we should expect that a moderate increase (beyond the mere four parts in 10,000 of our present atmosphere) of the food-stuff (carbonic acid) of plants would be favourable to more rapid production of vegetable tissue; and on the same grounds we should equally expect that such an increase of the same gas, as to practically asphyxiate plants, would be fatal to them. But between the two limits there is ample room for Prof. Prestwich's hypothesis, which is probably well founded.

Why not experiment on the question? It is easy enough.

Sachs (*Lehrb. d. Botanik*, p. 692) states that "experiments on plants (Vegetationsversuche) show that growth and the changes of material necessarily associated therewith only take place in the tissues (of plants) so long as free oxygen has access to them: in the absence of free oxygen (in einer saüerstofffreien Atmosphäre) no growth takes place; and if plants remain a longer time in such an atmosphere they die."

If, however, the percentage of carbonic acid in the present atmosphere were multiplied, say 100-fold, its volume would still be less than one-fifth that of the free oxygen present. This we should scarcely expect to reach the asphyxiation-proportion for plants. The above quotation is from the Leipzig edition (1874) of Sachs' great work. It is probable that in the recent new edition much fuller information is to be found.

Wellington College, Berks. A. Irving.
*4th May*, 1888.

## OBITUARY

### PROF. HENRY CARVILL LEWIS, M.A., F.G.S.

Born November 16th, 1853; Died July 21st, 1888.

Amongst the many and varied ties which serve to bind America and England together in friendly union, there are probably none more sincere and reciprocal than those which subsist between the scientific men of the two countries.

As Englishmen we take the warmest interest in the grand development of that wonderful country "on the other side," and the hearty reception given to our American cousins here is returned with equal or even greater warmth by them, whenever we visit the New World.

It is doubtless owing to their greater energy and enterprise that Americans are by far the more frequent visitors to our shores than are we to theirs. This is no doubt largely due to the historical attractions which an old country always offers to a new one, and also the desire to compare our scientific work and institutions with their own.

No one amongst the many young scientific Americans of note has more earnestly cultivated English and European methods of research, or has worked with greater enthusiasm to carry his geological investigations from North America into Britain, than the subject of this brief memoir, Professor Carvill Lewis. H. C. Lewis was

born in Philadelphia, November 16th, 1853, being the son of Mr. F. Mortimer Lewis and Emma Hulme (Carvill) Lewis, of that city. At the age of 20 he graduated B.A. with first honours in Classics at the University of Pennsylvania, taking his M.A. degree in 1876. He took a post-graduate course of three years in Natural Science, and between 1879 and 1884 he served as a volunteer on the staff of the Geological Survey of Pennsylvania; investigating at first the surface-geology of Southern Pennsylvania, and afterwards the Glacial phenomena of the Northern part of that State. Here he succesfully traced the great terminal moraine of the North American Ice-sheet from New Jersey to the frontier of Ohio. During this period he contributed a number of papers to the Academy of Natural Sciences of Philadelphia upon the mineralogy and geology of Pennsylvania.

In 1880 he was elected Professor of Mineralogy in the Academy of Natural Sciences, Philadelphia, and in 1883 he was appointed Professor of Geology in Haverford College, Pennsylvania, U.S.

In 1882 Prof. Carvill Lewis married Miss Julia C. Foulke, daughter of the late Mr. W. Parker Foulke of Philadelphia, a man of varied attainments and wide scientific interests.

Between 1885 and 1888 he was engaged in studies and original investigations in Europe; the winters being spent in Heidelberg, where he worked at microscopic petrology and crystallography, under the guidance of Prof. Rosenbusch, and the summers in the field tracing out the difficult and complex problems connected with the Glacial Epoch in Great Britain and on the Continent.

Here he had completed a map of the ancient glaciers and ice-sheets of England, Wales and Ireland, which was exhibited and discussed at the British Association, Birmingham, 1886; Manchester, 1887; and elsewhere.

He had also commenced similar studies in Switzerland and North Germany. These, however, were interrupted by a visit to America, where he contracted typhoid fever, which developed in a sudden and alarming manner immediately on his return to England, and terminated fatally on July 21st, at Manchester.

Prof. Carvill Lewis was a Fellow of the Geological Society of London; of the Geological Society of Germany; a Member of the American Philosophical Society; of the Academy of Natural Sciences of Philadelphia; the Franklin Institute; the American Association; a Corresponding Member of the British Association; and a Member of the Geological Society of Liverpool.

It is always sad to see a bright young life suddenly cut short in early manhood, but it is more especially so when, as in the case of Prof. Carvill Lewis, such good work had been already done, and we had abundant promise of a splendid future scientific career.

Over and above all this Prof. Lewis had such a happy, bright and genial manner, that he readily won for himself the warm regard of a very wide circle of friends, whilst among men of science he seemed to give sure promise of a long life of solid and valuable work. His loss will be keenly felt both in America and Europe, not only amongst geologists, but men of science generally.

