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FRIDAY, JANUARY 29, 1875.

All communications for the Society should be addressed to the Secretary John-street, Adelphi, London, W.C.

PROCEEDINGS OF THE SOCIETY.

FIRES AT SEA.

The Council have decided to offer the Society's Fothergill Gold Medal for an effective means of extinguishing fire on board ship, and they have directed the Secretary to enter into communication with leading ship-owners, with the view of enlisting their aid in this important matter.

TECHNOLOGICAL EXAMINATIONS.

The Programme for the Alkali Examination is now ready, and can be had upon application to the Secretary of the Society of Arts, John-street, Adelphi, London, W.C.

INDIAN SECTION.

The opening meeting for this session was held on Friday, the 22nd inst., under the presidency of Sir GEORGE CAMPBELL, D.C.L., K.C.S.I., late Lieutenant-Governor of Bengal, who delivered the following

OPENING ADDRESS.

LADIES AND GENTLEMEN,—We have met this evening to open the Indian Section of this Society. I believe that this Section is one of very great importance, and that it may very materially affect the interests of India. I fear that I am very insufficiently prepared to do justice to the subject, but I will try my best in a few words to open the proceedings of this deparment.

We Englishmen, or Britishers, as perhaps I should say, as governing India, occupy a very peculiar position. Our own institutions are free institutions, and we rely very much more on the enterprise of the people than on the machinery of Government. On the other hand, we who have these free institutions govern a country which is without free institutions, without the energies which usually attend them, and which is much more inclined to depend on the aid and support of Government than are the people of this country. It therefore becomes extremely difficult for us, with our free ideas and free ways, to adapt ourselves to the government of the country where the people are not free, and where we are rather bound to fulfil the functions of an absolute Government. Some things it is in our power to do well. We may make good laws, govern the country well, and we do many things for the good of the people; but in some respects we are undoubtedly deficient. We have not a Government machinery such as is necessary for many of the material improvements which it is incumbent on us to introduce into India, where there is vast room for improvements of that kind. With respect to agriculture and the arts, and other material improvements, there is still a very great deal to be done, but, as I have said, the machinery for so doing is much wanting. In England we rely for these things on private enterprise, and we have not, and need not, that system of Government machinery which we find in France and in other countries where the people are so much more accustomed to rely on the action of the Government. In France there are Ministers of Agriculture and Commerce, and in other countries of Europe you have the same thing — a State machinery accustomed to deal with the material interests of the people. In this country we do not possess such machinery; and in India, although we may in many respects govern well, we have extreme difficulty in furnishing the means of material improvement, engineering works only excepted. With respect to such works we have done great things; but with respect to the improvement of agriculture, of the arts, and of the manufactures of India, we have done very little, while I believe it is incumbent upon us to do very much. In respect of legal, moral, and other improvements, the Government of India has not only very considerable machinery, but it has the aid of other societies, such as the Social Science Associations, and others of various kinds. On the other hand, in respect of material improvement, in which we are so deficient, it has as yet had very little aid, and for that aid it must, I think, and may look much to this Society. I myself have had much practical experience of the great difficulties to be encountered with regard to material improvement in India. I have especially felt the great want there of improvements in agriculture and in the arts. Whilst it was my lot to administer a province of the Indian Empire, I tried to do what I could to introduce improvements of that kind, but the difficulties I found in the way were very great indeed. I found that when I attempted to introduce the teaching of agriculture, teaching the arts, or the teaching of material improvements of that kind, the difficulty was this—we were unable to find at hand persons who had the knowledge necessary to teach the people of India. When I attempted to establish agricultural classes as a department of our colleges in Calcutta, I found that in reality we were altogether without the men who had the necessary knowledge; that although we might have men who had a knowledge of European agriculture, and men who had a knowledge of India, we could not find those two departments of knowledge combined; we could not find men who really had so competent a knowledge both of agricultural science and of Indian agriculture as to supply the practical teaching required. In fact, when you came to practical work it appeared that the natives knew a great deal more about their own agriculture than did our agricultural professors. We have not even now therefore advanced to such a stage as to be competent to

teach the science of agriculture to the people of India. It is necessary we should first study the subject in order to make us competent to teach, and until we attain that knowledge by great labour, and as I hope by the assistance of this Society, we shall not be able to assist them as we ought and as we desire. The same experience on a larger scale has been felt by the Government of India. Some few years ago it established a department of agriculture and commerce, but I am bound to confess that up to this time for practical purposes that department has been a failure. It has been found that we had not the means, nor the knowledge, nor the machinery necessary; so that although that department has nominally existed, it has not up to this time been able to introduce any considerable improvements of a practical character. That being so, it seems clear that there is room for great effort and great improvement, and for that improvement I think the Government of India must very much rely upon the aid of a Society constituted as this Society is—a Society devoted, I think I may say, to material as distinguished from moral and legal improvement, a Society which has taken upon itself to advance material improvement in all its branches of Arts, Manufactures, and Commerce, and which has been good enough to establish an Indian Section, in the hope that by its means a great deal may be done in regard to the progress of India.

An immense field lies before the Society in this respect, and I think it offers a theatre in which real improvement may be practically developed to a very great extent. We know that in this country there are a very large number of practical men interested in India from a commercial and industrial point of view. On the other hand, there are resident in this country a large number of men thoroughly experienced in Indian administration; men possessing a great deal of leisure, a great deal of knowledge, and a great deal of practical experience and influence; and I believe that the function of this Society is to bring together these old Indians, and the commercial and industrial representatives of this country, in order that they may work together for the material improvement of that great country, which has been committed to our hands, and in which we have so great an interest.

India, as I have said, is a very great country, and one which has a very great population. That population may be individually and physically inferior to the European populations, but it is by no means wanting in intelligence, in industry, or in skill. On the contrary, I believe that it is eminently fitted for improvements in the arts, in manufactures, in everything that requires skill of hand and steadiness of head. That population up to the present time has not, I think, exceeded the capabilities of the country in regard to the means of sustenance, for I have not yet seen evidence that we have there an excessive population. But that population is rapidly increasing; it is likely that it will very soon, if it does not already, press very narrowly on the means of subsistence, and it is above all things most desirable and necessary, that in order to support that great population we should study the means by which production may be increased and improved. We should to the utmost of our power develop the material resources of India, not only to enable that great and increasing population to support itself, but also, in the interests of this country, to make it possible for India to pay for the manufactures which it imports from England. It falls upon India, not only to support itself and to pay for its great commerce with England, but also to remit to this country what perhaps is not properly called a tribute, but still is a payment for services rendered, which already amounts to not less than 13 or 14 millions a year. Therefore the produce of India has not only to support the people and to pay for the European products which are so largely imported into that country, but also to remit this large sum of money every year wholly without return. I need not say that it is impossible for any country to support such a drain unless its resources are very largely developed, and the only hope of developing those resources in such a way as to meet this great and increasing drain is by improving the modes of production, and the means of bringing the increased produce to market. I do not think it is necessary for me to impress upon you any further the immense importance of increasing and improving the industrial resources of India; and if my general proposition be acceded to, I will now go on to mention some of the particular subjects in regard to which I think improvement is especially to be sought for. I can by no means attempt to exhaust the infinite number of subjects with regard to which such improvement is desirable, but I will mention a few of the most important.

I need not say that agriculture is certainly the most important of all, and I will dwell for a few moments on the agriculture of India, and the extent to which there is room for improvement. I think I may say, broadly, that as regards the general system of agriculture in India, during the last 100 years for which we have been the dominant rulers of a large portion of the country, what must very forcibly strike one is this, that during that period there has not been the slightest improvement with regard to the general system of agriculture. I by no means say that the native system is very bad; on the contrary, I think it is tolerable. Perhaps 100 years ago it was as good as the agriculture of this country; but we cannot doubt there must be enormous room for improvement with regard to such a simple system as that which has existed in India for thousands of years. We know very well that not only in the course of thousands or hundreds of years has there been a vast improvement in the agriculture of this country, but we know that in the last 100 years the improvement has been absolutely enormous. It is impossible to look back and compare the character of the agriculture of this country of the last century with that of the present day, and not to feel at the time when our powers in India first commenced how immensely our own agriculture needed improvement, and how immense an improvement has since taken place. But I must say, and I say it with shame and grief, that in the period of 100 years, during which there has been so enormous an advance in the agriculture of this country, there has been absolutely no improvement at all in the agriculture of India. We have not mastered the subject; no one of us has

really mastered it to that degree that we can in any really practical respect show the natives how they can improve their system. I say it is a shame to us that we have not succeeded in doing this, and I think we are bound to study the subject until we can do something in this way. It is quite clear to my mind that although the natives are sufficiently industrious, and sufficiently skilful in their own small way, there must be enormous room for improvement. For instance, with regard to a system of manuring, a system of green crops, a system of providing food for cattle, and through cattle, of increasing their resources in the way of manure; and it is quite clear also that the breed of cattle may be immensely improved. So far from their cattle improving, it is unfortunately the fact that they are deteriorating, not perhaps directly through our fault, but because of the increase of population and the increase of cultivation; the natural amount of forage and the natural grazing grounds are diminished, and no artificial food being supplied, the cattle become less and less fully fed; they become thinner and weaker, and are notoriously deteriorating before our eyes. I say we are bound to make the most persistent efforts to improve the mode of agriculture and the breed of cattle, and generally to develope all the various departments into which agriculture necessarily branches out.

In connection with this subject I may dwell for a few moments on one very important question, to which great attention has been paid in this country, and with regard to which great interest is excited, namely, the system of irrigation. You are probably well aware that the Government of India, although they have not succeeded in improving the general modes of agriculture, have yet undertaken great works of irrigation, in the hope that by that means the production of the country would be very largely increased, and to some extent it has been increased. At the same time I do not think we have sufficiently studied this subject, or that we sufficiently understand it, and I do not think we have as yet found the means of spending our money on irrigation to the best advantage, or to distinguish between those schemes which are really likely to prove successful, and those with regard to which there are difficulties which stand in the way of financial success. It seems to be generally assumed that in India you have only to supply water, and the result will be a great increase of crops. That is undoubtedly the case with regard to some parts of the country, which are almost rainless, because there are some parts where nature has refused the annual supply of rain, but which are capable of being watered by rivers from sources where the rainfall is abundant. With regard to these rainless countries, there can be no doubt that the works of irrigation are enormously beneficial, and that they really have been a great success. But still India is not a country which is usually rainless. These comparatively rainless tracts are not very extensive as compared to the whole country, and there are very much larger tracts, sustaining infinitely greater populations, where the rainfall is very considerable; where a failure of rain is only occasional, and where the direct success of irrigation works is neither so immediate nor so certain. The great difficulty with regard to those irrigation works in countries where the rainfall is not usually deficient, and where the crops do not usually fail, seems to me to be this—that it is very doubtful whether a supply of water alone is sufficient, unless you supply at the same time manure by which the water may be utilised. You are aware that with regard to all agriculture there are some kinds of application to the soil which stimulate but at the same time exhaust it. It may be that in a country which has hitherto, by the help of the natural rains, supplied moderate crops, the soil will bear those moderate crops without a supply of manure greater than what the native system usually affords; it may be that you get from year to year, upon an average, a moderate return, and that if you apply water you may get for a year or two a larger return; but if you do not at the same time supply manure you may exhaust the soil, and you may find, as many men of considerable practical experience say has been found in some of these irrigation districts, that by irrigation you have exhausted the soil, and taken a great deal out of it which you have not returned to it, and therefore you have not obtained that benefit you hoped to obtain. This and other questions connected with irrigation it is necessary to study well before you can apply to full advantage the immense capital which these irrigation works require. Then there are the whole questions of drainage sanitation connected with these irrigation works, and these have as yet not been sufficiently studied. I think it is necessary that these questions should be very fully studied, and when we understand them, we should combine with irrigation a system of improved agriculture; and then only will the great benefit which may be expected from these works be fully obtained.

So much as regards the general question of agriculture in India, but then I may say there are questions with regard to the special cultivation of particular crops, in some of which we have already attained considerable improvement, but in others, I think, there is room for considerable improvement still. When I look at this question in a practical point of view, putting aside for the present the new agricultures which we have introduced into the hill climates, to which the natives are not yet accustomed, and confining our attention for the present to the old cultivated plains of India, I find that almost the only article in respect to which we have attained by European methods a considerable improvement is indigo. There is a very large European industry in indigo, and the cultivation of it has certainly been very much improved; but so far as I know, it is the only article of cultivation in the ordinary lands in respect of which any great improvement has been achieved by European enterprise. The only new crop which has been introduced in a general way throughout India is the potato, but it is not more than an additional vegetable—it is not an ordinary article of food, and we have not yet succeeded in adding much to the food of the people by its introduction. Then there is opium. The opium cultivation in Bengal is under the superintendence of the Government, and no doubt we have succeeded in producing a very large supply, though with what ultimate results is a very difficult and disputed question. The native grown opium in Malwa, however, is as

good as the Government grown opium in Bengal, and, I think, we can hardly say that the efforts of Government have greatly improved the cultivation of this particular produce.

Then I come to the great staple, cotton. We know that immense efforts have been made to improve the cotton cultivation of India, and it has sometimes been supposed that great success has attended our efforts. I am quite aware that with regard to the preparation for the market, with regard to the picking and the mode in which the cotton is brought to this country, very considerable improvements have been effected. But, speaking from my own personal observation, I may say that, as a rule, almost without exception, we have not succeeded up to this time in improving the cultivation of cotton in India; and that that is a problem which still remains for us to solve. We have great cotton-fields in India, we have a very large quantity of cotton, but the cultivation is of an inferior kind, and I think our efforts should not be relaxed until we succeed in producing a superior article, a cotton bringing a price something to be compared with Egyptian and American cotton. Up to this time, throughout the whole of India, with the exception of one or two districts of Bombay, in which some improvement has been effected, the cotton is cultivated under the old native fashion, and we have not achieved any improvement whatever. We must not, therefore, relax in our efforts until we really succeed in so improving the cultivation as to produce a much more valuable and thoroughly merchantable article.

With respect to the other and coarser fibres, you are probably aware that the production of jute has very largely increased, that the commerce in jute is largely increased, and that it is now one of the great staples. Still, that increase has been obtained solely by commercial means, and not by agricultural means. The ordinary jute is cultivated entirely by the natives, after their own fashion, and by their own efforts, and we have done nothing to improve it. And although probably the jute production is so good that it is not very necessary for us to do anything in this respect, still I am much impressed with the idea that there are very many others of the fibres of India which might be very materially improved, and brought to this country in large quantities with great advantage. The fact is, India is a great producing country. She has a great variety of hemps and fibres of different kinds; but up to this time I think I may say that the only great article of commerce is jute; and the other hemps and fibres are still mainly consumed in India, and not brought to this country. But I think, considering how very suitable India is to the production of fibres, and what an immense mass of hemps of various kinds are grown and used there, we ought so to improve and develop that production as to be able to import into this country very many of the finer, better, and stronger fibres besides jute.

Rheea we are making great attempts to improve, but the hemps we have not yet succeeded in improving in any degree, and we have not yet made them an article of commerce with this country. Efforts have been made to raise flax in India, but what seems to me very unfortunate is this, that while the flax plant, for the sake of its seed, is very well known there, in order to obtain a fibre from the stem we have gone, not to those parts of India which are most fit to produce long fibres, but to the driest countries, that is to say, the Punjaub. My view would be that if we are ever to produce good flax in India we must go, not to the dry, but to the moist districts, where we may expect to have long stems and long staples, and where we may do much more than we have yet done. I by no means despair of producing very great improvement in regard to the cultivation of flax in India, seeing that the plant is cultivated throughout the length and breadth of the land, and it is only necessary that we should so improve the native agriculture as to produce a stem fitted for fibre, and not only for the seed which at present is very largely produced.

To silk a great deal of attention has been paid, and I think this Society has itself paid much attention to it; but little has been effected, and the silk produce of India is not at present, I fear, an increasing produce. I believe very much remains to be done if we are to develope it. With respect to sugar we have also not been very successful. There is only one more article to which I will specially allude, to which, I think, attention has not been sufficiently paid, and with respect to which, I believe, that a great improvement and a great commercial development is possible. I allude to tobacco. The production of tobacco in India is enormous, and I believe that the raw material in India is in many parts very good. Within the last few years I understand that an export to Europe has been established, and it has been found that it is by no means bad tobacco. But the natives of India are very deficient in respect to the manufacture of this tobacco, not knowing how to properly prepare it for market, or for the uses to which it is applied. But that is only because they have never been taught how to prepare it. They are extremely skilful with their fingers, and I have no doubt that if the subject were sufficiently attended to the natives would be as competent to prepare cigars and cheroots as the people of Cuba, Manilla, Burmah, or any other country. I observed only this morning in the paper that the price of American tobacco has very much gone up; the supply seems to be at present somewhat short, and I think, considering the immense production of tobacco which already exists in India, the great varieties of soil and climate in respect of which tobacco may be produced there, that it is well worth the attention of all interested in the material improvement of India, and of this article in particular, whether very much may not be made both of the cultivation and the manufacture of tobacco in India.

I have hitherto dealt with the agriculture of the cultivated parts of India, the modes of native agriculture, and the introduction of improved staples amongst the natives. I will now advert to a different branch of my subject, viz., the cultivation of the waste lands of India and of the special cultivations which have been introduced by Europeans in those waste lands which have not been occupied by the natives on account of peculiarities of soil and climate. You are probably aware that the waste land question has been a good deal fought over in India, and the Government has been accused of an indisposition to encourage

European enterprise, by not granting to enterprising men ready to cultivate them, those lands which are lying barren and waste, and useless to the Government. I have taken a great deal of interest in that question, and I am prepared to say that in my deliberate view, the Government is not open to censure of this kind. It seems to me that the Government has to look two ways. First, to the eventual interests of the country; and secondly, to the development of these waste lands, under the best system. Now, I think it is not good for the future prosperity of the country that the Government, in order to develop these lands, should rush to the extreme of giving them away recklessly to land jobbers, in a land jobbing fashion. I have always thought that people do not appreciate a thing that they get absolutely for nothing, and that if you make the acquisition of these lands too easy they will be sure to fall into the hands of land jobbers. On the other hand, I feel we are bound to protect the revenue of India, and not sacrifice our land revenue; but I feel also that the land revenue derived from these remote hill tracts is very small, and the material improvement to be derived from their development by introducing Europeans is so great, that we ought not to stand in the way of making those lands available to *bona fide* men who really purpose to develop them. That is the system which has been followed in the colonies with success, and that is the system which we are attempting to follow in India. That is to say, we will not give away these lands to any man who chooses to say, "I am going to cultivate thousands of acres," without any guarantee that he will cultivate them. But if any approved man chooses to bring the money in his hand, and to pay down, say, 10s. per acre, we are willing to give him land, and to give him the utmost facility for cultivating it. Waste lands have been cultivated largely on these terms, and we hope they will be still more largely taken up in the same way.

I have not had much to do with the cultivation of coffee, but my particular attention has been attracted to the great tea cultivation which now exists in several districts of Bengal. I have personally inspected many of the tea plantations, and I am quite satisfied that, after many ups and downs, the tea cultivation has now reached a safe and sound position, and that it is now likely to be very largely developed, to the great benefit of the enterprising men who have achieved that success, and to the great benefit both of India and of this country. I think that the tea cultivation of India has taken deep root, that it will continue to increase, and there is no fear now that it will fail. The one great difficulty with regard to it has been the labour question, as you are probably aware, but I hope that day by day this difficulty will diminish. There were very great difficulties in the first instance. It is undoubtedly the case that when coolies unaccustomed to the climates of these remote districts suitable for tea cultivation were first taken there great hardships were endured by them; there was great mortality, and it was absolutely necessary that Government should intervene to protect its subjects from treatment which involved a mortality revolting to humanity. But I can say now with satisfaction that these difficulties have to a very great extent been overcome, for in a great majority of tea-producing districts the coolies employed are now very tolerably healthy. The great difficulty now is with regard to the means of communication. It still happens that the best tea-producing district in India, the great valley of Assam, is separated from India by a long voyage, and by a very difficult country, through which there are very deficient means of communication; and up to this time it is unfortunately the case that the transport of coolies from the populous districts to the tea districts of Assam has been attended with great risks, and occasionally with great mortality. The reason is, the voyage is so long and difficult, that the coolies are necessarily crowded together in the steamers, and they have at times suffered much in consequence, passing through countries which are the very hotbeds of cholera and other diseases. While I administered the government in India my attention was very much devoted to these subjects, and to the means of facilitating communication between the populous parts of India and those which required populating. My view was, that if we could establish easy communication between the populous districts of Western Bengal and the district of Assam in the east, that the mortality and the difficulties attending the progress of the coolies would be overcome; that you would have a very large population, which would be quite ready to go to the tea districts, those risks having been diminished; and that the tea districts would be very largely developed, at the same time that those countries that are threatened to be over-populated would be relieved from their surplus inhabitants. A good deal has been done in this direction. We have taken advantage of the late famine to employ the people very largely in making roads, which lead from these populous districts to the unpopulous portion of the country. The Government are now establishing a line of steam communication which, I hope, will lead to great improvement; and I hope it is still possible, we may see railways developed in that direction. Already a railway has been undertaken through Northern Bengal, which leads a considerable distance towards Eastern Bengal and Assam. I hope such a railway may be achieved, that the roads which are now being made will have eventually rails laid on them, and that the tea industry may be very greatly developed. Then there is a cultivation which has been undertaken by Government, and by a few enterprising men, in the hill countries, from which great benefit may be anticipated. I allude to the cultivation of the Cinchona plant, which yields quinine. I need not tell you that the great scourge of India is fever; cholera may carry off thousands, but fever carries off tens of thousands, and the one medicine which the natives above all appreciate is quinine. You are also aware that the production of quinine is at present limited to very distant and remote parts of the world, in South America, that it is a very expensive medicine, and so not within the reach of the great millions of India. It will be an enormous benefit if we succeed in making that cultivation so common on those Himalayan hill sides, now unproductive, that the people of India may be supplied at a cheap rate with this most valuable medicine. So far we have succeeded to a great extent in experimental culti-

vation. Thousands of acres, both in the Himalayan and Neilgherry hills, are now planted out with the cinchona tree. They have obtained a considerable size, and have begun to yield bark, and there seems to be good reason to hope that if this subject is studied scientifically and practically, the cultivation may be attended with complete success. Then there is another cultivation which has not yet been systematically attempted, but in which I think a great deal may be done in these Eastern districts, and on the warm hill-sides and bottoms, now occupied by jungle, I mean the cultivation of the india-rubber tree. Up to this time an important and active commerce has been carried on in india-rubber on the Eastern frontier, but it is confined entirely to commerce with the wild tribes who bring down the india-rubber from the trees in the jungle; and the more we have entered into the subject the more we believe that the result of that commerce is to destroy the trees, and, in fact, to kill the goose which lays the golden eggs; thus destroying the sources of production. We find that these wild tribes use the trees in a very reckless manner, that the finest trees are destroyed for the sake of very little india-rubber, and there is every probability of the supply being soon dried up. On the other hand, if the trees are attended to and cultivated, it is a very rapidly-growing tree, and one which, by little cultivation and attention, may be made to reproduce itself in a very short time; so that if these trees were once brought within scientific management, there is every reason to believe that within a very moderate compass we might have forests of them, which would produce a large supply of this very important article, and thus, too, lead to a great development of the productive resources of India.

