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SCIENCE AND INVENTION.

MARCONI ON WIRELESS TELEGRAPHY.

SIGNOR MARCONI, the inventor of the most successful system of wireless telegraphy, about which we have already printed considerable information, has recently given his views of the present state and future possibilities of his invention in an interview with Laura A. Smith, published in *The Humanitarian* (London, January). After modestly disclaiming all credit for himself beyond that due to the combination and development of the devices of others, Signor Marconi said, when asked whether he thought that his mode of signaling through space would supersede the ordinary method:

"No, I do not say so; it is not probable that it will supplant ordinary telegraphy, at least yet a while, but it will do, indeed is doing, things which ordinary telegraphy can not; for it can be used in places which have not before been practicable for telegraphic communication, where in fact wires were an impossibility."

In response to a request that he should particularize on this point, the inventor said:

"Take, for instance, islands which can not communicate with the mainland, and there are many such. They are unable to maintain cables, as these are subject to the constant friction of contact with the rocks, and they frequently break. In Scotland, where the seas are high, it is especially difficult to connect these islands with the main, and for many reasons it is desirable, nay imperative, that it should become feasible. It may be that owing to storms and stress the inhabitants themselves are in danger, in want of common necessities; perhaps there is an outbreak of illness which they have not sufficient medical aid to combat, or a want of provender which must end in famine, if not replenished from other sources; or it may be that some ship in distress is making signals to the island, and the islanders possibly feel that their efforts can at best be but puny ones where there is so much misery to relieve. With the new system of telegraphy there will not be any difficulty in establishing communication, not only between the ships in distress and the island, but also between the latter and the mainland. What will be necessary will be for each to have a transmitter and a receiver, and then the means of communication will be thoroughly established. Some very good experiments have lately been made in Germany."

To the question: "Can you point to any recent disaster at sea where your system would have been serviceable even to the extent of absolutely averting the danger?" Signor Marconi gave the following reply:

"Yes, there was the sinking of the *Drummond Castle*. Had the lighthouse off Ushant possessed a transmitter and the waves been able to be seen by a receiving-machine on board, those in command of the vessel would have been warned of approaching danger, signals could speedily have been made, and there would certainly have been less probability of so terrible a catastrophe. The fog would not have proved an obstacle to the experiments, altho a semaphore would have been practically useless."

Finally, the inventor gives the following forecast of the use of his apparatus in time of war:

"I will try and enumerate a few of the possibilities in military operations. Let us imagine a small detachment of Europeans, say, during one of these frontier wars, stationed in a rather lonely spot. They of course set up telegraphic communication with wires, by means of which they can learn the movements of the rest of their party, and report on their own. So far all is well, but the enemy is not likely to allow this state of things to continue, and one night the little band is surrounded, the wires are cut down, and the whites are at the mercy of their dusky foes. They can not communicate with the others, their provisions run short, as does possibly the ammunition. Frequently this results in fatalities, and all the time there is help at hand if only some way of enlisting it could be arrived at. Now with the new sys-

tem there would be nothing to notify to the enemy that these small outlying parties were in communication with the main body, and all the time the electric waves are in use, and perhaps ten miles off they are anxiously reading, by the ticking of the receiver, messages of paramount importance. It will be possible to communicate with besieged fortresses, and indeed to use it in many ways in field operations, where it is impossible to lay telegraph wires. There is sometimes difficulty in bringing the hospital at the base into speedy enough communication with the front; or again, commanding officers are hard put to find a mode of quickly giving their instructions to their seconds. Wireless telegraphy is a possibility anywhere, and it will, I think, soon be a reality in many places."

BABY-INCUBATORS.

THE so-called "incubators" for keeping weak and puny infants alive by insuring absolutely uniform temperature have been known and used for many years, but there has been a notable increase of interest in them in this country because of the recent introduction of an improved form from France. This is described in *The Humanitarian* (New York), by Maud Rodney, as follows:

"A human baby is almost the most helpless and defenseless creature in the world. The young of most animals are able to look out for themselves to some extent, but unless helped by some one else the human baby is bound to perish."

