for the decreased response to stimulation of an irradiated muscle-nerve preparation and the arrest or retardation of the beating of the isolated frog's heart and embryonic heart of a chick.

Further explanation is required to account for the action on bacteria and viruses—bodies which are of microscopic and ultra-microscopic dimensions. We have found that the agglutinating power of certain streptococci is increased after irradiation, but the virulence of a strain of pneumococcus was unchanged or changed in an indefinite manner. (Preliminary experiments with bacteriophage have given a negative result.)

Positive effects have been obtained with one virus. The accompanying table shows the effect of ultrasonic vibrations in increasing the potency of the virus of vaccinia. Through the kindness of Dr. Mervyn Gordon, the irradiated and control lymphs in various dilutions were used to vaccinate the skin of a rabbit. The 'takes' were recorded after the requisite period of time had elapsed for the characteristic lesions to be produced. Two series of experiments were carried out, the lymph in the first case being given only one-fifth of the exposure given in the second case. It will be noticed that the result is the same in both cases. Presumably the effect of the exposure was merely to disengage inert foreign material from the virus so that the latter could exhibit its intrinsic potency.

EFFECT OF ULTRASONIC VIBRATIONS ON VACCINIA VIRUS.
(Frequency 700,000.)

Dilution.	*1st Expt.*	*2nd Expt.*	*Control.*
1/1	+	+	+
1/10	+	+	+
1/50	+	+	+
1/100	+	+	+
1/500	+	+	−
1/1000	+	+	−
1/2000	−	−	−

We have seen that fish may be killed by means of inaudible sound waves. With so many effects occurring simultaneously—the breaking up of blood corpuscles; liberation of dissolved gases; paralysis of muscle and nerve; localised mechanical action and heat production—this should no longer surprise us. In conclusion, it may be added that ultrasonic radiation is not a menace to human life. The vibrations are of necessity produced in a liquid because at these high frequencies the waves are so rapidly attenuated in air that their propagation through it is practically impossible.

Obituary.

DR. THOS. A. EDISON.

BY the death at Llewellyn Park, West Orange, New Jersey, on Oct. 18, of Thomas Alva Edison, America has lost one of its most famous men, and one whose name, like those of his countrymen Fulton, Whitney, Colt, Morse, Bell, Maxim, Westinghouse, and the Wright brothers, will always be remembered as that of a great inventor. When a youth, Edison bought a set of Faraday's works, and he afterwards said, "I think I must have tried everything in those books." It was in this direction his great strength lay; for, gifted with a vivid imagination and a quick and active mind, he possessed a remarkable willingness to put everything to the test, and to seek in any and every direction for a solution to the problem of the moment.

Edison came of Dutch and Scotch descent, and was born at Milan, Ohio, on Feb. 11, 1847. It was apparently from his mother that he inherited his intense mental activity, while from his father's side came his exceptional physique and powers of endurance. His great-grandfather lived to the age of a hundred and four years, his grandfather to a hundred and two, and his father and several uncles to more than ninety years of age. The romantic story of his early life has many parallels in American biography. Owing nothing to schools or masters, he was his own instructor and the founder of his own fortunes. As a train boy of fifteen years of age he printed a small newspaper, the first ever produced on a train in motion; at sixteen years he was a telegraph operator; at nineteen he took out his first patent; at twenty-two he was working for a telegraph company at 300 dollars a month, and soon afterwards was able to sell his improvements in 'stock tickers' for 40,000 dollars, and in 1876 to open his laboratory at Menlo Park, Newark, New Jersey.

The record of the work of Edison and his assistants during the next twenty years at Menlo Park and at West Orange, to which he removed in 1887, probably has no parallel in the history of invention, and it is no wonder he became popularly known as the 'Wizard of Menlo Park'. It has been said of him that "he could always be counted upon to play his part in the mechanical evolution of new inventive arts", but his part often became the principal one. In telegraphy he will be remembered for the invention in 1872 of the type printing receiver and his subsequent work on quadruplex telegraphy, while to telephony he contributed the important invention of the carbon transmitter. Bell invented the telephone in 1876, Hughes the microphone in 1878, and Edison the carbon transmitter in 1877. To that year also belongs his outstanding invention of the phonograph.

Two years later Edison successfully solved the problem of "the subdivision of the electric light" by the invention of his incandescent lamp, his work in this direction being contemporary with that of Maxim, Lane Fox, and Swan. His improvements in the dynamo, made about the same time, gave him a place beside Gramme, Siemens, Crompton, Brush, and Hopkinson; while the first central power stations in both the Old World and the New World, the former in Holborn Viaduct, London, and the latter in Pearl Street, New York, were the direct outcome of his many inventions. Both these stations began operations in 1882.