Not only with respect to these trees, but in respect of other trees and other productions of those hill slopes now barren and abounding in jungle which is useless, I believe great improvements may be made. There are thousands of square miles of country which abound in jungle, where the vegetation is enormous, where the powers of nature are very great, but where the produce is useless, and it is for us to supply, by skill and by scientific arboriculture, useful produce in its place. I have often thought that in the Himalayas of Eastern Bengal where chestnut trees now useless as regards producing food for the people are naturally abundant, they might very well be superseded by forests of edible chestnuts. Again in many parts of the waste Himalayan valleys, where we have now much useless scrubby jungle, we might have forests of olives and other trees of that kind, and we might substitute for the very poor peach, apricot, and pear trees which grow there, others of a better kind. Indeed, as regards the science of arboriculture generally in India there is a vast field for improvement.

Then, going beyond the vegetable produce, I will touch very briefly upon the subject of minerals. India is certainly a country not so well supplied with minerals as it is with vegetables, and they are not relatively so important. I will not attempt to touch on every metal found in India, but will confine myself to the one great metal, iron. There cannot be the least doubt that the iron-fields of India are enormous; that there are tracts of country which are one mass of iron, and there is a vast amount of iron of an excellent quality which yet remains to be developed. Some small portion has been developed, but the iron industry has not yet been very successful. But in many parts of the country where there is iron there are also large quantities of coal. The coal is not of the very best quality, but still it is tolerable, and I cannot believe that in these days when iron has become dear, and when the demand for it has become so great, that it is not possible it can be developed with very great advantage. I am told that some enterprising men in this country are now attempting to develop this industry, and I hope this Society will give them its utmost aid, that we really shall attain to a very considerable production of iron before very long.

Then with regard to manufactures. The manufactures of India do not now hold the position which they once did. The native manufactures have very much declined, and the native arts I do not think have been improved, but rather spoiled, by the introduction of bastard European modes, which have to some extent interfered with the native art, which was pre-eminent in the Cashmere shawls, and things of that kind. While the old native manufactures have declined, I think it is our bounden duty to do what we can to introduce new and better arts and modes, and in this respect there is an immense field for our efforts. The natives are most apt, and there is a large field for introducing industrial arts, of which we have as yet very little availed ourselves. I do not think that, up to this time, we have succeeded in doing our duty by the natives of India in respect of teaching them the common arts which have been so much developed in Europe of late years. I have already detained you very long, and it would be impossible for me to enumerate a tithe of the many subjects in respect of which, I think, these intelligent and skilful men may be taught to use for popular purposes many of our European arts. I would only instance one—the art of pottery. There is nothing in respect of which there is such an enormous consumption amongst the natives. They use earthen vessels of all sorts and kinds. Their shapes are very good, but their material is, up to the present time, infamous; in fact, nothing can be worse than the material of which their pottery is made. Now, I cannot understand why it should not be very easily possible to improve that material, or why we should not introduce the arts by which common pottery is made in this country, and thus effect a very great improvement in the comforts and every-day uses of the people of India. But in respect to the arts and in respect to agriculture we have not yet succeeded in adapting ourselves to the ways and fashions of the natives of the country. We find that we have almost more difficulty with regard to industrial schools than we have with regard to agriculture. We have not examined as we should the modes and tasks, and habits of the natives. We must teach ourselves before we can teach them, and I think it is possible, by the aid of this Society, that an immense deal may be done in the way of communicating to the natives of India our common every-day arts. I do hope that a great deal will be done in that direction, and that the attention of this Society will be especially directed to that end. Then, while we

have not done much in the way of introducing the small arts, and while the Government has not done much in the way of introducing great arts, I think it is undoubtedly the fact that of late years private enterprise has succeeded in introducing arts on a great scale, by which I mean great manufactories by which cotton and jute are spun and woven on a large scale. There are now great manufactories in Bombay and Calcutta where natives are successfully employed, and where I think I may say, without fear of contradiction, that the natives have shown that they are capable of doing very great things in that way. Native men and women, and children also, have shown that they have great aptitude for working in manufactories. That much is proved by the experience of the existing mills. I know this is a delicate subject with respect to competition with Manchester and Dundee, but my view is that, as the governing body, we are bound not to favour one side or the other, but to do the best we can to develop the industrial resources of India. I do not think that by a protective system on the one hand, or by an attempt to stimulate it on the other, we should try to favour one party or the other; but what I do think is most important, and what I hope this Society will succeed in doing is to bring out the facts as much as possible, to ascertain what are the respects in which India has considerable advantages for manufactures, what are the difficulties which stand in the way, how far it is possible that Indian manufactures can succeed, and in what respect is it probable that they will not succeed in competing satisfactorily with the manufactures of this country. I hope this is one of the subjects to which attention will be devoted in the present Session. I hope we shall bring men of Indian experience face to face with men of English experience, that the whole subject will be discussed; that it will be ascertained what are the points in respect of which India gives facilities for manufactures, what are the points in respect of which the difficulties are such that it would be well not to attempt competition in this country.

I have detained you so long that I will now only very briefly allude to one or two other subjects, with respect to which attention may probably be devoted by this Society. There is the great sanitary question; the whole question of the sanitary condition of India. This Society, I think, has devoted much attention to sanitary questions, and these are enormously important in India; not only because they so much affect the people of India, but because up to this time we do not in the least understand them. We have attempted a good deal in the way of sanitation in some parts of the country with regard to the towns, and have to some extent succeeded; but with regard to the country at large, the native villages, and the great tracts of native country, where fever and cholera are very destructive, we have not succeeded at all. It is a great question in respect of which immense effort is necessary to solve questions which have hitherto been almost insoluble. We do not know how fevers are generated, how they are communicated, or how they are staved off. We do not know how far they are due to the water, how far to the air, how far to overcrowding, and to other causes. I think the efforts of this Society may be very beneficially directed to solve these questions so far as it is possible to solve them.

Then there are other subjects with respect to which I think discussion may be invited. There is the subject which has created a very great interest in India, namely, the effects of alcohol, and the development of a taste for drinking amongst the people of India. It has been said, and I am afraid with some truth, that it is ourselves principally who have developed in India a taste for strong liquors. It is said by some that our revenue system is such as to develop the use of spirituous liquors. I do not myself think it can justly be said that has been the case, because our only action is to heavily tax these liquors; but at the same time there are many excellent people who will connect the two facts, that wherever we go there also drinking increases. The subject therefore is well worthy of discussion. I hope it will be discussed, and that some satisfactory result may be arrived at. Then there is a great dispute with regard to the real effect of opium—whether the consumption of opium is really more injurious than the consumption of wine and spirits in this country? All these subjects very much affect the material prosperity of the people of India, and there is ample room for discussion and inquiry with regard to them.

Then there is the old subject of communications of roads, railroads, harbours, and lights. The Government of India has often been very much blamed because it has not made more roads and more efficient communications. I do not think that blame is fair. Those who blame should remember that the difficulties with regard to roads in India are enormous. The country is difficult in the extreme, the climate is extreme, the rivers and the mountains and everything else are upon a great scale, the soil in large parts of the country does not afford metal or materials for roads. We have done what we can, but I believe our principal success has been by introducing the great system of railways; that system has been on the whole eminently successful. But having made great trunk lines which have been successful, the attention of the Government is now directed to the question of making the smaller branch lines, and it is felt that if these are to be made they must be made in a much cheaper style, and on a smaller scale. The question is upon what principle the railways may best be made, and upon that there are many opinions; and with respect to these opinions I think the aid, counsel, and assistance of this Society will be very welcome to the Government of India, and discussion as to the nature of railways to be made in the future will be very useful to those who administer the Government.

Then, at present, very prominent is the question of the harbours which are required on the coasts. We are very deficient in respect of harbour accommodation, and there are now before the Government great proposals for supplying such accommodation at several of the most important places. But there are very many different opinions with regard to the best mode in which these harbours can be made. There are engineering questions; questions of navigation, and so on; and with regard to that also, I think the Government may be

be very much aided by the discussions here, and by the counsel which its experienced members may be able to give. Then there are the lights which are required to facilitate navigation by the Suez Canal and the Red Sea, and other places connected with our commercial intercourse. With regard to all these subjects, I feel quite sure that discussions here will be of the utmost benefit, and will much strengthen the hands of the Government.

Many other things might be mentioned, but I think I have said enough to show you that there is a very ample field for an Indian Section of this Association. I hope that field will be sedulously worked and cultivated, and that in that field Indian and English experience will be brought together. I do hope that not only we may bring together much experience in this room for the great benefit of both countries, but I also believe it is quite possible, by developing these subjects and creating an interest in them here, you may create a corresponding interest in India also. I know of no problem in respect to India which is more interesting than that of turning into a useful channel the immense amount of education and development that we are now bringing out amongst the native classes of India. We are at this moment educating very highly large numbers of young men of the most intelligent classes of India. But, having educated, we do not know what to do with them. We find the supply of educated men is greater than the demand. We turn out hundreds and thousands of these educated men in a literary point of view, but the result is that they all want Government appointments, and we cannot find them for them. They are dissatisfied and disgusted, and think they are ill-treated because they are not provided for. I think and I believe the Viceroy, Lord Northbrook, a little time ago pointed out, that if justice is to be done to this education, you must turn it into material channels, and not leave these young men to suppose they must all be lawyers or obtain Government appointments. You must turn that education into useful material channels; and amongst these young men themselves and amongst the native population I think there is a very considerable disposition to accept this view—that it is absolutely necessary that a large proportion of their educated men should learn to rival Europeans, not only in respect to intellect, but in respect to practical art; and I do hope that if these subjects are earnestly taken up by this Society, we shall find that we shall have in the great towns in India affiliated societies which will take them up on that side of the water also, which will correspond with us and learn from us, and that so working together the societies in India and this parent Society in this country may really effect very material improvement, both directly in the condition of the people in India, and indirectly by affording a field in which the education which we are now supplying to the natives may be turned into a useful channel. I trust then that this branch of the Society will flourish, and that much will be done by it, and that both directly and indirectly very great benefit will result from its mission.

DISCUSSION.

Mr. Andrew Cassels, after expressing his great sense of obligation to Sir George Campbell for the masterly address he had just given, said there was only one point on which he should venture to differ from him, that was with regard to the staple of Indian cotton. He understood him to say that indigo was the only article in which there had been any great improvement of late years, but having had a great deal of experience in connection with cotton he might speak upon it with some degree of assurance, and he believed that nothing in India had more improved during the last thirty years. When he first went to India the produce of clean cotton per acre was only between 30lb. and 40lbs., whereas, owing to the better teaching of Manchester, it was now from 60lbs. to 100lbs. At the same time he did not hesitate to say that with regard to the staple, the improvement during the last thirty years had been equal to from thirty to forty per cent. At the present time, notwithstanding all that had been done to introduce American sea cotton into India, the produce of that foreign seed cotton was not held in so much estimation in the Liverpool market as some of the indigenous growths; in fact the Hinghun Ghât cotton now held the highest place in the estimation of Lancashire spinners, and brought a higher price than any other. It had been truly said that India had to make payments of something like fourteen million sterling per annum for the interest of her debt, for pensions and so forth, and in payment for sleepers, railway iron, and other stores, and these payments could of course only be met by means of these efforts. Consequently, they ought to be encouraged to the utmost; but unfortunately they were subjected to an export duty by the Government, instead of being allowed to go out free. In the second place, although there had been a department of agriculture and commerce created, intended to promote the commerce of India, the same department had to take charge of the revenue, and he need not say to anyone who knew anything of India, that under such circumstances revenue matters naturally overshadowed the other two, and consequently until this mistake was rectified no very great results could be anticipated. In the next place they had to grope very much in the dark for want of facts, there being no statistics on which reliance could be placed. He had lately had occasion to look into some of the figures which had been collected, and was really ashamed to see how defective were the statistics in many respects. Thus a short time ago the population of Bengal was said to be forty millions, whereas it was now said to be sixty millions, which of course would necessitate a different scale of taxation and administration generally. He agreed with much that had been said with regard to Indian manufactures, and was happy to say that he had recently been in negotiation with a very able and experienced writer on the subject, as the result of which he hoped they would in a few weeks have an opportunity in that room of going thoroughly and fairly into the great question. On the one hand, Manchester manufacturers contended that our duties in India were protective, and on the other hand, manufacturers in India said that England had so many advantages that they were quite overshadowed. He hoped that matter would be brought to a test very shortly, when all the facts bearing upon it would be brought forward, so that a clear decision might be arrived at. But if it were really desired to encourage Indian manufactures it seemed to him that the five per cent. duty upon them must be removed as one of the first steps.

Dr. Burn said there was no doubt the products of India were very numerous and valuable, but the way to get at them had not yet been scientifically studied as it ought to be. The collection of the revenue and the constitution of the courts attracted a deal of attention, but the products of the country and its commerce were comparatively neglected. He would also remark that Europeans could not safely invest capital to any great extent in India, until there was greater security. We had just escaped, almost by a miracle, from one of the greatest calamities which could befall a nation, and for

this happy result they had in great measure to thank Sir George Campbell; and now one of the most necessary points to study was how to prevent a recurrence of such a famine. This was a most vital point, because none would invest large capital in a country, or attempt to improve its agriculture, when they could not be sure that a single year would not sweep away the whole of their cattle and other produce. These famines were sure to recur, but he believed their fatal results might be prevented by reverting to the ancient village system, under which a sufficient store of grain was kept in each village for one or two years' consumption, together with a like quantity of fodder for the cattle, and an ample supply of water in the tanks. Irrigation would not save India, it would only foster cultivation up to a certain amount, and in certain respects it was a dangerous expedient. He had known something of the ravages of fever in Guzerat, and not only was the destruction of life enormous, but there was a great loss of energy from the malarious influence of the irrigated lands; quinine was a most effectual remedy, but it was not always to be had. Extensive irrigation ought only to be applied in those districts where the rain was deficient, but in other parts where the rainfall was the natural means of promoting vegetation it could not be employed without danger. The sandy deserts were the richest parts of India if only irrigated, and there irrigation was quite safe and healthy. He would much rather see capital expended in laying by stores of rice, which was very cheap, and, unlike any other grain with which he was acquainted, keeps perfectly for years; in fact he had seen rice taken from stores in the Deccan which had been kept for ten years and was perfectly edible. It was preserved simply by excluding it from the air in cavities specially prepared for the purpose under ground.

Mr. Hyde Clarke remarked that although it was hardly usual to discuss an introductory address, so many subjects, and so momentous, had been brought forward, that instead of being able to discuss them in a single evening, enough work had been laid out for several sessions. He should not therefore be tempted to enter in detail upon any of the points mentioned by Sir George Campbell, but it was impossible to see him again present on such an occasion without bearing in mind that he was one of the founders of the Section, and had done much to put it in the position of utility to which he had himself borne witness. And though he had been absent for some time in India, engaged as had just been remarked in the most momentous duties, still they felt that his spirit had been with them, and it was very gratifying to find him again presiding over them, not merely in an ornamental capacity, but bringing with him that experience and aptitude of suggestion by which he had always been distinguished. As chairman of the Indian Section, he claimed the privilege of moving a vote of thanks to him for presiding on that occasion, and in so doing he might be pardoned for one or two remarks on some of the many interesting points which had been mentioned. For instance, with regard to the production of caoutchouc, if any one considered how valuable a material it was in telegraphy and many of the arts, the practical nature of the suggestions would strike the mind at once. Unfortunately the savage tribes of India were not the only destroyers of the valuable trees which produced this material; the same thing was going on all over the world, and very shortly it would be found that the price would be so enhanced as to greatly interfere with many manufactures, and render many articles of public necessity and utility difficult to be produced. If, therefore, the Foreign Department of India could be induced to take that matter into consideration, a valuable service would be rendered. It was very gratifying to hear what had been said as to the extent of the tea culture, but at the same time it must be matter of regret to them all to remember that they had lost one of their most valuable friends and colleagues—Dr. Archibald Campbell—who had taken a most active part in connection with that subject. With reference to the culture of tobacco, no doubt some persons would look upon it as a mere matter of pleasure or luxury, but it was really a commercial product, which might prove of great importance to India. At the present time the tobacco crop of Virginia had been so much affected as to yield only one-fourth of an average, so that the time was most favourable for paying attention to its production in India; and by making timely representations to the Government, and the commercial community in India, they might be able to do for tobacco what Mr. Cassels had already said the Government had done for cotton. He would not attempt to anticipate the valuable discussions that would hereafter arise on many of the important subjects that had been mentioned, and would confine himself to moving the vote of thanks he had already mentioned.

Mr. Ward said he would not presume to second the motion just made, which he would leave to abler hands, but he would venture to make one remark, which might be encouraging to those who were hoping for the further development of jute, flax, and other products which had been spoken of as comparative failures. It might be in the remembrance of many that some time ago there was a meeting to consider what could be done for the tea culture, when almost everyone was in despair about it; and, in fact, he was almost the only one who took a hopeful view. They had now heard of its great success, and it should encourage them all to remember that the failures of to-day might a few years hence turn out to be great successes. With regard to the tea itself, he believed that it was the best in the market, and that the difficulty was to get enough of it; and he should, therefore, like to know if any arrangements were being made for extending railway accommodation to Darjeeling. The Government, in making arrangements for the transport of troops and human beings, should also bear in mind the importance of giving every facility to tea planters for bringing their produce to market, but he knew at the present moment of an estate upon which there were about 3,000 chests of tea awaiting means of transport.

Mr. Fitzgerald asked whether Sir George Campbell's remarks about the silk cultivation not having answered expectation, referred to those kinds known in Italy, China, and elsewhere, or whether they referred also to the Tussore silk, which was especially an Indian product.

Dr. Boycott having briefly seconded the vote of thanks,

Mr. W. Botly referred to the importance of developing and improving agriculture, which he was confident, from his own experience in this country, would prove exceedingly profitable. He had known estates, formerly letting at from 10s. to £1 an acre, which had been so improved in value as to now fetch from £4 to £5 by irrigation and drainage works, and he was convinced that what would pay here would pay all over the world.

Mr. Elliott asked whether the natives of India had any method of supplying the exhaustion of the soil caused by the production of jute, oil seeds, and other exhausting crops.

Dr. Fayrer, C.S.I., said one important question which had to be borne in mind and discussed with regard to irrigation was whether, although of great importance, it did not often involve questionable results; whether, when the rainfall exceeded about 16 in. per annum, it was desirable at all; whether it did not induce a greater amount of sickness than need be. Another point of some importance which had not been touched upon was the destruction of trees which had been going on for some time, and was still proceeding, and which he believed tended to alter the climate, to increase the heat and dryness of the atmosphere, sterilize the soil, and interfere with the agricultural progress of the country.

The vote of thanks having been passed unanimously,

Sir George Campbell, after acknowledging it, and paying a cordial tribute to the memory of the late Dr. Campbell, proceeded to reply to some of the observations which had been made. With respect to railway communication with the tea districts of Darjeeling, he was happy to say that a railway in that direction had been sanctioned and commenced, and was already far advanced towards completion. He had long been an advocate for that railway, but at the same time he had been compelled to admit that it was impossible to construct such a line in the interests of Darjeeling alone, unless taking into account the interests of the populous districts of Northern Bengal. When afterwards administering the government of Bengal, he went into this subject very narrowly, and found that the districts lying between Calcutta and Darjeeling were in fact amongst the richest and most populous districts in India, and that there was every reason to believe that a railway through that district would prove a safe speculation, and develope the country without loss to the Government. Having ascertained the facts as well as the means at his disposal enabled him, he laid those facts before the higher power, and urged upon them that a line in that direction should be constructed. The question was just hanging in the balance when the famine occurred in Bengal, and, lamentable as were some of its effects, it had this good result, that the Government upon the first note of alarm were induced to sanction the prosecution of the railway works, which were at once begun, and had been proceeding actively ever since. He should explain that the railway was in the first instance limited to a place called Julpigoree, about thirty miles from the foot of the hills. There was some doubt whether the remaining distance should be sanctioned. He himself had urged that the missing link should be completed, and yet hoped that it would, but it had not been finally determined. With regard to Mr. Elliott's question as to the methods used by the natives to supply the exhaustion of the soil, he could not give any very definite answer; but they showed a considerable amount of skill and agricultural knowledge, being perfectly conversant, for instance, with rotation of crops. They were quite aware that they could not get such crops as jute or oil seeds every year, and generally practised a rotation, except where the fertility of the soil was kept up by inundations of the great rivers. Considerable inquiry had been made on this point in Eastern Bengal, and the results tended to show that no very rapid exhaustion was taking place. At the same time he was quite convinced that this was one of the subjects which required a great deal of attention. The heavier the crop, the greater demand upon the soil, and the more fear of its being exhausted; and if commerce called upon the country to supply more jute and oil seeds without at the same time supplying an improved agriculture, great evils might eventually result. He quite agreed with Dr. Fayrer that the question of the sanitation, or insanitation, resulting from irrigation, was one which required to be studied with the greatest care, and which had not received anything like the attention it demanded. In fact many persons seemed blindly to suppose that merely spending money upon irrigation was sufficient to put the country into a vastly improved position. There were, however, two sides to the question, and it was doubtful whether, both in respect of sanitation and exhaustion of the soil, there might not be evils counterbalance the benefits of irrigation. With regard to the destruction of trees he was not prepared to give so confident an opinion, but his impression was that the destruction of trees and denudation of mountain tracts had not gone on to the same extent as had produced so pernicious an influence in Europe. A considerable destruction of timber trees had taken place undoubtedly, but in many parts, where cultivation did not take place, the greatest evil was that useless jungle sprang up in the place of useful trees; and he was not inclined to think that in those parts with which he was acquainted they had suffered much from that cause. Still there were districts—notably in the Punjaub—where the evil existed, but the attention of the Government had been attracted to it, and efforts were made to promote the planting of trees in the place of those which had been destroyed. In these days of law and order, however, there was not the same power to enforce this as in more despotic times. For instance, when he was serving in the Punjaub as a young man, he took upon himself to make a law in his own district that every man who cut down a tree should plant five in its place, but orders of that kind could hardly be enforced now. In the dryer parts of the country the attention of the Government was being given to this point, however, and in the moister they were not likely to suffer. With regard to the Tussore silk, he could hardly answer the question, which was really a commercial one; but he did not think the silk trade had increased of late. The Tussore silk trade was an important one, and every means should be taken to develope it; but it must be remembered that the worm which produced it was a wild worm, not usually cultivated. He believed, however, that a good deal might be done in the way of semi-cultivation, that the growth of these little animals upon the jungle trees might be promoted by taking the cocoons from one tree to another, and that the natives were already beginning to put this method in practice. He could not follow Mr. Cassels into the question of how far the cultivation of cotton had increased, but his remarks seemed to have special reference to the Hinghun Ghât cotton. He (Sir G. Campbell) had at one time administered the province in which that was grown, and had gone carefully into the subject with the Commissioner, Mr. Carnac, the results of his investigations being—in which Mr. Carnac agreed with him—that this cotton was indigenous, that it was produced in the same way as it had been for two or three generations, and that no improvement had been effected by new modes of cultivation. Mr. Cassels, whose authority no one could dispute, put the improvement at from 30 to 40 per cent., which he was glad to hear. He also understood that in some parts of Bombay improvements had been effected in the cultivation itself, and these he hoped to find extend to other districts.