"In France a great many babies are born so weak and puny that they can not be raised even with the most tender care their parents can give them. They are so frail that the slightest change in the amount of heat or cold to which they are exposed, or the slightest impurity in the air they breathe, brings a quick end to their poor little lives. The population of France, instead of increasing or staying at the same number, as is the case in most other countries, began to

grow rapidly smaller. It became a serious matter and it became important to save the lives of the little babies of which so great a number were dying, because they were too weak to live through the early days of their lives. So the doctors turned their attention to the matter, and one of them, Dr. Lion, invented an incubator which does for the baby what 'the artificial mother' does for the little chicken who has just pecked his way through the egg-shell. He made many experiments before he was at last able to provide the pure air and the even warmth which is needed to keep the weak baby alive. The picture on this page shows the incubator just as it is used to-day in many places in France and in two places in New York City.

"The case is made of metal, as that was found to be the best material, because it furnishes no hiding-places for microbes or injurious dust. In the front are glass doors, through which one may see the baby inside, as shown in the picture. The warm air comes from a furnace. At the Lion Institutes in New York there are about thirty of these incubators, each one occupied by a little baby, who remains under the care of this mechanical mother and the nurses and doctors, who watch the incubators day and night until the baby has become big enough and strong enough to be



INCUBATOR.

taken care of in the same way as other babies are who were not in the first place too weak to stand changes of temperature.

"The incubators are ranged around the sides of a large room, which is itself kept at the usual degree of heat. At the end of this room is another, called the nursery, and it is here that the babies are dressed and undressed and bathed and fed. It is separated from the room where the incubators are by glass doors, and in the nursery the warmth is the same as in the incubators themselves. When a baby is to be fed, one of the nurses opens the door of the incubator, lifts the baby out, throws a light cloth over its face so it will not take cold on the way, and hurries quickly to the nursery. Each baby is fed, usually from a nursing-bottle, once every two hours, and every time it is fed it is weighed, because the gain or loss of weight tells the doctor whether the baby is getting stronger or weaker.

"Into each incubator runs a small pipe, which brings heated air from the large pipe which connects with the furnace. This air is filtered, it passes into the incubator and out through the pipe which you see at the top of the picture, so that the baby is always breathing pure, warm air, and is surrounded by air which always has just the same degree of warmth. At the top of the incubator you will see a sort of chart or map. On this the nurse puts down the baby's weight every day, and by it the doctor can tell at a glance just how much the baby has been gaining or losing."

CLOTH FROM PINEAPPLE LEAVES.

RECENT experiments under government auspices indicate that the fiber of the pineapple plant is valuable for textile purposes, and as the pineapple can be cultivated in Florida we may have here a noteworthy addition to our industrial crops. The subject is thus treated in the recent "Catalog of the Useful Fiber Plants of the World" published by the United States Department of Agriculture. Our quotations are from an abstract made for *The Scientific American Supplement*, which says:

"Indications are that the fiber of the pineapple leaf will eventually take prominent place among the constituents of textile fabrics.

"Both the wild and cultivated pineapple yield fiber which, when spun, surpasses in strength, fineness, and luster those obtained from flax; can be employed as a substitute for silk, and as a material for mixing with wool or cotton. Useful for cordage, textile fabrics, sewing silk or twist, laces, etc. In China, fabrics for clothing for agriculturists. In request in India as material for stringing necklaces. Produces the celebrated pina cloth of the Philippine Islands. It is remarkably durable, and unaffected by immersion in water; and is white, soft, silky, flexible, and long in staple. Samples cleaned, without washing, in the government experiments in Florida, 1892, when twisted to the size of binding twine, showed a breakage strain of 150 pounds. Dr. Taylor subdivided a specimen of this fiber to one ten-thousandth of an inch.

"As to the value of the fiber, a London quotation for a lot of well cleaned from an Asiatic source was \$150 per ton. There is no doubt that if the fiber could be produced in quantity at an economical cost, manufacturers would soon find a use for it and would know what price they could afford to pay for it. The market price would then be fixed by the demand and supply. The machine question enters largely into the problem, however, and as the leaves are small, a quantity would need to be cleaned at one feeding of the machine to make it pay. Estimating ten leaves to the pound, there would be over 22,000 leaves to the ton, which, as we have seen, would produce from 50 to 60 pounds of fiber.

