to a peaty marsh, though the waters appear not to be affected by the peat but are said to be salt at certain periods, occur abundance of confervæ and minute algæ, as well as a species of *Ruppia*. In the shady damp hollows, at the entrances of the caves, is usually seen a rich growth of ferns, jessamine, and coffee trees of good size.

The general features of the indigenous vegetation of the islands are the Junipers, *Lantana camara* L., a verbenaceous shrub which grows in dense masses, and the Oleander, which also grows in abundance and is used for hedges. A few trees of the Date and Cocoa-nut palms may occasionally be seen, but their fruit produce is not sufficiently abundant to be of any importance. One of the greatest pests in the island in the form of a weed is *Leucœna glauca* Bth., which sends down its tap roots to a great depth, and is difficult to eradicate. It is a leguminous plant, and in its native state forms an ornamental tree.

The least cultivated part of the island is at Paynter's Vale, where orange and lemon-trees luxuriate in their wild state. From the prevailing dampness of the atmosphere all over the island, a species of Nostoc abounds not only in the caves and on the rocks near the sea-shore, but also amongst the roots of grass on lawns. Out of about 160 flowering plants collected in Bermuda *Morus rubra*, *Hibiscus arborea*, and *Chrysophyllum cainito* are the only three that do not occur in an absolutely wild state. Perhaps not more than 100 are true Bermuda plants. Many of the plants of the island were no doubt originally brought from the West Indies by the Gulf Stream, or the cyclones. The presence of American plants is perhaps to be traced more to the migrations of birds, which come in large numbers, more especially the American Golden Plover. Then, again, to account for the presence of other plants, there is the fact of the annual importation of large quantities of hay, and also of seeds, such as onion seed from Madeira and potato seed from America, with which other seeds are, no doubt, constantly introduced. Shipwrecks, also, which occur on the coast, are probably fruitful sources from whence new plants arise; as a proof of this, it is stated that a vessel with a cargo of grapes was recently wrecked and the boxes of grapes washed ashore, the seeds of which, being saved, were sown, and produced an abundance of young plants.

## INDUSTRIAL CHEMISTRY

THE Society of Arts seems to be increasing its efficiency every year, "lengthening her cords and strengthening her stakes;" quite recently a Chemical Section has been added, which we believe will be productive of much practical benefit. At the opening of this Section on the 6th inst., the chairman, Dr. Odling, gave a valuable and interesting address, which, by the courtesy of the secretary of the Society, we are able to present to our readers:—

I have been desired by the Council to say a few words at this introductory meeting on the importance of Industrial Chemistry, but really to do so is to urge upon you a theme which requires no advocacy, I should think, on the part of anyone, and I am afraid it would be as tedious as thrice-told tales. If we look at the objects with which we are surrounded and consider how very few of them are in a state in which they are presented to us by nature, we shall find that the metamorphoses to which they have been subjected are essentially chemical ones; that is to say, wherever we find one kind of matter in nature, and somehow or other the matter is turned into another kind of matter, we submit it to a chemical change; and how very few indeed of the different kinds of matter with which we are surrounded are really in their primitive forms. When we have mentioned wood and stone, I mean building stone, we have mentioned almost all. When we consider the gas which, though now gas, was a short time ago in the form of coal, or the glass of our windows which a short time back was in the form of sand, soda, and limestone, or if we look at the plaster of our rooms, which was originally limestone, which has undergone varied metamorphoses, and more particularly I might direct your attention to the metallurgical industries, especially iron, which was a short time before in the ironstone—all these are instances of the chemical metamorphosis to which we subject the different natural objects, and so change one kind of matter into another.