The following are amongst his more important papers :—

"On Philadelphite, a new Mineral Species." (Proc. Acad. Nat. Sci. Philadelphia, 1879.)
"The Optical Characters of some Micas." (Proc. Acad. Nat. Sci. Philadelphia, 1880, pp. 244-251.)
"Siderophyllite, a new Mineral." (Proc. Acad. Nat. Sci. Philadelphia, 1880, pp. 254-255.)
"The Surface Geology of Philadelphia and its vicinity." (Journ. Franklin Institute, 1883.) (Proc. Acad. Nat. Sci. Philadelphia, 1880, pp. 258-272.)
"The Trenton Gravel and its relation to the Antiquity of Man." (Proc. Acad. Nat. Sci. Philadelphia, 1880, pp. 296-309.)
"The Iron-ores and Lignites of Montgomery Co. Valley." (Proc. Acad. Nat. Sci. Philadelphia, 1880, pp. 282-291.)
"A New Fucoidal Plant from the Trias." (Proc. Acad. Nat. Sci. Philadelphia, 1880, pp. 293-294.)
"Some Enclosures in Muscovite." (Proc. Acad. Nat. Sci. Philadelphia, 1882, pp. 311-315.)
"An American Locality for Helvite." (Proc. Acad. Nat. Sci. Philadelphia, 1882, pp. 100-102.)
"Pseudomorphs of Serpentine after Dolomite." (Proc. Acad. Nat. Sci. Philadelphia, 1882, pp. 36-38.)
"The Great Terminal Moraine across Pennsylvania." (Proc. Amer. Assoc. Adv. Sci. Montreal, 1882.—*Science*, 1883, vol. ii. pp. 163-167.)
"On a Supposed Human Implement from the Gravel at Philadelphia." (Proc. Acad. Nat. Sci. Philadelphia, 1883, pp. 40-43.)
"Phosphorescent Variety of Limestone." (Proc. Acad. Nat. Sci. Philadelpia, 1884, pp. pp. 10-12.)
"Report on the Great Terminal Moraine across South-Eastern Pennsylvania and Western New York, 1884, pp. 299, maps, sections. and photograhs.
"On Supposed Glaciation in Pennsylvania South of the Terminal Moraine." (Amer. Journ. Sci. 1884, vol. xxxiii. pp. 276-288.)
"Erythrite, Gentbite and Cuprite from near Philadelphia." (Proc. Acad. Nat. Sci. Philadelphia, 1885, pp. 120-122.)
"Marginal Kames." (Proc. Acad. Nat. Sci. Philadelphia, 1885, pp. 157-173.)
"A Great Trap Dyke across South-Eastern Pennsylvania." (Proc. Am. Phil. Soc. 1885, pp. 438-456.)
"Comparative Studies upon the Glaciation of North America, Great Britain, and Ireland." (GEOL. MAG. 1887, Ser. III. Vol. IV. pp. 28-32.) British Assoc. Reports, Birmingham, 1886.
"On a Diamantiferous Peridotite" and "The Genesis of the Diamond." (Brit. Assoc. Rep. Birmingham, 1886.) (GEOL. MAG. Ser. III. Vol. IV. 1887, pp. 22-24.) (*Science*, vol. viii. 1886, pp. 345-347.)
"The Terminal Moraines of the Great Glaciers of England." (British Assoc. Reports, Manchester, 1887.) (Amer. Journal Science, 1887, ser. iii. vol. 34, p. 402.)
"On some extra-Morainic Lakes in England, North America, and elsewhere during the Period of Maximum Glaciation, and on extra-Morainic Boulder-clay." (British Assoc. Reports, Manchester, 1887.) (GEOL. MAG. 1887, p. 515.)
"On the Matrix of the Diamond." (Brit. Assoc. Reports, Manchester, 1887.) (GEOL. MAG. 1888, p. 129.)
"The Terminal Moraine of the Irish Sea Glacier near Manchester." (Brit. Assoc. Reports, Manchester, 1887.)

## THE TERMINAL MORAINES OF THE GREAT GLACIERS OF ENGLAND.

NOTE.—Mrs. Lewis desires to state that, after the meeting of the British Association at Manchester last year, Prof. Carvill Lewis set out in company with herself and Dr. H. W. Crosskey, of Birmingham, to visit and examine Frankley Hill, in Worcestershire, the only alleged deposit of glacial "Till" south of the great Moraine line which he had not seen prior to the Manchester meeting. Here an excavation was made, under Prof. Lewis's superintendence, through the gravel to a depth of from eight to ten feet; thence the party traced the few detached Arenig boulders to the frontier of Wales. Prof. Carvill Lewis then said that for the first time in all his experience, both in the old and new world, he had found unmistakeable evidence of a glacier, between which and the Glacial Epoch there was as vast an interval of time as between that and the present day. It was the intention of the late Prof. Lewis to make a thorough re-examination of all England, lest a similar deposit elsewhere might have escaped his notice; but now that his labours have been so suddenly brought to a close, Mrs. Lewis thinks this statement should be put on record.—H.W.