In Menlo Park, in 1880, Edison made experiments with electric traction, while he afterwards

contributed to the advancement of photography and cinematography. One fruitful observation he made in 1883—the Edison effect—he left for others to utilise; and from this, through the work of Sir Ambrose Fleming, came the thermionic valve. The work of an inventor responsible for more than a thousand patents cannot be adequately dealt with in an obituary notice, but, in conclusion, mention may be made of his nickel and iron storage cell patented in 1900 and improved in subsequent years.

Many biographies of Edison have been written and many writers have put forward extravagant claims on his behalf. But he himself stood in need of no such panegyrists. His works speak for themselves, and the *Times* remarks that though his older friends and staff have passed away, "those who survive him retain an abiding impression of him as a great man, and a singularly delightful personality, devoid of egotism, inspiring enthusiasm and exceedingly human, as all who share his love of children must be".

For fifty years Edison's name has been a household word, and it is nearly forty years since it was included in the list of recipients of the Albert Medal of the Royal Society of Arts, where it is found beside those of Faraday, Wheatstone, Bell, Hughes, Kelvin, Swan, Parsons, Fleming, and Marconi. It is among such as these he rightly takes his place.

Dr. C. A. Keane.

Dr. Charles Alexander Keane, who died, at the age of sixty-seven years, on Sept. 18, had been identified for the last thirty years with the development of technical education in London. After studying at Manchester under Roscoe and at Erlangen under Otto Fischer, he served as lecturer and demonstrator in chemistry at Liverpool for fifteen years before coming to London to take up the post of first principal of the newly established Sir John Cass Technical Institute. This Institute was founded out of the increased revenues of the trust established by Sir John Cass (1661–1718) for the maintenance of a Foundation School for the children of the Ward of Portsoken. Appointed in 1901, almost a year before the opening of the new building in Jewry Street—now, in eloquent testimony of the success of his administration, undergoing extensive enlargement—Keane at once gained the confidence of the governors, and was able to determine from the very beginning the lines on which the Institute should develop. As soon as possible another building was provided for Sir John Cass's Day School, and all elementary teaching was given up in favour of more advanced work. Two chief principles were adopted: first, the encouragement of research among the teachers and senior students, and, secondly, close association with the industries of the district. In both these respects the Sir John Cass Institute has fulfilled the wishes of its promoters; a long list of original researches has been published from its laboratories, while its industrial classes, each controlled by a consultative committee representing its special subject, are a characteristic and flourishing feature of its work.

Keane contributed a number of papers on organic chemistry to the *Journal of the Chemical Society*, but his chief interests lay in applied chemistry, and he did pioneer work on electrolytic methods of analysis and the analysis of gases. He wrote a book on "Modern Organic Chemistry", intended for readers with no special chemical training, and edited the English edition of Lunge's "Technical Methods of Chemical Analysis", which was completed in 1914 and was followed by a revised edition on which he was engaged almost to the time of his death. He was an active member of the various societies associated with chemistry, and acted as chairman of the London Section of the Society of Chemical Industry in 1917–19, a position in which his sound common sense and business acumen proved of great value.

Keane retired from his post at the Cass in 1926 after a period of ill-health culminating in a serious operation, and spent the remaining five years of his life at his country home near Canterbury, actively engaged in local affairs. A man of wide interests and culture, and a charming companion, his loss will be severely felt. A. H.

Prof. Fritz Foerster.

We regret to record the death on Sept. 14 of Prof. Fritz Foerster, Director of the Laboratory of Inorganic Chemistry of the Technische Hochschule, Dresden, and we are indebted to the *Chemiker-Zeitung* for Oct. 7 for details of his career.

Born in 1866 at Grünberg in Silesia, Foerster proceeded in due course to the University of Berlin, where he studied under A. W. von Hofmann. After graduation he became assistant to Mylius at the Physikalisch-Technische Reichsanstalt, and in 1894 he joined the staff of the Technische Hochschule in Charlottenburg, but in the following year he accepted a post as lecturer under Walter Hempel at the Hochschule in Dresden, where in 1900 he was appointed to the new chair of electrochemistry and physical chemistry. In 1905 a new laboratory of electrochemistry was established under his direction, and in 1912, on the retirement of Hempel, Foerster was elected to the chair of inorganic and technical chemistry. After the War he applied himself to the task of rebuilding the Chemical Institute, which was ready for occupation in 1925.

Foerster's experimental work lay chiefly in the field of electrochemistry, the bulk of his original papers being published in the *Zeitschrift für Elektrochemie*. The problems which he investigated cover a very wide field, and include the electrolysis of alkali chlorides and the salts of the halogen oxy-acids, as well as electro-analytical methods and technical applications. During the last twelve years he was particularly concerned with an investigation of the chemistry of the oxy-acids of sulphur and the electrolytic reduction of compounds of polyvalent metals. His well-known handbook "Elektrochemie wässeriger Lösungen" (1905) is recognised as a standard work on the subject. In 1923 he began to remodel the whole work, and the first volume was approaching completion at the time of his death.