

THURSDAY, JANUARY 22, 1874

SCIENCE AND INDUSTRY

IS England rapidly losing that commercial and manufacturing supremacy which she has held before all the world for generations past? Is she going the way of Venice, of Florence, of Holland? If so, is it because she feels blindly secure that "what hath been, will be," neglecting the means on which success in commerce and manufactures in these days depends—means which are being so industriously used by rival nations, that they are rapidly shooting ahead of England on England's own ground?

Such would seem to be the drift of the utterances which have come from three different quarters during the past week. In Lord Derby's address at the inauguration of the Society for the Promotion of Scientific Industry; in the correspondence in the *Times* of the past few days; and in the statements of the Society of Arts' deputation last Saturday to the Lord Chancellor with respect to the Patent Museum, it is more or less distinctly hinted that the industries of England are perishing from lack of knowledge. Other countries, but especially Germany, we are told, are distancing us, and we fear the proofs of the statement are too convincing to be resisted. To all appearance, Germany is destined to step into the honourable position as an industrial nation, which all the world has hitherto acknowledged as belonging to England. In short, in Commerce as in Science we are losing ground.

One correspondent in Monday's *Times* tells us that in the East "the Germans are carrying everything before them;" "by their energy and enterprise they have gone ahead of their easy-going English neighbours . . . whatever be the causes, there can be no question that they are outstripping us in the race for commercial prosperity in the East." This is in confirmation of what a correspondent in a previous number of the *Times* had stated from observation as to the rapid ascendancy of the Germans in commerce. Another correspondent, an "Ex-president of the Liverpool Chamber of Commerce," states in Monday's *Times*, without hesitation, that young Germans make the best business men. Dr. Lunge, in his recent address to the Newcastle-on-Tyne Chemical Society (see NATURE, vol. ix. p. 113), states that in the matter of the applications of chemistry, "foreign countries are taking the wind out of our sails very fast in that line, and that both their rate of progress and the means of attaining it are very much superior to ours," because a better career is open to chemists there than with us. Lord Derby says that if we don't take care we shall find ourselves in the position of a man who succeeds to a ready-made business, and who "does not get up as early nor work as hard as his father, who had to make it." Perhaps, had Lord Derby said all that he thought, he would have put the case much stronger against us.

What are the causes which have led to this state of things? How is it especially that Germany is getting so rapidly ahead of us? All who have inquired into the question, attribute it to the difference between the methods of education in England and in Germany, and the greater application of Science in the former country.

The mere fact of the establishment of the Society for the Promotion of Scientific Industry, shows that the eminent men who compose it feel that energetic measures should at once be taken to enlighten the multitudes on whom the success of our industries depend. Lord Derby, in his speech at Manchester, said :—

"If we mean to keep our old position as the industrial leaders of the world we must throw away no chance, and leave no stone unturned. No doubt, in applied science, whatever discoveries are made or inventions brought into use by one country will soon extend to all. Still there is an obvious advantage in getting the lead; and that advantage we ought, if possible, to secure. . . . We are shut up therefore to one or two conclusions—either we must acknowledge ourselves beaten, or we must contrive to make every day's labour of a man more productive than it has been hitherto by the more general, or by the more skillful use of mechanical and chemical science.

He then goes on to state that :—

"Now it is the belief of the promoters of this new society that a great deal may be done for technical training without interfering with that training of the workshop which is, in one sense, the best of all. They believe, moreover, that there are innumerable investigations of an experimental kind, having for their object the perfecting of industrial processes, which being everybody's business are nobody's business, which would in their results enormously benefit the trade or industry which they concern, but which individuals are slow to undertake, because they do not bring any certain return of profit to the person who spends time and labour upon them."

Hitherto the vast majority of those connected with our industries have done their work by mere rule-of-thumb, without anything like a scientific knowledge of the material or the machinery on which they are employed. This will no longer do; herein lies our weak point; in this direction it is that the Germans are rapidly excelling us. The secret of the growing success of the Germans in commercial and manufacturing industries lies not only in their thoroughly organised and scientific system of education, in their "Realschule" and their technical training-schools, but in the general interest taken in the advancement of knowledge, the development of new methods. In the Realschule the young German gets a thorough liberal and scientific education, not a mere rule-of-thumb technical training. The literary training is at least as good as that which can be obtained at our best public schools, with the advantage of a thorough instruction in the principles and facts of physical science, *without any narrow views as to their future practical application*. "The consequence is," says a German writing to Monday's *Times*,

"That the 'Realschule' trains thorough gentlemen who in future life are able to make themselves useful as bankers, merchants, and manufacturers. Many of my friends have acquired such positions; several of them are well-known inventors and chiefs of enormous trading and manufacturing concerns. This system of education produces a class of men who take a warm interest in all practical matters, and find as much pleasure and amusement in the invention and rivalry of machinery, or the production and quality of merchandise, as the young men in England find in horses and billiards. Go among a parcel of young Germans of that class, and though you find them ready for all amusements of youth, you will at the same time perceive that they can talk of a great many

useful things in a spirit of enlightenment which has nothing mean in it, but displays a fitness for cosmopolitan life of which we see the practical results. Besides the 'Realschule,' there are throughout Germany a number of 'high schools of commerce,' where young men enter to learn office-work and technicalities."

