

Mendel's papers were re-discovered, and his results confirmed, at the beginning of this century, by Tschermak, Correns, and de Vries, into believing that de Vries had repeated Mendel's experiments on peas; and I rashly assailed Mr. Punnett for not making any reference to papers which I had not read. Mr. Punnett was therefore entirely in the right, and I was in the wrong.

Mr. Lock has also pointed out to me that an experiment, almost identical with the kind of crucial one which I said ought to be performed, has already been done. I am familiar with the experiment to which Mr. Lock refers (one of his own with maize), and though I regard it as very strong evidence in favour of the Mendelian interpretation of hereditary phenomena, I am sure that Mr. Lock will agree with me that an experiment the results of which will be obtained in September, 1909, is an even more crucial one.

A. D. DARBISHIRE.

#### THE RESEARCH DEFENCE SOCIETY.

THERE is evidence of a growing feeling among members of the medical profession that the time has come to disperse the atmosphere of mystery which has hitherto attended their ministrations, and to take the public more into their confidence as to the principles on which health may be preserved or regained. They have every reason to believe that the popular ignorance of medical science not only hinders the progress of hygiene and therapeutics, but also is the soil on which quackeries of all kinds grow and flourish, and that the education of the laity in the elementary principles of medicine would conduce to the public health, and at the same time benefit the physician by freeing him from the competition of the incompetent and unscrupulous.

One of the noisiest sections of the opponents of scientific progress is formed by the numerous small societies the object of which is stated to be the further limitation or the complete prohibition of experiments on animals. It might seem that the evidence given before the Royal Commission on Vivisection would suffice to demonstrate the benefits accruing to humanity from the use of this experimental method in the past, as well as to indicate that its prohibition would relegate medicine to the slow advance it made in the Middle Ages. But it is felt that only a small fraction of the public has the courage to seek knowledge in a Blue-book, and that to reach the multitude information must be conveyed in a less unprepossessing guise.

With this object in view, the Research Defence Society has been formed, with Lord Cromer as president, "to make known the facts as to experiments on animals in this country, the immense importance to the welfare of mankind of such experiments, and the great saving of human life and health directly attributable to them." In his letter to the Press announcing the formation of the society, Lord Cromer directs attention to the evidence given before the Royal Commission that "these experiments are conducted with proper care, and that the small amount of pain or discomfort inflicted is insignificant compared with the great gain to knowledge," and states that the society will "endeavour to make it clear that medical and other scientific men who employ these methods are not less humane than the rest of their countrymen, who daily, though perhaps unconsciously, profit by them." With this object the society proposes to publish articles, to give information to all inquirers, and assist all who desire to examine the arguments on behalf of experiments on animals.

The founders of the society ought to be gratified by the success which has already attended their efforts, for it numbers more than 1200 members, of whom 100 are ladies, and this membership has been drawn from all

departments of public life, and includes representatives of every class, including many who have taken an active part in the prevention of cruelty to animals. The medical profession is naturally largely represented, but the great number of members who appear to have no direct connection with either medicine or science indicates that there is a wide-felt impression that the methods adopted by the opponents of vivisection are objectionable, and that they have failed to justify their criticisms of this method of investigation.

The society has lost no time in opening its crusade, for we have already received two pamphlets published under its auspices. The first of these comprises "The Evidence of Lord Justice Fletcher Moulton before the Royal Commission on Vivisection" (Macmillan and Co., Ltd.), and the society is to be congratulated on having had this extremely valuable presentation of the principles of the question available as an introduction to its promised series. For, while the other witnesses on the scientific side were by the nature of things compelled to limit their evidence to a detailed account of the methods adopted in their special branches and the results accruing from them, Lord Justice Fletcher Moulton was able to take a wider view, and pointed out with indisputable logic that the experimental method offers the only way to advance in medical as in other scientific subjects. Far from questioning the justification of using animals for experimental purposes, he holds that it is actually immoral to test any method of treatment in man until it has been ascertained as far as possible by investigations on animals that it may be used without injury. As for the suggestion that investigators should experiment upon themselves, he considers that this is to be deprecated except after full investigation by means of animal experiments, not only on account of the danger to the individual subject of the experiment, but because such a procedure tends to lessen the feeling of the sanctity of human life.

