also are used for the purification of gases and the conduct of scientific research. For commercial use it is thus far too expensive If economy were of little account liquefied air might be used with effect as a motive power, for I have personally ridden in a locomobile, owned by Professor Tripler, which was driven noiselessly and speedily by this agency. It has also been mentioned as a likely motive power for submarine boats and as a supplier of oxygen for the crew. As an explosive liquefied air has been combined with charcoal and naphtha and patented by Dr. Linde under the name of "Oxyliquit," and experiments have been successfully carried out recently in the Simplon tunnel.

In concluding this article I might mention that one hundred gallons a day is the daily output of Professor Tripler's plant, and it is all being used in surgery and the manufacture of pure oxygen

THE AUTHOR AND HIS DEWAR VACUUM BULB.

gas for physicians and hospitals. Liquefied air is naturally so cold that a block of ice is a pillar of fire compared to it. On the application of heat liquefied air struggles to get back to its natural state. When one knows that a difference of 180° of Fahrenheit will turn ice into steam, one can imagine how very cold a liquid is, which is nearly 30° colder than ice.

The Commercial Potentialities of India.

There are, in my opinion, writes H. C. Richards, K.C.,M.P., in the *Magazine of Commerce*, great openings for English capital and for English manufacturers—for men who would come to India themselves, bring their foremen, and start and teach the natives what to make and how to make it. It is not in cotton or cloth mills that I am making this suggestion, for in Bombay there are already many well in progress under Parsi auspices, but in a land where flowers are prolific and oranges plentiful it is extraordinary that perfumes and preserves come tinned and bottled from England or from Germany. I have been asked by the best friends of England in this country—these officials who look to England for inspiration and support—to oppose any increase of the cotton duties on imports to India, and if Lancashire is firm England will follow her lead. If the potentialities of English trade in India are to become possibilities, trade must not be hampered, and we must reduce, rather than increase, our import duties.

India is still a land of hope, though to most of our officials there, unless they come out very young, it is a land of exile. We are educating the native, and in Madras we find English as readily understood as Hindustani. We are not educating our master—that the Hindu will never be; we are educating our competitors, and we must seek by greater attention to distribution, as well as to cheapness of production and transport, to hold our own, and still to be *primus*, even if *inter pares*.

"The potentialities of Indian commerce are great, and in America, as in Germany, there are many enterprising spirits who are quite prepared to take advantage of 'the Open Door.' Shall the door, which we have opened and kept well on its hinges for a century and a-half, be held open for other nations, because our own spirit of enterprise is diminished or baffled?"

LITERATURE.

By Henry T. Buckle.

Literature, when it is in a healthy and unforced state, is simply the form in which the knowledge of a country is registered—the mould in which it is cast. In this, individual men may of course take great steps, and rise to a great height above the level of their age. But if they rise beyond a certain point, their present usefulness is impaired; if they rise still higher, it is destroyed. When the interval between the intellectual classes and the practical classes is too great, the former will possess no influence, the latter will reap no benefit. This is what occurred in the ancient world, when the distance between the ignorant idolatry of the people and the refined systems of philosophers was altogether impassable; and this is the principal reason why the Greeks and Romans were unable to retain the civilisation which they for a short time possessed. Precisely the same process is at the present moment going on in Germany, where the most valuable part of literature forms an esoteric system, which, having nothing in common with the nation itself, produces no effect on the national civilisation. The truth is, that although Europe has received great benefit from its literature, this is owing, not to what the literature has originated, but to what it has preserved. Knowledge must be acquired before it can be written; and the only use of books is to serve as a storehouse in which the treasures of the intellect are safely kept, and where they may be conveniently found. Literature in itself is but a trifling matter; and is merely valuable as being the armoury in which the weapons of the human mind are laid up, and from which, when required, they can be quickly drawn. But he would be a sorry reasoner who, on that account, should propose to sacrifice the end that he might obtain the means; who should hope to defend the armoury by giving up the weapons, and who should destroy the treasure, in order to improve the magazine in which the treasure is kept.

