ments have been made for the exhibition of interesting plans and specimens, and for a full discussion of some of the more interesting questions and problems, medical and social, bearing upon the treatment and prevention of tuberculosis.

Great Britain, acting through an executive committee selected from a very large representative national general committee, and presided over by Sir William Church, with Dr. Theodore Acland as treasurer and Dr. J. J. Perkins as secretary, has for some time past been engaged in preparing a series of reports on the methods of combating the spread of tuberculosis and in carrying out treatment of this disease, which reports will be presented by national and other delegates.

When the executive committee was first formed the whole of the members met in London; but as soon as the general plan of work had been laid down it was decided that national committees in England, Scotland, and Ireland should meet in London, Edinburgh and Dublin, the Dublin committee being presided over by Her Excellency the Countess of Aberdeen. These committees have made the arrangements for the report from each country to be presented to the congress. They have also combined to send out an "exhibit" of plans, sections, pathological specimens, and other preparations for the large museum which has been arranged by the American Exhibition Committee working under Dr. Henry Beyer, of Washington. The keenest interest is being taken in the work of the congress, and President Roosevelt, in accepting the presidency, speaks of the modern crusade against tuberculosis as bringing "hope and bright prospects of recovery to hundreds and thousands of victims of the disease, who under old teachings were abandoned to despair. The work of this congress will bring the results of the latest studies and investigations before the profession at large, and place in the hands of our physicians all the newest and most approved methods of treating the disease—a knowledge which will add many years of valuable life to our people, and will thereby increase our public wealth and happiness. . . . Our country, which is honoured this year as the host of other nations in this great gathering of leaders and experts, and as the custodian of the magnificent exhibit which will be set up by the entire world, should manifest its appreciation by giving the congress a setting worthy of the cause, of our guests, and of ourselves. We should endeavour to make it the greatest and most fruitful congress which has yet been held, and I assure you of my interest and services to that end." Should this spirit pervade, as no doubt it does, the whole of the American executive, we may be assured of the fruitfulness of the congress.

From Great Britain Government delegates are being sent out in the interests of the various local government boards, and it is to be hoped, in view of proposed legislation on tuberculosis, that as full a report as possible of the work of the congress may be placed in the hands of those whose duty it will be to draw up legislation to be placed before the Parliament of the country. The universities, various medical schools and examining bodies, the Royal Commission on Tuberculosis, the Royal Society of Medicine, municipalities, the Victoria Jubilee Institute for Nurses, King Edward VII. Sanatorium, the National Association for the Prevention of Consumption, Invalid Children's Association, and other institutions are sending out representatives to assist in the discussion of such questions as the portals of entry, sources and channels of infection, especially the path of the tubercle bacillus from the exterior to the lungs, vital importance of early diagnosis, comparative importance of treatment in sanatoria near at hand, of entire change of climate, the present status of sanatoria treatment, diet in pulmonary tuberculosis, graduated labour in the treatment of tuberculosis, urgent necessity for hospitals for far advanced cases, relative frequency by bovine infection of lung disease compared with that of other organs, the economical aspect of tuberculosis, adverse industrial conditions, the social control of tuberculosis, after care of arrested cases, educational methods and agencies, promotion of immunity, responsibility of society for tuberculosis, &c.

One of the most interesting sections is that dealing with State and municipal control of tuberculosis, in which the provisional programme includes laws and ordinances relating to tuberculosis, especially with reference to notification, Government care of tuberculous patients, educational propaganda and scientific research under Government auspices, sanitary measures in the home, including disinfection, better housing, ventilation, &c., sanitary surveillance over travellers and those engaged in trades and occupations, in public buildings, factories and workshops, &c., prevention of tuberculosis among children and adolescents, including the subjects of heredity, environment, schools, factories, playgrounds, &c. In the section dealing with tuberculosis in animals and its relation to man, the prevalence of the disease amongst domestic animals, the modes of infection and the methods of diagnosis are all to be dealt with in a series of interesting papers, as are also resistance to tuberculosis in different genera, species, breeds, families and individuals, the methods for controlling the disease in animals, the comparative bacteriology and pathology of tuberculosis in animals, the relation of tuberculosis in animals to the public health, including the evidence for and against the transmission of tuberculosis from animals to man, milk hygiene and meat hygiene in relation to tuberculosis in animals. These papers should lead to most enlightening discussions, and we may confidently look forward to some very interesting and important reports.

