

he became quite certain that the movement could not be accounted for by any residuum of the force which he had himself communicated, his astonishment developed into dread, and he ran to conceal himself under some articles of furniture, there to behold at a distance the "uncanny" spectacle of a dry bone coming to life.

Now in this, and in all my other experiments, I have no doubt that the behaviour of the terrier arose from his *sense of the mysterious*, for he was of a highly pugnacious disposition, and never hesitated to fight an animal of any size or ferocity; but apparent symptoms of spontaneity in an inanimate object which he knew so well, gave rise to feelings of awe and horror which quite enervated him. And that there was nothing *fetichistic* in these feelings may be safely concluded if we reflect, with Mr. Spencer, that the dog's knowledge of causation, for all immediate purposes, being quite as correct and no less stereotyped than is that of "primitive man," when an object of a class which he knew from uniform past experience to be inanimate suddenly began to move, he must have felt the same oppressive and alarming sense of the mysterious which uncultured persons feel under similar circumstances. But further, in the case of this terrier we are not left with *à priori* inferences alone to settle this point, for another experiment proved that the sense of the mysterious was in this animal sufficiently strong of itself to account for his behaviour. Taking him into a carpeted room I blew a soap-bubble, and by means of a fitful draught made it intermittently glide along the floor. He became at once intensely interested, but seemed unable to decide whether or not the filmy object was alive. At first he was very cautious and followed it only at a distance, but as I encouraged him to examine the bubble more closely, he approached it with ears erect and tail down, evidently with much misgiving; and the moment it happened to move he again retreated. After a time, however, during which I always kept at least one bubble on the carpet, he began to gain more courage, and the scientific spirit overcoming his sense of the mysterious, he eventually became bold enough slowly to approach one of the bubbles and nervously to touch it with his paw. The bubble, of course, immediately vanished; and I certainly never saw astonishment more strongly depicted. On then blowing another bubble, I could not persuade him to approach it for a good while; but at last he came and carefully extended his paw as before with the same result. But after this second trial nothing would induce him again to approach a bubble, and on pressing him he ran out of the room, which no coaxing would persuade him to re-enter.

One other example will suffice to show how strongly developed was the sense of the mysterious in this animal. When alone with him in a room I once purposely tried the effect on him of making a series of horrible grimaces. At first he thought I was only making fun; but as I persistently disregarded his caresses and whining while I continued unnaturally to distort my features, he became alarmed and slunk away under some furniture, shivering like a frightened child. He remained in this condition till some other member of the family happened to enter the room, when he emerged from his hiding-place in great joy at seeing me again in my right mind. In this experiment, of course, I refrained from making any sounds or gesticulations, lest he might think I was angry. His actions, therefore, can only be explained by his horrified surprise at my apparently irrational behaviour—*i.e.*, by the violation of his ideas of uniformity in matters psychological. It must be added, however, that I have tried the same experiment on less intelligent and less sensitive terriers with no other effect than causing them to bark at me.

I will only add that I believe the sense of the mysterious to be the cause of the dread which many animals show of *thunder*. I am led to think this, because I once had a setter which never heard thunder till he was eighteen months old, and on then first hearing it I thought he was

about to die of fright, as I have seen other animals do under various circumstances. And so strong was the impression which his extreme terror left behind, that whenever afterwards he heard the boom of distant artillery practice, mistaking it for thunder, he became a pitiable object to look at, and, if out shooting, would immediately bolt home—or, if at a great distance from home, would endeavour to bury himself. After having heard real thunder on two or three subsequent occasions, his dread of the distant cannons became greater than ever; so that eventually, though he keenly enjoyed sport, nothing would induce him to leave his kennel, lest the practice might begin when he was at a distance from home. But the keeper, who had a large experience in the training of dogs, assured me that if I allowed this one to be taken to the battery, in order that he might learn the true cause of the thunder-like noise, he would again become serviceable in the field. The animal, however, died before the experiment was made.

GEORGE J. ROMANES

RUHKORFF

WE regret to record the sudden death on December 20, at Paris, of Henry Daniel Ruhmkorff, whose name is so closely connected with the history of magneto-electricity. He was born in Hanover, Germany, in 1803, and but little is known of his early life. In 1819 he wandered to Paris, and obtained a position as porter in the laboratory of Prof. Charles Chevalier, at that time one of the leading French physicists. Here he displayed a remarkable fondness for electrical apparatus, as well as ingenuity in its arrangement, and was enabled shortly after to start a modest manufactory of physical apparatus. Through the efforts of Chevalier and the excellence of the work performed, the business was rapidly extended. In 1844 Ruhmkorff brought out his first invention, a convenient thermo-electric battery. Soon after he turned his attention to magneto-electricity, especially the production of the induced currents, discovered by Faraday in 1832. A long series of experiments resulted in the appearance, in 1851, of the famous "Ruhmkorff coil," with its later modifications, the most important piece of apparatus in this branch of physics. With this powerful adjunct the electrician was enabled to obtain sparks 18 inches in length, pierce thick plates of glass, and carry out a vast variety of experiments. The invention was rewarded by a decoration and medal at the Exhibition of 1855, while in 1858 it received the first prize of 50,000 francs at the French Exhibition of Electrical Apparatus. Since then the manufacture of the coils and of electrical machines in general has assumed enormous dimensions, and the leading physicists of Europe are well acquainted with the dingy little bureau in the Rue Champollion, near the University. Personally M. Ruhmkorff was of a quiet, dignified appearance, and despite the disadvantages of his early life, he enjoyed the friendship of the leading Parisian *savants*, and was an honoured member of the French Physical Society. M. Jamin delivered an address over the grave, in which he stated that Ruhmkorff died almost a poor man, because he had spent all his earnings on behalf of science and in works of benevolence.

LIQUEFACTION OF OXYGEN

THE number of the permanent gases is rapidly diminishing. We have had occasion recently to refer to M. Cailletet's successful attempts to compress nitric oxide, N_2O_2 , methyl hydride, CH_4 , and acetylene, C_2H_2 , to the liquid form. The list of non-compressible gases was thus reduced to three, viz., hydrogen, nitrogen, and oxygen. Within the past week M. Raoul Pictet has succeeded in obtaining the last-mentioned gas in the liquid state, an event which is certainly one of the most