This German hits the right nail on the head, when he says that—

"The English Government would do well to establish such schools upon some definite plan as to unity of teaching. Young Englishmen are quite as well disposed as Germans; in many matters their character is even more stable, but you must give them the opportunity of learning what the Germans do. Proprietary schools will never succeed in this; and no breach of the liberty of the subject would be committed if your Government were intelligent and far-seeing enough to recognise the need of such a system of schools, supernatant on the elementary education."

As another *Times* correspondent says, the maintenance of our commercial prosperity is pretty much a schoolmasters' question. No "association for the promotion of scientific industry" will ever be able to remedy our shortcomings in this respect unless there be a career for men of Science, in which case it will be studied, and unless Science be properly taught. Unless this country is to be entirely outstripped by other nations in the very direction in which we have hitherto prided ourselves as being supreme, Government must take the matter up and see that there is put within the reach of all who are in any way to carry on our industries the means of making themselves thoroughly acquainted with the sciences and scientific principles upon which these industries rest. Let us also, like the Germans, have well-organised Realschule and technical training-schools; and for this purpose let Government take the advice of the deputation which waited on the Lord Chancellor last Saturday, and make haste to appoint a responsible Minister of Education, whose duty it will be to see that our educational machinery in all departments, both in extent and in efficiency, is kept up to the wants of the age. The establishment of mere technical schools is not sufficient; these will be of but little avail unless those who wish to take advantage of them have had a previous thorough training in the scientific principles on which the arts are founded. Thanks to Mr. Cole's wise foresight, there are now tens of thousands of our artisans who have had such a training.

No better instance could be afforded of the evil consequences which arise from the want of a responsible Minister of Education, than the disgraceful condition of the Patent Museum. In a dark rusty iron shed at South Kensington are huddled together so as to be practically inaccessible for purposes of study, the paltry collection which represents the genius of that nation which has been foremost in mechanical invention. Let us hope that the object of the Society of Arts' deputation will be granted, and that no time will be lost in arranging in a suitable building everything necessary for the comprehension of Science applied to our various industries, in such a manner that anyone who wishes may study historically all the improvements that have been made in any department; and that, as in the French "Conservatoire des Arts et Métiers," lectureships will be established, thus furnishing a most efficient means for training the men

who are to carry on our industries. If this were done, and if local museums were established in suitable centres throughout the country, and if Government take steps to put within the reach of all a thorough general scientific education, and do besides, what no "society for promoting scientific industry" can do, provide means for carrying on unremunerative scientific research, England will soon regain her industrial supremacy, or at least be placed beyond any danger of being outrivalled.

BELT'S "NATURALIST IN NICARAGUA"

The Naturalist in Nicaragua: a Narrative of a Residence at the Gold Mine of Chontales; Journeys in the Savannahs and Forests; with Observations on Animals and Plants in reference to the Theory of Evolution of Living Forms. By Thomas Belt, F.G.S., Author of "Mineral Veins," "The Glacial Period in North America," &c. With Maps and Illustrations. (London: Murray, 1874.)

MR. BELT is a close, an accurate, and an intelligent observer. He possesses the valuable faculty of wonder at whatever is new, or strange, or beautiful in nature; and the equally valuable habit of seeking a reason for all that he sees. Having found or imagined one, he goes on to make fresh observations and seeks out new facts, to see how they accord with his supposed cause of the phenomena. He is a man of wide experience; having travelled much in North and South America and in Australia, as well as in many parts of Europe—and always with his eyes open—before visiting Nicaragua. He is a geologist and an engineer, and knows how to overcome obstacles whether caused by the perversity of man or the forces of nature.

The book we are noticing has, therefore, a value and a charm quite independent of the particular district it describes. As a mere work of travel it is of little interest. The country and the people of Nicaragua are too much like other parts of Spanish tropical America, with their dull, lazy, sensual inhabitants, to possess any novelty. There is little that can be called adventure, and still less of geographical discovery; and the weakest and least interesting parts of the volume are the detailed descriptions of the daily route in the various journeys across the country. We have here and there good illustrations of Spanish American character, as when staying for the night at a ruinous farm-house, the proprietor, Don Filisberto, informed him that he was busy building a new residence. On asking to see it, "He took me outside and showed me four old posts used for tying the cows to, which had evidently been in the ground for many years. 'There,' he said, 'are the corner posts, and I shall roof it with tiles.' He was quite grave, but I could not help smiling at his faith. I have no doubt that, as long as he lives, he will lounge about all day, and in the evening, when his wife and children are milking the cows, will come out, smoke his cigarette, leaning against the doorstep of his patched and propped up dwelling, and contemplate the four old posts with a proud feeling of satisfaction that he is building a new house. Such a picture is typical of Nicaragua."

Mr. Belt has done perhaps more than any other