THE LATE M. MASCART.

THE ranks of French physicists have suffered sad losses of late. Last week it was Henri Becquerel whose obituary we published. To-day it is that of M. Mascart, whose death occurred on August 26 at his country residence at Poissy, where he had lain suffering for some months.

Éleuthère Élie Nicolas Mascart was born at Quarouble, near Valenciennes, on February 20, 1837. He was a scholar of the Ecole normale supérieure, taking his first degree in science in 1858, was admitted *agrégé* in 1861, and *docteur-ès-sciences* in 1864. His first post was that of conservator of the collections in the École normale. Then he became professor of physics in the Lycée de Versailles, and subsequently at the Collège Chaptal. He also acted as deputy for Regnault at the Collège de France during the later years of that great master; and in 1872 succeeded to the occupancy of his chair. Devoted to experimental physics, and, like his master, possessed of a great capacity for the methodical and patient treatment of details, he early made his mark in the scientific study of meteorology. It was therefore an appropriate appointment when in May, 1878, he was elected to the post of director of the Central Bureau of Meteorology in Paris. This post he filled for nearly thirty years, retiring only in 1907. He succeeded in the face of numerous difficulties in gradually perfecting the equipment and organisation of his bureau, and in establishing the systematic publication in France of weather-charts and weather-forecasts.

Mascart's earliest researches were chiefly devoted to optics; later electricity, magnetism, and the determination of the electrical units claimed his attention. The pages of the *Comptes rendus*, of the *Annales scientifiques de l'École normale*, and of the *Journal de Physique* attest his industry and his scientific insight. It must suffice here to indicate a few of his principal investigations. He was one of the first to apply photography to the study of spectrum analysis, and in 1862 constructed a spectrograph with a quartz train with which he photographed the ultra-violet spectra of many of the metals, adding many new lines to those already known, and directing attention to the harmonic relations presented by groups of lines, for example, by those of magnesium. He then made a number of standard determinations of wave-lengths by use of Nobert's gratings. Fizeau reported to the Academy of Sciences that this was the most thorough and satisfying piece of work on wave-lengths that had been made since the researches of Fraunhofer, and on his recommendation Mascart was awarded the Prix Bordin. He also prepared tables of the dispersion of the principal kinds of glass used by opticians, and of iceland spar. He devised, with M. Perrin, a novel cptometer, and studied the distribution of the colour-sensation over the retina of the eye. In the theory of light he presented, in 1871, an elaborate memoir on the calculation of the interference fringes formed in different circumstances, carrying out the investigation with great generality, and giving the results of comparison between theory and experiment. He investigated the phase-relations in the light reflected from metallic films of great tenuity; and he wrote a series of didactic articles in the *Journal de Physique*, then (1872) newly-founded, on the application of the spectroscope to the observation of interference phenomena. He also produced an improved apparatus for the study of interference, based on the phenomenon of Talbot's fringes. For the study of colour-mixtures he devised an instrument producing three parallel spectra, each of variable intensity, which could be superposed on one another, and displaced so as to yield a mixture of any three spectrum tints in any proportion. An important paper in 1874, followed by another in 1878, was devoted to refraction and dispersion in gases, some twenty being examined. Another research dealt with the index of refraction of water under pressure. Doppler's theory also was examined, and an investigation was made, of great interest in the light of recent ether theories, whether the proper motion of the earth had any appreciable effect on the phenomena of optics. The conclusion was that optical phenomena give no indication of the absolute motion of a body, but only of its relative motion. This memoir was awarded the Grand Prix des Sciences mathématiques in 1874 on the report of M. Fizeau.

In 1876, M. Mascart published a treatise on statical electricity greatly in advance of any previously existing on the Continent in that it introduced to Continental readers the potential theory developed on the basis of Green's book, and the electrometric work of Lord Kelvin. The volume included several matters of original interest, comprising a research on discharges across long distances, and on the measurement of great differences of potential. About this time also he made new observations on atmospheric electricity, on the influence of ozone (*i.e.* air ionised by the passage of sparks) on the formation of fogs, and on the influence of electricity on evaporation. In 1877 he published in the *Journal de Physique* an elegant exposition of the elementary theory of magneto-electric and electrodynamic machines, based on the energy formulæ of Helmholtz and Thomson. In this article the law of efficiency of motors, at that date generally misunderstood, was correctly stated. In the succeeding year, in collaboration with M. Angot, he made many tests on Gramme machines and others, to test his formulæ. The influence of Lord Kelvin's volume of reprinted papers on electrostatics and magnetism now became very great on Mascart's work. He communicated to the Académie des Sciences a paper on the reciprocal action of two electrified spheres, employing Thomson's method of electric images; another paper on the propagation of electric impulses along conductors; and another on the theory of induction.