AFRICAN SECTION.

The opening meeting of this Section was held on Tuesday evening last, when the Rev. HORACE WALLER occupied the chair.

The Chairman said he was very sorry to be obliged to announce that Captain Knowles, who had prepared a paper on the Niger and the voyage of the *Investigator*, had been suddenly stricken down by illness, which, he was glad to say, was not dangerous, but which would nevertheless prevent him from appearing amongst them for some weeks. In his absence, however, Dr. Mann would read a paper by Mr. Shepstone on some passages in the early native history of the Natal territory, which would be of especial interest at the present moment on account of certain difficulties which had arisen within the colony. In the first place, however, he would himself give a brief glance at the movement now going on in Africa, a movement which was not only enlisting the sympathies of the outer world, but which also seemed to emanate from a power within itself. Beginning with the northern part of the east coast, a new state of things was there originating, and all honour to the Khedive of Egypt for his exertions to advance his people. He was a man quite 100 years ahead of his fellows, and though it was a hard task for him to drag them onward to his own position, he was a man eminently fitted for such a work. Sir Samuel Baker had already stated in that room how he had tried to abolish the slave trade, and though this seemed almost

impracticable, the Khedive did not think so. He had shown his determination in this matter by engaging the assistance of Colonel Gordon, who already said that he saw no difficulty in developing the whole of that district which Sir Samuel Baker and Messrs. Speke and Grant had before described. Writing to him from Gondokoro at the end of November, he said there was no difficulty in ventilating that country with a wholesome atmosphere, by bringing trade into it, and abolishing the slave trade. Indeed one tribe, the Dinkas, had already so far been won over to his side, as to stop and capture a convoy of 1,600 slaves, thus striking a deadly blow at this vile traffic. Two engineer officers had already joined him, one of whom, Lieut. Watson, wrote that he found travelling there as easy as up the Rhine, which was already a wonderful advance. Colonel Gordon desired very much that some scientific men would come out to him, in order to make observations, &c., for which he had not time, and said that they would find no difficulty in reaching him or in pushing their way right and left from his stations. If therefore, any one present felt inclined to take part in this work, or were acquainted with those who would, he should be glad if they would communicate with him, when he would at once place the matter before Colonel Gordon. From the centre of the lake region the Khedive meant to draw a very large commerce, there being an enormous accumulation of ivory there, which hitherto had been brought out by the Arabs at Zanzibar, but which, together with metallic treasures, the Khedive had determined to divert into the more northerly route. Passing down the coast towards Aden, a very different state of things would now be found to that which existed a few years ago; and here again might be noticed how much depended on the genuine thorough goodness—for he could call it nothing else—of one man. Half the difficulties connected with trade and missionary exploration on the east coast had been removed by the establishment of a branch of the British India Steam Navigation Company. He believed that honest Scotch philanthropy had been at the bottom of it all. Mr. Mackinnon and the gentlemen associated with him were determined to back up what Livingstone had begun, and acted not so much with a view to profit as to aid that part of Africa, and the result was that whereas it used to take six months to communicate with Zanzibar, letters could now be received in less than three weeks. Some few years ago it was difficult even to make people believe in the existence of the slave trade and all its horrors in that region, but now by degrees a most wholesome alteration in opinion was taking place, and Her Majesty's Consul-General said that the slave trade had been paralysed along that coast in the most extraordinary way. In fact, the slave trade by sea was stopped; but unhappily, there was a chance of its being renewed, in a way which, if it were not checked, would certainly arouse popular clamour when it was mentioned in the House of Commons. The Sultan of Zanzibar, who apparently stood to lose everything by the abolition of the slave trade, was now most honourably and thoroughly desirous of putting a stop to it, as he (the Chairman) had been convinced on evidence brought before him by those who knew the Sultan best, in opposition to his preconceived opinions. The fact was the Sultan saw that it was better for him to have the British for friends than enemies, and he was *bona fide* desirous of carrying out the treaty which he had signed. The difficulties now lay not with him, but with the Government at home and the Crown lawyers, as had been plainly shown by a naval officer in a paper printed in the *Independent*, but which was about to be reprinted in a separate form by Messrs. Longmans. The subject required thorough investigation, and he hoped it would not be lost sight of. But though both the Khedive of Egypt and the Sultan of Zanzibar were thoroughly desirous of improving the moral and material condition of their people, they could not go much farther down the coast without coming to a halt. The Portuguese had in this region a set of subjects and colonists who had been a disgrace to their name, who had always been the greatest slave dealers, and had proved a veritable curse to the east coast. They had now taken advantage of what was going on in the north, and seeing that the coast line of the Sultan of Zanzibar was secured by English cruisers, they were supplying the demand for slaves in Madagascar with greater activity than ever. There would be no excuse for the Portuguese if this went on, because communication was now easy, and there was no reason why intelligent active governors should not be sent there, who would make themselves acquainted with what went on, and who, if they were sincere, could put a stop to the slave trade much more easily than the Sultan of Zanzibar. He hoped, therefore, that an appeal would be made to the intelligence, humanity, and Christianity of the ruler of Portugal, and that this great blot would soon pass away. If not, it would bring its own scourge with it, and Portugal would yet have a heavy price to pay for lagging behind in the onward march of civilisation, and for placing a stumbling block in the way of all that concerned our common humanity. Going further south yet, we again met with a state of things which savoured of improvement and advance. Ten years ago no one could have pictured to himself twenty-one thousand Europeans quartered in one of the most barren parts of Southern Africa, but such was now the case, owing to the diamond discoveries; and men were led by a hand, which certainly led them for good, into the interior of the country, where they settled down to gain their livelihood, and to draw after them many other relatives and friends. The discovery of gold had always been looked forward to by those who knew anything of that region. The Portuguese had worked—unsteadily, as they always did—at the gold fields on the south of the Zambesi, and everyone who had travelled amongst the natives knew that there were gold deposits. He himself had never met with a native north of the Zambesi who did not know what gold was, and the native name for it, and he had always foretold that some day these discoveries would be made. It was a problem which no one could solve, but it certainly seemed, as if in the providence of God, the most sterile and dangerous parts of the world had a sudden interest attracted towards them beyond discoveries. For many long years Africa had been left to herself, but now this growing rushing tide of European life was drawn towards her, which he trusted would result in the good of the people. No doubt it would not be an unmixed good, but surely it was not too much to hope that in the great immigration of those who thirsted for gold, there must at all events be one true golden view of something like honesty, something like an Englishman's feeling toward the oppressed, by which these poor people would by-and-bye profit. Looking down the east coast from north to south, there was a new life going on, a new interest excited, a new thirst aroused to know more of this wonderful continent. To some extent this progress was impeded—it was like a ship making headway against the stream, but it was sure. No one could be brought in contact with these natives, but must feel that there was something strange before him; perhaps the fears of childhood with regard to a negro were almost engraved in human nature, and it was almost too hard a task to make the English people take an interest in them, and long to help them, but by degrees this feeling seemed to be giving way, and the desire to know more of them and to help them was gaining ground daily. No one could help a feeling of despondency at the news of Livingstone's death, but it had always struck him as being most significant that on the very evening of the day when the sad intelligence arrived, Colonel Gordon took his departure from this country, and he was betraying no trust in saying that no man ever left England more determined to do good for these tribes or to sacrifice his life, if need

be, to aid them, than Colonel Gordon. Indeed, he was the personification of all that was wanted for the work he had undertaken, and he was sure that he would not now withdraw from these native Africans the aid which had been given them first of all by Mackenzie and Livingstone. If he could indulge his own feelings he should have liked to give a more detailed account of what Livingstone had done, but he had been asked to do this on another occasion in the form of a paper, wherein he could more fully convey that which struck him with regard to his wonderful career. He would only now say that there were already three missionary enterprises on foot, and that three parties, in the course of a few months, would be all wending their way to the district of Lake Nyassa, to the head waters which communicated with the Zambesi, the great highway into the eastern part of Africa. He believed there was a design in all this, and that there was a bright day coming for Africa, and he trusted that his auditors would not only give their attention to that which was looming in the future, but that all who came there to listen to what was detailed by the friends of Africa, would not only do so with deepening interest, but would go on one stage farther, and try, by their personal exertions and influence, to push forward the good work, until that continent which had been covered with such a deep curtain of darkness, might yet prove to be worthy of the beautiful world in which it was placed.

Dr. MANN then read the following paper by Mr. Shepstone:—

THE EARLY HISTORY OF THE ZULU-KAFIR RACE OF SOUTH-EASTERN AFRICA.

By Theophilus Shepstone,

Secretary for Native Affairs in the Colony of Natal.

The last 80 years' history of the colony of Natal shows more wonderful changes than we could well imagine, if we tried to invent a probable, or even a possible story, for our own amusement.

The "ups and downs" in the fortunes, not of individuals only, but of whole communities and populations, and the revolution in the social as well as in the political condition, which each change caused, are so wonderfully strange, as well as complete, that it would be difficult to find a country which could furnish a true story of itself so full of vicissitudes as Natal.

Ten, or at most twenty years more, will deprive us of the testimony of nearly all the few remaining eye-witnesses of the earlier of those exciting scenes which thus revolutionised the country. The particulars of the short sketch I propose to give you have been gathered from those eye-witnesses, and I believe them to be almost as correct as in the nature of the case it is now possible to make them.

It is necessary that I should first describe, as shortly as possible, the different phases of condition through which the inhabitants of this country have passed since 1812, for it was about that year that the great disturbance of their ancient comfortable mode of life commenced.

I shall endeavour to trace the causes which led to that disturbance, and its consequences, and in doing this I shall be obliged to take a glance at what is now called Zulu-land, for it was there, towards the close of the last century, that domestic events in a chief's family gave the first small impulse to the movement; and it is one of the most curious points in our wild story, that this impulse was to receive its strength and direction from such civilisation as then existed in the Cape Colony, before it could so rudely influence, as it afterwards did, the destiny, not of Natal only, but of the whole of South-Eastern Africa.

Up to about the year 1812, then, and for how many centuries before we cannot now tell, this country was thickly populated by numerous tribes, under independent chiefs. These tribes lived so close together, that tribal change of residence was difficult, if not impossible. They intermarried with each other—possessed flocks and herds—lived in ease and plenty themselves, and at peace with their neighbours; until this luxury occasionally culminated in a periodical quarrel (as is the natural tendency, the natives say, in all that grows fat), and this quarrel was settled by a periodical fight, but those fights were then by no means such serious matters as they afterwards became. In those days armies never slept in the open, *i.e.*, away from their homes. The day was fixed beforehand, the men of the rival tribes met in battle on that day, and the result of the single encounter decided the quarrel. The few old men still living, who lived then, delight to tell how that in those good old times they did not fight to shed blood, or burn houses, or capture cattle, or destroy each other, but to settle a quarrel, and see which was the strongest; how that their women looked on while the men fought; that prisoners taken in battle were not killed, but kept till ransomed; and especially how that many a young warrior, when the day's strife was over, would hand his shield and assegai to a companion to take home for him, that he might accompany his late foes, to renew his vows to some daughter of the rival tribe. For then, unlike later times, they will touchingly add, "The sun that saw tribes fight never set till their quarrel was ended." But although their relations with each other, as tribes, were so simple, and the opposite of aggressive, there was always imminent danger of one ground of quarrel arising, which aroused every feeling of animosity, occasionally split up tribes, and caused more bloodshed, and the exhibition of more ferocity, in one year, than all their punctilious tribal battles did perhaps in ten. I mean quarrels between relations for succession to the chieftainship, in which sections of the tribe took opposite sides. This is certainly not changed in our experience of human nature, exhibited either in clans or families; but from the account of these quarrels, they seem to have been kept up with such persevering malevolence as to suggest an explanation to what we ourselves experienced in our contact with these people, *i.e.*, that strong attachment to individuals and families which makes them earnest partisans; and that wonderful respect for, and devotion to, any person of whose duly constituted authority they are sufficiently convinced, which makes them obedient subjects.

We see, then, that with the exception of family quarrels, these people were unwarlike and harmless, and lived in happiness and contentment with each other. Then, as now, the seasons favoured the high lands one year, and the low the next, and interchange of commodities for food went on, as it still continues to do, between the inhabitants of the two different classes of country, and friendly relations between tribes were the rule.

Such was the general condition of perhaps a million souls in what is now the colony of Natal,

up to the year 1812, when the first or quiet phase of their history closes. Time will not admit of my entering into the detail of their social condition, such as their belief in witchcraft, and its effects, with other matters, which, although sufficiently interesting, are not necessary in so short a sketch as this of their general history.

In this year (1812) these people saw the first fruits of a single seed of knowledge, sown in the mind of a lonely fugitive, perhaps twenty years before; although sown to the westward of the great Fish River in the Cape Colony, it germinated to the north of the Tugela. And the fruit of this first lesson in civilisation was sad enough, for it inaugurated the second or turbulent phase of their history. It inspired one among the many tribes in that region (north of the Tugela), which were then living in almost the same circumstances and condition as those in this country, with a military spirit, and caused it to introduce a military organisation. This change soon developed itself still further, and became aggressive, so that the neighbouring tribes were compelled to adopt the new system also. But for some time wars, although more frequent, were carried on under more or less observance of the old rules. Tribes were not at first destroyed, although conquered. It was not until this new mode of warfare was directed by the sanguinary genius of Chaka, that extermination, as far as possible, followed every conquest. So great was the terror caused by this policy, that tribe after tribe gave way before him, and forced themselves through their weaker neighbours, whose feeble resistance they easily overcame. Several powerful tribes were driven in this way to force their retreat through what is now Natal. In vain did the inhabitants combine to resist; although numerous enough, they were undisciplined, and unused to earnest fighting; so they were easily defeated, and some of them carried to the south by the tribes they had attempted to oppose.

I have mentioned the year 1812 as the date when the second, or turbulent phase of their history commenced, because it was about that year that the first of these large tribes entered this country on their retreat from Zulu-land, through the present division of Newcastle, whose inhabitants were not only defeated, but plundered and scattered, and became in turn aggressors upon their weaker neighbours. This was the first actual experience they had of the great coming change. From the date of that event, wave after wave of desolation swept over the land, in the shape of retiring tribes, carrying all before them, in the attempt to place as great a distance as possible between themselves and the universal enemy Chaka. The alarm and demoralization caused by the passage of these foreign bodies through such a people as then inhabited Natal, can be better imagined than described. But it is difficult for us to imagine even their full effect. The instinct of self-preservation, stimulated by terror, turned friends into foes, lifted every man's hand against his neighbour; and justified every treachery and atrocity hitherto unknown among them. But it was not by fugitive tribes only that such effects were caused—Chaka himself had to finish what they had merely begun. And after clearing away or subjugating the population north of the Tugela, he sent his armies periodically to this side, to ravage a country whose inhabitants were already sufficiently demoralised and spiritless, but who nevertheless possessed an abundance of the means of subsistence. His orders were to spare neither man, woman, nor child, to burn all houses, and destroy all food; and faithfully enough did his men execute those orders. The object, of course, was to render existence impossible within the reach of his arms, except under his rule. He aimed at universal sovereignty. And it was only during the last years of his life that he expressed his willingness to share the world with the white man. Several tribes offered themselves to Chaka as vassals, and were accepted. These afterwards contributed very much to the sufferings of the friends they had deserted. Their knowledge of persons and places enabled them to render much service to the armies of the great exterminator. Year by year did these armies extend the sphere of their operations, until at length they reached the tribes which had retreated through Natal, and established themselves to the south. These were either destroyed or were, for the most part, incorporated by Chaka, or driven upon the Kafirs on the frontier of the Cape Colony, among whom they became a sort of slave property, under the name of Fingoes. It is a strange coincidence that a recent Acting-Lieutenant-Governor, General Bisset, and I, were both present when Sir Benjamin D'Urban, the Governor of the Cape, at the head of a division of the British army, emancipated these very people from their slavery, in the Kafir war of 1835-36; and that in the course of our respective duties we have both had much to do with the measure.

But to return to our own population. Those who still remained in the country—and there were many thousands who did so remain—were by this time reduced to a condition absolutely hopeless and wretched. Naturally the means of subsistence furnished by their cattle and other smaller domestic animals had failed first; for they were eagerly sought after by Chaka's soldiers. Their stores of grain held out longer, but in time they were exhausted also, and as hopelessly as the cattle, for their granaries could not be replenished by cultivation, because cultivation attracted attention, and had therefore to be abandoned. Living in their usual huts, or indeed anywhere, except in rocks and bushy kloofs or glens, was out of the question. To live at all, without their usual food, seemed impossible. Their dogs had long been too weak to help to capture any, and, lean and hungry as they were, had been eaten by their masters. Wild roots were the only means of subsistence within their reach. These were scarce, required much labour to procure, and afforded but slight nourishment after all. No wonder, then, that the country was filled with the dead; and that, as the natives express it, the assegai killed people, but hunger killed the country. No wonder that these victims were left unburied by their emaciated friends, to feed wild animals, and still less that these animals became as much an object of dread as Chaka's warriors. Many poor wretches who could, crawled towards the Tugela to be picked up, as they termed it, by Chaka's haughty vassals. There they could at least get food, whatever the Government might be. Others refused to leave

their country, and preferred meeting the death that seemed to stare them in the face, to submitting to those who had caused them so much misery, and whom they had such small cause to trust.

It seems impossible, that in a cup so brimful of sorrow, space could be found for one additional drop. But it was possible, and that drop was the bitterest of all. In terror of wild beasts, in still greater terror of Chaka's ruthless soldiers and vassals, maddened by hunger, and altogether demoralised by the circumstances which surrounded him, a man conceived the horrible idea of feeding on his fellow man, and at once put it into practice. Starving wretches, in misery equal to his own, rallied round him, and a band of cannibals was soon formed, to be increased by two or three in other parts of the country. These bands hunted for human beings as men hunt for game. Driven first by necessity, they acquired a taste for this revolting practice, and continued it long after the necessity ceased. They had become so formidable that it was not until about the arrival of the first Dutch emigrants in Natal that the last of them were dislodged from the Biggersberg, and driven over the Kahlamba mountains by Dingaan. I have heard many a stirring story of escape from these cannibals, from the lips of those who were captured, and who had themselves listened to discussions as to whether they would eat tender or tough when they were killed.

To such a state of things, then, was this country reduced in the course of less than ten years after the first fugitive tribe entered the Division of Newcastle; and it continued, with little amelioration, until Chaka's policy had absorbed, with few exceptions, the whole of the survivors, and the Zulus actually occupied one-third of what we now know as Natal.

This completes my brief description of what I have called the second or turbulent phase of the history of our natives. To the third belongs the revival of hope, caused by the arrival of the Dutch emigrant farmers, and the establishment of a settled Government in Natal. To this I shall do no more than make an allusion presently.

I have said that all this suffering was caused by a lesson in civilisation learned by a fugitive in the Cape Colony. I must now relate to you a little of the personal history of that fugitive, to show how he came to be in the way to learn such a lesson, and how he applied it. To do this I must go back to the ten years which brought the last century to a close.

One of the most considerable tribes then occupying the country north of the Tugela was that of the Umtetwa. The Zulus were but a small collection of families, tributary to their more powerful neighbour. Jobe was the name of the Umtetwa chief. Warned by the example afforded by family quarrels about the succession in other tribes, he had determined, on the approach of old age, to make arrangements such as he supposed would leave no opening for dispute in his family. The two sons nearest the succession were named Tana and Godongwana. The old chief formally nominated the elder son, Tana, to succeed to the chieftainship at his death, and assigned to him one of the royal kraals as his residence. Had the old man done this and died, the great change we have been considering would most probably not have taken place; and if they had not, Natal could scarcely have become a British colony. But he lived on, to the great disappointment of his ambitious son, until, weary with waiting, the latter formed a plot to destroy his father. The younger brother, Godongwana, was privy to this plot—perhaps its originator. The two brothers lived together. The conspiracy became known, however, to the old chief, and he took immediate and very strong measures to repress it. He ordered the instant execution of both the young men, and sent a force to carry out the order. Special directions were given that the younger should not escape; he was considered the more dangerous of the two. Accordingly, the hut in which the brothers were sleeping was surrounded in the night, and nearly all found in it were put to death. Godongwana, fortunately for himself, succeeded in rushing through his assailants and leaping the outer fence. He did not escape scatheless, however. He was wounded in the back by a barbed assegai, and had to carry it away in his body. Daylight showed Tana, the eldest son, to be among the dead; the younger had escaped. His only chance of life now was to conceal himself. His sister knew he was wounded, for she had heard that the man who had leaped the fence was wounded, and she knew that no one but her brother could take such a leap. She sought for him as few but a sister would seek, and found him the next evening, faint and hungry. She extracted the spear, and ministered to his wants as best she could, told him of the danger of his position, that his father was angry at his escape, and had ordered strict search to be made for him; gave him her own kaross or robe, got a few attendants to accompany him, and bade him depart, with her blessing, until better times should come. At first the young man thought he would stay as near his home as possible, and he tried to linger among neighbouring tribes; but they were all, more or less, subject to his father's influence, and, generally speaking, willing to purchase the old chief's favour at the cost of his son's life. Many attempts were made to destroy him, but failed. I should weary you were I to tell the many stories of miraculous interposition in favour of this young man which are believed by the natives. In some of these the sister's robe is said to be the instrument of his safety; others, some ointment she had given him. But, whatever amount of truth there may be in these stories, it is quite clear that, finding his life so much sought after, he took a dive, no one knew where, and was not heard of for years after. In the meantime, although his people believed him to be dead, his father professed the contrary, and to the last refused to nominate a successor other than his missing son. But on the death of the old man, it became necessary to appoint a successor, and Godongwana's younger brother, of another house, assumed the government of the tribe.

