dents of science in America, we extend a cordial welcome to the greatest body representative of the intellect of the old world which has ever visited our shores. Did our visitors not represent the most hospitable of nations, we should indulge in bolder assurances of the warmth of the reception they will meet with from all classes of Americans. But those who know what English hospitality is will content themselves with modestly hoping that American hospitality does not fall far short of it, and with remarking that our great railways extend a corporate hospitality to distinguished visitors which is not known abroad.

The sentimental consideration that the visit is one the very possibility of which is a striking illustration of what science has done, will add zest to the occasion. In times past, the idea of a local society choosing a place of meeting across the Atlantic would have appeared as quixotic as can readily be imagined. Indeed, we can but suspect that the project at first presented a little of this appearance to a majority of those concerned, and that a meeting very successful in point of numbers was hardly expected. But the result seems likely to more than realize the hopes of the most sanguine supporters of the project, and it is fitting that the promoters of science should enjoy to the utmost a result which the work of their class has rendered possible.

Circumstances are in several ways favorable for paying us a visit. The time and place of holding the meeting of the American association were especially chosen so as to facilitate the reception of any visitors from the sister-organization who might grace the meeting by their presence. Arriving in Philadelphia, they will find not only our own association, but the electrical exhibition of the Franklin institute. Although the latter cannot be expected to rival the great displays at Paris and Vienna, it will afford a better opportunity than any which has been offered in Europe, for seeing what has been done here in forwarding the utilitarian applications of electricity. Visiting electricians, of whom we may hope for a considerable number, may also expect an invitation to take part in the electrical conference, which is to be conducted under the auspices of the government, and in which the novelties of the exhibition will be made known. Philadelphia is only four hours distant from the national capital, and thus a visit can be made to the collections of the government without any serious loss of time. The division of his time between pleasure and business will be a question for the decision of each individual visitor, to whom the journeys and excursions tendered to the American association will be freely open. He should, however, bear in mind that the colleges and universities are generally in vacation till near the close of September.

Finally, the student of politics and sociology will regard it as fortunate that his visit takes place in the height of a presidential canvass, thus enabling him to study one of the most interesting of political phenomena on the largest scale. If he judges only from the course of newspaper criticism on the presidential parties and candidates, he will doubt what the future has in store for us; but, if he looks deeper, he will see a process of endosmosis, by which, from the huge mass of objurgation, falsehood, and not very elevated humor, political acumen is being infiltrated into the minds of millions of voters. And no one, whatever his politics, need fear the danger of being converted to new principles. Whether he be the most advanced Liberal, or the most conservative Tory, he will have no difficulty in seeing every thing by the light he brings with him, and returning home with all his views strongly confirmed.

LORD RAYLEIGH.

LORD RAYLEIGH, the president of the British association of science for this year, is well known to all Americans who have kept pace with the development of physical science. Although his reputation cannot be called a popular one, yet no student of physical science can well be ignorant of his investigations; and his treatise on sound places him easily in the front rank of writers on a subject of which the

theoretical and practical importance is second to none in its bearing on the progress of humanity.

John W. Strutt, the third of his race bearing the title Lord Rayleigh, is the eldest son of John James, second Lord Rayleigh, and of Clara Elizabeth Latouche, daughter of the late Capt. Vicars, R.E. He was born Nov. 12, 1842; was educated at Trinity, Cambridge, of which he was a fellow. He was married in 1871 to Evelyn Georgiana Mary, second daughter of the late James Balfour, Esq., of Whittinghame, N.B., and succeeded to the title in 1873.