Public work began to fall upon M. Mascart, in connection with the electrical machinery shown in the Paris Exhibition of 1878; and, still more, in connection with the Electrical Exhibition and the International Electric Congress of 1881. In the congress he took an active part, particularly in the debates on the then burning question of the electric units. He contributed to the settling of these matters by a fine determination of the absolute electrochemical equivalent of silver, which he deposited from a nitrate solution, measuring the current in absolute terms by means of a current-weigher, a balance of his own design. The value found was about one-half of one per cent. below those respectively found by Lord Rayleigh and Prof. Kohlrausch. Between 1881 and 1884 he completed a re-determination of the unit of resistance, by the methods of Weber and Kirchhoff, finding as a result 106·3 centimetres for the length of the mercury column to represent the ohm, Lord Rayleigh's figures being 106·28 and 106·24. In these years also, he had, in conjunction with his friend M. Joubert, prepared a text-book of electricity and magnetism, based on his courses at the Collège de France. It introduced many points from the treatise of Maxwell, and the use of the C.G.S. system of units.

In 1884 he was elected to the Académie des Sciences in the place of Jamin. Of that distinguished body he became an active member, being at various times vice-president, perpetual secretary, and in 1904 president.

Being a man of affairs he was frequently in request to advise the Government on matters within his competence. He was vice-president of the consultative committee on arts and manufactures, and president of the commission on inventions for the War Ministry. He was also a member of the Bureau of Longitudes, and of the International Bureau of Weights and Measures. In recognition of his public services he was created Grand Officer of the Legion of Honour. He took a prominent part in organising the electrical sections of the exhibitions of 1889 and 1900, and in the latter year was president of the electrical congress which met in the exhibition. He was widely travelled, and had been an active member of the Chicago congress in 1893, which he followed up by a visit to the Yellowstone Park. He was profoundly interested in the establishment of the meteorological station at the top of the Eiffel Tower, and it was a particular pleasure with him, during the exhibition of 1900, to conduct parties of scientific friends to the special gallery above the highest to which the public had access, to show them the observing instruments therein installed.

Amidst these busy avocations he still found time to write. His "Traité d'Optique," in four volumes, which appeared between 1890 and 1893, possesses all the elegance of style peculiar to writers trained in the school of Laplace and Arago and Verdet. It is particularly rich in the sections of interferences and meteorological optics. In 1900 he published a "Traité de Magnétisme terrestre" in one volume.

Mascart was president of the Société française de Physique, and at another time of the Société internationale des Électriciens. He was elected in 1885 an

honorary member of the Physical Society of London; in 1892, Foreign Member of the Royal Society; in 1900 vice-president, and in 1901 honorary member of the Institution of Electrical Engineers.

After his retirement last year, at the age of seventy, from the directorate of the Bureau of Meteorology, his health, which had suffered under his strenuous activities, broke down, and even the repose of his country residence failed to bring recovery. He was buried with military honours on Saturday, August 29, in the cemetery of Montparnasse.

THE LATE EARL OF ROSSE.

THE Earl of Rosse, whose death on August 29 has been already announced, inherited a name of great renown in science. It was during his childhood that his father, the third Earl, erected the mighty reflecting telescopes at his seat at Birr Castle by which the name of Lord Rosse became famous throughout the world. The third Earl was endowed by Nature with much mechanical skill, and as a means of utilising his tastes and opportunities in the best possible manner for the advancement of knowledge he commenced to make reflecting telescopes. Every detail of the work was carried out in the workshops which gradually grew about Birr Castle. Incessant experiments were made to improve the methods of casting, grinding, and polishing the specula, until at last his efforts culminated in the mighty six-foot reflector which even at this day, notwithstanding the advances of the last sixty years, has still the greatest aperture of any astronomical instrument in the world.

The great six-foot telescope at Birr, or Parsonstown, as the little country town used then to be called, soon gave abundant proof of its power. The most notable achievement was the discovery of the spiral nebulæ, which were not visible by any other telescope at that time existing. Indeed, the spiral nebulæ were not altogether credited in some quarters, until the advent of photography in recent years put an end to all doubts and showed that the spiral nebulæ abound in such myriads as to form, next to the fixed stars themselves, the most characteristic objects in the sidereal spaces.

