

the results of the Experiments universally available. In 1882, in 1884 and in 1893 Gilbert personally visited the United States and Canada to lecture upon the experiments; and in the early nineties bound collections of the Rothamsted papers, consisting of three quarto and seven octavo volumes, were presented to various national institutions throughout the world.

PUBLIC RECOGNITION.

Labors so unselfishly devoted to the public good could not, however, escape recognition. So early as 1855, twelve years after the commencement of the Experiments, a new laboratory was erected by public subscription and presented to Mr. Lawes in replacement of the original laboratory which was installed in an old barn (See Fig. 1). On this occasion the idea of the Testimonial Committee was to present a service of plate, but the amount of money collected was diverted to the more publicly useful object in accordance with a suggestion characteristically made by the recipient. In 1893 the Jubilee of the Experiments was celebrated at Rothamsted and Harpenden by the presentation to Sir John Lawes of his portrait painted by Herkomer, by the presentation to Gilbert of a massive silver salver, and by the erection in front of the Laboratory at Harpenden of a huge granite monolith with a commemorative inscription. On this occasion King Edward, then Prince of Wales, presided over the Committee, and signed the address from the subscribers. The ceremony of presentation took place at Harpenden on July 29th, 1893, when other addresses were also presented from the leading agricultural and scientific societies of the world, the two leading French agricultural societies (Société Nationale d'Agriculture and the Société des Agriculteurs de France) being represented by personal delegations. The subscriptions to the Jubilee Fund were not confined to Great Britain, but came from all over the world, and nineteen of the Agricultural Experiment Stations of the United States participated. In 1882 Lawes was created a baronet, and in 1893 Gilbert received the honor of knighthood.

DEATHS OF FOUNDERS AND CHARACTERISTIC INCIDENTS.

The partnership which had endured so long and which had been so fruitful was dissolved by the death of Lawes on August 31, 1900, at the age of 86. His portrait here reproduced is from a photograph by Elliott and Fry (See Fig. 2). It was natural that his aged friend should not long survive alone, and Gilbert's death too occurred little more than a year afterwards on December 23, 1901, at the age of 84. They rest side by side in the parish churchyard at Harpenden, inseparable in death as in life and leaving their names carved on simple tombstones, but imperishable as "proudest record midst the tombs of kings." The two men were eminently fitted to be the complement each of the other. Lawes was the man of affairs, thoroughly acquainted with agricultural problems, and able to check by experience of practical details any tendency towards visionary experimentation. He was also versatile and inclined to introduce changes and modifications, and has been known to say that but for his partner he would have ploughed up many of the plots before they had yielded their full results. Gilbert, on the other hand, was the born scientist, uniting with absolute accuracy and attention to detail indomitable perseverance and determination to see an Experiment through to its very end, and wrest from it all that it was capable of teaching. In personality Sir John Lawes possessed the quiet unassuming manner of the typical English country gentleman. Of his appearance he was somewhat negligent, and was, therefore, apt easily enough to be mistaken for strangers for a person of less consequence than he really was. Thus, on one occasion when walking near his home he was accosted by a laundry woman who offered him 2d. to help her carry a basket of washing. Sir John cheerfully assented, much to the amazement of a third person who met them and recognized the baronet. At another time he was attentively examining some fine poultry, the property of a female cottager. She eyed him with great suspicion, and was greatly relieved when he moved away, but no less astonished at the subsequent receipt of a request "to name her price for the fowls which Sir John had admired that afternoon."

PERMANENT ENDOWMENT OF EXPERIMENTS.

In 1889, eleven years before his death, Sir John Lawes provided for the perpetuation of the Experiments by creating the "Lawes Agricultural

Trust," and endowing it with the sum of £100,000 (\$486,000) with the famous Laboratory and with certain areas of land devoted to the Experiments. Under the trust deed the Experiments are conducted by a Committee consisting of representatives appointed by the Royal Society, the Chemical and Linnean Societies and the Royal Agricultural Society of England. Subsequently, with a view to extend the scope of the Experiments a Society was incorporated, which enabled voluntary donations and subscriptions to be collected from the public. The interior of the Laboratory with its vast collection of samples is shown in Fig. 3.

RECENT DEVELOPMENTS.