Among all these metamorphoses which are of a chemical nature there are some to which we more particularly apply the name of chemical manufactures. In reality, a brick is as much a product of chemical change; it was not originally the same matter it now is, but was produced by a change of chemical composition of its elements. But among these more particularly called chemical manufactures, the production of which is conducted in works which are called chemical works, are those performed in so-called alkali works; and I think I need have no hesitation in saying that these works have proceeded to a far greater development in this country than in any other, notwithstanding the fact that among the constituents received and metamorphosed by these works are many which are of foreign extraction, more particularly the pyrites, or other sources of sulphur, and the manganese or other sources indirectly of the chlorine manufactured at these works. And we see, that in the course of lectures which has been provided for us, three have reference especially to these manufactures, which are conducted exclusively at works which are denominated chemical works. We have a process for the manufacture of soda by Mr. Vincent; another on pyrites, as a source of sulphur, copper, and iron, by Dr. Wright; and another on the manufacture of chlorine, by Mr. Weldon.

Starting from the crude substances, coal and limestone, and pyrites and common salt, we have a production of soda which will be treated of more particularly in Mr. Vincent's address. Then we have the further manufacture of copper, sulphur, iron, and chlorine, which are the necessary economical concomitants. It is indeed remarkable, at the present day, how much the production of chemical manufactures takes in the working up of what were formerly waste products. Perhaps we could not have a more singular instance of this than in the utilisation to which that class of refuse, which was formerly known as burnt pyrites, is now put. Not only do we obtain from the original pyrites sulphur in a form which was formerly thrown away on a very large scale, but, moreover, copper and iron, which were also formerly thrown away in the burnt pyrites. And we have also one very remarkable product now obtained from pyrites on a comparatively large scale, and I may say, with regard to the manufacture of copper from pyrites, that the amount now produced—as Mr. Wright will tell you—from a material which was formerly thrown away, constitutes a very large proportion of the entire quantity now manufactured in the United Kingdom.

But in addition to that there is a very considerable manufacture of silver now going on also extracted from these waste pyrites. This extraction of silver from these pyrites, in which it occurs in an exceedingly minute proportion, has an essential interest for chemists in this point of view, that the processes which are adopted for its extraction really resemble most closely the processes which purely scientific chemists adopt in the laboratory. The pyrites are first of all heated with common salt, whereby the copper is converted into chloride of copper soluble in water, and the silver into the state of chloride of silver, which is soluble in the common salt solution; and not only so, but in this process of removing the soluble copper and the soluble silver from these pyrites, the arsenic and the sulphur, which formerly prevented the burnt pyrites being put to any use, are got rid of, so that what remains is useful in a further stage of the iron manufacture. But with regard to the extraction of the silver, we find how important a knowledge of even delicate chemical processes is, in order to allow the extraction to be pursued with advantage. By the ingenious process of Mr. Claudet and Mr. Phillips, it is first of all examined by the nicest chemical means to see the exact amount of silver it contains, by a process rivalling in delicacy that which is pursued in laboratory research, and having ascertained exactly the quantity of silver contained in the solution, the exact quantity of extremely expensive reagent, iodide of potassium, which is required, is added to it to precipitate the amount of silver; and when the iodide of silver is thrown down the iodine is recovered to be used over and over again, and the silver itself is set free by means of metallic zinc, which forms iodide of zinc, thus setting free the silver. In this way, a considerable portion of silver is extracted.

I mention this as an illustration of the remarkably close association which is every day taking place between sure chemistry in the laboratory, and manufacturing chemistry in the factory. Now-a-days we have such out-of-the-way bodies, as they were formerly considered, as these different aniline products, as alizarine and chloral, which were formerly barely obvious in the laboratory, now made on a manufacturing scale. On the other hand, we find these different products of estimation, formerly confined to the laboratory, are now carried on in the manufactory, and thereby such an element as silver is produced by processes which are essentially laboratory processes. In this way it happens that we find many improvements in manufacturing chemistry are now produced by men who have obtained a reputation in other fields. For instance, I need scarcely refer to the names of Hoffmann, Perkin, and Nicholson, gentlemen known as scientific chemists and men of the highest eminence, before their attention was directed to manufacturing operations, and they realise on a manufacturing scale the results of their laboratory experience. In mentioning them, I ought not certainly to dissociate from them our lecturer this evening, Mr. Field, who was so long and so highly esteemed in purely scientific circles for his admirable researches into a great number of compounds, more especially connected with mineral chemistry, before he devoted his great ability to the elucidation and improvement of the manufacture of aniline dyes, and subsequently to these metamorphoses of the bodies which we now use for illuminating purposes in the form of paraffine and ozokerit, and also the other candles which are composed of stearic acid, palmitic acid, and so on.