Yet this is what many persons are apt to do. From literary men, in particular, we hear too much of the necessity of protecting and rewarding literature, and we hear too little of the necessity of that freedom and boldness, in the absence of which the most splendid literature is altogether worthless. Indeed, there is a general tendency, not to exaggerate the advantages of knowledge,—for that is impossible,—but to misunderstand what that is in which knowledge really consists. Real knowledge, the knowledge on which all civilisation is based, solely consists in an acquaintance with the relations which things and ideas bear to each other and to themselves; in other words, in an acquaintance with physical and mental laws. If the time should ever come when all these laws are known, the circle of human knowledge will then be complete; and, in the interim, the value of literature depends upon the extent to which it communicates either a knowledge of the laws, or the materials by which the laws may be discovered. The business of education is to accelerate this great movement, and thus increase the fitness and aptitude of men, by increasing the resources which they possess. Towards this purpose, literature, so far as it is auxiliary, is highly useful. But to look upon an acquaintance with literature as one of the objects of education, is to mistake the order of events, and to make the end subservient to the means. It is because this is done that we often find what are called highly educated men, the progress of whose knowledge has been actually retarded by the activity of their education. We often find them burdened by prejudices, which their reading, instead of dissipating, has rendered more inveterate For literature, being the depository of the thoughts of mankind, is full not only of wisdom but also of absurdities The benefit, therefore, which is derived from literature itself, depends upon the skill with which it is studied, and the judgment with which it is selected. These are the preliminary conditions of success; and if they are not obeyed, the number and the value of the books in a country become a matter quite unimportant. Even in an advanced stage of civilisation there is always a tendency to prefer those parts of literature which favour ancient prejudices, rather than those which oppose them; and in cases where this tendency is very strong, the only effect of great learning will be, to supply the materials which may corroborate old errors, and confirm old superstitions. In our time such instances are not uncommon; and we frequently meet with men whose erudition ministers to their ignorance, and who, the more they read, the less they know.

He is always a poor man who knows no more in life than making money.

The first step toward curing a crooked world will be to straighten your own glasses.

THE SCIENCE OF TO-DAY.

By R. K. Duncan.

Laymen in science who wish to follow the trend of modern discovery are limited for the most part to one of two things: either they must read the pseudo-science of the magazines, which is arranged chiefly for dramatic effect rather than for accurate exposition, or they must turn to specialised and technical works written by the discoverers themselves for their fellow-workers—books in which technical training is taken for granted, and the lay reader, however cultured and thoughtful he may be, becomes utterly and hopelessly lost.

The world is thus divided between men who know and cannot tell, and the men who tell and cannot know. The great expositors are dead: Huxley and Tyndall and all the others; and the great expositor of the future, the interpreter of knowledge to the people, has still to be born. The love of contemporary natural knowledge is legitimate. There is something peculiarly attractive about this borderline between science and ignorance. It is the fighting-line—and it is so pre-eminently human and natural to love the spectacle of a struggle. It is the spectacle of a contemporary struggle the *casus belli* being neither more nor less than the nature of the chemist's atom. The nature of the atom may seem at first sight to be too abstruse and remote to enter into the sphere of practical interest. Such a hasty judgment would be unwarranted. The atoms of matter are the bricks of the universe, out of which you and we and the Milky Way and the Dog Star are all made up. What affects the atom affects us. As a matter of fact, there is nothing secret about it and little that is abstract. The knowledge is apprehendable enough and vastly important. Locked up in it is the cause of the heat of the sun, together with the nature of electricity, the evolution of a universe and the birth and decay of matter. There are also, possibly, a cure for tuberculosis, light without heat, a demonstration of vast stores of energy hitherto unsuspected, beside which the forms of energy with which we are acquainted are absolutely insignificant, and a whole series of radiations heretofore unknown from matter in the natural state. Ten years ago men talked with extreme positiveness about this and that; a famous litterateur, even, wrote a comprehensive treatise on "The Bankruptcy of Science," in which he proved (sic) that everything essential and possible of knowing was known, and that all that remained was mere detail. It is proper to say that the answer of science to this tremendous indictment was in deeds, not words, for there came in rapid succession Hertz' discovery of electro-magnetic waves, Moissan's revolutionary work with the electric furnace, Röntgen's X-rays, Rayleigh's and Ramsay's discovery of the rare gases of the atmosphere, and Dewar's liquefaction of hydrogen. Finally, there has come, as most upsetting to all preconceived ideas, the famous discovery of Becquerel and the Curies, which in itself and its consequences forms a very important subject. Where before there was solid, walkable ground to the older science, now there is nothing but shifting sand. The last century began with the atom, and the result is the implements of civilisation as we have them This century begins with the atom within the atom, and, if one may judge, the civilisation of the coming years will be rapidly modified and eventually transformed into phases of which, now, we have but the barest glimpse.

The Fastest Turbine.

The first of the three new magnificent turbine steamships which the Great Western Railway Company have ordered from Messrs. Cammell, Laird and Company, Birkenhead, and Messrs. John Brown and Company, Clydebank, for the new Anglo-Irish service between Fishguard, North Pembrokeshire, and Rosslare, on the Wexford coast, have been launched on the Mersey.

The steamers will be named St. George, St. Patrick and St. David, and will take rank as the fastest and most luxurious cross-channel vessels afloat. There is room aboard for 1,000 passengers, and sleeping accommodation for 220 first class and 100 second class is provided.

The Parsons turbines will drive the vessels at a speed of 22½ knots, and the distance of fifty-four nautical, or 62 statute, miles between the new ports will, therefore, be covered in two-and-three quarter hours, thus making it the shortest sea passage between England and Ireland The new route will be opened for traffic in the summer, and its effect will be to shorten the distance between places in England and the most frequented tourist centres in Ireland, to the extent in many cases of 100 miles as compared with the existing route via Dublin.