The great value of Lord Justice Fletcher Moulton's evidence has been recognised by all who are interested in the subject. He was the only layman who appeared before the Commission in defence of scientific method, and he has presented his views with a cogency which must convince anyone who is capable of following a simple line of argument, and has not abandoned common sense and ordinary logic.

The second pamphlet is by Colonel David Bruce, and is entitled "The Extinction of Malta Fever (a Lesson in the Use of Animal Experiment)" (Macmillan and Co., Ltd.). It forms an admirable complement to the first, for while Lord Justice Fletcher Moulton is largely concerned with the ethical considerations involved in vivisection and the general principles of scientific investigation, Colonel Bruce gives a concise account of one case in which these principles were applied with remarkable and indisputable benefit. Malta fever formerly accounted for about 75,000 days of illness each year in the garrison at Malta, and hundreds of officers and soldiers had to be invalided to England as the result of its ravages. The old statistical methods had been applied for many years, but had failed to give any clue to the cause of the fever, and no improvement resulted from improved sanitation. Finally, the Government induced the Royal Society to send out a commission under Colonel Bruce to investigate the subject, and they soon satisfied themselves by experiments on animals that the cause of the fever is a micrococcus which gains entrance to the human body by means of the goat's milk, which is largely consumed in the island. About half the goats in Malta harboured the microbe, and 10 per cent. of them secreted it in their milk. Measures were at once taken to pre-

vent further infection of the garrison by this vehicle, and the results are strikingly displayed in two charts. In 1905 the number of cases was 643; in 1907, after the preventive measures came into force, seven cases were admitted from Malta fever. Surely further argument is unnecessary to prove the value of the method which can adduce such results.

On June 19 the Research Defence Society held its inaugural meeting in the hall of the Royal Society of Medicine, 20 Hanover Square. There was a very gratifying attendance of members, nearly half those present being ladies. The honorary secretary of the society, Mr. Stephen Paget, read the report of the committee, and stated that he had received a number of letters from members regretting their inability to attend the meeting. The Earl of Cromer, the president of the society, was in the chair, and delivered a very telling speech, which has appeared in the daily Press, and which was directed to show that there is little or no pain inflicted in the methods used in experiments on animals in this country, and that in this way alone is there any prospect of further advance in medicine. The first motion approving of the aims of the society was moved by Sir Thomas Barlow and seconded by Lord Robert Cecil; the second one, approving of the formation of branches, was moved by Mr. Walter Long, who, referring to his experiences in stamping out rabies, stated that he was inspired to do so only by his faith in Pasteur's results, and was seconded by Prof. C. J. Martin. The very successful meeting was closed by a vote of thanks to the president for his speech, and for the keen interest he took in the society, which was moved by Mr. Butlin and seconded by the Hon. Sydney Holland.

#### ARTIFICIAL DIAMONDS.

FOR some time past the daily Press has been interested in the production of diamonds artificially. Long articles have been written upon the subject, and various persons, scientific and otherwise, interviewed, owing to the prosecution of M. Lemoine by Sir Julius Wernher on account of his failure to produce diamonds by chemical means after he had stated he was able to do so, and, in fact, had promised to produce diamonds of very large size at a price which would compete readily with the natural product. However, after obtaining large sums of money to build a factory, and apparently carrying out experiments in which small diamonds were supposed to be obtained, M. Lemoine entirely failed to produce large ones. When diamonds said to have been produced in the crucibles were critically examined, experts were able, not only to assure the magistrate that these diamonds were not artificial, but were also able in several cases to identify them as stones which had been bought from known sources. The whole case hinged upon a certain envelope which was originally lodged in an English bank, and in which it was stated a formula was contained by means of which diamonds could be produced artificially. On Tuesday, June 16, this envelope was to be opened before the magistrate, but in the meantime the modern alchemist had vanished. When the letter was opened, according to the *Times* of June 18, the following particulars were found:—