Upon the death of Gilbert, A. D. Hall, F.R.S., was appointed director of the Experiments, and under his able direction, which lasted from 1902 to 1912, noteworthy progress was made. In 1906 the James Mason Bacteriological Laboratory was added to the buildings. It was erected and equipped at a cost of about \$25,000, presented by J. F. Mason, M. P. In the following year the Goldsmith's Company granted to the Station a sum of £10,000 (\$48,600), the income of which is devoted exclusively to the investigation of the soil. The position of first Goldsmith's soil chemist was held by Dr. E. J. Russell, and it was not long before the grant bore practical fruit. In 1910, Dr. Russell, in collaboration with the bacteriologist of the Station (Dr. H. B. Hutchinson), made the important discovery that certain organisms in the soil provisionally classed as protozoa prey upon ammonia-producing bacteria and so reduce their activity in increasing the fertility of the soil. By partial sterilization of the soil, by which through heat or other

house. The special work carried on in this new wing includes investigation of the partial sterilization of the soil, the losses of nitrogen in high farming, the biological conditions in the soil, the composition of green crops with particular reference to the sugars and starches, the effect of poisons on plants, and the distribution of weeds. This year, in commemoration of the centenary of Sir John Lawes' birth, the Rothamsted Experimental Station is appealing for a sum of £6,000 (\$29,160), which with a further sum of like amount to be granted by the British Government out of the "Development Fund" will be used to rebuild the old subscription laboratory, now showing structural defects and so provide much needed additional accommodation. Upwards of \$20,000 has already been subscribed for the purpose.

From the modest beginnings we have endeavored to describe how the Rothamsted Experiment Station has grown to important dimensions as a State-aided institution with a staff all told of about thirty, including, besides the Director, nine research chemists, two botanists, two bacteriologists, a protozoologist, a soil physicist, a farm manager and four research scholars, besides nine secretaries, clerks, assistants and laboratory boys.

PRESENT AND FUTURE WORK.

Recently, under the guidance of Dr. Russell the writer was able personally to inspect the Laboratory buildings and the Pot Culture Station, and to study the effects of partial sterilization as illustrated by chrysanthemums (See Fig. 5). It was easy to trace the effects of the treatment in the growing plants, those in the treated soil having taller stems of deeper green and more robust vegetation as compared with those in the untreated pots.

In England the factor governing fertility is usually the nitrogen in the soil, and consequently a special study is devoted to the production of nitrogenous plant food and the sources of the loss to which it is liable. The good English farmer generally obtains high yields, and it is doubtful whether he can get economically much higher yields owing to the climatic conditions. But the process of getting high yields always involves waste, and the returns from nitrogenous manures are successively less as larger amounts are applied. The wastes and losses of nitrogen from the soil are now being very carefully studied at Rothamsted. Another line of work is the testing of the composition of the crop with a view finally to ascertaining what are the factors that determine quality. The best hope of the English farmer, and indeed of the American farmer also, is to produce crops of high quality. At present very little is known as to what really constitutes quality or how it may be secured. The investigations that are now being conducted will, it is hoped, ultimately throw light upon the very intricate and elusive problem of quality in farm crops. In all

these investigations the results have been and will be of universal value, and it is to be hoped that the coming centenary will furnish the occasion for securing to them a substantial and widespread support.

The embargo placed by the British Government on the exportation of wool is proving a thorn in the side of growers of Blackface wool in Scotland. The stores of wool brokers there are overloaded with thousands of tons of that material, and a move is being made by some Scottish agriculturists to petition the Government to relax the embargo in so far as the exportation of Blackface wool to America is concerned. Evidently the classes of wool from which khaki clothes for the army are made do not include Blackface wool. Manufacturers of khaki maintain that their machinery is not adapted to deal with this wool, but some Scots more far-seeing than their kin have made "samples" of khaki from selected Blackface wool, and while that cloth is not so smooth as cloth made from other wools, it is strong and should wear well, and could easily be utilized in connection with soldiers' clothes.

The English Hackney Horse Society has received a letter from the American Hackney Horse Society stating that the rules governing admission to the American Hackney Stud Book had recently been amended to admit of registration therein of horses registered in the English Hackney or Canadian Stud Books. The English councilmen have sent the American brethren a letter of thanks for this "friendly action" as it is officially described.



Fig. 3—Interior of the Rothamsted Laboratory.

specific agent these larger organisms are destroyed, it has been found possible to restore or increase fertility. The discovery has opened up a new field of investigation which promises to yield fruitful results.

SUPPORT FROM THE STATE.

In 1912 Dr. Russell succeeded to the directorship on the resignation of Mr. Hall, and in the following year (1913) a new wing was added to the existing buildings. This, costing about £3,100 (\$15,066) was built by a grant from the newly-formed "Development Fund" of the British Government, the grant being conditional upon the raising of an equal sum from private sources for the taking over and stocking of a new experimental farm of 230 acres. This sum was duly raised, and the farm acquired by the efforts of the Society to which reference has already been made. Fig. 4 shows on the left the old subscription laboratory and on the right the new wing with the James Mason Bacteriological Laboratory in the centre.

An annual grant of £2,500 (\$12,150) was also made to the Station by the Government; so that the experiments are now partially supported by the State instead of continuing to be entirely a private enterprise as in the time of Lawes and Gilbert. The new wing, which is shown on the right in the illustration (Fig. 4) consists of a large soil laboratory, with director's room on the ground floor, botanical and chemical laboratories, library and other rooms on the first floor, and a glass house for water cultures on the roof. In the basement are special rooms for polarimeter work and for soil incubations. Electrical current is generated in an adjoining dynamo and battery