SCIENCE

A WEEKLY JOURNAL DEVOTED TO THE ADVANCEMENT OF SCIENCE, PUBLISHING THE OFFICIAL NOTICES AND PROCEEDINGS OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

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MSS. intended for publication and books, etc., intended for review should be sent to the responsible editor, Professor J. McKeen Cattell, Garrison-on-Hudson, N. Y.

ADDRESS OF THE PRESIDENT OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

II.

HOW TO GET MORE UNIVERSITIES.

What, then, is to be done? Fortunately, we have a precedent admirably in point, the consideration of which may help us to answer this question.

I have pointed out that in old days our Navy was chiefly provided by local and private effort. Fortunately for us, those days have passed away; but some twenty years ago, in spite of a large expenditure, it began to be felt by those who knew that in consequence of the increase of foreign navies, our sea-power was threatened, as now, in consequence of the increase of foreign universities, our brain-power is threatened.

The nation slowly woke up to find that its enormous commerce was no longer insured at sea, that in relation to foreign navies our own had been suffered to dwindle to such an extent that it was no longer capable of doing the duty which the nation expected of it even in time of peace. At first, this revelation was received with a shrug of incredulity, and the peace-at-any-price party denied that anything was needed; but a great teacher arose; * as the

* Captain Mahan, of the U. S. Navy, whose book, 'On the Influence of Sea-power on History,' has suggested the title of my address.

facts were inquired into the suspicion changed into an alarm; men of all parties saw that something must be done. Later, the nation was thoroughly aroused, and with universal agreement the principle was laid down that, cost what it might to enforce our sea-power, our Navy must be made and maintained of a strength greater than those of any two possibly contending powers. After establishing this principle, the next thing to do was to give effect to it. What did the nation do after full discussion and inquiry? A bill was brought in in 1888, and a sum of 21,500,000*l.* was voted in order, during the next five years, to inaugurate a large ship-building program, so that Britain and Britain's commerce might be guarded on the high seas in any event.

Since then we have spent 120,000,000*l.* on new ships, and this year we spend still more millions on still more new ships. If these prove insufficient to safeguard our sea-power, there is no doubt that the nation will increase them, and I have not heard that anybody has suggested an appeal to private effort.

How, then, do we stand with regard to universities, recognizing them as the chief producers of brain-power and therefore the equivalents of battleships in relation to sea-power? Do their numbers come up to the standard established by the Admiralty principle to which I have referred? Let us attempt to get a rough-and-ready estimate of our educational position by counting universities as the Admiralty counts battleships. I say rough and ready because we have other helps to greater brain-power to consider besides universities, as the Admiralty has other ships to consider besides ironclads.

In the first place, let us inquire if they are equal in number to those of any two nations commercially competing with us.

In the United Kingdom, we had until quite recently thirteen.† Of these, one is only three years old as a teaching university and another is still merely an examining board.

In Germany there are twenty-two universities; in France, under recent legislation, fifteen; in Italy twenty-one. It is difficult to give the number in the United States, because it is clear, from the tables given in the Report of the Commissioner of Education, that some colleges are more important than some universities, and both give the degree of Ph.D. But of universities in title we have 134. Among these, there are forty-six with more than fifty professors and instructors, and thirteen with more than 150. I will take that figure.

Suppose we consider the United States and Germany our chief commercial competitors, and apply the Admiralty principle. We should require, allowing for population, eight additional universities at the very lowest estimate.

We see, then, that instead of having universities equalling in number those of two of our chief competitors together, they are by no means equal to those of either of them singly.

After this statement of the facts, anyone who has belief in the importance of higher education will have no difficulty in understanding the origin of the present condition of British industry and its constant decline, first in one direction and then in another, since the tremendous efforts made in the United States and Germany began to take effect.

If, indeed, there be anything wrong about the comparison, the error can only arise from one of two sources; either the

† These are Oxford, Cambridge, Durham, Victoria, Wales, Birmingham, London, St. Andrews, Glasgow, Aberdeen, Edinburgh, Dublin and Royal University.

