

ground mines. On the Mesabi range, however, some of the largest mines are worked as open quarries, the ore being obtained by steam shovels at a cost of $7\frac{1}{2}d.$ per ton. The accompanying illustration shows the steam-shovel method of mining at the Oliver Mine on the Mesabi range. The face of iron ore is 50 feet high, and the 90-ton steam-shovel with a $2\frac{1}{2}$ cubic yard digger shown, is capable of loading 500 tons of ore per hour. It is difficult to over-estimate the value to the United States of the discovery of ore in the Mesabi Range. A producer for only four seasons, this district has in sight to-day nearly 400,000,000 tons of better ore than the average used in the United States, and perhaps 200,000 tons of ore containing 60 per cent. of iron, 0.06 per cent. of phosphorus, and 10 per cent. of moisture. Indeed, Mr. Winchell thinks that it is not unreasonable to assert that the range will produce 500,000,000 tons of ore before it is abandoned.

At the present time the cost of a ton of Mesabi ore laid down at a Lake Erie dock is made up of the following items:—

	s.	d.	to	s.	d.
Royalty	0	0	to	1	5 $\frac{1}{2}$
Mining cost	0	7 $\frac{1}{2}$	to	3	1 $\frac{1}{2}$
Railway freight	1	4	to	4	2
Lake freight	2	6	to	3	4
Insurance, commission, and loss	0	2 $\frac{1}{2}$	to	0	10
Totals	4	8		12	11

There is probably no mine which has all the minimum costs, and it is evident that prices may go still lower without shutting up enough mines to produce a scarcity of ore. Mr. Winchell appends to his valuable paper a carefully compiled bibliography, tables of analyses, and statistics of shipments for the past forty-one years.

BENNETT H. BROUGH.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The following is the speech delivered on March 10 by the Public Orator, Dr. Sandys, in presenting, for the honorary degree of Doctor in Science, Prof. Wilhelm Pfeffer of Leipzig, Croonian Lecturer of the Royal Society, 1898:—

Veris adventu iam propinquo, dum terra gaudet, dum caelum avet nitescere, et arbores frondescere, nihil auspiciatius ducimus quam veris quasi praeunantium quandam trans maria advectionem verbis bene ominatis salutare. Salutamus praeceptorem insignem, qui rerum naturae pulcherrimam nactus provinciam, discipulis ex omni orbis terrarum parte affluentes docet, qua lege lilia crocique calyces suos explicant; quo admonitu flores, alii solis calore, alii solis lumine adducti, se aperiant; arte quali mimosa tactum etiam mollissimum reformidet frondesque teneras in sese contrahat; artificio quam admirabili etiam vites, natura caducae, clavicularis suis adminicula quaedam tamquam manibus complectantur, et quasi animantes a terra sese altius erigant. Quam dilucide demonstrat, quicquid terra gignit, secundum ea quorum in medio vivit, velut ipsos animantes, naturam suam sensim variare ac mutare. Idem neque per membranam tenuissimam aquae sorbendae rationem, quae osmosis dicitur, neque cellularum motum, qui chemotaxis nuncupatur, inexploratum reliquit. Etiam animalium minutissimorum quae bacteria nominantur motus varios quam subtiliter moderatur, et in ipsum exitium quam insidiosae pellicit. Nuper a Societate Regia Londinensi in Britanniam vocatus, propediem (nisi fallor) ostendet, in eis rebus quas terra gignit, quinam sit ipse motus fons et origo; quo potissimum modo succus ipse quem e terra trahunt, spiritus ipse quem e caelo hauriunt, quasi vim quandam mittat liberam, unde motuum inter se diversorum varietas tam magna exoriatur. Quid est in his omnibus, Academici, (ut Ciceronis utar verbis) "quid est, in quo non naturae ratio intellegentis appareat"?

Praesento vobis scientiae botanicae praeceptorem illustrem, Professorem Lipsiensem, WILLELMUM PFEFFER.