Things went on quietly enough for a while with the Umtetwa tribe. At length strange rumours reached them. It was whispered that Godongwana was still living, and that he intended to return. In due time the fact that he was actually on his way became known. Soon after this followed descriptions of his person, and his mode of travelling; and highly exaggerated these descriptions were. Of course he was handsome, and

looked every inch a chief. But the strange animal he sat upon was the wonder of all men. When it carried him along, no one, at first sight, could say whether it was all man or all beast. It looked as one animal. It had, however, been ascertained, people said, that it was a man sitting upon an animal, and that man was Godongwana, the son of Jobe, chief of the Umtetwa tribe, and that the animal was an "Injomane." What this meant no one could tell, as a horse was as much an object of curiosity to the natives of these parts in those days as a live unicorn would be to us. To give you some idea of the notion these people had of a horse, I will relate an incident which occurred twenty years after the time of which I am now speaking. One of the tribes, now in this colony, had met an expeditionary force from the Cape frontier to the south of the St. John's River. Part of that force was mounted. During the engagement that followed one of the horsemen got separated from his horse, and it ran wildly away. The chief immediately gave orders for every exertion to be made to destroy it. He thought that letting the animal loose was one of the modes of warfare used by the enemy; that it tore men to pieces with its teeth, and stung them to death with its tail. It seemed to them so active an animal that the sooner it was despatched the better. The poor innocent victim of this calumny was of course easily despatched, amidst triumphant yells from the valiant warriors.

You will see, then, that a young chief, returning to the tribe over which he claimed authority, under such circumstances, and sitting upon a horse, would do so with no small prestige in his favour. The reigning brother offered a futile opposition, and lost his life for his pains. Godongwana soon established himself as the rightful chief of the Umtetwa tribe, for (as the natives, in allusion to the scar he received in his leap for life, express it) his wound was his witness. In compliment to his strange history, his name was changed from "Godongwana" to "Dingiswayo," which means "The Wanderer," or "he who was caused to wander." And I shall now speak of him by that name.

It seems that in his travels he had reached the Cape Colony, and must have lived with or entered the service of some colonist. Whether he got his horse honestly or not is a question which must now, I fear, for ever remain unsolved. It was during his stay in the Cape Colony that he acquired the information, or made the observations, which were to effect the great change in his native land and the surrounding countries of which I have just given you a very imperfect idea. He learned the strength of standing armies, the value of discipline and training, as compared with the mobs called armies in his own country. He saw that if he could gain possession of his tribe he could gratify his ambition. He had heard of or seen bodies of civilised soldiers; he had ascertained that they were divided into regiments and companies, with regularly appointed officers, and he thought that all soldiers were bachelors. He had no sooner got possession of power than he set to work to organise his tribe in accordance with these ideas. He formed all the young men into regiments, with commanders in due subordination to each other, and very soon he had a formidable regular force at his command.

To possess such a force, and to use it, seems to have been a necessary consequence with such a man, and he was not long in making the trial. As might be expected, no tribe could withstand the attacks of his army, newly formed though it was. But he was neither blood-thirsty nor avaricious. He fought to conquer, and to show his superiority, caring little for capturing cattle. He forbade the destruction of women and children. The great test of victory in his mind seemed to be the power of feeding his army on the grain stores of the conquered. "Let the weak man sow, and the strong man reap" was his motto. It is said that he always halted his army until the enemy's corn was exhausted. But his opponents usually tendered their submission, and re-occupied their country as Dingiswayo's vassals the moment he withdrew his forces; so that he never destroyed, or permanently dispersed any people with whom he went to war.

But the surrounding tribes had already, in self-defence, adopted the new military system, and Dingiswayo, not calculating the effect of this on his neighbours, eventually himself fell a victim to the organisation he had introduced. He was taken prisoner when in advance of his main body with a small guard, and put to death by a chief who had often been his prisoner before, and whom he had as often released, in deference to his grey hairs; for, said Dingiswayo, "he was the companion of my father." But it must be said, in excuse for this old chief, that it was his great wife—a lady whose head was much larger than her heart—who insisted on the execution of her husband's generous enemy.

Dingiswayo was the introducer only of the novel war system, but the man who caused it to make such an impression on the country must be now briefly spoken of, to render this sketch intelligible.

Senzangakona, chief of the small tributary Zulu tribe, had an illegitimate son, named Chaka. The young man was energetic and talented, and, like many such young men, assumed airs which did not quite suit his position, and were offensive to his father's family. In consequence of their hostility, he and his mother were compelled to flee for their lives. They took refuge with Dingiswayo not long after that chief had succeeded in organising his army. Chaka entered one of Dingiswayo's regiments as a private soldier, and was present with it in all that chief's expeditions. His gallant conduct soon won for him a great reputation as a soldier. He narrowly watched his master's policy of forbearance and its consequences, and disapproved of it, because he thought it would lead to dangerous combinations against the supreme chief. In his opinion the only safe plan was to inflict such an injury as would thoroughly disorganise, if not destroy. Hence, when he acquired power, he adopted the uncompromising system which raised the Zulu name to such renown in South Africa.

When Chaka had served long enough in Dingiswayo's army to understand the system it was based upon, and to mark its defects, his father, Senzangakona, died. Chaka was of course not entitled to the succession, for there were other sons whose claims were superior. But in deference to their supreme chief, the tribe submitted the question to be decided by Dingis-

wayo, and he being convinced, not only of his young soldier protégé's ability, but, of what was of far greater consequence, his loyalty to himself, appointed Chaka chief over the Zulu tribe, at that time weak, tributary, and insignificant.

Up to the death of Dingiswayo, Chaka always faithfully co-operated with his old master, and it was the result of a combined movement by these two chiefs that drove the powerful tribe on its retreat, to enter the present division of Newcastle about 1812, as already mentioned. And thus was caused the first shock felt by the doomed but unsuspecting inhabitants of this land.

All the troubles which followed, and which I have very imperfectly described, were caused by Chaka alone. His genius overbore all opposition, and he died within the territory which now constitutes this colony, on the 23rd September, 1828, undisputed sovereign of all South-Eastern Africa, from the St. John's River on the south, to King George's River on the north; including a large portion of what now forms the Orange Free State, and the Transvaal Republic, as well as the tribe and territory of his old master and patron, Dingiswayo.

This brings us to times to ascertain the history of which we have more or less of documentary evidence to refer to, I shall not, therefore, trespass upon them. I have selected the period embraced in this sketch, because it is of necessity less known than that on which books have been published, and because the tale of its occurrences, however imperfectly I have told it, may teach us valuable lessons,

I wish, in conclusion, to present a kind of analysis of this history; and you must be good enough to bear in mind that it relates to a period scarcely extending back sixty years from this date. It shows three phases, representing three conditions, as opposite, each to the other two, in most respects, as it is possible for any nation to be.

In the first, we have simple, primitive, unalloyed barbarism, unmitigated, as well as untainted, by any trace of civilisation. Under this condition, which probably had lasted for centuries, the people enjoyed peace, prosperity, and plenty.

In the second, we have the same barbarism, the same people, and the same country; but we have also added to these a dash of civilisation—a stray, but not very incorrect, notion of one of its practices, which poisoned all enjoyment, cut off all that sustains life, turned thousands of square miles into literally a howling wilderness, shed rivers of blood, annihilated whole communities, turned the members of others into cannibals, and caused miseries and sufferings the full extent of which can now never be known, and which, if even known, could not be told.

In the third, we see civilisation no longer represented only by a mere notion or idea, but in its living bodily form protecting and ameliorating the condition of the remnants of this wreck. Where, a few years ago, so dreadful a storm of human passion and violence raged, we now see a British colony, with its quiet farms, its representative institutions, its Christianity, its electric telegraph, and its little railroads; and we see also its inhabitants occasionally discussing the most advanced topics of the most enlightened civilisation of the age. When we realise the idea that these three great changes have all taken place in the country we live in, during the short compass of less than a man's lifetime, we shall understand and wonder at the fearful rapidity with which revolutions sometimes overwhelm a people; and we shall wonder still more when we contemplate the apparently trivial events from which such momentous consequences have sprung—events which, if calculated according to the ordinary doctrine of chances, would have stood at one hundred to one against occurring at all. But trivial as they were in themselves, they have already influenced the destiny of thousands, and have, in my opinion, contributed in no small degree to the planting of civilisation in this land for some wise and beneficent purpose, which I sincerely hope may be faithfully fulfilled.

ADDITIONAL NOTE ON THE KAFIRS OF NATAL.

By Robert James Mann, M.D., F.R.G.S.,
Late Superintendent of Education in the Colony of Natal.

The interesting memorandum, by Mr. Shepstone, which I have communicated to the African Section of the Society, relates to a period included between the years 1785 and 1828. The colony of Natal, which is now the centre of the region alluded to in this narrative, and which is essentially the gate by which civilising influences are flowing in to the native tribes of this part of the African continent, is not a large State. It is a mere strip of land, about one-third the size of England, between the Drakenberg range of mountains and the sea, and looking out by its seaward slopes upon the Indian Ocean. The Natal territory begins at the River Umtamfumé, nearly 800 miles beyond the Cape of Good Hope, up towards the Indian Ocean, and leads along the seaboard for about 150 miles. The seacoast lies between the 29th and 32nd parallel of south latitude, but the territory extends inland along the 30th meridian of east longitude to a distance of about 250 miles, being at that northern point not more than 220 miles away from the southern tropic. The capital Pietermaritzburg stands in same parallel of latitude that Grand Cairo occupies on the other side of the equator.

This part of Africa, it will be remembered, was discovered by the renowned Portuguese navigator, Vasco de Gama, at the end of the year 1497. He made the land suddenly while beating up to the India Sea, towards Hindostan. It is not certainly known which part of the coast it was that he first sighted, but it was certainly some part that now lies within the colonial territory. Tradition marks the beautiful inlet of smooth land-locked water, which at this time forms the harbour of the colony, as having been the Christmas-day haven of the old seaman, and the land has hence been named the "Land of the Nativity." Scarcely anything beyond the fact of its geographical existence was, however, known for another two centuries and a quarter after its discovery.

In the year 1823 an officer of the Royal Marines, who had been engaged in surveying the African Coast, repeated the action of the Portuguese navigator. He paid a passing visit to the Bay of Natal, and was so favourably impressed with its

aspect, that when he returned to the Cape of Good Hope he proposed to occupy it as a trading station. The Government at the Cape declined to have anything to do with the scheme, but Lieutenant Farewell managed to interest about 20 individuals in his plans, and with the personal co-operation of Mr. Foynn, but recently well known as one of the earliest English settlers in Natal, he returned to the Bay, and established himself in huts which were erected, as the first lodgment of the expedition, on the exact spot where the market square of the Port of Durban now stands.

Lieutenant Farewell's party landed at the Bay within five years of the termination of the period that is touched by Mr. Shepstone's narrative. The shores of the beautiful Bay and the surrounding hills were at that time virtually destitute of human inhabitants, and the military frontier of the Zulu despotism was fixed some thirty miles further up the coast towards the north-west; but in a position that lies far within what is now known as colonial territory. Chaka had at that time a large military post, or camp, close to the river Umblali, at a spot which is still spoken of as Chaka's kraal, although it is now filled and made musical with the swaying and rustle of the sugar cane of the colonists. Mr. Foynn, the companion of Lieutenant Farewell, has left a very graphic and touching account of the desolate condition of the land at this time. He says that there was not a single native hut or village to be found between the river Tongaat, which was within half a dozen miles of Chaka's military kraal at the Umblali, and the Bay. There were no cattle, no gardens, no growing crops; the entire country was an unoccupied wilderness. Occasionally a few half-starved stragglers were encountered deriving a miserable and precarious subsistence from wild roots and shell-fish. It was the rarest occurrence to see more than two natives together. In the hill regions of the interior some small remnants of the broken tribes, clinging to the fragments of their Lares and Penates, still managed to hold together in concealment in the impenetrable bush, and dragged on a miserable existence, dogging the emissaries of the conqueror from place to place, and occasionally dying of actual starvation. As Mr. Shepstone states, some of these wretched and starving savages actually became cannibals under the pressure of their privations and sufferings. Dogs were commonly eaten, and the hyænas became so daring and fierce from feeding on human flesh that they boldly attacked full-grown men and women, and frequently carried away children.

The English settlers, of course, had to make application to Chaka for permission to establish their operations at the Bay, and a deputation was sent up to his military post at the Umblali for this purpose. The military despot, with most probably a keen eye to the material advantages he might receive from a handful of men, that he could not possibly have any cause to fear, and with perhaps also some memory of the marvellous things he had heard from his old master Dingiswayo, of the doings of this white race, gave at once a ready consent. The wretched and starving stragglers in the surrounding bush, however, began almost immediately to flock in round this nucleus of white men, instinctively impressed with some sense of safeguard and protection from their presence, and this constituted the first germ of the black population of Natal—giving first a voluntary obedience to the white settlers, and subsequently a formal allegiance to the Queen—that has since grown to nearly three hundred thousand people. By a recent investigation, Mr. Shepstone has ascertained that there were no less than ninety-two distinct small tribes residing within the territory which at this time constitutes the colony of Natal, before the invasion of Chaka, and anterior to the period that is spoken of by Mr. Shepstone. The Zulu tribe, that afterwards waxed so mighty and so dread, was no doubt primarily but a small, powerless tribe of the same gentle and unaggressive character. At the present time representatives, and in some sense descendants, of forty-three of the original tribes are to be found in the native districts of the colony; and there are, also, over and above this, seven other tribes that have come in from beyond the borders of the colony, and nine new tribes that have been formed by the Colonial Government by the commingling of the fragments of the old tribes of the district that had been almost exterminated by the raids of Chaka. In all there are now fifty-nine distinct tribes of Natal Kafirs, each with its own separate headman, or chief; but all in orderly subjection to the English Government.

The traveller who goes among these Natal Kafirs in their own locations at the present day, finds them living there very much in the manner in which they lived in the same region before the advent of the white man, and before the invasion of the armed legions of Chaka. They dwell in hemispherical huts of reed and straw, which they enter by crawling on all-fours through a low arched orifice, in some sense resembling the entrance of a bee-hive. These huts are planted in circles on the hill-sides, within a ring-fence of faggots and wattle. With the exception of these thatched hemispheres they have no architecture. In their own reserves they have never attempted to hew a stone or to fashion a brick, although they now continually see their white neighbours doing such things. They remain almost without clothes, and for domestic utensils and implements have little more than the rude sun-baked pots, carved wooden bowls and spoons, and woven grass beer vessels of their forefathers. Their beds are small coarse mats spread upon the ground, their pillows logs of hard wood, and their fireplaces clay hearths formed in the centre of the huts, without any chimneys. They have herds of oxen and flocks of long haired sheep, and of goats, which are looked after by the boys and men, and gardens of cultivated millet and maize, which are tilled by the girls and women. It is exceedingly remarkable that these people, with considerable powers of observation, and much natural aptitude, have, after their dispersion by the aggressions of Chaka, again gathered themselves back into the fold provided for them by civilised protection, with an exact reproduction of their old life of primitive barbarism. Each tribe is again headed by its own patriarch, or chief, who in many instances is the direct descendant of the old ruler. But these several chiefs are now each and all children of Queen Victoria, and living beneath the shadow of her shield. They are still chiefs in the sense that they are looked up to by their people as the traditional heads of the clans, and with authority to settle petty

disputes, and to punish petty offences, but they are also now Lieutenant Chiefs, held responsible to the supreme chief, the Lieutenant-Governor of the Colony, for their administration, and all grave matters are referred to the magistrates and judges of the land. They are eminently sociable in their tastes, and clannish in their instincts, and live in close intercommunication and fellowship. They are great talkers, and by means of this talk a certain measure of informal and undesigned education goes on amongst them. The young men are restlesss, impulsive, and noisy, like overgrown children, and some of this impulsiveness takes a form of empty boasting and grotesque displays of marshal ardour of the Bobadil class, which in all probability is the principal legacy that has been left to the race by the traditions of the warlike deeds and days of Chaka, but this juvenile fervour tames down as they reach the years of manhood and maturity. The old men are almost universally sedate, sagacious, shrewd, unswerving in their ready obedience to order and to law, and with a very keen and adequate sense of the advantages they enjoy in being within the pale of a settled and just Government, and of the great fact that they have taken a guarantee in this against any possible return of the old wretched days of spoliation and systematised murder. The indolence of the men, and their disinclination to make any effort in social advance is, no doubt, in a very considerable measure, due to the geniality of the climate, and to the very restricted range of their actual wants, rather than to inherent and ineradicable incapacity.

The Kafirs, as a race, are somewhat below the stature of average Englishmen, and have slim, lithe, and active frames, capable at a push of bearing considerable exertion of a certain class, such as long journeys on foot, although disinclined, as a rule, to sustained labour. Many of the true negro characters are strongly marked in them. They have the woolly hair, the broad noses, and the thick lips, and also much of the docility, the light-heartedness, and the extravagantly grotesque humour of this race. But some higher qualities, which the negro does not possess, are superadded to these. They have on the whole a finer physical development—more gracefully and lightly sculptured limbs, a higher cerebral organisation, and greater natural shrewdness and sagacity. It is most probable that they are a fusion of the negro stock with a race that has originally come down from the highlands of Abyssinia, and passed through the equatorial tribes, mingling with them, and sending forth a mixed race of their common descendants towards the south. Mr. Palgrave's description of the Kahtame Arabs of the south-eastern districts of the Arabian peninsula, whom he believes to have originally come from the highlands of Abyssinia, and to be quite distinct from the Ismaelitic Arabs of the north-west of the peninsula, very forcibly recalls many of the peculiar characteristics of the Natal Kafirs, and it is worthy of note that he speaks of one of the peculiarities of the Kahtanic Arabs as being a readiness to fuse with the negro tribes. Among the Kafirs of Natal there is sometimes more of the one of these forms of physical organisation and sometimes more of the other, presented to observation. Even in the same family the projecting jaw, the long head, and the broad flat nose of the negro are sometimes seen side by side with the sharp features, the thin lips, the projecting nose, and the upright head and prominent square forehead of the higher and nobler type. In these instances it is sometimes the negro element and sometimes the Arab element of the organisation that seems to crop out. It is a fact well recognised by ethnologists that the true negro characteristics are in a state of mitigation, if not in abeyance, towards the eastern borders of the vast African continent. The great source of this mitigation may therefore very naturally be looked for far up along those eastern borders of the sea-girt land, and it is precisely there in the high regions of the eastern coast that the Abyssinian cradle of the Kahtanic Arab is found by the adventurous explorer.

The Chairman said that the Zulus, who had been so well described with regard to their military organisation, had played a great part in Africa, and he believed they would continue to do so for many years to come. He quite concurred in the view expressed by Dr. Mann, that they originally came from the north, but there was now a partial reflex action going on, and some of them were making their way back again. A party of them crossed the Zambesi in 1859, and, profiting by their military discipline, had formed themselves into a tribe which was devastating a great part of Eastern Africa. These were the people who were mentioned by Livingstone as the Masitu; they massacred adults in all directions, but enlisted boys of 12 and 14 years of age, and brought them up in their own habits, teaching them to cast off their spears and bows and arrows, and to fight at close quarters. One of their most desperate battles at Dingaan was won by breaking their assegais in two, so that the warriors were obliged to use them as daggers instead of throwing them; and in all ages it had been found that those who could thus fight at close quarters had been more than a match for those who depended on long shots. So it had been with these Masitus; they had completely decimated the tribes on the east and west of Lake Nyasa, on the east side of Lake Tanganyka, and there was great reason to suppose that they extended to the west of it also. He mentioned this to show what good discipline could accomplish, and how easy it would be for a few determined men, with a knowledge of warfare, to form troops and subdue a large country. Englishmen might take a lesson from this, and if something like the Hudson's Bay Company were started in Central Africa, it should be remembered that a few men with a knowledge of European drill and tactics could not only protect themselves, but insist on peace being preserved in their neighbourhood. And he would add, that if there were one thing more than another which Africans understood and appreciated, it was the blessing of peace, and they would always cling to anyone willing to enforce law and order.

Mr. Trelawny Saunders, in proposing a cordial vote of thanks to the Chairman for his interesting address, and for the valuable hints he had thrown out, said that if ever English merchants, who were always lovers of peace, were desirous of establishing themselves in Africa, they must begin by making themselves respected, and show their ability to keep their own ground by means which the natives could appreciate. If they wished to penetrate into the interior they must do so with arms in their hands, not only to peacefully carry on their own pursuits, but to put down lawlessness and establish order. The advocacy of such a system would go far to make Englishmen understand how civilisation might be carried out in Africa, and might induce young men of enterprise, such as those who established the Hudson's Bay and

East India companies, to form some new African company, which should be the beginning of a new era of civilisation in that great country.

Mr. Swanzy, in seconding the resolution, said he had always taken a great interest in the progress of Africa, and he had been very much pleased with the suggestions offered by the Chairman that evening. His experience up to the present time had not been very favourable to African companies, but he did not doubt that a powerful association, well armed, might penetrate into the interior. What they were to do when they got there he did not know, but that was another matter. There was ample scope for trade with the interior, but not on the West Coast, as he had already shown on a former occasion. He should, however, be happy to aid in the formation of a company at any time, and to give them the benefit of such experience as he had gained in a long course of African commerce.

The vote of thanks was carried unanimously.

SEVENTH ORDINARY MEETING.

Wednesday, January 27th, 1875; Captain Sir JOHN HERON MAXWELL, Bart., R.N., in the chair.

The following candidates were proposed for election as members of the Society:—

Arteaga, Rodolfo de, 79, Gower-street, W.C.
Browne, Roland Jay, 3, Hare-court, Temple, E.C.
Cleaver, the Hon. William, 122, Cannon-street, E.C.
Emmott, W. T., Binfield-lodge, Clapham, S.W.
Fox, Colonel A. Lane, Upper Phillimore-gardens, Kensington, W.
Gisborne, Thomas Matthew, 4, Upper St. Germain's-terrace, Blackheath, S.E.
Waugh, John George, 11, South-square, Gray's-inn, W.C.; and Highfields, Crouch-end, N.