The possibilities of the product may be imagined from the following account of what is already done with it in China:

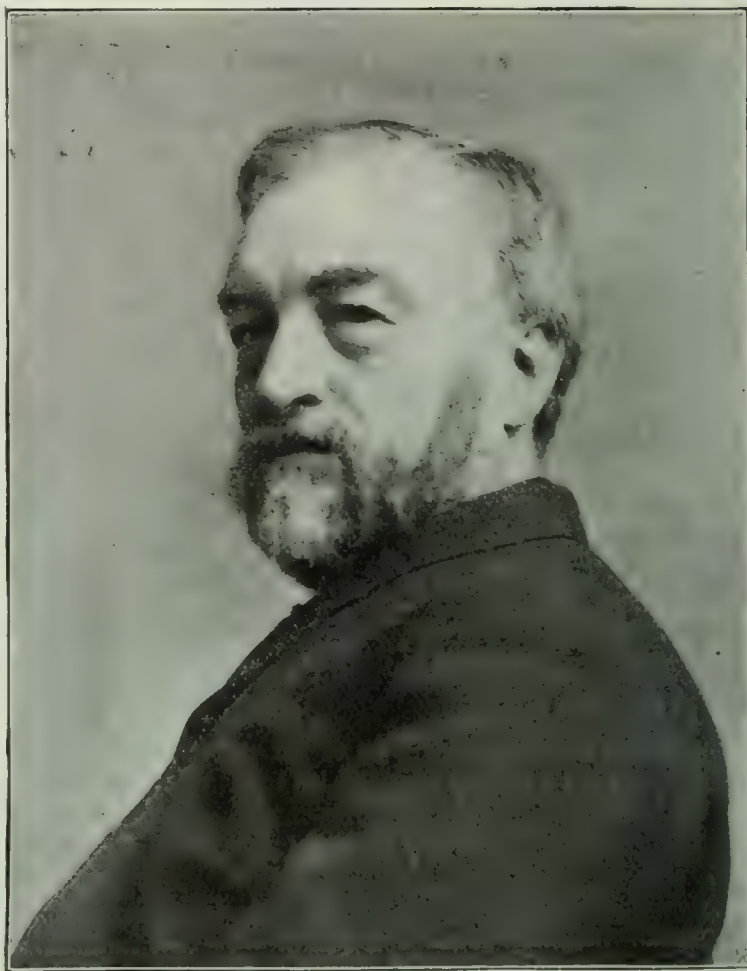
"The Chinese extract the fiber by hand. The first step is the removal of the fleshy sides of the leaf. A man sitting astride a narrow stool extends on it in front of him a single leaf, one end of which is held beneath him. He then, with a kind of two-handled bamboo plane, removes the succulent matter. Another man receives the leaves as they are planed, and with his thumb-nail loosens the fibers about the middle of the leaf, gathers them

in his hand, and by one effort detaches them from the outer skin. The fibers are next steeped in water, washed and laid out to dry, and bleached on rude frames of split bamboo. The processes of steeping, washing, and exposing to the sun are repeated until the fibers are considered properly bleached. In the Philippines the blunt end of a potsherd is used, and the fiber is carefully combed and sorted into four classes.

"The Chinese fiber is manufactured into a strong, coarse fabric resembling the coarser kinds of grass cloth. In Formosa its chief use is for the inner garments of the agricultural class. The fabric is called Huang-li-pu. Pina is considered to be more delicate in texture than any other known to the vegetable kingdom. It is woven from the untwisted fibers of the pineapple leaf after reducing them to extreme fineness and after the ends have been glued together to form a continuous thread. There is another delicate fabric, used for ladies' dresses, which is said to be manufactured from pineapple fiber woven with silk, the latter forming lustrous stripes in soft colors or shades."

THE STORY OF THE SMITHSONIAN INSTITUTION.

THE purposes and work of the Smithsonian Institution in Washington are not so widely understood throughout the country as they should be. People generally know vaguely that the Institution is connected with the Government and that it has to do with science; but that is about all. It was therefore a



PROF. S. P. LANGLEY.

happy idea for the authorities of the Smithsonian to issue a volume giving the story of its foundation and of its work for the fifty years (1846-96) of its existence. This volume contains 856 pages on different phases of the general subject, contributed by men of recognized scientific authority. We quote the following paragraphs from a review of the book in the *New York Tribune*. Of the origin of the Institution and of its founder that journal says:

"James Smithson was the son of an English widow of high rank, Elizabeth Keate Macie; and if his father, Hugh Smithson, had kept his pledges of marriage to her, instead of contracting a matrimonial alliance with the great house of Percy and thus becoming a Duke of Northumberland, there would have been no

mentation in the lower animals is an important factor in the great struggle for survival. One proof of this is that albinos in all species are apt to be defective in keenness of sense, thereby being placed at a great disadvantage in the competition for existence with their fellows. Pigmentation, especially in the organs of sense, seems to be essential to their full development. As a result, with the coincident disadvantage due to their conspicuous color, such albinos are ruthlessly weeded out by the processes of natural selection; their non-existence in a state of nature is noticeable. Darwin and others cite numerous examples of the defective senses of such non-pigmented animals. Thus, in Virginia, the white pigs of the colonists perished miserably by partaking of certain poisonous roots which the dark-colored hogs avoided by reason of keener sense discrimination. In Italy, the same exemption of black sheep from accidental poisoning, to which their white companions were subject, has been noted. Animals so far removed from one another as the horse and the rhinoceros are said to suffer from a defective sense of smell when they are of the albino type. It is a fact of common observation that white cats with blue eyes are quite often deaf.