Lord Rayleigh's career at the University of Cambridge, which he entered at the age of nineteen, was a distinguished one. He secured the Sheepshanks astronomical exhibition in 1864. The following year he came out senior wrangler and first Smith prizeman. Trinity college thereupon elected him to a fellowship, which he held until his marriage, in 1871. In 1879 he was elected to succeed Maxwell as director of the Cavendish physical laboratory at Cambridge; and he received the medal of the Royal society in 1882, and was president of section A of the British association in 1882. This brief record of the important dates in the life of Lord Rayleigh may make his life seem uneventful to the ordinary reader; but the student of his writings will perceive that the years between his acceptance of the fellowship at Cambridge, and his appearance as president of the British association for the advancement of science at Montreal, have been eventful in the scientific sense, and full of work. It was no ordinary compliment to a man to be selected as the successor of Maxwell. We well remember the commendation pronounced by leading English men of science before Lord Rayleigh became director of the Cavendish laboratory, — 'strong man, Lord Rayleigh;' and this simple and peculiarly English method of commendation still expresses the truth to-day. An Englishman said to the writer lately, "They question the necessity of the House of lords and the use of lords. Look at Lord Rayleigh! Cannot we expect from this select body of men of hereditary traits and of inherited possessions great things in science, if they will only abandon the subject of franchise bills and the marriage of wife's sisters, and follow the path pointed out by Lord Rayleigh?"

Lord Brougham, it is true, had scientific tastes, and wrote papers on optics; but, if one wishes to compare the physical science of Brougham's time with that of the present, and, moreover, to compare the scientific attainment of Lord Brougham with Lord Rayleigh, let him read Brougham's papers, and then turn to Lord Rayleigh's investigations on diffraction-gratings, and to his various papers on theoretical optics. Perhaps his most important work is the 'Theory of sound,' in two volumes, begun on the Nile in 1872, and published in 1877–78. This work has received the commendation of Helmholtz, and takes the place, in theoretical acoustics, which Helmholtz's 'Tonempfindungen' fills in physiological and practical acoustics.

In looking at Lord Rayleigh's investigations before the appearance of the 'Theory of sound,' we perceive that he has embodied in this work the special investigations and mathematical work of nearly ten years. Before the appearance of this work, the subject of acoustics had been treated in a disconnected manner. There were geometrical, and what might be called synthetic, treatises; but, with the exception of Donkins's 'Acoustics,' there was no generalized and analytical work on sound. What Newton did for mathematics, when he discovered the method of fluxions, or the principles of the differential and integral calculus, Lord Rayleigh has done for sound. He has bridged over, so to speak, angular intervals, has filled up discontinuities, and has made the general treatment of acoustical equations flexible. In reading this treatise, one speedily finds that it is not a narrow or limited one. The entire range of modern mathematics is employed; and the system of generalized co-ordinates receives, in this treatise, perhaps the greatest exemplification of its power. One cannot read the treatise who has not become familiar with

the highest flights of modern mathematics. Moreover, the lecturer on the great doctrine of the conservation of energy will find that this book is founded upon this doctrine, and opens with its fundamental equations. Lord Rayleigh pointed out, before the appearance of this treatise, the use of a peculiar function, expressing the law of decay, so to speak, and subsidence of impulses in any system or configuration; and although he probably saw its chief employment was in the discussion of the dissipation, and frittering into heat, of sound-vibrations in any complicated system, yet he probably saw, in common with Maxwell, that the dissipation function could be employed in electricity to express the oscillation and change of electrical induction-currents, also, into other forms of energy. The intelligent reader of Rayleigh's 'Theory of sound' has a great intellectual pleasure in tracing in it the methods of reciprocity of similitudes, the illustrations of the conservation of energy, and must rise from its perusal with a clearer notion than he has had before of the unity of physical forces, of the great modern truth of the equivalence between work and heat.

Since Lord Rayleigh has become director of the Cavendish laboratory, he has organized its scientific work, and has made it a centre of physical investigation as well as of instruction. His determinations of the ohm, which were presented to the Paris conference of electricians, 1883–84, were generally regarded as the most accurate, and formed the basis of the unit of electrical resistance now formally adopted. He has lately investigated the methods of obtaining a practical unit of the strength of an electrical current, and has shown that the method by the deposition of silver is capable of a high degree of accuracy. It will be seen that he unites unusual qualities for director of physical science, great mathematical ability, and the power to execute and supervise scientific investigation.

Lord Rayleigh's countenance will soon become familiar to every American man of science; and we hope that even the uneducated American will learn to see in him, not the lord of the manor of Terling and the patron of two livings, but a peer of the distinguished school of mathematicians of Cambridge, Eng., the pre-eminence of which, in mathematical science, American centres of learning can honor, but not dispute.