MR. WILLIAM HOULDSWORTH, Rozelle, Ayr, has just intimated his intention of presenting to the University of Glasgow a sum of 5600*l.*, so invested as to yield an annual income of 150*l.*, in order to endow a research studentship in connection with the Faculty of Science. The sum of 120*l.* is to be paid annually to the research student on the foundation, the remainder to be used

to defray laboratory expenses and materials in connection with his work, and the fees of such science classes as he may attend. To be eligible for appointment candidates must have studied at least two years in the University of Glasgow, and the appointment is to be made in the manner laid down by the ordinance regarding research students and fellows. The period of tenure is to be two years, during which the holder must prosecute research studies in the Natural Philosophy department with diligence and regularity. Mr. Houldsworth has taken this method of showing his interest in the welfare of the University and the advancement of science, and his recognition of the distinguished services rendered to scientific research by Lord Kelvin during a professorship of fifty years.

THE London University Commission Bill passed through Committee of the House of Lords on Thursday last. The Duke of Devonshire announced that the names of the Commissioners were the same as those in the Bill of last year with one exception, and were as follows:—Lord Davey (chairman), the Bishop of London, Sir William Roberts, Sir Owen Roberts, Prof. Jebb, M.P., Prof. Michael Foster, and Mr. E. H. Busk (chairman of Convocation). It was agreed that the powers of the Commissioners should continue till the end of 1899 instead of 1898. With the object of securing for the Agricultural College of Wye, established by the County Councils of Surrey and Kent, the advantages derivable under the Bill, Lord Stanhope moved an amendment to the clause referring to the powers and duties of the Commissioners, and he was supported by Lord Ashcombe and Lord Thring. The amendment was not pressed on a promise being given by the Duke of Devonshire that if it were found to be possible without injuriously disturbing the compromise embodied in the Bill he would endeavour on the report to insert words to meet the claims of Wye College.

REPLYING to a question asked by Lord Norton in the House of Lords on Thursday last, the Duke of Devonshire said he hoped the Bill of the Government relating to secondary education would be introduced after Easter. He added: "It is not, and never has been, the intention of the Government to do anything in the nature of what may be called establishing secondary education all over the country. Any measure which we propose will be solely for the purpose of organising in a better way that which already exists, and, possibly, for supplementing it to a certain extent. That what is being done by county authorities, or municipal bodies, or private individuals is something to be done by the Government, is not an idea which has ever been entertained by the Government. No doubt a certain amount of the 800,000*l.* which has been given to be principally expended on technical education may have been at the outset misapplied, and perhaps a certain portion of it has been wasted; but, on the other hand, I believe that a very large portion of it is now being most usefully employed, and with very great advantage, to the various localities. It is not dependent entirely upon the will and pleasure of the County Councils. Almost every County Council has, for the purpose of administering this grant, established an educational committee, which does not usually consist solely of members of the County Council, or need not consist solely of members of County Councils. Those bodies are gradually acquiring a great deal of experience, and I believe that in a great many centres they are at present doing very valuable work."

SCIENTIFIC SERIALS.

IN the January number of the *Quarterly Journal of Microscopical Science*, Mr. E. A. Minchin gives a valuable addition to our knowledge of asconid sponge morphology in a paper on the origin and growth of the triradiate and quadriradiate spicules in the family Clathrinidae. Mr. Minchin here produces full histological evidence of his discovery of the composite origin of these two kinds of spicules; he shows that the triradiate spicules are formed by trios of dermal cells which immigrate from the epithelium to the interior; by the division of each cell a sextet is formed, and the spicule appears with each of its rays corresponding to two sister cells of the sextet. With regard to the quadriradiate spicules the three basal rays develop exactly as do the triradiate spicules, but the fourth or gastral ray is secreted by a mother cell derived from a porocyte. The spicules are crystalline as a whole, but the rays are non-crystalline so long as they are distinct from one another, and may remain so for some little time after union has taken place; the crystallisation appears