"Other examples might be cited of similar import. They all tend to justify Alfred Russel Wallace's conclusion that pigmentation, if not absolutely necessary, at least conduces to acuteness of sense; and that where abundantly present it is often an index of vitality. This eminent naturalist even ventures to connect the aggressiveness of the male sex among the lower animals with its brilliancy of coloring.

"Applying these considerations to man, evidence is not entirely wanting to support De Candolle's (1887) thesis that 'pigmentation is an index of force.' Disease often produces a change in the direction of blondness, as Dr. Beddoe has observed; asserting, as he does, that this trait in general is due to a defect of secretion. The case of the negro, cited by Ogle, whose depigmentation was accompanied by a loss of the sense of smell, is a pertinent one. The phenomenon of light-haired childhood and of gray-haired senility points to the same conclusion. A million soldiers observed during our Civil War afforded data for Baxter's assertion that the brunette type, on the whole, opposed a greater resistance to disease, and offered more hope of recovery from injuries in the field. Dr. Beddoe finds in Bristol that the dark-haired children are more tenacious of life, and asserts a distinct superiority of the brunette type in the severe competitions induced by urban life. It is not for us to settle the matter here and now. The solution belongs to the physiologist. As statisticians it behooves us to note facts, leaving choice of explanations to others more competent to judge. It must be said in conclusion, however, that present tendencies certainly point in the direction of some relation between pigmentation and general physiological and mental vigor."

FOOD VALUE OF MUSHROOMS.

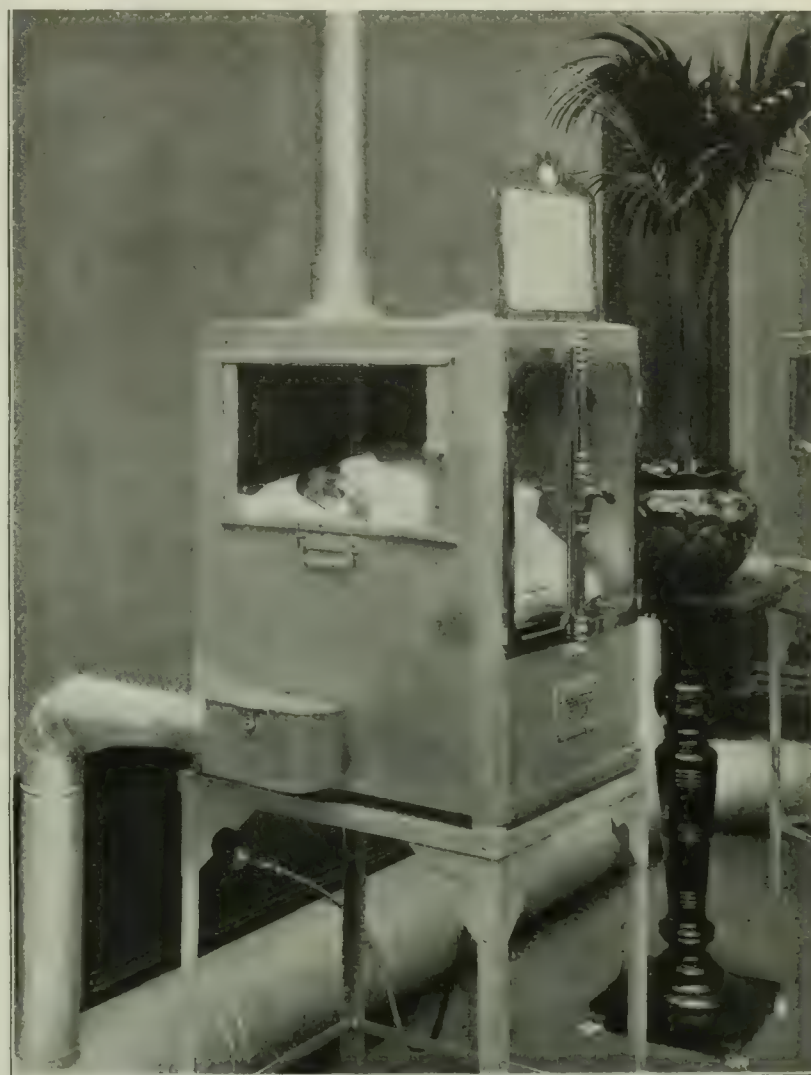
WE have been told a good deal recently about the great store of valuable food that is daily going to waste in the shape of edible mushrooms, and we have been urged to make more use than we do of these fungi. But it appears from some recent investigations that the nutritive value of the mushroom is not very high after all. The researches were made by Prof. L. B. Mendel, of Yale, and described by him at Ithaca, N. Y., at the tenth annual meeting of the American Physiological Society. Professor Mendel's investigations were made in pursuance of a plan inaugurated by a commission organized a year ago by the society, at the suggestion of Dr. Weir Mitchell, to investigate the physiological properties of the edible and poisonous fungi. This commission now consists of Professors Chittenden (Yale), chairman, Abel (Johns Hopkins), Pfaff (Harvard), and Bowditch (Harvard). *Science*, February 18, in a report of the meeting, describes Professor Mendel's experiments as follows:

"Chemical analyses were combined with experiments in artificial digestion, and special attention was given to the amount of available (digestible) proteid present. The latter was found to be not over two or three per cent. in fresh mushrooms, which shows that the prevailing idea of the great nutritive value of mushrooms is not yet justified. They may be valuable as dietetic

accessories, but they do not deserve the term 'vegetable beef-steak.' Their nitrogen is largely in the form of non-proteid bodies. The amount of fat, cholesterin, soluble carbohydrates, crude fiber, and inorganic substances contained in them corresponds in general with that found in other vegetable foods, such as peas, corn, and potatoes. Professor Chittenden reported the results of some preliminary experiments upon the toxicity of some species of poisonous mushrooms, made by Dr. W. S. Carter (University of Texas). In view of the great interest now shown in the edibility of mushrooms, the investigations of the commission, which are being actively continued, will prove of immediate practical value."

THE SAVING OF INFANT LIFE.

WE gave a few weeks ago a brief notice of Dr. Lion's incubators, and we are now able to present our readers with a more detailed account of the use and results of this method, by which the lives of so many feeble babes have been saved. The article from which we quote is taken from the editorial pages of



AN INCUBATOR AND ITS PRECIOUS CONTENTS.

The Health Magazine (New York, January). The impulse that led to the perfection of the incubator system is explained by the author to be the much-discussed decrease of population in France. He says:

"The vital statistics of France show an appalling mortality among infants. One hundred and fifty thousand premature births occur annually, ranging, according to place and condition, from 15 to 30 per cent. of the birth-rate, and this estimate does not comprise the entire number of weakly children, who are almost doomed to death from their birth. French specialists assert that of the number of infants born at a normal stage, over 50,000 are unendowed with sufficient vitality to live beyond the earliest days of babyhood.

"He who devises measures to overcome the decimating of the population from excessive infant mortality arising out of the ravages of disease, unfavorable environment, or existing social evils, is truly a benefactor of his race. The infant-incubator is the outgrowth of a loyal impulse on the part of Mr. Alexander Lion to save his nation from threatening depopulation. Ruminating

one day on the perilous condition of his country from a demographic point of view, it struck this patriotic and humane person that the holocaust among prematurely-born infants would be largely diminished if the helpless atoms could only be kept sufficiently warm. Accordingly, in 1891, he invented his *couveruse*, or modified incubator. The success attending this new departure in infant-life preservation has been surprising.

"Formerly, as the London *Lancet* remarks, no very serious efforts were made to prolong the ephemeral existence of these unwelcome little strangers. They were rather hopelessly allowed to pine away and die, under the impression that they could not possibly survive; but human life has of late become so valuable in France that no breathing waif need now be abandoned as an irretrievable derelict."