But while in this way manufactures derive a very great advantage from the light thrown on them by purely scientific chemists in one way or another, I do not think we ought to overlook the benefit which pure chemistry derives, on the other hand, from manufacturing operations. I do not mean the mere material gain that purely scientific chemists have enjoyed by the opportunity of examining minutely a great number of bodies, which previously it was almost impossible for them to obtain, but I think they have gained a very much greater knowledge of the especial subject of their studies — I mean chemical phenomena. We chemists take in our province every change by which one kind of matter becomes metamorphosed into another kind of matter, whereby that which was ironstone, for instance, becomes iron, whereby that which was sand, chalk, and soda becomes glass, and which takes place wherever one kind of matter is metamorphosed into another; but, after all, a great number of the metamorphoses which we must study take place in the test-tube and small vessels of similar character; and we are rather too apt, I say, to shut our eyes to those metamorphoses which take place on a large scale around us.

Those changes manifest themselves particularly in two forms. We have those by which the different forms of agricultural produce are furnished us by the vegetable kingdom, and by which they are metamorphosed into the animal kingdom. Here we have one great illustration of industrial chemistry—the chemistry by which crops are produced, and by which stock is fed and flesh is made. This feeding of stock and production of crops is one very large function of industrial chemistry, and I would venture to say that any scientific chemist who devotes his attention entirely to what takes place in the test-tube, and who neglects those changes which are constantly taking place around him, has a very imperfect notion of the subjects which he professes to investigate. And in addition to these changes thus taking place in natural processes, modified to a certain extent by art, we have three other processes which take place on a grand scale, by which from such substances as ironstone we produce metallic iron, from common salt, on the one hand, carbonate of soda, applied to the manufacture of glass and other useful purposes, and by which we provide also chlorine in its different combinations, applicable to so many purposes, more particularly in the preparation of our wearing apparel, and in our linen and fabrics of every description.

I think, then, that when we have the advantage of having these industrial subjects brought under our notice by men like our friend here, who are familiar, on the one hand, with the most recondite points of theoretical chemistry, and, on the other hand, with the greatest practical achievements which have been obtained in manufacturing chemistry, it will be of immense benefit to those who wish to study chemistry in its pure aspect, as they will see what can be done on a large scale, and what habitually is done, and what perseverance, assisted with chemical knowledge, has obtained for us. It must also be interesting to practical men, by throwing out suggestions capable of improvement in various branches of manufacturing art. I think, then, that the Society of Arts has really done a very useful work in bringing together men engaged in the purely scientific pursuit of chemistry on the one hand, and, on the other, men who are pursuing the application of the science with a view to the practical good of their kind. I do not know that I need trouble you with any further remarks, but I have attended here this evening with the greatest pleasure, because I feel how much advantage is likely to be derived by all classes of the community by the discussion of these problems which are so interesting to all, and I would venture to say as much in a purely scientific as in a practical point of view.

## NOTES

SUFFICIENT attention has not been attracted to the fact that one of the recommendations of the Committee on Scientific Instruction has borne early fruit. Mr. Phillips Jodrell, desirous to promote research in physiology, has attached to the professorship of that science in University College, London, an endowment of 7,500*l*. to enable the professor to devote to biological investigation whatever time is not needed for the discharge of his duties as lecturer. This endowment is accompanied by the further sum of 500*l*., to be expended in the purchase of the necessary apparatus. It is difficult to speak in terms sufficiently high of Mr. Phillips Jodrell's intelligent munificence, which, we have no doubt, will bear good fruit. It is gratifying that the recommendations of the Commission have so far had such an excellent result, and we only hope that Mr. Jodrell's handsome example will be largely followed by others who have enough and to spare.

OUR readers will no doubt learn with surprise and regret that M. Alglave, editor of the *Revue Scientifique*, and Professor of