the most powerful microscope. For example, do the students of the School of Practical Science, Toronto, an institution maintained by the Ontario Government, ever avail themselves of the lectures given during the college term by the faculty of the Biological Department of Toronto University, which is also maintained by the Ontario Government? We are unable to find any record their having done so.

While discussing this general subject we must refer to a paper by George C. Whipple, in the *Proceedings* for 1896 of the Society for the Promotion of Engineering Education, on "Biology for Civil Engineers." He points out the fact that the science of biology has intimately touched the profession of civil engineering in water supply and sewage practice, so that the educational training of a civil engineer can no longer be considered complete without a suitable grounding in bacteriology. In this he is undoubtedly correct. He pointedly observes that filters, which civil engineers must now design and operate as prominent features of both water and sewage treatment, are not mere strainers but immense colonies "of organisms whose one object in life is to convert the decomposable matter * * * into harmless nitrates." The bacteriological laboratories connected with the waterworks of Boston and of Brooklyn, to say nothing of others, show clearly what must of necessity be the trend of civil engineering education in relation to this matter, and the excellent work already done by civil engineers in the same line at Boston and other places demonstrates the correctness of the views we have expressed.

ANALYSIS OF NOVA SCOTIA COALS AND OTHER MINERALS.

BY E. GILPIN, JR., LL.D., F.R.S.C., INSPECTOR OF MINES, HALIFAX, N.S.

A set of analyses of coals from the three seams worked at Springhill by the Cumberland Railway and Coal Company were given me some months ago. They are made by J. T. Donald, Montreal, and were taken from the workings at a depth of from 800 to 1,000 feet. These analyses are interesting when compared with a set of analyses of the same seams made by me in the year 1881, and I believe not hitherto published, and with an analysis of the Black seam made by me in the year 1880, and published in the "Transactions of the North of England Institute of Mining Engineers," in a paper on "Canadian Coals," giving a full set of analyses of Nova Scotia coals, their ashes, etc.

East or No. 1 Slope—Black or Main Seam:

	Analyses made in 1897.	Analyses made in 1881.
Moisture	2.02	3.86
Volatile combustible matter	18.94	{35.65 26.46
Fixed carbon	75.29	{59.90 65.23
Ash	3.75	4.45
	100.00	
Sulphur	1.14	

West or No. 2 Slope—South Seam:

Moisture	1.41	1.399
Volatile combustible matter	27.93	{34.808 31.225
Fixed carbon	67.47	{58.003 61.586
Ash	3.19	5.790
	100.00	
Sulphur	.58	.808

North or No. 3 Slope—North Seam:

	Analyses made in 1897.	Analyses made in 1881.
Moisture	2.71	1.625
Volatile combustible matter	28.41	{33.401 28.672
Fixed carbon	64.69	{60.701 65.431
Ash	4.19	4.272
	100.00	
Sulphur	.79	.783

Analyst—J. T. DONALD, *Montreal.*

These analyses show the coals to be of excellent quality. The amounts of ash and sulphur are small, and that of the fixed carbon is large.

From a comparison of the later with the older analyses it will be seen that those of coal from the deeper portions of the seams show lessened amounts of volatile combustible matter, increased percentages of fixed carbon, and diminished amounts of sulphur and ash. Speaking in general terms, the coal would appear to have developed more into a steam fuel, the evaporative power being in a general way proportionate to the percentage of fixed carbon. This would give the coals as at present mined a high calorific power. From analyses by Mason and Matheson in a paper read before the Nova Scotia Mining Society, it would appear that the calorific powers of coals from the Sydney coal fields vary from 7238 to 7623; of Pictou coal (sample from Intercolonial mine), 6963, and of Springhill coal, 7898. As compared with United States coal, they should stand nearly in the rank of the best free burning coals of Pennsylvania, Virginia and Maryland. Those coals hold from 12 to 21 per cent. of volatile matter, and from 69 to 76 per cent. of fixed carbon. The average contents of the United States coals are from 29 to 35 per cent. of volatile matter, and from 53 to 67 per cent. of fixed carbon. These coals therefore from Springhill should rank for steam purposes next to the class which may be described as the best selected for use on the large ocean passenger vessels.

I have not at hand any proximate analyses of English coals to compare with these under consideration. However, taking the results obtained in the English Admiralty trials of steam coals, and comparing the percentage of fixed carbon found in the trials with the fixed carbon given in these analyses, it will be found that the English and Scotch coals run from 49 to 88 per cent., as compared with 68.2 per cent. in the Springhill coals. This would give the Springhill coal about the same relative position to the best Welsh coals as has already been assigned to it in comparison with the best American coals. The evaporative power of the Springhill coals would, from the analyses, stand higher than that of the English and Scotch coals, and rank next to that of the best Welsh steam coals. It may be remarked that the best American and Welsh coals would be classified as free burning, semi-anthracite, while the Springhill coals are bituminous and coking.

In the upper part of Georges River in Cape Breton county there is a large deposit of iron pyrites in rocks, which are, I think laid down as Laurentian by the Geological survey. The deposit has as yet been examined only superficially, but so far appears somewhat low in sulphur. The following analysis from the most promising exposure gives:—

Sulphur	25.00
Copper	1.10
Gold	Trace.
Silver	Trace.
Silica	52.00
Iron, etc.	25.00