

coveries will ultimately win the race at the expense of those which have been more neglectful in that respect. The possession by the latter of greater natural resources will only serve to stave off defeat for a time.

Moulds may be trained, under certain conditions, to produce various other compounds from sugar—for example, up to 50 per cent. of citric acid, also fumaric and pyruvic acids. Lactic acid and vinegar are, of course, largely manufactured by fermentation, but Mr. Chapman deplures the way in which these industries have neglected to apply modern scientific results. In the manufacture of vinegar, in particular, no real progress has been made since Pasteur's work of 1868.

We have been more successful with the production of acetone and butyl alcohol from starch, but this, too, originated in France in the experiments of Fernbach. Mr. Chapman discusses the process in some detail; in normal times its commercial success will depend on a means of utilising

the butyl alcohol, which is produced in twice the quantity of the acetone.

Other applications of micro-biology are to agriculture, bread-making, tanning, sewage disposal, and food-production. Brewers' yeast is almost a waste product to the extent of 50,000 or 60,000 tons per annum in the United Kingdom, but is being used more and more as a cattle food and, in the shape of an extract, for human consumption. "Mineral yeast" (not a true yeast) was grown in Germany as a war food.

Finally, Mr. Chapman reiterates his plea (already made in a paper to the Society of Chemical Industry) for the foundation of a National Institute of Industrial Micro-biology, which should provide for the systematic prosecution of industrial research, be a centre for specialised training, and maintain a complete collection of pure cultures. "For far too many years we have been content to act as middlemen and agents, when we ought to have been manufacturers."

Obituary.

G. W. WALKER, F.R.S.

BY the death of Mr. GEORGE WALKER WALKER, physical science has lost a brilliant exponent of its rigidly exact experimental side, which his high mathematical attainment and inventive capacity enabled him to develop with marked success.

Mr. Walker was the only son of Mr. John Walker, of Aberdeen, and was a founder of the Robert Gordon's College, Aberdeen. He started life as a practical engineer, but, not caring for this, he obtained an appointment with Messrs. C. & P. H. Chalmers, of Aberdeen, where he remained one year. His interest in science, however, led him to pursue its study in the evening classes of Gordon's College, where he received so much help and encouragement that he obtained a national scholarship, which brought him in 1892 to the Royal College of Science, South Kensington, where, in due time, he obtained his associateship. While at South Kensington he so impressed Sir Arthur Rücker with his mathematical ability that he urged him to go to Cambridge, where he obtained a Sizarship at Trinity College. He was fourth wrangler in 1897, and Smith's prizeman and Isaac Newton student in 1899, and was appointed a fellow of Trinity in 1900. In 1901 he studied at Göttingen. From 1903 to 1908 he was lecturer in physics at Glasgow University. He was then appointed superintendent of Eskdalemuir Observatory, for which his prior training at South Kensington so admirably fitted him. There he remained four years. From 1912 to 1915 he was engaged on the new magnetic survey of the British Isles. He was elected a fellow of the Royal Society in 1913. He assisted the Earl of Berkeley in his laboratory at Boar's Hill in 1915, and became Halley lecturer in 1916.

In May, 1918, Mr. Walker was appointed chief scientific worker at the Royal Naval Mining School,

Portsmouth, where the numerous and urgent problems connected with marine mines afforded abundant scope for his genius. His success in dealing with these was properly appreciated by the Superintendent of Mining and other naval officers, but this work, from its nature, is essentially confidential. In November, 1920, while engaged on experimental work at Falmouth, he contracted a chill, which developed into lung trouble and was the cause of an abscess, for which operation became necessary. He went into University College Hospital, Gower Street, in July last, where the shock due to two operations led to his death.

Besides his work on magnetic surveying, Mr. Walker was an authority on seismology, being also a warm admirer of Prince Galitzin. In 1904 he married the daughter of Mr. Gifford, of Aberdeen, who, with one son, survives him.

C. V. B.

DR. PETER COOPER HEWITT.

Dr. Peter Cooper Hewitt, who died in Paris on August 25 last, at the age of sixty years, was the son of a leading New York iron manufacturer and merchant well known as the promoter of many civic, educational, and philanthropic causes. His mother was the daughter of Peter Cooper, an inventor, manufacturer, and railroad builder, who presented New York with the Cooper Union for the advancement of art and science, now more usually known as Cooper Institute.

Dr. Cooper Hewitt was born on March 5, 1861, and was educated at the Stevens Institute of Technology at Hoboken, New Jersey, and at the Columbia University School of Mines. He early manifested a strong inclination towards mechanics, and his course of studies was directed towards the mechanical, chemical, and electrical sciences. One of his earliest inventions was in relation to improvements in the machinery em-