

publishing the truths of nature, which they may be agents in discovering. Nor are we over-sanguine in believing that this high aspiration if carried into practice would not interfere with the lower motive of their existence—money-making.

Nor is Sir Michael Faraday the only scientific worker in the field of practical science who has given the results of his labor unreservedly to the world. It is almost invidious to single out instances when so many distinguished men and such a multitude of obscure toilers are working at the intricate problems of technology from sheer attachment to truth and without any thought of gain. But three notable names may be mentioned, as representative of this noble army of the unselfish, our own Prof. Henry, Dr. Roentgen, and that devoted couple, whom we rank as one, for they as husband and wife were as devotedly in love of one another as they were one in love of science—Mons. and Madame Curie. The Roentgen Ray may have needed no patents, or patentable devices, or any business organization to push its beneficial applications, especially in the alleviation of suffering humanity, but it would not have been difficult to concoct patents had Dr. Roentgen, before describing his discoveries, wished to make money out of them.

And could the practical resources of radial activity be measured by dollars, what a fortune the bereaved widow would reap! But Prof. Roentgen enjoys a better harvest than royalties, and Madame Curie would not exchange for a mountain of gold the world's admiration and its reverence for her husband's memory.

But to descend to a lower plane. If it is the fact that technical science has progressed of late with such unwonted speed through the co-operation of many workers, and that this co-operation has been made possible by the publication and exchange of ideas and experiences in the technical and scientific journals, would not our progress be even more rapid and thorough if all barriers of secrecy were broken down and every encouragement were given to our technical workers not only to describe in print and by conference their notions and their actual experiments? This is the attitude of some of our large concerns, but unfortunately it is not that of all. It is impossible to compare the efficiency of works whose gates are fast shut, and where obscurity and secrecy are imposed and practiced, with those to which free admission is granted and where freedom of information is encouraged. But the following reflections force themselves upon us in this connection. We know that very few technical papers issue from certain establishments, that on their officials silence is imposed, and that to these inquisitive visitors are politely but peremptorily refused admission. There are not many such, but they are and have been very successful. But suppose that in imitation of their practice and regulations, all were tempted to adopt it, and thus the same policy became universal, what a sudden paralysis of industry would follow. Our secretaries would find it difficult to fill even their shrunken volumes of transactions with papers worth printing; our students would have to content themselves with what antiquated learning their professors could supply them with, for there would be no more summer classes for practical work in mines, smelters and electrical factories, and the professors themselves would have to learn from old books. Every manufacturer and smelter would be obliged to bribe his neighbor's workmen and tempt away his neighbor's superintendents for information. As a result before long the very workers which now find it so profitable or think they do, to tap their friends' stock of knowledge and experience, and

give nothing in return, would be driven in upon their own resources, and probably not then find them so complete as they imagine. Of course I am supposing an impossibility, because the spirit of intellectual freedom in our professions is too strong and too widespread to submit to such a tyranny and because before such darkness of ignorance had settled down on our great industries, the most pronounced advocates of secrecy would feel and acknowledge what the ultimate consequences of concealment are, and would become reformers. Today they may have valuable secrets, as valuable as Sir Henry's method of making plate glass and bronze powder, and it may pay them to conceal them from their competitors, as long as they are admitted freely to their competitors' open shops, but even this is doubtful. For the spirit of secrecy is intimately allied with the spirit of suspicion and distrust, and the mind which is always suspecting is closed tight against the admission of liberal impressions. Being jealous of others, it is prejudiced against their suggestions, and correspondingly prejudiced in favor of its own preconceptions. Progress, therefore, ceases.

This is a temper of mind foreign to a new country like this, whose special industries have not been established long enough to wear grooves of rigid practice and sink into ruts of self-satisfied indifference. About the best correction we can apply to the growth of dry rot is the banishment of secrecy. A curious instance of its blighting influence is seen in some of the older, not the newer, industries of the old world. The iron and steel works of Europe have not kept pace with ours in size and production, but the ironmaster of Great Britain and Germany in coke-making and in blast furnace economies, and in steel-making processes, have been our teacher. Nor have they been shy of communicating their improvements, nor through jealousy of our success, slow in adopting ours. No nobler monument of international comity exists than the seventy volumes of the Proceedings of the Iron and Steel Institute. And with few exceptions the iron and steel works of England, Scotland and Germany and France are open to any accredited worker in the same domain. But before England was conspicuous as a maker of iron, she was famous the world over for her copper and tin production. But what between self-conceit and the inbred habits of trade secrecy, her copper smelting industry has fallen from its high estate. And it is not accidental, but linked as closely as any effect with its cause, that this decline is in great part the result of habits of secrecy which grew with the growth of age. At Swansea every gate to the smelting works is guarded, and as a result it has been difficult for thought to escape out as for suggestions to find their way in. She should still enjoy the prominence which her skilled labor, splendid coal and commanding maritime situation put within her reach, but she has preferred clinging to her secrets behind closed doors rather than going out into the world in search of new business as well as technical methods, and inviting the world to enter and exchange ideas. And that notwithstanding that the first practical application of electrolysis to metals was made in England by Elkinton, and that the Vivians adopted the Manhes method before Farrel introduced it into this country. But what feeble use they have made of these great improvements. The Atlantic separates continents, but it does not delimit the operation of laws. And therefore what is baneful in its effects in Europe is not likely to be beneficial here.

In political life vitality is maintained only when every man takes his full share as a debater in the dis-