It was under the shadow of the great telescope and amid such inspiring surroundings that Lord Rosse was reared. The sons of the third Earl inherited the mechanical tastes of their father, and joined eagerly in the practical work of the laboratories and workshops at Birr Castle. The eldest, Lord Oxmantown, succeeded to his father's scientific gifts no less than to his title and estates, and the youngest, the Hon. C. A. Parsons, following the natural development of his tastes from childhood, has achieved fame for his country as well as for himself by the splendid invention of the steam turbine.

The education which Lord Rosse derived from his father's precept and example was, of course, supplemented by the necessary education of a more conventional type. In this he was also exceptionally fortunate. The two first mathematical men of their year (1855) in Trinity College, Dublin, were John Purser, the late distinguished professor of mathematics in Belfast, and the Rev. T. T. Gray, who is at present a most respected senior fellow of his college. First one of these men (Gray) became resident at Birr, and to him the education of Lord Oxmantown was entrusted. He was succeeded by Purser, and under such admirable tuition the future Earl of Rosse developed much power in mathematics and its physical applications. In due course he entered Trinity College, Dublin, and had there a distinguished career.

The third Earl had been president of the Royal Society for several years, and his personal scientific distinction, as well as his unrivalled position as one of the most bountiful and most capable patrons of science, naturally placed him in intimate association with the leading men of science of the day. Sir John Herschel, Romney Robinson, Sabine, Fairbairn, Lyell, South, and many other distinguished persons in the middle of the last century were the friends of Lord Rosse. As Lord Oxmantown always resided with his father either in the ancestral home at Birr Castle or when a visit was paid to London, or a cruise was taken in their yacht, his years of early manhood were passed in close association with the illustrious friends of his father, and he had thus unique advantages of making acquaintance with science and with scientific workers. On one occasion (more than forty years ago) we know of Lord Oxmantown's spending a long day with Babbage, who was enthusiastically explaining to him the details of that wonderful analytical engine which would perform every description of calculation up to fifty significant figures that the mind of man could render into formulæ. Babbage had many parts of the engine to exhibit. But though the differential engine was to some extent completed, the much more formidable analytical engine had not made much progress beyond the drawings, in which, however, it was believed that the characteristic mechanical difficulties had been overcome. Another time, Lord Oxmantown and his brothers would be the guests of Wheatstone for an afternoon, who would explain to them his inventions of the moment, such as the original printing telegraph or the inverted stereoscope, that presented objects hollowed out instead of in relief. Even in those early days of electricity Gassiot, at his home in Clapham, showed to the great Earl, as well as to Lord Oxmantown and his brothers, his wonderful battery of many thousand cells by which effects which at that time seemed marvellous were produced.

A specially notable incident in the early career of Lord Rosse as an astronomer was a visit which he paid in 1866 to the observatory of Sir W. Huggins at Tulse Hill. It was a memorable time in modern astronomy. Huggins had commenced that great series of spectroscopic discoveries which, by the labours of himself and others, have so amazingly extended our knowledge of the heavens. On the night in question Huggins was observing the new star T Coronæ, which, after a few days of brightness, had then declined to the sixth magnitude. We are now so much accustomed to the outbreak of new stars and to the occurrence of bright lines in the spectra of such stars that it requires a special effort to recall the interest with which these discoveries were received at the time of their making. Huggins showed these lines to Lord Rosse, who also saw another most interesting object on that same evening. It was the linear spectrum of the first planetary nebula of which the gaseous nature had recently been announced.

With such opportunities and with the splendid instruments available at Birr, Lord Rosse devoted himself keenly to practical astronomical work. His first achievement was his magnificent drawing of the great nebula in Orion. It is probably the most elaborate piece of astronomical portraiture ever completed. It occupied about seven years of practically continuous work at all available opportunities with the six-foot reflector. The beautiful engraving which was made from Lord Rosse's drawing of the nebula is a familiar object on the walls of astronomical observatories. Among his other astronomical investigations we may mention those of the lunar radiation of heat. On this he was engaged up to the time of his last illness, and, indeed, at the recent meeting of the British Association in Dublin Sir Howard Grubb exhibited a short-focus mirror of remarkable construction which he had