an abstract taken from the thirty-first meeting of the above-named society, held at Montreal, Canada, August 1, 1882:

"I propose to surround the waist of the unconscious patient by a rigid jacket or drum somewhat larger in diameter than his body. The apparatus can be rendered practically airtight by a rubber band around the thorax, and another around the loins. Upon exhausting the air inside the drum, a partial vacuum is produced around the abdomen. Under such circumstances, the pressure of the atmosphere forces air through the mouth and nose into the thorax, causing the depression of the diaphragm and consequent expansion of the abdomen. The alternate rarefaction and condensation of the air confined around the abdomen thus cause alternate inspiration and expiration."

CHARLES R. COX.

Volta Bureau, Washington, D. C., October 15, 1905.

Old Things Forgotten in These Progressive Days.

To the Editor of the SCIENTIFIC AMERICAN:

It is surprising to an oldish man how many things of daily use the present generation seems to have forgotten.

Here are some instances.

1. To tell the points of the compass by a watch.—Point the hour-hand at the sun. Then south is halfway between the hour-hand and the figure twelve of the dial.

2. To measure an angle by a watch.—Lay two straight-edged pieces of paper on the angle, crossing at the apex. Holding them by where they overlap, lay them on the face of the watch with the apex at the center. Read the angle by the minutes of the dial, each minute being six degrees of arc. It is easy to measure within two or three degrees in this way.

3. To start a tight screw.—Press the screwdriver firmly in place with one hand, but do not turn it. Then take hold of it sideways with flat-jawed pliers as close to the head of the screw as possible, and turn it with them. A hand vise is better than pliers. Leave just enough of the tip of the screwdriver outside the vise to fill the slot of the screw, but no more. This reduces the danger of breaking or bending a badly-tempered screwdriver to a minimum.

4. To put a pin through starched linen, rub the pin with paraffine. To push a collar button through a starched buttonhole, rub paraffine on the back of the buttonhole.

JACOB BROMFIELD.

Boston, September 23, 1905.

The Reasoning Power of Animals.

To the Editor of the SCIENTIFIC AMERICAN:

I read your valuable paper weekly with much interest and profit. The several articles that have appeared recently therein on the subject, "Do Animals Reason?" have deeply interested me; and the facts stated so strongly appeal to my love for justice for animals that many abuse and underrate, as well as my love for them, that I desire to repeat a single instance, one of many, showing the rapid reasoning and quick action by one, and the intelligent confidence displayed by another animal in my presence—a dog and a horse.

I was the possessor of a bright, active Irish setter dog, "Laddie," who accompanied me on my many drives through the country. My dog and horse were inseparable friends, and when we were out driving "Laddie" assumed to take charge of both the horse and myself; several times helping us out of what might have resulted in serious difficulties, at one time catching and holding the horse, when frightened and running away, until I could reach her. But the instance I desire to relate occurred two years ago last spring. I was driving through a rough and hilly section of the country, where the road was frequently crossed by brooks, which at that season of the year, at times, assumed large proportions, flooding both roads and bridges. I approached one of these streams, over which was a bridge about twelve feet long and somewhat raised above the road on the farther side from me. The water was up to the bridge, and beyond the bridge was a pond of water some five or six rods in width, dark and muddy and several feet deep in places. A little way from the point of crossing were some large rocks standing close together, over which the dog could cross without taking to the water, and he started to cross in that manner. When I drove onto the bridge, my horse stopped and refused to take to the water, which stood level with the bridge; my dog stood on one of the large rocks watching my progress, and when the horse stopped and refused to go on, the dog with human intelligence and reasoning instantly leaped from the rock onto the bridge, ran up in front of the horse, looked into her face, gave a sharp bark of encouragement, and then turned and deliberately walked off from the bridge into the water, all of the time looking over his shoulder at the horse, saying, "Come on," as plainly as his intelligent face could express those words. Then without any urging on my part the horse at once followed the dog into the water and across the flooded strip of road to the dry land, at times up to her belly in the flood, the dog swimming over the center of the road just in front of her.

The intelligence displayed by both animals struck me very forcibly at the time. The dog saw the difficulty, and with the quickness of human reasoning he saw the way to overcome it, and he acted on the instant. The horse had unlimited confidence in the dog, gained from their former experiences together, and she was ready to follow where he would lead without any hesitancy. Returning some hours later over the same road, the dog, always in advance, stopped a moment, just long enough to see if the horse would make the passage of the water all right, and when he saw that she raised no objection to crossing, he took to the rocks and crossed without wetting his feet.

I have often thought of this incident; the quick, active reasoning of the dog, the quick action taken by him, and the understanding of the dog's purpose and confidence in him displayed by the horse.

D. R. P. PARKER.

Hermon, N. Y., October 10, 1905.

THE SECOND ANNUAL AUTOMOBILE RACE FOR THE VANDERBILT CUP.

As stated in our last issue, the second annual race for the Vanderbilt cup resulted in the triumph of two French, one American, and one Italian car. It was the first time an American machine ever was placed in an international race, and for this due credit should be given to the designer and driver of the 120-horse-power Locomobile which finished third. One of our illustrations shows this car as it crossed the line at the finish, while for descriptions of the machine and the changes recently made upon it, we refer our readers to the issues of May 27 and October 7. The day before the race this machine developed a cracked cylinder, which necessitated the replacement of one of the pairs of cylinders. Mechanics worked until 5 A. M. October 14 putting on the new cylinders and a new crank case, as this also was broken. In view of the fact that the machine had never been run with these new parts until it went to the starting line, its performance was remarkable. Its fastest time, 27:40, was made on the fifth round, and corresponds to a speed of 61.38 miles per hour. The average speed for the whole race was 56.90 miles per hour. No tire trouble was experienced, though several stops were made for gasoline, water, and oil, and to wash oil out of the clutch with gasoline.

What was undoubtedly the most consistent performance was that made by Heath, who drove the same 90-horse-power Panhard car with which he won the race last year. The only change in this machine is the substitution of a honeycomb radiator for the framed radiating coils employed a year ago. The engine is a 170 x 170 millimeter (6.692 x 6.692 inch) four-cylinder, vertical motor with steel cylinders and corrugated copper water jackets. It is fitted with a Krebs automatic carbureter and Eiseman high-tension magneto ignition. A four-speed transmission is used. This car also had no tire trouble, and its flat-tread Michelin tires appeared to be in first-class condition at the end of the race. Heath steadily rose from fourteenth position at the start to second place at the end of the fourth round, which position he held to the end. His average speed for the entire distance was 60.72 miles an hour.

The winner of the race, Hemery, drove an 80-horse-power Darracq racer of light construction and mounted on wire wheels. A companion car driven by Wagner burst a tire in front of the grand stand at the end of its second round and gave out during the fourth round from the loss of the gear box cover and the seizing of bearings in the transmission. Hemery, however, had better luck. He succeeded in covering all but the fourth round in less than 28:35. His fastest time—68.42 miles an hour—was made on the fifth round, which was covered in 24:49. At this point in the race he was sixth. The next round saw him jump to third place, which he held until the eighth round, in which he passed Heath and wrested first place from Lancia. His total time for the 282 miles was 4 hours,