The pictures that accompany the article show the workings of the system in New York, where it has been very successful. Of the incubator itself the editor says:

"The Lion incubator is composed of a parallelopiped of metal, standing upon iron supports. It can be disinfected without de-



ENTRANCE TO THE LION INSTITUTE, NEW YORK CITY

terioration by means of a steam-stove under pressure. Ventilation is obtained by means of a tube of about three inches in diameter, with a chimney of the same size. A screw placed on the top indicates by its rotation the strength of the current of air. The front of the incubator is fitted with a glass window, through which the child may be seen, while on the left is another glass window, which enables the mother or nurse to attend to the wants of the infant and, if necessary, to remove it. The baby is laid in a metallic hammock, placed in the center of the incubator, thus enabling the warm air to circulate freely about it. A thermometer placed at the level of the infant's head regulates the working of the apparatus. The heating is effected by means of a siphon through which the hot water circulates and which communicates with a reservoir at its side. A special system of pipes allows the air to pass directly from the exterior into the apparatus. In these pipes the air is filtered before it enters the incubator. The temperature is automatically regulated by a very ingenious device, and the current of heat is increased or diminished as required and without variation.

"The incubators are placed gratuitously at the disposal of the poor, without distinction of creed or nationality, but those who can afford to pay are expected to do so. They are under the permanent supervision of competent doctors. Other hospitals in the different cities, such as Washington, Baltimore, Chicago, and elsewhere, will be opened, and in all probability a regular service

will be organized for the rearing of infants at the dwellings of the parents, so as to avoid as much as possible the separation of the mother from the child and to be able to make use of the *couveruse*, or incubator, immediately."

Some of the results of the work are as follows:

"A prematurely-born child, if exempt from hereditary disease, rarely dies in the Institute, provided it weighs not less than two and one-quarter pounds—that is, about one third of the normal standard—and provided, also, that its installation in the *couveruse* is accomplished with the least possible delay and exposure. At this stage of the untimely bud's frail existence a chill is almost certainly fatal, so the transfer from the lying-in bed can not take place too soon or be carried out too carefully.

"When one considers the astonishing results attained by the use of the incubators in foreign cities, in their valuable service to the cause of hygiene, the utility of establishing in every city an infant asylum or maternity with baby-incubators can not be doubted. A report made from the records of the Paris Institute shows that of 185 prematurely-born infants received, weighing from one and three-quarter pounds to six pounds six ounces, 133 left the institution healthy and in good condition, 48 died, and 4 were still under treatment and progressing favorably.

"Experience in Paris and the larger cities of the Old World has demonstrated that the annual death-rate of baby 'prematures' and 'weaklings' for three years prior to the discovery and introduction of the Lion incubators averaged 800 in every 1,000, and that during the three years of their employment the death-rate from this cause has fallen to 150 per 1,000 in each year. Therefore, Parisians now send all of this class of new-born babes to the local Lion Institute, which is sustained financially by municipal and private contributions. In both London and Paris philanthropic women have formed 'Ladies' Infant-Saving Associations,' and our American women will doubtless emulate their example."

SENSE OF FEELING IN A LOST LIMB.

WE refer a sensation at once to its source in the finger-tips or the ear or the nose, or wherever it may be, and so expert have we become in recognizing the source that we localize the sensation itself there, thinking of the sensation of touch as being in the skin of the finger instead of in the brain, where it actually is. Hence he who has lost a finger refers directly to the absent member any irritation of the nerve that formerly connected with it, and can scarcely believe that it is not in its old place. This phenomenon is familiar enough and many are the superstitions to which it has given rise, but it is only of late that it has received serious scientific study. A recent work on the subject is that of M. Abbatucci, published in Paris, which has called forth a paper by Professor Pitres, contributed to the *Annales Medico-Psychologiques* of that city. We quote below part of an abstract from *The National Druggist* (March). Says that paper:

"M. Pitres shows that the illusion of the existence of a limb (in place of one which had been amputated) may go so far as to cause many accidents. In the majority of cases the illusion is so perfect and vivacious that it constantly deceives the intelligence of the individual, so imperiously does it force itself upon him. Some of those who had lost a limb, questioned by M. Pitres, declared that they felt the amputated limb frequently more really and substantially than they did the one still attached to the body. Sometimes they get to believing more firmly upon the existence of the phantom limb than upon those members that remain, as in the case of a patient of Dr. S. Weir Mitchell, who declared: 'I state only the truth when I say that I am more conscious of the existence *in place* of the limb that I lost, than of the one that I saved.'

"Many of Professor Pitres's patients made analogous declarations. 'Parbleu!' said one, 'I know mighty well that I have no right leg—yet, when I try to analyze my sensations, I feel that leg there. Why, I feel the foot this minute more distinctly than I do the left one, which is there before my eyes. It (the phantom) hurts me, while the other does not. If I could not assure