"I, the undersigned Henri Lemoine, declare that to make artificial diamonds, it is sufficient to employ the following process:—(1) take a furnace; (2) take some powdered sugar carbon; (3) place the carbon in a crucible; (4) place the crucible in the furnace and raise the temperature to from 1700° C. to 1800° C. in order to obtain crystallisation; (5) when this high temperature has been obtained apply pressure to the cover of the crucible. The diamonds will then be made, and it remains only to take them out."

From this it will be noticed that the formula contains absolutely nothing new; sugar carbon, being the purest form of amorphous carbon, has always been the starting product when any successful attempts to prepare diamonds have been made. Consequently those daily papers which ridiculed the process because of the fact that sugar carbon was one of the ingredients, showed want of knowledge of the subject. However, now that the whole formula is made public, it is, to say the least of it, absurd.

It will be noticed that the carbon is to be placed in a crucible and heated to from 1700° C. to 1800° C., and then pressure is to be applied to the cover of the crucible. When, in 1896, Moissan succeeded in obtaining diamonds artificially, he did subject sugar carbon, when at a very high temperature, to a very great pressure. It will be remembered that sugar carbon was dissolved in molten iron, and the crucible containing this was heated to a temperature of 3000° C. to 4000° C. While at this high temperature the crucible and its contents were plunged into cold water or mercury in order to cause rapid solidification. When carboniferous iron is cooled, it expands in the act of solidifying. By suddenly quenching the iron, a solid layer or crust is obtained outside the molten metal; consequently when the inside layer commences to solidify it expands, and thus, as it is encompassed with a solid crust, enormous pressure is exerted. On dissolving away the iron by means of acids, minute crystals of diamond were produced.

About the same time Marjorana, by heating a small piece of carbon in an electric arc and then suddenly compressing it by driving a piston down upon it with enormous force, the force being produced by firing a charge of powder in the piston chamber (*NATURE*, June 7, 1900), also obtained minute diamonds.

In 1905 Sir Andrew Noble exploded cordite in closed steel cylinders, when it was calculated that a temperature of 5100° C. was obtained and a pressure of 50 tons per square inch. Sir William Crookes examined some of the carbon deposited, and found it to contain minute diamonds. It would appear, therefore, that M. Lemoine exploited results well known in the scientific world in order to deceive people engaged in the diamond industry.

It is a rather remarkable fact that although amorphous carbon can be converted into graphite, and diamond may also be converted into graphite, as was recently shown by Parsons and Swinton, who obtained graphite from diamond by rapid bombardment with kathode rays, it does not appear possible to convert graphite into diamond. It has been found that when amorphous carbon and graphite are heated to a temperature of 3600° C. in the electric arc in an atmosphere incapable of acting chemically upon carbon, they vapourise without first liquefying, and on cooling condense to form crystals of graphite. Diamond, on the other hand, is first converted into graphite, then vapourises, and on condensation forms graphite. It thus appears that carbon must be in a dissolved condition, and must be cooled under pressure in order for a diamond to crystallise out. Possibly, therefore, we shall never be able to obtain the conditions necessary for producing large diamonds in the laboratory. Low down in the earth's crust carbon may be dissolved in iron or other substances, and may at high temperature be subjected to enormous pressure, such as we, even with the wonderful machinery at our command, and capable of exerting pressures of thousands of tons, have not contemplated. In the earth also the cooling while under this pressure will be slow, and therefore there are the conditions necessary for the growth of large crystals.

Although in nature diamonds are found in pipes of