The following candidates were balloted for and duly elected members of the Society:—

Haliday, Maj.-Gen. Andrew, United Service Club, S.W.
Hands, Richard Medwin, Coventry.
Higgin, James, F.C.S., 22, Little Peter-street, Gaythorne, Manchester.
Hirst, J. H., 8, Small-street, Bristol.
Lewis, William Henry, Charnleigh, Roath, Cardiff.
Twite, Charles, F.R.G.S., Uuruguay, and 5, Victoria-street, S.W.
Whittem, Thomas Sibley, Wyken Colliery Company, Coventry.

The paper read was—

THE MERCANTILE MARINE OF GREAT BRITAIN.

By Capt. Bedford Pim, R.N., M.P.

In the remarks I am about to make I shall endeavour to place before you, as fully as time will permit—although of necessity I must be at least comparatively brief—the leading features of a subject of the gravest importance and the greatest interest to us all, "The State," that is, "and the Condition, of the Merchant Marine of our Country." Possibly the words I have just spoken to some of you may have appeared strange, and, indeed, exaggerated; but, on a little reflection, I am disposed to believe you will admit my present subject to be, in the highest degree, both important and interesting to us all—to us all, individually as well as collectively, since I shall be able, as I proceed, to show that we are all more or less dependent upon our merchant shipping, not merely for the comforts and the luxuries, but even for the necessaries of everyday life.

The area of these dearly-beloved islands of ours, including the Channel Islands, is about 80 millions of acres. Of this about 50 millions are cultivated for crops, leaving the remaining 30 millions to be accounted for by lands covered with houses and buildings, by gardens and parks, lakes, rivers, roads, bogs, moors, and woods. This 50 millions is altogether insufficient to sustain our great and ever-increasing population, even in the commonest food. In fact, careful calculations show this area of the British Islands to be capable of sustaining about one-fourth only of our population of 32½ millions; and, consequently, that for the sustenance of the remaining 75 per cent. of our people—that is, for at least 24 of our 32½ millions—we have to depend upon supplies brought to our shores by merchant shipping from foreign countries.

Seen from the other side, the same great question assumes an aspect such as this:—The imports for the year 1873, in money-value, amounted to £371,287,372, the exports for the same period being £311,004,765. Thus the total value of the cargoes brought into Great Britain and taken out from her in a single year amounted to the vast sum of £682,292,137. In order to accomplish this enormous carrying to and fro of the earth's produce, and of the productions of human industry, shipping having an aggregate tonnage of 6,500,000 tons is employed by us. Or, estimating each sailing-ship at an average of 240 tons, and each steamer at 400 tons, 2,500 steamers and 22,000 sailing-ships, making a grand total of 24,500 vessels, engaged in conducting this indeed mighty commerce.

Again, allowing for each 100 tons of sailing-ships three men, and for each 100 tons of steamers five men, the services of no less than 200,000 seamen would be required.

The cargoes thus conveyed to us on this gigantic scale, year by year, very largely consist of various articles of food and clothing, necessary for health and happiness. On the other hand, the exports represent our national industry and enterprise, or, in other words, they exemplify our national wealth.

The amount of our imports and exports, therefore, is clearly seen to materially affect the personal interests of all classes of our national community, from the highest to the lowest in the land,—and this, not as a matter of wealth only, but as bearing directly upon the primary and vital question of our very existence. And so, considering the intimate connection existing between our imports and exports and our merchant shipping, I do not hesitate to assume your hearty assent to my proposition, that the "state and condition of our merchant marine" very closely touches the health, the wealth, and the happiness of every individual of ourselves now here present, of every other individual also of our fellow countrymen and countrywomen through the length and breadth of these realms.

If this be true, as certainly most true it is, how great and imperative must be the necessity—not to say, the duty—incumbent upon us, by every

possible legitimate means, to promote the expansion as well in numbers as in efficiency both of our merchant ships and of the sailors who man them.

Now, under what aspect and in what form does this great matter really present itself to us? To such an inquiry the answer is as simple and plain as it is both startling and lamentable. Since the repeal of the Navigation Laws in 1849, just one-quarter of a century ago, the marine carrying trade of this vast commerce has gradually been melting away from our flag, and falling into the hands of other nations. Indeed, at the period of the commencement of the great Civil War in the United States, in April, 1861, matters looked dark indeed for us, our Transatlantic kinsmen having then absorbed a very large proportion of the marine carrying trade of the world. At that time the tonnage of American merchant shipping was about equal to our own. One effect of the American Civil War, however, was to throw the United States completely into the background in respect to their merchant shipping. And yet, notwithstanding the approximate extinction of that once formidable rivalry, at the present moment a very large proportion of our own commerce is carried in foreign bottoms. Had it not been for the American Civil War, it would be difficult indeed to say to what condition our merchant service before the time now present might have been reduced; so that in this case, at all events, we have an illustration of no common magnitude of the saying, "It is an ill wind that blows good to nobody."

It is not my purpose even to attempt to deal with the policy of abrogating the Navigation Laws in 1849. That measure is in itself a matter involving many and intricate questions closely affecting our national domestic economy. It also continues to be in so complicated a position that, at any rate on the present occasion, I shall not pause even to cross the threshold of the subject. Instead of this, I am content to point out that, all competition notwithstanding, the amount of our national tonnage still retains very respectable comparative proportions, though, perhaps, not all that could be desired when looking at our essentially maritime position, to our dependence upon ships and sailors, and to the rapid increase of our population. Our tonnage is equal to that of three other countries of Europe—France, Holland, Norway—and that of the United States. I have computed that at the end of last year, exclusive of river steamers, England possessed—

	Numbers.
Sailing ships	22,000
Steam ships	2,500
	Tonnage.
Sailing ships	5,300,000
Steam ships	1,200,000
	Sailors.
Sailing ships	150,000
Steam ships	50,000
Total	200,000
Deduct *known* foreign sailors	25,000
Total	175,000

From this general sketch you will be enabled, I hope, to form some idea of the extent, as also of the range, of our mercantile marine resources.

I will now proceed to discuss the state and condition of the merchant navy of Great Britain. That I may be enabled to do this in order and with the greater clearness, I propose to divide the subject into two parts:—The first part I shall devote to the men; and the second part will deal with the ships.

SEAMEN.

As I have already stated, in our sailing-ships and steamers, exclusive of river-boats, there are employed not less than 200,000 seamen. Of that number three-fourths serve in sailing-ships, and the remaining one-fourth in steamers. Of this 200,000 seamen, a very large proportion, amounting to about 25,000, or one-eighth of the entire number, are *known* to be foreigners; but, by persons who are well qualified to form an accurate judgment on this subject, I have been informed that the foreign sailors in our ships in reality exceed even 50,000 in number, since now-a-days men are shipped without questioning; and, in very many cases, almost the entire crews of ships sailing under our flag are composed of foreigners. I have reason to believe that an English ship sailed from our shores the other day without a single English-born subject belonging to her; and certain it is that, at the shipping ports, notices to the following effect are far from infrequent:—"Wanted, a few hands—foreigners preferred." Foreign sailors, I may observe, are to be had comparatively cheap.

If we assume that 150,000 British-born seamen are to be found in our merchant service—this surely is a sufficiently large number of men, probably a larger number than belong to any other trade in the kingdom—to make an inquiry into their condition a matter of great interest. It is to the condition of these men that I desire to invite attention, not at all after a sensational fashion, but in the calm dispassionate spirit of a man who has served in the merchant navy, who naturally takes a deep interest in its welfare, and who has had more or less intimate experience of it for upwards of 30 years; who, moreover, is deeply impressed with the grave national importance of this subject, and also of the absolute necessity for a searching inquiry into the entire organisation, or rather the total disorganisation of this invaluable class of men. In proof of the urgent need for such searching inquiry, it cannot be denied that our merchant sailors are less understood than any other class of working men in the United Kingdom. Were it not so, the existence of the following facts would have been impossible:—

1. That the sailor is ill-used.
2. That he is inadequately paid.
3. That he is badly fed and housed.
4. That his life—a life of continued exposure and hardship—is rendered the less endurable by systematic neglect; and that he is altogether worse off than the members of any other class of his fellow-subjects, not even excepting the denizens of our prisons.

As a consequence of these facts, and a long course of neglect, it has been conclusively shown that, on the whole, and with certain noble exceptions, the merchant sailor of to-day is not the same personage he was less than a generation ago. "The Committee of Inquiry into the Condition of our Seamen" have investigated this matter exhaustively; and their

report states, that from a large number of replies to pratical inquiries, they find 89 per cent. of such replies agreeing in the opinion that the sailors in the merchant service—as a general rule—have deteriorated as seamen; 65 per cent. of these same replies agree in like manner in the conviction that they have deteriorated in physical condition; and 71 per cent. of the same replies are unanimous in considering him to have deteriorated in subordination.

Now listen to what the merchant sailor says of himself. Take the north-eastern ports, for example, in which, of all parts of Great Britain, the men naturally and justly might expect steady employment and good treatment. They say, "we sailors (skilled workmen as we are, and valuable ones) gladly take any employment on shore, where even the farm labourer, although he runs no risk of life and limb, gets better paid."

So much for what the north country seamen say of their present condition, and what they say speaks plainly and direct to the point, needing no comment to explain, no argument to enforce their words; but let us look to other points of the compass. The petition which I now will read to you—a document plain, clear, and conclusive—and which in a few days I shall have the honour to bring before the House of Commons, emanates from seamen representing, not the northern ports alone, but also the southern, the eastern, and the western.

To the Honourable the Commons of Great Britain and Ireland, in Parliament assembled.

The humble petition of the undersigned mariners respectfully showeth:—

First.—That in the opinion of your petitioners, founded upon their own experience, the men employed in the British Mercantile Marine Service are subject to great disadvantages, which can only be remedied by practical legislation.

Second.—That the present way in which ships' articles are drawn up is arbitrary, and productive of inconvenience and injustice, and that advantage is taken of the articles to bind seamen to other duties than those which properly belong to them on board ship, and to membership in "benefit societies," which have no natural relation to the purpose for which articles of agreement were designed by your Honourable House.

Third.—That it would conduce to the welfare of the mariners and the interest of owners of ships, if, at the time of signing articles, it were made compulsory upon owners to give any mariner who required it an allotment note for two-thirds of his pay payable monthly, for the support of his family or relations, and that it would tend to diminish the evils that arise from the present system of advance notes.

Fourth.—That in the opinion of your petitioners it is undesirable and unjust that a mariner who fails to comply with the articles of agreement is punished criminally, while he is compelled to take costly and tedious civil remedies against an employer who fails on his part.

Fifth.—That the laws and regulations with respect to the supply of food to mariners are in many cases evaded or defied by owners or masters; that quantity is deficient, the quality inferior, and that no inspection of food is provided or enforced.

Sixth.—That under the present system so much time elapses between the discharge of crews and their being paid off that much suffering and immorality arises therefrom. That wages should be paid within forty-eight hours after the termination of the voyage, and any further delay should count two days for one in favour of the mariner.

Seventh.—That in the opinion of your petitioners it would be a great advantage to owners, masters, and seamen, and the nation at large, if seamen were required to pass a practical examination in seamanship before being allowed to sign as an "A.B.," and that it should be made penal on the part of the master or other person to engage uncertificated men, and that the apprentice system should be restored, and it should be made compulsory upon owners to carry a number of apprentices in their ships according to their size and tonnage.

Eighth.—That great inconvenience and injury result to the mercantile interests of the kingdom from the large and increasing employment of foreigners and Lascars in British ships. That within the last few years the proportion of foreigners to British seamen much exceeds that of one quarter of the whole.

Ninth.—That a serious evil arises from the shipping of foreigners, generally the outcasts of their country, from the amount of disease they introduce on board ship in spite of the beneficial working of the Contagious Diseases Acts. Your petitioners therefore pray your Honourable House to so legislate that a compulsory medical examination of seamen shall take place before the crew will be allowed to sail in any ship under the British flag.

Tenth.—That great abuses have crept into the present system of shipping seamen at the various shipping offices in the United Kingdom which require the attention of the Legislature, and especially in regard to large companies.

Eleventh.—That, in the opinion of your petitioners, great abuses do exist by the practice of shipmasters charging interest upon moneys that may be advanced out of seamen's own wages.

Twelfth.—That the berthing accommodation at present alloted to sailors is altogether insufficient, and in most cases so disgracefully bad as to call for immediate legislation.

Your petitioners therefore pray your Honourable House to take such steps as shall, in the wisdom of your Honourable House cause the above and other grievancees of the merchant seamen of the United Kingdom to be presently remedied.

And your petitioners will ever pray.

Signed on behalf of the London Seamen's Mutual Protection Society. President, TOM. S. LEMON.
Secretary, A. PETERSEN.

It is not to be supposed that the men are alone in their complaints—their most just complaints—for the officers also seem to be in almost as bad a plight. For instance, the Master's Society of Sunderland point out that they "believe the Marine Boards and Courts of Inquiry are not properly constituted to satisfy the ends of justice (considering the difficulties that surround a seaman). They are not aware that any other class of her Majesty's subjects are liable to be deprived of earning a livelihood for errors of judgment, neither are they aware of any class or profession liable to be tried in the same way as masters and mates of the mercantile marine. They do not object to inquiries, but wish that the courts may the more effectually scrutinise and deal out justice. In fine, they wish to be dealt with as other subjects of her Majesty are."

Thus I have endeavoured, unreservedly and in plain words, to lay bare the actual state and condition of our merchant seamen, officers as well as men. Here, then, before passing on to the second part of the subject, in which I shall treat of our ships, I pause in order that I may be enabled briefly to suggest the remedy—or rather the remedies—calculated, in my opinion, at once to check the alarming decline in both the quality and the quantity of British seamen, and which also ultimately may resuscitate, or, perhaps I ought to say create, a powerful body of seamen, better trained, better disciplined, and, as I trust and believe, in every sense better men than ever before were possessed among her priceless treasures by Great Britain.

The first step, a step in every respect of paramount importance, if the regeneration of the national Mercantile Marine is any object to the nation, is the appointment of a responsible head,

whether in the shape of a "Director-General of the Mercantile Marine," or "Commissioners of Maritime Affairs" (of course under the presidency of a "Chief Commissioner"). Whatever arrangement may be held to be most advantageous, and therefore most desirable, thus much is certain—that matters cannot be expected to mend until there exists a member of the Government endowed with ample powers, who is responsible for the conduct and the well-being of our merchant navy. To appoint such an officer, and to make such an appointment immediately, is clearly the duty of the Government.

The next suggestion I desire to make is that Lord Campbell's Act, 9 and 10 Vic., cap. 93, be made to apply as clearly to loss of life at sea as it now does to such cases on land, so that the registered owner or owners—for, as I need scarcely say, no ship should be permitted to sail without a registered responsible owner—might at once be made to answer for any loss of life.

This is an expedient that appears, as indeed it is, extremely simple, as it is expressed in a very few extremely simple words. As in the instance of great inventions, however, so in the gravely important matter under our consideration, the simplicity of the legal provision I have just suggested is one essential element of its value. It would do far more, I am convinced, than any other form of legislation to improve both seamen and ships, because it would imply that ship-owners would take very good care to become personally acquainted with their ships' crews, as well as thoroughly to inspect each one of their ships before allowing her to sail. At present, of all proprietors ship-owners have the least real knowledge of their property, and in like manner they have less acquaintance with the persons who are engaged in their service than any other employers of labour in the kingdom. Strange, and perhaps almost incredible, as it may appear, it is by no means an uncommon case to find owners who never have even seen their ships, and who know no more of the men who serve on board those ships than if they lived in Timbuctoo.

Notwithstanding the fact that this measure would not directly affect the seamen, on a little reflection it becomes obvious that indirectly such a step must tend in more ways than one to their advantage. This much is unquestionably certain: it would ensure that constant contact between owner and men which speedily would bring about a mutually satisfactory, because mutually advantageous, settlement, and it would certainly at once put an end to the odious necessity felt by the Board of Trade of sending detectives to spy out the defects of merchant vessels.

Everyone must feel that the estrangement now so unhappily prevalent can have but one effect, that of aggravating existing evils.

Scarcely less important than either of the preceding, is my third proposal, the medical inspection of seamen—the compulsory medical examination, I mean, as set forth in the ninth clause of the petition I have just read to you, and which, as it is so important, I will repeat here:—

That a serious evil arises from the shipping of foreigners, generally the outcasts of their country, from the amount of disease they introduce on board ship in spite of the beneficial working of the Contagious Diseases Acts. Your petitioners therefore pray your Honourable House to so legislate that a compulsory medical examination of seamen shall take place before the crew will be allowed to sail in any ship under the British flag.

I have no hesitation in saying that no nation in the world treats its sick seamen so utterly disgracefully as we do. Unless they suffer from some accident, or can get a governor's ticket, they may rot in the streets—for all Great Britain cares. How different are these matters managed in other countries, take the United States, for instance. Although competition, scamp-work, and cheap sailing is quite as much practised there as in this country, yet the following extract from the *Lancet* of 9th Jan., 1875, will give some idea of what the American government does:—

THE MARINE HOSPITAL SERVICE OF THE UNITED STATES.

Our Transatlantic neighbours, ahead of us in many things, are most decidedly in advance of the old country in providing for the care of their sick sailors. We have before us a most elaborate and exhaustive report by Dr. John M. Woodworth, the supervising surgeon of the Marine Hospital Service of the United States—an office that was created only about three years ago. The United States Government provides for the care of its sick seamen by the imposition of a tax of 40 cents per month upon every officer and sailor in the mercantile marine serving afloat. This tax not only suffices to afford medical and surgical aid and hospital accommodation to the sick, but a sufficient margin is left to be expended in the building of new hospitals at various ports as they are found to be required. Under present regulations, the hospital tax is collected at the Custom-house in each port, where also the sick sailors apply in the first instance for relief. A medical officer is on duty at the Custom-house, whose function it is to examine the candidates for admission, decide as to their eligibility, and send them off to hospital. The duties of the supervising surgeon (who has his headquarters at Washington) are both numerous and important. He has been charged with the construction of a code of rules and regulations in consonance with the scope and intent of the Act; to advise the establishment of a hospital, and the kind of building that should be erected; to collect, check, and summarise the returns and statistics sent in by his colleagues from the outports; and to direct generally the application of the Marine Hospital Fund for the relief of sick and disabled seamen. Certain revised regulations, which came into force about four years ago, define very clearly the duties of the medical as distinguished from the fiscal department, so that no clashing of officials can well occur. It is not necessary to quote many figures; but we may record, as an evidence of the usefulness and success of the present system, that during the year 1873, 13,529 sick and disabled seamen received medical and surgical aid; 12,697 seamen were maintained in hospital 420,160 days, or an average of about 33 days for each hospital patient; and 832 others, who were suffering from diseases and injuries of a character not requiring treatment in hospital, were relieved as out-patients. The average daily number of patients in hospital throughout the year was 1,151, and the average cost of maintaining and treating each patient was a fraction over 4s. per day. The hospital-tax produced last year £62,170. But the report is not valuable only in a statistical sense. Besides including papers on the natural history of yellow fever in the United States, by Dr. J. M. Toner (briefly noticed in the *Lancet* of the 27th of June last), and some special operations performed in the marine hospital, and on the general condition of the mercantile marine, by Drs. Minor, Ellmwood, Crampton, and Heber Smith, the supervising surgeon has contributed a very valuable article on hospitals and hospital construction, to which numerous sectional and other sketches are appended. It includes, among other useful matter, a detailed account of the proposed marine hospital at San Francisco. Much of the work described has been borrowed from the Herbert and other British hospitals, as detailed by Colonel Douglas Galton in his address on hospital construction. The authorities, however, are all quoted, and the article, as well as the entire report, evinces in its compilation a great deal of care and labour on the part of Dr. Woodworth, who has probably more than enough to do in superintending the details of a service extending (as he remarks) from the

Atlantic to the Pacific, and from the Great Lakes to the Gulf.

The Marine Department of the Board of Trade, and our shipowners all over the kingdom, are now discussing the best means whereby to popularise our own merchant service, now considerably at a discount. Compulsory apprenticeship, training ships, and the abolition of advance notes are all proposed as remedial agents. Would it not be worth while to take a leaf out of the book that we have just briefly noticed, and extend systematically the useful practical work that has been done at Greenwich, for fifty years afloat and now ashore, by the Seamen's Hospital Society?

While by the above simple measures we may wonderfully improve the condition of seamen *at once*, the great question of a future and constant supply of sailors must not be lost sight of, and to this part of my subject I have given close and earnest attention. My proposition is to insert a clause in the Education Act—without which, by the bye, that enactment for practical good is like the play of "Hamlet" without the principal character—extending Industrial Schools to every county in the kingdom, each supplying its quota of boys to a training-ship stationed on the coast as close to the school as possible. In England, Scotland, and Wales we have more than 60 desirable localities for these ships, and 20 at least in Ireland. Now let us assume 200 boys per annum for each ship—and be it remembered that there are upwards of 100,000 pauper boys in England and Wales alone under 16 years of age—we shall then have 16,000 trained and disciplined boys, the exact estimated loss in the merchant service per annum. The way to keep these boys attached to their profession, and, still more, attached to British ships, is an easy problem to solve, but too long to enter upon in any detail on the present occasion. I believe, however, that we have only to see that their lives are ensured, and that a substantial deferred annuity is provided for their old age, and we shall not fail to knit them to their country and their ships.

SHIPS.

That a change, no less palpable than decided, has taken place within the last few years in the form and proportions of our ships no one can well attempt to deny. It is not necessary to be a sailor in order to be led to observe and to note this change. Whoever now-a-days sees a ship is at once struck by her long, low, narrow appearance, commonly eight times her beam in length, often ten times—like the model on the table—and occasionally even eleven times her beam, so unlike the proportions of thirty years ago, when vessels in their length rarely, if ever, exceeded four times their beam. In those days, if well and substantially rigged, fairly fitted out, ably handed, and constructed without reference to "builder's tonnage," our ships were ready to face, and well qualified to surmount, whatever weather they might encounter, without—to use a sea phrase—straining a rope-yarn. These vessels were the result of an experience—an observant practical experience—extending over centuries. At all events with them our ancestors piled up an enormous commerce, at the same time carrying the English flag triumphantly to the uttermost parts of the world. And all this was achieved while the coasts of different countries were badly lighted, and when rocks and shoals, at best, were imperfectly surveyed and buoyed. They had no "Rule of the Road at Sea," whether to guide them faithfully or to mislead them disastrously. Lifeboats were unknown to them, even in their dreams; and of the many advantages now enjoyed by seafaring men, few, if any, in their days had been devised and provided. Notwithstanding disadvantages such as these, however, disadvantages equally affecting both the ships and the sailors of past times, the numbers of wrecks and collisions, with the consequent loss of life—irrespective of the casualties justly distinguished as the act of God—were absolutely insignificant when compared with the frightful, nay appalling, catastrophes which characterise the present day, a daily loss of three or four ships and ten or twelve men.

With antecedents such as these, and with history bringing with it from the past lessons fraught with admonitory suggestions for the future, an inquiry may well be made into the reasons which could have led to the radical change that has taken place in the form and character of our shipping. And the cause for all this—not a good cause, but one essentially bad—is easily discovered in the extreme faultiness of the laws regulating the measurement for tonnage, laws which have been more seriously tampered with, altered, and "amended" (as the legislative patching process is somewhat ironically styled) than any other enactments on the statute-book of this country. The *Moniteur de la Flotte*, the naval organ of our French neighbours, without hesitation, and in so many words, denounces our present tonnage law and the Bill for its amendment as enacting a "legal fraud;" and I myself do not hesitate to say of it, that it is an unjust and oppressive law:—

Extracts translated from an article in the "Moniteur de la Flotte."

"In a few years' time the people will not understand how such an official act as that of the present measurement of vessels could remain so long a legal fraud. And is it not really a fraud, this system of measurement applied by the constituted authorities according to law, and which gives a result hardly equal to *two-thirds of the truth?*

. . . . . .

"Must one think reform hopeless? A fear might exist on that score if one thought only of the *coup de force* of which the Suez Company was the victim, simply because the British Government would not allow the establishing of a maritime taxation founded on true tonnage. It is the characteristic of unjust acts to be obliged constantly to defend themselves. Right is indomitably tenacious; one never knows with what arms it will be provided on the first assault. The exclusive and selfish interest of shipowners has been the bulwark of official tonnage.

. . . . . .

"Take two cases. The first of a steamer of 796 tons of official tonnage, with a cargo of 1,671 tons of pyrites and 500 cases of oranges. The second, of 420 official tonnage, with a cargo of 850 tons of sulphur ore and 1,500 cases of oranges.

. . . . . .

"Statistics show that on an average steamers carry 50 per cent. above their registered official tonnage.

. . . . . .

"Fraud attracts fraud, even if anyone dares to give a legal character to it.

"There is but one solution. Renouncing the admitted error, the legislature ought simply to say that the official tonnage of ships, be they sailing ships, steamers, or packets, shall express the real capacity and the faculty of lading; and that every ton put on board above the official registered tonnage, which would be a dangerous surcharge for the crew, would entail the application of a very severe penalty. This would only be simple, true, and honest. When will this happen?"

When speaking in such strong terms of this law and of its effect upon our mercantile marine, I do not for one moment desire to confine myself to the objections raised by the writer in the *Moniteur de la Flotte*, or to be considered insensible to the existence of a few other dark spots which tarnish the escutcheon of our merchant navy, and to the existence of which but too justly must be assigned the loss of very many valuable lives and the waste of a vast amount of property. Unseaworthy ships and unshipworthy seamen are doubtless, to be found, and found far too frequently under the English flag. Still, I am prepared to assign to the unsafe and unhandy form of steamer now unhappily so prevalent, almost without an exception, the deplorable cases of foundering at sea with which we are now becoming more and more familiar.

But let me bring before you what Sir James Elphinstone, an old sailor, and the member for Portsmouth, has stated on this point in his evidence before the Tonnage Committee :—

"I was coming home from Bombay, in the spring of 1870, in a ship 315 feet long of the new construction."—"She had a flush deck fore and aft."—"We had very bad weather indeed, and I was particularly interested in the behaviour of that ship, because I had never been in a ship so long before, and the action of the sea upon that ship showed me exactly what the action of the sea must be in heavy weather on ships of that length and that description."—"The effect of the sea upon a ship of that sharpness was this, instead of being thrown off, as it was in the old description of ship, the sea ran along the ship's side and fell on board in a mass, either just abaft the chessel-tree or about midships, just in the place where, if she had not been a flush-decked ship, the sea would have tumbled into her, and I attribute the losses of ships of that construction very much to that circumstance. I was on deck the whole time of that gale of wind, and I watched the thing most narrowly, and I was very much interested in seeing the behaviour of the ship. I am quite certain that we should have been in bodily danger if she had not been a flush-deck ship with her hatches battened down. This is one illustration which I think there is a good deal in."

The blame for this condition of things cannot be said to rest entirely with ship-builders, who simply comply to the best of their ability with the requirements of their customers, the shipowners. The shipowners are naturally influenced by a desire to make the largest possible amount of money upon the least possible amount of tonnage, a state of things fostered, if not expressly and directly encouraged by our present tonnage law, which, as I have just shown, by the *Moniteur de la Flotte* is designated a "legal fraud."

At this point it will be well to consider what this term "tonnage" rightly implies, for the question of tonnage of late years has been so overladen with empirical rules and grossly unfair exemptions that confusion and evasion reign supreme. To such an extent, indeed, does this disgraceful and deplorable condition of things prevail—and prevail, you will bear in mind, to the extreme degradation and debasement of the mercantile marine — that a counsel, no less able and eminent than Sir John Karslake, when engaged in a tonnage case at the beginning of last year, in open Court confessed his inability to understand the law; whereupon the judge who presided said that he would *endeavour* to understand it—a confession which conclusively demonstrated the state of the law upon tonnage to be, to say the least, signally unfortunate. But let us refer to the opinions of practical men, delivered in this very room, and to be found in the Transactions of the Institute of Naval Architects.

Transactions of the Institute of Naval Architects. Vol. ix. 1868.

ADMIRAL THE EARL OF HARDWICKE.

"I should not myself recommend that the mode of measuring tonnage according to the British rule should be adopted by all nations. Tonnage, as we use the term, is nothing more than a statement which represents the bulk of the cubic contents of the inside of a ship. By our mode of measurement the divisor is 100, and in stating that 100 cubic feet make a ton, we mean a ton of—what? Do 100 cubic feet make a ton of iron, a ton of lead, a ton of ladies' bonnets, or a ton of what article? Does that convey to you the slightest notion of what the tonnage of a ship is? The word implies the weight-carrying power of a ship, but the mode in which it is adopted gives us nothing of the kind. That, I think, is a great fault.

"If this mode of measurement were adopted by all nations, I should recommend that they should more nearly approach the weight of something than merely taking the number of cubic feet contained in the inside of the hull of a vessel, the divisor of which is 100. I would much rather see some number as a divisor which would give us the notion of some weight which we are accustomed to look at — water, for instance. Why should we not use 33 cubic feet per ton instead of 100?

"Why not approach the weight-carrying power of a ship to the element in which she floats?

"I undoubtedly should take from her all those parts which are employed in her propulsion, and in the means of conducting her safety, and I should be rather inclined to present the ship to the public with all her machinery on board necessary for her propulsion, with her spars and such other weights as are absolutely necessary for her conduct; and then I would place an indelible line along her hull, and then I would have another line above it, which should state to the public what the safety of that ship would be at sea, and then I would call the tonnage of that ship what existed between those two lines. Now that would be intelligible, it would be safe, and it would be useful. You might adopt that in all nations. You might give to all people a thorough knowledge of what they had, and of what they were making use of, and of what they were going to put their cargoes on board of, and of what the safety of their vessels depended upon."

MR. SCOTT RUSSELL.

"If you are to be quite fair, you should allow all the coals as well as all the engine-room. Now there is no making an honest allowance. There is no doing it, because if I want a ship with enormous tonnage to be measured I shall lay out my ship on the first voyage to go all round the world, and then she will get the whole inside of her allowed as room for fuel; and then, if on the next voyage I put her upon a short trip, it is quite plain that the law will have been utterly abused, and we all know how utterly the law is abused when it is possible.

"Lord Hardwicke, as I conceive, only expressed what we all feel—that the true light-line of a ship ought to be a legible quantity, either on the ship's papers, or on the outside of the ship herself. We all agree that the deepest load water-line ought to be a legible line, either on the ship's papers or on the ship herself. We all agree that there are enormous interests—and we often think them not very honest interests—which are opposed to that piece of daylight; but I do believe that for any actual national interest there is nothing so good as daylight, everything above board, and, if possible, everything put into the newspapers. Therefore I would strongly advocate, as the greatest boon that could be conferred upon the interests of this country, an indelible mark of the deep load-line of the ship; and as to the light-line, perhaps that would take care of itself."

MR. HENRY LIGGINS.

"In some cases the system of allowance for tonnage acts very harshly and unjustly; I mean particularly in reference to the allowance to steamers. I speak rather from the deck point of view, which is a point that ought not to be forgotten in coming to any decision on a matter of this vast importance. There are certain allowances, of course, for engine-room space, which seem to be fair and reasonable. But then it may be argued by the dock company, that the

ship that brings comparatively a small amount of cargo ought to pay a proportionately small amount as compared with the tonnage of the ship, and they argue that the steam ship could very well afford to pay for that engine space, which, if it had been a sailing ship, would have been filled with cargo.

"Of course, in a sailing ship the freight earned by the vessel would be, say £2 10s. a ton, whereas in the steamboat, which has brought the cargo at a quicker pace, it may be £7 a ton, and therefore the shipowner who has this large allowance made to him, is really quite as well able to pay the dock company on the whole space, as the sailing ship would be for her whole internal space. Then, again, as to the point about the space for cargo, and the space for the accommodation of the passengers and the crew. It should be remembered that in the large ocean steamers a very large proportion of the crew are really for the comfort of the passengers, who pay a very high charge for the accommodation in the ship which they enjoy, and I think it would be unjust and arbitrary to the dock company to deduct the space occupied by these servants, their sleeping accommodation, and so forth, from the tonnage paid to the dock company. Then it also frequently happens in large steamers that they fill the cabin space in the vessel which is not occupied with passengers, with cargo. I speak thus from my own knowledge, having travelled in the Cunard steamers, and the large Royal West India Mail steamers. I have crossed in the West India steamers, and I have seen in the cabins tobacco, bales of cotton, and so on. I have seen both crew space and passenger space occupied with cargo, and very often the stewards, whose berths were filled with cargo, have lodged in spare passenger cabins. It would, therefore, be a gross injustice to the dock companies to make a large deduction from ships capable of paying a fair and reasonable rate, because their earnings are large in proportion, on account of the excessive freight which they get. I think that in many cases the present system of Tonnage Laws act with great injustice, and require supervision and amendment."

One of the difficulties hitherto experienced in establishing a sound and proper Tonnage-law (though in fact the so-called difficulty has been purely imaginary), in a great degree, has arisen from an unwillingness to grapple effectually with the load-line question. But this very question, which embraces also the height of the vessel's freeboard, and has a most important direct bearing upon the safety of the crew, presses beyond all others for immediate settlement.

Now the true tonnage of a vessel is simply the number of tons of dead weight she is capable of carrying in safety, or her bulk between the light and the load water-lines—*i.e.*, the difference between her light and her load displacements given in tons. This difference used to be very correctly designated as the ship's "burden."

A vessel, with her equipment and crew, will have a certain line of flotation and a certain displacement; and, after taking a full cargo, she will have another and a deeper line of flotation, with a greater displacement; or, so to speak, her own deeper immersion will cause her to impress a deeper hole in the water. The cubic contents of that portion of the vessel contained between these two water-lines, measured externally, will be the same as the number of cubic feet of water which the cargo, by depressing her, has compelled the vessel to force out of its place. As the weight of one cubic foot of water is known, that weight multiplied by the number of cubic feet of water displaced by the greater immersion of the vessel, will give the weight of the volume of the water so displaced; and that weight will be the same as the weight of the cargo, the presence of which caused the displacement in question—that weight I therefore propose should constitute the tonnage of the vessel, since it is the weight, when expressed in tons, of the cargo which she can carry with safety to herself and her crew.

Simple as this statement is, I hope I may be pardoned for giving the following example in illustration of it, since it is the turning point of my present argument. I take a vessel with her complete equipment, but without any cargo, and will consider the whole to weigh 80 tons. I assume her to be afloat, and, accordingly, the line to which on her exterior surface the water rises, I entitle her "light water-line." Now, suppose the water in which this vessel is floating to become solid, so as to retain the impression (or hollow) made by her form when floating, after she had been lifted up and removed; and further suppose this hollow, or impression, so retained to be filled with water. If that water were taken out and weighed it would be found to weigh exactly 80 tons. Again, I now suppose 100 tons of cargo to have been placed on board this vessel, the vessel herself, as before, to be afloat. In this case her deeper immersion, caused by the presence of her cargo, will cause her to make a deeper impression, or a larger hollow, in the water; and the water, rising higher around her exterior, will give her "load water-line." If the former process be repeated, the result of the operation will show a larger hollow, or impression, which will contain exactly 180 tons of water,—or the weight of the water required to fill the larger hollow will exceed the weight of the water required to fill the smaller hollow, by 100 tons, being the exact weight of the vessel's cargo—the exact measure in tons, therefore, of her capacity for carrying cargo, which is her "tonnage." The difference between the two supposed impressions, or the two real displacements, is marked upon the vessel herself by the space between her light and her load water-lines,—as, indeed, I have already said. It, therefore is evident (to repeat what I have just said in another form of words) that whatever weight a vessel may be—whether without a cargo, or with either a full or a partial cargo, that same weight will be identical with the weight of the water it will displace; whence it follows, that the displacement of a vessel with cargo on board, minus her displacement without it, gives the weight of the cargo, or the true tonnage of the vessel.

In former times this principle was well understood, it having been applied so long ago as 1694 by the 6 and 7 of William and Mary (in consequence of "divers new Frauds, Deceits, and Abuses") to the counties of Northumberland and Durham for the measuring and marking of keels; and subsequently it was extended under the 15th George III. to the collier trade at all other ports of Great Britain, in the following terms:—The vessels to "be admeasured by a dead weight of lead or iron, allowing twenty hundred-weight avoirdupois to the ton, and marked and nailed as aforesaid to denote what quantity of coals each will carry up to the mark set thereon." I question if this Act has ever been formally repealed. When this Act was passed, the vessels affected by it were comparatively small. This method of ascertaining their weight-carrying capacity could therefore easily be worked out, and was perfectly correct.

Another Act, differing entirely in principle (6th Geo. I.), was at the same time in force for vessels engaged in the spirit trade; it was enacted by it —"That the following rule shall be observed: (that is to say) take the length of the keel within board (so much as she treads on the ground), and the breadth within board by the midship beam, from plank to plank, and half the breadth for the depth, then multiply the length by the breadth, and that product by the depth, and divide the whole by 94; the quotient will give the true contents of the tonnage."

And this Act for the spirit trade, instead of that for the coal trade, formed the basis of the first general Act (13 Geo. III., c. 74); and later, an additional Act (59 Geo. III., c. 5) was afterwards passed for deducting the length of the engine-room in steam-vessels.

In the year 1821, so great was the dissatisfaction at the state of the law, that a Commission was appointed to investigate the subject; and this Commission reported:—"That there are sufficient reasons for being dissatisfied with the mode of measurement now legally employed, on account of the great occasional variation of its results from the actual proportionate capacities of the ships to be compared." Also, "They would have been desirous of removing all doubt upon the subject by proposing the admeasurement of that portion of the ship which is included between the light and heavy water-lines; but this method has been considered as liable to insuperable objections, on account of the impossibility of ascertaining the position of these lines in a satisfactory manner."

The Commissioners, therefore, recommended another method, which they admitted did not in all cases annihilate the errors; but the Government of the day did not adopt their recommendation.

A consolidation of the Tonnage Acts took place under 3 and 4 Will. IV., c. 55, and a second Commission was appointed in the year 1833, "to consider the best mode of measuring the tonnage of ships." This Commission reported, "That internal measurement will afford the most accurate and convenient method of ascertaining the capacity;" and their recommendation was carried out by an Act of Parliament, the 5 and 6 Will. IV., c. 56, afterwards amended by the 6 and 7 Vic., c. 84, and consolidated by 8 and 9 Vic., c. 89; but affording incorrect results, and being open to evasion, a third Commission was appointed in the year 1849, "for the purpose of inquiring into the defects of the method of measuring ships for tonnage." And this third Commission, determining apparently to be right at last, recommended the very opposite, namely, "that the equitable basis on which charges for dock, light, harbour, and other dues should be made, is that of the entire cubic contents of all vessels measured externally."

This recommendation was, however, unfavourably received by the shipping interest.

And now we have the Merchant Shipping Act, 1854 to 1873, in so far as it relates to the measurement of the tonnage of ships, requiring amendment by a fresh Act; and so it will ever be the case with any measure which departs from fundamental principles, and vainly endeavours to conciliate conflicting interests by enacting arbitrary rules of measurement.

The following list of factors will show at a glance the diversity of rules in force at various times for tonnage admeasurement, and it is worth notice that these very rules vary in their application at different ports under the same Government:—

England (year), 1720	94
" " 1773	94
1st Commission	560
2nd Commission	3500 / 92·4
3rd Commission	·27 / ·002
Present Act and recent Bill	100
France	94
Spain	$41\frac{61}{775}$
Portugal	$57\frac{726}{1000}$ / 96
Naples	94
Norway	$242\frac{1}{2}$
Russia	94
United States	95

As regards our tonnage laws, numerous and imperfect have been our attempts to improve them, or to effect what we have been pleased to regard as improvements in them. The three Commissions specially appointed to investigate and report upon these laws differed widely from one another in their conclusions; and, to my regret, I am constrained to say that the same haziness appears to have prevailed to a most distressing extent in the report of the late Commission at Constantinople, so that, without entering into the merits or demerits of M. de Lesseps claims, which are somewhat foreign to my present purpose, I believe that gentleman to be in a position to find substantial grounds for complaint in the very report of the Commission itself.

In the case of the ships, it is no less true than in that of the seamen, that the remedy may be brought into action with ease and readiness. An attentive consideration of this remedy will show that my assertion is well founded and correct. If we merely look back to the last thirty years, and attentively observe the effect of the different tonnage laws on the forms and characters of our merchant vessels, and trace the numerous disasters which have occurred in the mercantile marine to their origin, we cannot fail to observe the evil influence these laws have exercised. This is no idle assertion; thousands of lives have been lost, and an untold amount of property has been sacrificed, through the loop-holes for evasion which arbitrary and faulty rules for estimating the tonnage have permitted.

If by building a vessel with any peculiarity of form, a greater capacity for carrying goods, while retaining the same nominal tonnage and the same outlay for motive-power, could be obtained, human nature unhappily is such that the vessel would be built, the prospect of larger cargoes and smaller tonnage dues offering a stronger temptation than safety and seaworthiness. It is, however, but fair to believe that the true liabilities of a ship at sea have never been thoroughly realised by the great body of naval architects and shipowners; for it cannot be supposed that any men, however clever or intelligent, could, without being practical seamen, fully estimate at their actual value all the risks and dangers to which their vessels would be

subjected; indeed, the present lamentable condition of our ships of war will show how millions can be thrown away when the architects employed are destitute of any practical experience of the sea. It is a poor consolation to the country to be told this, and to find from the evidence of Sir Sydney Dacres (the late Senior Sea-Lord of the Admiralty) before the Committee on Designs, "that our iron ships could not sail in company with safety;" and from Sir T. Symonds, the Admiral in command, "that a fleet composed of vessels like Mr. Reed's ***Monarch*** could not save themselves under the commonest circumstances."

The following extract from the report of the Committee on Designs will show how the old tonnage law, or "builders' measurement" (as it is termed), has affected the Navy:—

"We have been struck by the very misleading and inaccurate measure of the real size and displacement of a vessel afforded by the common mode of classifying ships according to what is termed 'builders' measurement.'

"We observe that, in order to obtain the requisite displacement within the prescribed limits of builders' measurement, forms which are manifestly disadvantageous have not unfrequently been adopted; we beg to recommend that the mass of a ship be described by displacement."

The method for obtaining the true tonnage which I beg to propose to you is extremely simple. It is as follows:—Take the area in square feet of the horizontal plane at which the vessel floats when fully equipped, with her masts and sails (or machinery and coals), and with her crew and provisions on board, and the area of the horizontal plane, at one foot above it; add the two areas together, and divide by 2, which will give the number of cubic feet. Then divide by 35 for the tonnage, repeating the operation, foot by foot, between the light and load lines (leaving to the owner the responsibility of fixing the latter).

The areas of one side only need be taken, and this could be done by a simple instrument, a model of which I hold in my hand, and which any hedge carpenter could make and work. But perhaps one of the greatest advantages of this mode of measurement is the making the foot tonnages coincide with the draught of water, so that nothing can be more simple than ascertaining at once the amount of tonnage or cargo on board.

The sum of all the foot tonnages will be the entire tonnage, and whether the vessels be three-deckers or boats, wedge-like or circular, or as dissimilar as human ingenuity can construct them, the same rule will equally apply, and the same weight, when placed on board, will give the same increase of displacement to each. As the cubical contents to be measured under this system are entirely confined to the space between the light and load lines, they will scarcely equal a fourth of all the numerous spaces included under the present Act. The model on my right has been made to illustrate the rule I have just proposed.

The immediate effect of such a law as I have suggested, besides supplying an exact and equitable system of measurement, will be the discontinuance of the withering influence of the long series of tonnage laws on the architecture of our mercantile marine, and it will break the fetters which now bind the hands and cramp the energies of naval architects, who thenceforward would find themselves free to devote their talents and experience to the construction of vessels in which sea worthiness and swiftness shall be dominant qualities, instead of applying their ingenuity to the evasion of the law. Such a system of tonnage, by leaving unfettered the construction of our vessels, would do more to improve the character of our mercantile marine, both externally and internally, and to preserve human life, than all Mr. Plimsoll's well-meant but ill-directed efforts; and I feel satisfied that all, whether they be shipbuilders, or shipowners and their crews (and I will also include insurers) will derive benefit from its adoption, in lieu of the present false and empirical system.

One of the greatest boons that could be conferred on the shipping interest would be freedom from the present paralysing effects of Board of Trade interference; and this interference would be diminished in its most offensive particulars by a law of limited displacement for tonnage, *i.e.*, the total load displacement minus the light (or a fixed proportion in lieu of the light), or else the displacement for the time being.

In what I have already said, I have endeavoured to bring before you a passing glance at the Merchant Marine of Great Britain, as it exists at the present moment. The time at my disposal, however, has by no means permitted me to deal with this great subject as its vast importance deserves, and indeed demands. I have not attempted, you will bear in mind, to execute even a comparatively finished picture; my highest aim, on the contrary, has been to produce what you might accept as a suggestive sketch. Still, even from a sketch slight and imperfect as this may be, I think you will be enabled clearly to discern the fact, that our Merchant Marine, in respect to both men and ships, is in a condition to be profoundly deplored—a condition, that imperatively demands prompt and earnest measures for its correction. The men we find to be ill-treated, ill-paid, and ill-found; their physique deteriorated, their seamenship fast disappearing, and their subordination almost at an end. And, if we turn to the shipping, the scene is scarcely less gloomy. The unseaworthiness of the ships, arising from culpable negligence on the part of their owners, is seen to be as nothing in comparison with their unseaworthiness, the inevitable result of inherent structural defects.

But hear what Mr. Augustus Creuze, a late Chief Surveyor at Lloyd's, asserts in the *Encyclopædia Britannica*:—

"The merchant princes of England, with their boundless wealth, proverbial generosity, and persevering enterprise, might surely have attracted the attention of men of science to the improvement of their argosies. That they have not done so is indisputable: the startling fact that one ship and a half is the average daily loss registered on the books of Lloyd's appears as a sad corroboration of the acknowledged truth, that the Mercantile Navy of England is the least speedy and the most unsafe that belongs to a civilised nation. . . . And when at length the injurious tendency of the tonnage laws was perceived, it was not until they had become so completely identified in men's mind with ships themselves, that years more were suffered to elapse before it was made manifest that the cause of the inferiority of the shipping was the absurdity of the law. Years more must elapse before the Mercantile Navy of Britain can recover from the state to which these laws have reduced it. . . . It must be remembered that the safety of a ship is not only dependent on her powers as a sea-boat, but is in inverse proportion to the time she is exposed to the dangers of the seas." Mr. Creuze believes "that England scarcely ever committed a greator error than when she first determined the existence of a law levying duties according to tonnage."

With the prospect of disaster after disaster thus looking us with threatening vividness in the face, the subject under our consideration is indeed one that is painful in the highest degree. But then it is this very painfulness of the subject that serves to enhance the culpable character of any hesitation on my part (when knowing the state and condition into which our merchant marine has been allowed to drift) in not boldly making the truth plainly, openly, and unreservedly known to those whom it most deeply concerns. Happily, it is not too late to apply the necessary remedies; and I believe that they may be applied easily, and without extravagant costliness. The first step towards remedying an evil is to recognise the existence of that evil, coupled with a clear discernment of its character; and then the next step, which consists in determining the true remedies required, easily leads on to the final step in the accomplishment of the required rectification. These steps will not be found difficult to be taken in the case of our merchant marine. We know both in what the evil consists and where it lies; we also know the proper remedies and how to apply them.

Nothing can be more true than the words used in the "Preamble of the report to the Queen's Most Excellent Majesty, by the Royal Commissioners on unseaworthy ships."

The safety of a ship at sea cannot be secured by any one precaution or set of precautions, but requires the unceasing application of skill, care, and vigilance from her first design to her unloading at the port of destination. She must be well designed, well constructed, well equipped, well stowed, or she is not seaworthy. She must be also well manned and well navigated, otherwise all precautions as to her construction and as to her stowage will be unavailing.

True, most true, but unfortunately, our ships as a rule are not "well designed, well constructed, well equipped, or well stowed," neither are they "well manned, or well navigated." Now what is to be done? Well, I think I cannot do better than briefly, very briefly, recapitulate the remedies I propose:—

1. A responsible head to the Mercantile Marine.
2. A Maritime Lord Campbell's Act.
3. A Mercantile Marine Medical Service, and compulsory medical examination of seamen.
4. Industrial Schools in every county, with training ships attached, the boys apprenticed, their lives insured, and deferred annuities secured for old age.
5. An honest tonnage law, with taxation removed from ship to cargo.

What is the cost, I may be asked, for all this? I reply, *nil*. Four of the remedies proposed would cost the nation absolutely nothing, and might be tried immediately; the remaining one, viz., a responsible head to the Mercantile Marine, ought to be the means of effecting a wonderful saving in more ways than one.

In conclusion, it remains for me, to the utmost of my power, to urge upon your serious reflection the supreme importance of the subject on which I have been speaking, an importance which receives fresh weight and increased urgency from the circumstances of the times in which I speak. It is not only in the vital interest of that magnificent commerce of our country, with a direct view to the maintenance of its supremacy, that I plead for the reformation of our mercantile marine. This, indeed, alone might well be sufficient, and more than sufficient, to command thoughtful regard, as a prelude to vigorous action. But that reformation of our mercantile marine which I am advocating, in its influence and also in its practical action, extends far beyond the range of actual commercial enterprise.

As our Royal Navy is the strong arm (assuming it to be strong, or at any rate to be in the act of receiving fresh strength) to which we look to adjust the balance between our numerically insignificant insular land forces and the vast armed hosts of the great continental powers, so to our merchant navy must we look as an important adjunct to our naval strength in time of peril. When armed with a single gun of formidable powers, its powerful steamers may sweep from the seas the merchantmen of the enemy, and at the same time do good service in paralysing the offensive action of his armed fleets. Just now we are informed of the resolution of one of the greatest of the great powers of the Continent of Europe to require military service from every man in the empire. What we have to do to meet and checkmate this gigantic land force is to resolve that our ships and our seamen, and as far as may be every one of them, shall be thoroughly efficient on the sea. It is recorded of Alexander of Macedon, that he first laid down the principle that "the command of the sea secures the possession of the land." In times much nearer our own, an illustrious English sailor, Sir Walter Raleigh, said, "He who commands the sea commands the trade of the world; and he who commands the trade of the world commands the riches of the world, and, consequently, the world itself."

We Englishmen have learned—and the lesson has come down to us, for many a year, from father to son—to apply the sentiment enshrined in the words of the Macedonian and our own great but hapless fellow-countryman, after a fashion of our own, in these four words, "Britannia rules the waves." If we are to transmit that significant saying, in its full force, to those who will come after us, without delay and in thorough earnest we must take in hand such a reformation of our merchant navy as now I have sketched out before you, and on behalf of which I lift up my voice.

DISCUSSION.

At the conclusion of the paper, **Captain Pim** showed, by a model of Atlantic waves, the dangers of excessively long ships such as he had already produced a model of. The wave model being on the same scale, represented a length of 400 ft. from crest to crest, with a height of 42 feet, the largest which had ever been measured; and comparing the vessel with these waves, it was evident that when on the crest of one she would, in seeking her natural displacement, sink so low that the wave would tumble in amidships on both sides of her, the weight of water varying from 20 to 50 tons, according to circumstances. The consequence would be that, unless she were battened down tightly, she would inevitably founder, however staunch she might be. The *La Plata* might have gone down in that way, though he did not say she had, because he knew nothing about her; and it was pretty evident that the sea was not so high as he had depicted, because, as had happened in several other

cases lately, heavily laden boats had lived, though the ship had gone down. This, however, showed the danger of unreasonably lengthy ships, which were so built for the sake of economising motive power. Indeed, they almost justified the sailors' saying, that they were "built by the mile and cut off in length as required."

Capt. George Peacock, F.R.G.S., asked to be allowed to say a few words as an old practical seaman and steam-officer. The important subject so ably brought forward by Captain Pim was not sufficiently attended to by the Legislature, which was not surprising considering its ignorance. Acts of Parliament were brought forward from time to time by parties knowing little or nothing of the subject, and when they were found impracticable others were brought in to amend them, and so it went on, until there were half a dozen or so in the maritime code, the last being entitled, "An Act to Amend an Act for Amending another Act, &c." This might be easily avoided by having practical seamen on the committtee. Captain Pim had shown by models the dangerous class of steam-vessels in present use, and the strain to which they were exposed in heavy seas, and this he believed to be a tremendous evil. He did not wish to introduce anything like religious claptrap, but he had always considered the dimensions of the Ark the very beau ideal of a ship, either for steam or canvas; as a boy he had made a model on those proportions, and some twenty years ago he drafted and superintended the building of an iron ship of 800 tons with the same proportions, viz., the length six times the beam, and the depth one-tenth of the length. She answered admirably; sailed well; carried a large cargo on a light draught; was very smart in stays and in wearing, and became a great favourite as a liner in the New Zealand trade, where she still remained, as sound and good as the first day she was built. On the completion of her first twelve years she was strictly surveyed by Lloyd's, and re-classed, without shifting a rivet or a plate. If it were asked how this happened when so many iron vessels had to be re-classed and had to receive new plates after much less service, he could only say that he owed his success to his practical experience, first as an apprentice at sea, as an amateur stoker on board a steamer, as an amateur engineer at Messrs. Maudsley's, and subsequently as sailing master in the Royal Navy, and to his study of the principles of galvanic action. He found that iron did not agree with either copper or mercury, and therefore devised a plan for doing away with all holes and cocks in a steamer's bottom, having them all, feed-pipes, blow off, bilge water, injection pipes, &c., made of iron or white metal, communicating with iron boxes rivetted to the inside of the ship, one on each side, and the pipes brought up just outside the engineer's cabin, where they were always under the eye of the engineers of the watch, the cocks being all separate from each other, and marked so that no confusion or danger of leaving a sea cock open could possibly arise; for he had known instances of this being done inadvertently, and the water rising so high in the stokehole before it was discovered that the cock could not be shut off, and the vessel had gone to the bottom of the harbour. He had also carried out a series of experiments from 1837 to 1856 on plates of iron, and after discarding all preparations containing mercury or copper, which he always found ate off the rivet-heads and honey-combed the plates, he established a composition for protecting the rivets and plates, and keeping them clean, which, under the name of "Peacock and Buchan's," was now in use all over the world. This composition was applied to the iron ship he had already spoken of, which was coated with Day's cement inside, and it had been equally successful with the troop ship *Himalaya*, which was as sound now as when constructed in 1853. He feared that the use of mercury and copper, though not referred to by Captain Pim, had had something to do, coupled with their extreme length, with some of the recent distressing losses of iron steamers, and this had induced him, having had thirty years' experience at sea in every capacity, from apprentice to captain, to bring the matter forward.

Mr. Lemon, as a seaman of twenty-three years' experience, wished to say a few words as to the hardships endured by British sailors. To the seaman, the unworthiness of a ship was a secondary consideration, for being familiar with the dangers of the sea he thought but little of them, and was prepared to meet them. What he complained of was the wretched accommodation provided. If he called for a survey he had no chance but to back out of the ship altogether, and if, as frequently happened, his bunk was never dry, he could only make up his mind not to sail in the same vessel again. Then, when the voyage was over, he was not paid off for three or four days, during which time he had to live on credit at the mercy of crimps and sharks of all kinds, and the consequence was that when he went to the shipping office to get his money he was only too glad to sign articles again, if only to get rid of his creditors, especially if he had left a wife and family behind him who were indebted to the butcher, baker, and other tradesmen. He had known men sign fresh articles the very day after they were paid, after coming off a voyage of fifteen or sixteen months, and sometimes even before they received their money. If he made any complaint at the shipping office he was referred to a magistrate, and if he went there he had only his bare statement to put forward, so that practically he had no redress. Thus married men frequently could only spend some forty-eight hours with their families after working for them for eight or ten months. The natural result was that sailors were glad to turn to any other employment, and numbers of them became porters, lumpers, colliers, or anything rather than go to sea. In fact, if Jack only had reasoning power, and could put this and that together, there would very soon be no seamen at all. The hardships they endured from cold and wet, being turned out of bed steaming to go shivering to the wheel, were enough to ruin the constitution of anyone, and often the men were not really in a condition to discharge the duties of their calling. As to bringing up boys as sailors, it was only introducing them to a life worse than that of a convict. If they complained to the master he told them he was obliged to work the ship; they had signed articles, and if they did not obey orders he would put them in irons. He might be a kind man or a harsh one, but he really could not help himself. He did not think any vessel should be considered seaworthy if there were not proper accommodation for the men, and good food. The latter was often deficient, only barely enough being put on board, according to the Act of Parliament, for the expected length of voyage. The sailor could go aft to see the food weighed out, but it was done by a spring balance which was often out of order, so that he had no certainty of getting his allowance. Such a state of things was discreditable to the shipowners who allowed it, and though some provided for the comfort of their men, many never took it into consideration at all. If they did, he was sure the men would serve them much better, and that if closer relations existed between owners and seamen, the former would not be out of pocket by it, for Jack was as grateful for kindness as anyone.

Mr. Grazebrook said Captain Pim had divided his subject into two parts, the first of which—construction—he did not propose to say much upon, further than to remind the meeting that in former days England captured her models from the Spaniards, French, and others, and found them much better than her own build. There was another point, however, of much more importance, for, though it was sad to lose valuable lives from the unseaworthiness of ships, others would take their place; but if the lives of the men were made so miserable that no sailors could be obtained, the results would be infinitely more disastrous. Brave lives had been lost before now,

in battle as well as on the seas, and their places were supplied, but if the spirit of the English tars was lost, then, indeed, England would lose all that had made her great. History always reproduced itself, and the time might come when England would again have to fight for the supremacy of the sea. If she lost command of the Channel, if her fleets were beaten by the foe, or destroyed by the elements, it would mean simply starvation, because in a few months all her supplies could be cut off, and she would be immediately subjugated. It was therefore a matter of vital consequence to keep up the race of seamen, but to do so they must be better paid and more comfortably provided for. It was no use bringing in apprentices if trade were not made sufficiently attractive to keep them in it, instead of becoming labourers and colliers, as they now did in large numbers.

Mr. Norwood, M.P., said this subject, like all others, admitted of a good deal being said on both sides, and to allow of this being done he begged leave to move the adjournment of the discussion to Friday evening, February 5th.

The motion was carried unanimously.

MISCELLANEOUS.

THE PROPOSED ALTERATIONS IN THE RAILWAY SYSTEM OF THE GERMAN EMPIRE.

(*Continued from page* 154.)

It unfortunately cannot be denied that very few German States have, as regards the question whether State or private railways were to prevail, acted with any consistency, nor that even those who have decided in favour of State railways have not sometimes permitted private lines to be constructed for some cause or other. But we believe we are correct in saying that they have generally repented doing so, and that the respective States would not now, with their present experience, have granted any such concessions to trading companies. But there cannot be said to exist a mixed State and private railway "system." It was not a principle, but an absence of principle arising from changes of views and the results of experiment, which produced such a mixture of private and Government railways. Even in Prussia it was not the result of a system, but of a change of systems. From want of experience, and from the example of England and America, nothing was thought of at first in Germany but giving over the railways into the hands of companies, and in Prussia the first railways were consequently constructed independently of State control. The productive lines were of course seized upon by private companies, and it was not until the construction of less favourable lines was projected, that the State was called in. But as the feeling gradually gained ground that the State ought not to undertake all the unprofitable lines, and leave the profitable ones in the hands of private speculators, the Prussian Government began to construct the railways itself, and proved it to be anything but an unproductive enterprise. Since that time certainly a number of private companies have been permitted, and the rage for speculation which arose from these concessions caused great scandal at the time, and gave rise to Herr Lasker's admirable speech of the 4th April, 1873, in the Imperial Parliament; but lately the Prussian Government has again commenced the construction of State railways on a large scale, and in the measure passed through the Prussian Parliament on January 5 to 8, 1874, though concessions to joint-stock companies were not absolutely prohibited, yet they are saddled with the condition that the Government is entitled to buy the lines after a period of 30 years, at a fixed price, and if not purchased that the concession lapses again into the hands of the State after a period of 90 years. Though this measure is of course not retrospective, yet the action of the Prussian Government on the matter shows conclusively that its object was to assume gradually the entire control over the railways, and not to rest content with a mixed system of Government and private lines, yet by this new measure a system it to be fostered which would destroy the profit of about $2\frac{1}{2}$ milliard florins, invested by the Governments in the railways of various German States—not to mention the ruin of many private lines—for such assuredly would be the result of giving to each Government line a rival in the shape of a private line, and *vice-versa*. That the private lines are often managed more economically than the State lines is true, but we must set against that the losses which have been caused to the public in the railway companies by the speculation, by jobbing, by the profits of bankers, of brokers, of contractors, which are partly lost to the undertaking altogether, partly taken out of the hands of individuals who subscribed shares to be paid in full, or obligation shares to the newly formed companies, and of the public, who buy these shares and stocks at the exchange from financiering branches, and contractors who are paid in shares. How much of the profits of paying lines goes into the pockets of jobbing speculators, whilst the moderate profits of less remunerative lines are turned to the ruin of the deluded shareholders? How often it has occurred in the last 20 years that the cost of establishing a private railway has far exceeded the actual cost of execution, and why? First, because they can only obtain capital at a much greater price than would be the case if Government were the promoter of the undertaking. Secondly, because stockbrokers, finance and building committees, boards of directors, and contractors all strive to fill their pockets, quite regardless of the interest of the general public. This latter evil can never be eradicated from private railway companies, for all laws, however strict, can be and are evaded. How the commercial public has been defiled and corrupted by the speculation mania, and what a demoralising effect these illgotten gains and sudden fortunes have had upon every class of society, is too well known. They have fostered the feeling that honest work and thrift lead to nothing. Speculation is now the watchword of the world, and how many innocent persons have gone down in this whirlpool of speculation, and the consequent crash? Let us see how the German States would be affected by the plan of the Railway Department for gathering together all the railways under Imperial control.

* NOTE BY E. CHADWICK.—The President of the India Board seems to have made an independent discovery of the financial principle so often propounded here, of the use for all public works of cheap public capital obtainable on public security, instead of the dear capital, which is the only capital obtainable by private security. The Marquis of Salisbury, in his recent address to the Manchester Chamber of Commerce, is reported to have made the following statement:—"There is a popular notion that railways in India have not paid at all, or paid exceedingly badly, and as a financial fact there is no doubt that we have to pay a guaranteed interest of some £1,500,000 or £1,700,000 every year to make up the deficiency. I believe that result is in a great measure due to the mistakes which attended the original construction of the railways. It was a new matter; many blunders were made, and though many men gave all their earnestness and all their ability to the task, still it was not to be hoped that they should escape from every kind of error; and to show how much of the comparative failure of railways is due to accidental causes, I will mention just one fact which I had brought out by calculations made the other day. The money for all these railways in India was raised by a guaranteed interest at 5 per cent. I inquired what the difference would have been if, instead of raising the money by guaranteed interest the Indian Government had raised the money by borrowing from time to time as its credit stood at the time in the open market. I found that we should have saved the payment of £600,000 a year by simply altering the form of our financial action. If, instead of adopting the system of guarantees, we had adopted the more orderly system of borrowing money as we wanted it, we should have saved that enormous sum. At the present rate of interest that represents a capital of £15,000,000, and my impression is that that £15,000,000 would go very far to supply all the railways which India now wants." It is of great importance that the principle should be known and applied in the Treasury as a means of stopping waste.

In the "motifs" of the Bill a list is given of the German lines up to the end of 1873. They amounted to:—

	Miles (German).
State lines	1,357·85
Private lines under State supervision	411·44
	1,769·29
Private lines	1,451·03
Total	3,220·32

Of these—

	Miles.
Elsass-Lothringen had	115·12
Prussia (542 State; 341 private, under State supervision; 1,053·19 private lines)	1,937·29
Bavaria (246·80 State; 40·45 private, under State supervision; 159·02 private)	446·27
Würtemberg (152·10 State lines; 0·87 private)	152·97
Baden (135·79 State; 12·62 private, under State control)	148·41
Grand Duchy Hessen (11·82 State; 86·64 private)	98·46
Saxony (128 State; 17·13 under State control; 43·72 private)	188·85
Oldenburg (25·36 State; 4·40 private)	29·76
Mecklenburg (private)	42·61
Brunswick	45·91
Lübeck	14·60
	3,220·32

Thus in almost all the German States except Prussia the Government railways predominate, and even in Prussia they form—together with the private lines under State control—nearly one-half of the whole number; moreover, the Prussian Government is in the act of enlarging its network of lines, whilst it is doubtful how far some of the private lines will reach completion.

In Elsass-Lothringen the Empire purchased all the lines, with the exception of some branch lines, which were in course of construction by a company at the time of the war (for example, the lines of Courcelles Bolchen to Saarlouis). But it is certain that sooner or later the Imperial Government will purchase these also. The German Government has expended on these railways 144 millions of thalers, and far from viewing this as an unproductive expenditure, every reasonable German will rejoice that it has been undertaken; firstly, because for strategic purposes it is most important that all these lines should be under Government control, but secondly, and chiefly, because the State is thereby enabled to render the greatest services to the commercial and agricultural interests of Elsass-Lothringen (as, for example, by the cheaper transit of coals, &c.). We do not wish to express, however, any opinion concerning the tariff system on these lines. The fact that the Elsass-Lothringen railways have in the first year of their State management only yielded a profit of about 2 per cent. cannot be taken as conclusive for various reasons; if, however, further experience shows that the profits of these lines still continue insufficient, it would go far to prove that the new tariff system is at fault. No one can expect the Government to carry him and his goods at a loss, and the neighbouring German States may fairly complain of the Imperial Government setting up ruinously cheap lines at the public expense. But who could approve the establishment on every main route in Elsass-Lothringen of competing private lines which might draw the traffic away from the Imperial lines, and thus ruin the State railways. This might, however, easily occur if the supreme control over the railways fell into the hands of a board which considered the first principle of healthy traffic to be "the co-existence on all main lines of State and private railways."

In Baden again, the Rhine Valley and the adjoining Black Forest lines are very favourable for the construction and favourable working of railways; but in the middle and southern parts of the Duchy the mountainous character of the country places great difficulties in the way of railway construction. From these circumstances it is absolutely necessary that the Government should hold all the Baden railways in its hands, and by working the profitable Rhine Valley line be enabled to open out the lines into the interior of the country which, though much less profitable, are indispensable to the development and welfare of the country and its resources. Will Baden expose itself to the danger of the railway board working out its theories of a healthy development of traffic by giving it competitors on all the profitable State lines?

The same is the case in Würtemburg and in most of those States where it is only by possessing the paying lines that the Government has been able to extend to the whole country the blessings of an easy and cheap transport of goods and persons.

The following corrections should be made in the first portion of this article, which appeared Jan. 15. Page 151, right hand column, ninth line from the bottom, for "narrow" read "uniform." Page 153, left-hand column, thirteenth line from the bottom, for "Liberal" read "Federal." Page 154, fourth line from bottom end, for "series" read "influence."

(To be continued.)

FIREMEN'S RESPIRATORS

The following communication has been received from Professor Tyndall with regard to the newest form of his improved respirator:—

The latest form of smoke respirator consists (with exception of a tin cylinder containing the filtering materials, and the goggles for the eyes) entirely of vulcanised india-rubber.

A sheet of vulcanised india-rubber, about ten inches long and seven inches wide, has (at about two inches from one edge, and midway from each end) an aperture cut, of such shape and dimensions as to allow the lips to protrude. Above this another aperture is cut, which allows the nose to pass easily through it. On each side of the nose apparatus, and a little above it, two circular holes are cut, corresponding to the position of the eyes.

A bent tin cylinder, 4½ inches long and 2 inches diameter (having a curvature nearly corresponding to the curvature of the face), is firmly and securely fixed opposite to and entirely closing the mouth aperture, by means of strips of india-rubber. The nose aperture is closed with sheet rubber, forming a chamber sufficiently large for the protruding nose. The lower ends of the nose cover are attached to the rubber sheet supports of the tin cylinder, in such a manner as to connect the nose and mouth apertures by a small chamber.

Into each hole corresponding to the eyes a circular curved glass about 1¾ diameter (similar to a watch glass) held in a suitable fitting, is inserted.

One end of the tin cylinder is closed by an india-rubber valve, opening outwards. This valve is protected by a moveable wire gauze covering.

The side of the tin cylinder, a little below the valve, is pierced by a hole, covered with wire gauze, which opens into the mouth chamber. The other end of the tin cylinder is fitted with a moveable wire gauze covering, which prevents the filtering materials from falling out.

The filtering materials are the same as previously employed.

The apparatus when in use is secured to the head of the wearer by two narrow elastic straps, one of which

passes from the upper part of the apparatus round the head; the other passes from the lower part of the apparatus round the neck. With a little pressure of the straps, the flexible sheet india-rubber of the face piece is drawn air-tight into the indentations of the face, and around the mouth and nose.

During inspiration the valve is closed by the atmospheric pressure, and the air passes through the filtering materials in the tin cylinder through the hole (below the valve) opening into the mouth chamber to the mouth and nose. During expiration the air is ejected from the lungs through the outward opening valve.

The total weight of the apparatus when charged with the filtering materials is about nine ounces.

Its advantages over previous forms are its lightness, simplicity of construction, and cheapness; the ease and rapidity of adjustment; no undue heating of the head, the face only being covered; no chance of derangement by the bursting of water tubes, &c., as none are used. The supply of air to the mouth and nose being perfectly free, there is therefore no excessive secretion of saliva.

THE INDUSTRIAL USES OF BISULPHIDE OF CARBON.

Up to the year 1850 the sole industrial application of bisulphide of carbon was in the vulcanisation and dissolution of caoutchouc; but since later invention has found means of producing the material at low price, it has been applied to a multiplicity of uses in a large number of the arts. The extraction of oils from grains, the wholesale removal of fatty matter from wool, the treatment of spices to obtain the same in soluble form, the fabrication of prussiate of potash by the Géles process, and of sulphocyanide of ammonia for the preparation of the toys called Pharaoh's serpents, the purification of crude paraffin, the manufacture of liquid fire for incendiary projectiles, and as a means of destruction of vermin, are a few of the principal employments of bisulphide of carbon. As respects magnitude, however, and future influence upon manufactures, its adaptation to the utilisation of waste residues is of chief importance, and is fast forming the groundwork of a new and distinct industry. The credit of first extracting the fatty matters from these refuse products is due to M. Deiss, of Belgium, and by the aid of the bisulphide the former are obtained in quantities sufficient to serve for the lubrication of machinery or the fabrication of soaps and candles. In order to show the rapidly increasing value of this useful substance, we have gathered quite a number of its most recent as well as most important applications, and are thus enabled to present a fair view of the various refuse matters in connection with which it is now employed. In the manufacture of fatty acids brown compact deposits are precipitated. These, mixed with sawdust, in order to facilitate the action of the bisulphide, and treated with the latter, yield up to 20 per cent. of acids, which otherwise would go to waste. The pasty mass of metal filings, dirt, grease, &c., taken from car and wagon axles, is first treated with hot sulphuric acid, then with bisulphide, and lastly, washed and dried. This isolates the grease in a saponified state. Cotton waste, employed in or about machinery, is freed from its grease by sulphide and is again available for use. Residues of the manufacture of beeswax, which formerly found no sale except as manure, selling at about eight shillings a hundred-weight in France, are now subjected to the action of bisulphide, and an excellent yellow wax is extracted; the final residue is still useful as a fertiliser. Sawdust which has served to filter oils purified by sulphuric acid, yields, after pressure, 15 per cent. of oil; again, 50 per cent. of oil is obtained from the muddy deposits due to the mingling of oils with sulphuric acid. These are washed in boiling water, dried, mixed with sawdust, and, lastly, treated with bisulphide. Balls of oleaginous grain, when they cannot be used as food for cattle, yield fatty matters; and their residue is an excellent fertiliser, as it contains large proportions of nitrogenised substances and phosphates. Bisulphide is also used to extract the grease from olives after they have been pressed, and from residues of tallow and suet after melting and pressure, also from the residues of the manufacture of cocoa. Bone fragments, when treated with bisulphide at 104° Fahrenheit, yield 12 per cent. of grease; they are subsequently unfit for the manufacture of gelatine, but answer excellently for the fabrication of bone black. The cleanings of wool cards, when acted upon by bisulphide, give about 30 per cent. of fatty substances, utilisable for the manuacture of soaps. It is evident from the great number of waste products, and the abundance of some of them, that a very considerable amount of greasy and oleaginous matter can be returned to the various industries through the new processes involving the use of bisulphide. The material has also been successfully employed in the scouring of wool and in the extraction of bitumen from schists and bituminiferous sandstones. In the latter case the quantity of bitumen obtained is from 4 to 5 per cent. superior to that furnished by distillation, which only gives in all from 7 to 8 per cent. MM. Van Haecht, Emile, and Co., of Belgium, exhibited in the Vienna Exhibition a number of improved machines for carrying on these processes, and in which all species of fatty residues could be treated. The price of manufacture does not exceed, for certain purposes, 12s. per ton; about half a ton per hour can be treated. The loss of bisulphide is reduced to barely one-half per cent.—*Journal of Applied Science.*

CORRESPONDENCE.

FOG-SIGNALING APPARATUS.

SIR,—With reference to my remarks in my communication to your *Journal*, "that trains cannot be heard so distinctly in foggy as in clear weather," I do not think it is generally known (although a well-known fact amongst railway men) that after a slight shower of rain, or on a dewy or frosty morning, trains cannot be heard at so great a distance as they can on a dry, clear day, because, at such times the metals are what is termed greasy, and as fog makes the metals more greasy than rain or dew, I think the above will be sufficient to prove that I am correct in what I stated, for there is as much difference in the noise that a train makes on a dry day and what is termed a greasy one, as there would be in a man running or sliding over a pond covered with ice—the running would represent the dry day and the sliding the greasy one. Now, sir, independent of the above causes, I do not believe that sounds are more audible in foggy than in clear weather, for the following reasons:—About two years ago I was stationed at the mouth of a tunnel to protect trains, in consequence of a large stream of water having forced itself through the wall, at a distance of about a quarter of a mile from the mouth of the tunnel. I could distinctly hear the water running, also I could hear the men at work trying to prevent it; but one morning a dense fog came over, and I could neither hear the running of the water nor the men at work, so I came to the conclusion that the water had ceased, but when the man came out of the tunnel, who had to inform me as to the state of the roads, I remarked to him that I supposed the water had stopped, but, to my surprise, he said it was running faster if anything! I called his attention to the fact that I could not hear it, and we could neither of us make

out the cause, but when the fog cleared away we could hear the noise as distinctly as before, but it was not until the above occurred three or four times that we came to the conclusion that it was owing to the mouth of the tunnel being blocked up with fog that we could not hear the water running. Then again, sir, I don't know whether you have noticed it or not, but fog is very deceptive, for I have heard old railway men say that they have heard a train coming when it had been foggy, but for the life of them they could not tell whether it was an up or down train! I do not doubt but what I can supply you with other instances, if you require them, to prove that fog tends to deaden rather than assist sound.—I am, &c.,

OLIVER CULLIS.

9, Cranbrook-street, New-town, Deptford, S.E.
January, 1875.

GENERAL NOTES.

Improved Cabs.—With regard to the recent action of the Society on this subject, it may be interesting to notice that it is the intention of the Directors of the Alexandra Palace Company to hold, in the course of the ensuing season, at the Alexandra-park, an exhibition of cab-horses and cabs, and to appropriate a sum of £200 to be distributed in prizes for cabs in the best condition, and to drivers who have been longest in the employment of one master, and who have never been charged with cruelty to their horses, reckless driving, drunkenness, insolence, or other offences. It will be held at the close of the London season, when cab-drivers will be able to attend in large numbers. The stables at the Alexandra-park, which will afford accommodation for 400 horses, will give special facilities for the intended show.

Relics of George Stephenson.—There is now at the Patent-office Museum, South Kensington, a number of relics of the late George Stephenson. These include a safety-lamp; a box of watchmaker's tools; the medal of Leopold, King of the Belgians, presented to Mr. Stephenson by the engineers on the laying of the first stone of the first railway there, 1834; foot rule, always carried by him; a hone; two plated metal boxes, with inlaid bronze medal—one containing a silver medal presented to Stephenson by a Flanders railway, the other containing five railway passes; two snuff-boxes, the larger one containing a little snuff; magnifying glass; pocket compass; two pairs of silver studs (initials on one pair), one gold seal, with device of safety-lamp; silver repeater; four autograph letters of G. Stephenson; three autographs of ditto; three autograph letters of Robert Stephenson; some hair of George Stephenson; some hair of Mrs. Stephenson (Fanny Henderson), and various other articles.

Mineral Statistics.—According to Mr. Robert Hunt's "Mineral Statistics of the United Kingdom for 1873," the mineral produce of the kingdom in 1873 was as follows:—Coal, 127,016,747 tons, of the value of £47,631,280; iron ore, 15,577,499 tons, of the value of £7,573,676; copper ore, 80,188 tons 10 cwt., of the value of £342,708; tin ore, 14,884 tons 17 cwt., of the value of £1,056,835; lead ore, 73,500 tons 10 cwt., of the value of £1,131,907; zinc ore, 15,969 tons, of the value of £61,166; iron pyrites, 58,924 tons 3 cwt., of the value of £35,485; arsenic, 5,448 tons 17 cwt., of the value of £22,854; bismuth, 1 ton 4 cwt., of the value of £68; cobalt, 6 cwt., of the value of £12; manganese, 8,671 tons 6 cwt., of the value of £57,766; ochre and umber, 6,368 tons 8 cwt., of the value of £5,410; wolfram, 49 tons 19 cwt., of the value of £526; clay, fine and fire, and shale (estimated), 1,785,000 tons, of the value of £656,300; salt, 1,785,000 tons, of the value of £892,500; barytes, 10,269 tons 11 cwt., of the value of £7,993; other earthy minerals (estimated) of the value of £3,000; total value £59,479,486. The total value exceeds that for 1872 by upwards of half a million. The metals obtained from the ores was as follows:—Pig-iron, 6,566,451 tons, of the value of £18,057,739; tin, 9,972 tons, of the value of £1,329,766; copper, 5,240 tons, of the value of £502,822; lead, 54,235 tons, of the value of £1,263,375; silver, 537,707 ozs., of the value of £131,077; zinc, 4,471 tons, of the value of £120,099; other metals estimated at £5,000; making £21,409,878, the total value of metals produced from British ores in 1873 being £660,000 less than in the statement for the preceding year. Mr. Hunt adds to this total £47,629,787 as the value of coal raised, and £1,681,834 for minerals, earthy, &c., and the result is £70,722,992, being £529,576 more than the corresponding total given in his summary for the preceding year. The increase is entirely in the item of coal.

Paris Mud.—With regard to the experiments on road traction and street pavements now being carried on by a committee of the Society, the following particulars respecting the value of the mud of Paris may be worth notice. A French journal states that the contractors pay 600,000 fr. annually to the municipality for the right of taking it away. It is sold for manure at from three to five francs per cubic metre, and thus yields a revenue of about 3,000,000 fr. Out of this amount the expenses of sweeping the streets and carting away the mud must be deducted. The scavengers and other employés of the contractors are under the superintendence of the authorities, the entire staff being composed of several thousand persons. In 1823 the amount paid for the right of collecting the mud of Paris was only 75,000 fr.; in 1831 it was let for 166,000 fr., and in 1845 it reached the sum of half a million of francs.

Rhubarb Production in China.—The best rhubarb is still produced in Kansuh, but one of the principal marts for the sale of the drug is, it appears, Sanyiian, in Shensi, in which province also rhubarb is grown to a considerable extent. The cultivation in both provinces has, however, it is said, been seriously affected by the Mohammedan rebellion. Consul Hughes, of Hankow, states that much of the rhubarb which reaches that port comes from Szechuan, and is generally of very common quality, being usually quoted in the market at from 5 to 8 taels per picul (2½d. to 4d. per lb.) while the kind known as Shensi is usually quoted at from 15 to 50 taels (8d. to 2s. 2d. per lb.) This inferiority of the Szechuan drug is said to result from the moist heat of the province, which is injurious to the preparation of the root. In both the provinces of Kansuh and Szechuan the rhubarb is grown in mountainous districts. The plants, when grown, are cut down and thrown in heaps; they are then taken to the farmer's house, where the roots are pared and scraped. In Kansuh the roots are then tied together, and hung up from poles covered with matting; but in Szechuan the roots are obliged to be dried in the sun, and as a consequence, they are not like those of Kansuh, of firm substance throughout. One of the Chinese merchants supplied Consul Hughes with the substance of the following information respecting the qualities of rhubarb, price, and places of production. Province of Kansuh, Sining, average value, say 80 taels per picul (133⅓ lbs.). Same province, Liang-chow, very nearly as good, 75 taels. Szechuan, Mien-chow, 30 per cent. worse, 55 taels. Kansuh, Kiaichow, 50 per cent. worse. Kansuh, and North-West border of Szechuan, 60 per cent. worse; if well made, 40 taels, if common, 20 taels. Szechuan, Kuan Hien, 60 per cent. worse; better quality, 30 taels; common, 20 taels. The very common, at 5 to 8 taels per picul, comes, as has been said, from Szechuan. The rhubarb from Sining and Liang-chow, of the finest quality, does not at present reach Hankow, and it is probable that it finds its way overland to Russia *via* Kiachta. Very little of the rhubarb from Mien-chow goes to Hankow, and the requirements of the market are supplied from the other districts.

NOTICES.

TICKETS FOR THE SECTIONAL MEETINGS.

As the arrangements for these meetings are necessarily liable to alteration, the tickets are issued to members without being dated. The dates are duly announced from time to time in the *Journal*, and members are particularly requested, when issuing tickets, to fill in the date in the space left on the tickets for that purpose. Considerable inconvenience has already been experienced by visitors to these meetings from the neglect of this regulation.

PROCEEDINGS OF THE SOCIETY.

ORDINARY MEETINGS.

Wednesday Evenings, at 8 o'clock. The following arrangements have been made:—

FEB. 3.—"The Protection of Buildings and Ships from Fire, with Arrangements for the Ventilation of Ships," by J. A. COLEMAN, Esq., C.E.

FEB. 10.—"The Sandblast and its Adaptation to Industrial Purposes," by WM. NEWTON, Esq.

FEB. 17.—"Description of M. Kastner's New Musical Instrument, the Pyrophone," by M. DUNANT. The instrument will be exhibited.

FEB. 24.—"The Art of Illustration as applied to the Printing Press," by HENRY BLACKBURN, Esq.

In order to suit alterations in the arrangements for the evening meetings, Mr. Newton has consented to postpone the reading of his paper on "The Sand-blast and its Adaptation to Industrial Purposes" till the 10th February.

EXTRA MEETING.

FEB. 5.—Adjourned Discussion of Capt. BEDFORD PIM'S Paper on "The Mercantile Marine of Great Britain."

AFRICAN SECTION.

Tuesday Evenings, at 8 o'clock. The following arrangements have been made:—

FEBRUARY 9.—"A General Description of the Trade on the West Coast of Africa," by W. BABINGTON, Esq.

FEBRUARY 23.—"The Slavery of the West Coast, and its Influence upon Commercial Progress," by CONSUL HUTCHINSON.

INDIAN SECTION.

Friday Evenings, at 8 o'clock. The following arrangements have been made:—

FEBRUARY 12.—"The Possibility of Adapting the Roman Alphabet for the Languages of India," by FREDERICK DREW, Esq.

CANTOR LECTURES.

The first course of Cantor Lectures is on "Alcohol: Its Action and its Use," by Dr. B. W. RICHARDSON, F.R.S. The following are the remaining lectures of this course:—

LECTURE VI.—MONDAY, FEBRUARY 1ST.

Influence of Alcohol on the nervous organisation, with special reference to the mental phenomena induced by its use.—Summary.

The Second Course of Cantor Lectures will be delivered by the Rev. ARTHUR RIGG, M.A., on "The Material, Construction, Form, and Principles of Tools and Contrivances used in Handicraft."

LECTURE I.—MONDAY, 8TH FEBRUARY, 1875.

Tools used in very Early Times, evidenced in prehistoric Implements, as well as in Sculpture and Drawings of ancient date; also Tools used in Recent Times amongst (so-called) savage races.

LECTURE II.—MONDAY, 15TH FEBRUARY, 1875.

Hammers.

LECTURE III.—MONDAY, 22ND FEBRUARY, 1875.

Hammers (continued).

LECTURE IV.—MONDAY, 1ST MARCH, 1875.

Picks, Axes, Adzes, Chisels.

LECTURE V.—MONDAY, 8TH MARCH, 1875.

Planes, Knives, Shears, Saws.

LECTURE VI.—MONDAY, 15TH MARCH, 1875.

Saws and Dove-tailing Tools.

Tickets for this course will be issued with next week's *Journal*.

The Third Course will be "On some of the Forms of the Modern Steam Engine," by F. J. BRAMWELL, Esq., F.R.S., President of the Institution of Mechanical Engineers.

Members are privileged to introduce *two* friends to each of the Ordinary and Sectional Meetings of the Society, and *one* friend to each Cantor Lecture.

SCIENTIFIC MEETINGS FOR THE ENSUING WEEK.

MON. ...**SOCIETY OF ARTS**, John-street, Adelphi, W.C., 8 p.m. (Cantor Lectures.) Dr. B. W. Richardson, "Alcohol; its Action and its Use." (Lecture VI.)
Farmers' Club, Salisbury-square, E.C., 5½ p.m. Mr. J. B. Lawes, "The more Frequent Growth of Barley."
Royal Institution, Albemarle-street, W., 2 p.m. General Monthly Meeting.
Society of Engineers, 6, Westminster-chambers, 7½ p.m. Mr. John Henry Adams, "Inaugural Address."
Royal United Service Institution, Whitehall-yard, 8½ p.m. Staff Commander T. A. Hull, R.N., "The Unsurveyed World, 1874."
Entomological, 12, Bedford-row, W.C., 7 p.m.
British Architects, 9, Conduit-street, W., 8 p.m.
Medical, 11, Chandos-street, W., 8 p.m.
Victoria Institute, 8, Adelphi-terrace, W.C., 8 p.m. 1. Professor T. R. Birks, M.A. (Cambridge), "The Indestructibility of Force." 2. Rev. S. Wainwright, D.D., "The Philosophy of Human Consciousness."
London Institution, Finsbury-circus, E.C., 5 p.m. Professor Ferrier, "Functions of the Brain."

TUES. ...Royal Institution, Albemarle-street, W., 3 p.m. Mr. E. Ray Lankester, on "The Pedigree of the Animal Kingdom."
Civil Engineers, 25, Great George-street, Westminster, S.W., 8 p.m. Prof. Joseph Prestwich, "On the Origin of the Chesil Bank, and on the relation of the existing Beaches to past Geological changes independent of the present Coast Action."
Pathological, 53, Berners-street, Oxford-street, W., 8 p.m.
Biblical Archæology, 9, Conduit-street, W., 8½ p.m.
Zoological, 11, Hanover-square, W., 8½ p.m.
Royal Colonial (at the HOUSE OF THE SOCIETY OF ARTS), 8 p.m. Adjourned Discussion on Mr. Eddy's and Mr. Labilliere's Papers will be resumed.

WED. ...**SOCIETY OF ARTS**, John-street, Adelphi, W.C., 8 p.m. Mr. J. A. Coleman, "Protection of Buildings and Ships from Fire, with arrangements for the Ventilation of Ships."
Microscopical, King's College, W.C., 8 p.m. Annual Meeting.
Pharmaceutical, 17, Bloomsbury-square, W.C., 8 p.m.
Royal Society of Literature, 4, St. Martin's-place, W.C., 4½ p.m. Mr. Walter de Grey Birch, "On the Classification of MSS., chiefly in relation to the Classed Catalogue in the British Museum."
Obstetrical, 53, Berners-street, Oxford-street, W., 8 p.m.

THURS....Royal, Burlington House, W., 8½ p.m.
Antiquaries, Burlington House, W., 8½ p.m.
Linnean, Burlington House, W., 8 p.m. 1. Rev. Geo. Henslow, "On the Origin of Prevailing Systems of Phyllotaxis." 2. Mr. H. N. Mosely, "On the Plants and Insects of Kerguelen's Land." 3. Mr. J. Ganmie, "On Ariscema Speciosum."
Chemical, Burlington House, W., 8 p.m.
London Institution, Finsbury-circus, E.C., 7 p.m. Dr. Zerffi, "The Grotesque in Indian Art."
Society for the Encouragement of the Fine Arts, 9, Conduit-street, W., 8 p.m. Mr. F. R. Dalby, "Printing in connection with early Art."
Royal Institution, Albemarle-street, W., 3 p.m. Prof. Tyndall, "On Subjects connected with Electricity."
Royal Society Club, Willis's Rooms, St. James's, S.W. 6. p.m.

FRI.....**SOCIETY OF ARTS**, John-street, Adelphi, W.C., 8 p.m. Adjourned Discussion on Captain Pim's Paper "On the Mercantile Marine of Great Britain."
Royal Institution, Albemarle-street, W., 8 p.m. Weekly Meeting, 9 p.m. Mr. J. Dewar, "On the Physiological Action of Light."
Geologists' Association, University College, W.C., 7½ p.m. Annual Meeting.
Philological, University College, W.C., 8 p.m. Professor Mayor, "Rhythm."
Archæological Institution, 16, New Burlington-street, W., 4 p.m.

SAT.....Royal Institution, Albemarle-street, W., 3 p.m. Mr. J. T. Wood, on "The Discovery of the Temple of Diana, and other Results of the Government Excavations at Ephesus."