Admiralty is thoughtlessly and wastefully spending money, or there is no connection whatever between the higher intelligence and the prosperity of a nation. I have already referred to the views of Mr. Chamberlain and Lord Rosebery on this point; we know what Mr. Chamberlain has done at Birmingham; we know the strenuous efforts made by the commercial leaders of Manchester and Liverpool; we know, also, the opinion of men of science.

If while we spend so freely to maintain our sea-power our export of manufactured articles is relatively reduced because our competitors beat us in the markets of the world, what is the end of the vista thus opened up to us? A Navy growing stronger every year and requiring larger votes to guard our commerce and communications, and a vanishing quantity of commerce to guard—a reduced national income to meet an increasing taxation!

The pity is that our government has considered sea-power alone; that while so completely guarding our commerce, it has given no thought to one of the main conditions on which its production and increase depend: a glance could have shown that other countries were building universities even faster than they were building battleships; were, in fact, considering brain-power first and sea-power afterwards.

Surely it is my duty as your President to point out the danger ahead if such ignoring of the true situation should be allowed to continue. May I express a hope that at last, in Mr. Chamberlain's words, 'the time is coming when Governments will give more attention to this matter'?

WHAT WILL THEY COST?

The comparison shows that we want eight new universities, some of which, of course, will be colleges promoted to university rank and fitted to carry on university work. Three of them are already named: Manchester, Liverpool, Leeds.

Let us take this number and deal with it on the battleship condition, although a modern university on American or German models will cost more to build than a battleship.

If our present university shortage be dealt with on battleship conditions, to correct it we should expend *at least* 8,000,000*l.* for new construction, and for the pay-sheet we should have to provide ($8 \times 50{,}000l.$) 400,000*l.* yearly for personnel and up-keep, for it is of no use to build either ships or universities without manning them. Let us say, roughly, capitalizing the yearly payment at $2\frac{1}{2}$ per cent., 24,000,000*l.*

At this stage, it is important to inquire whether this sum, arrived at by analogy merely, has any relation to our real university needs.

I have spent a year in making inquiries, as full as I could make them, of friends conversant with the real present needs of each of the universities old and new; I have obtained statistics which would fill a volume, and personally I believe that this sum at least is required to bring our university system up to anything like the level which is insisted upon both in the United States and in Germany. Even Oxford, our oldest university, will still continue to be a mere bundle of colleges, unless three millions are provided to enable the university properly so-called to take her place among her sisters of the modern world; and Sir Oliver Lodge, the principal of our very youngest university, Birmingham, has shown in detail how five millions can be usefully and properly applied in that one locality, to utilize for the good of the nation the enthusiasm and scientific capacity which are only waiting for adequate opportunity of development.

How is this money to be raised? I reply

without hesitation, *duplicate the Navy Bill of* 1888–9; do at once for brain-power what we so successfully did then for sea-power.

Let 24,000,000*l.* be set apart from one asset, our national wealth, to increase the other, brain-power. Let it be assigned and borrowed as it is wanted; there will be a capital sum for new buildings to be erected in the next five or ten years, the interest of the remainder to go towards increased annual endowments.

There need be no difficulty about allocating money to the various institutions. Let each university make up its mind as to which rank of the German universities it wishes to emulate. When this claim has been agreed to, the sums necessary to provide the buildings and teaching staff of that class of university should be granted without demur.

It is the case of battleships over again, and money need not be spent more freely in one case than in the other.

Let me at once say that this sum is not to be regarded as practically gone when spent, as in the case of a short-lived ironclad. *It is a loan* which will bear a high rate of interest. This is not my opinion merely; it is the opinion of those concerned in great industrial enterprises and fully alive to the origin and effects of the present condition of things.

I have been careful to point out that the statement that our industries are suffering from our relative neglect of science does not rest on my authority. But if this be true, then if our annual production is less by only two millions than it might have been, having two millions less to divide would be equivalent to our having forty or fifty millions less capital than we should have had if we had been more scientific.

Sir John Brunner, in a speech connected with the Liverpool School of Tropical Medicine, stated recently that if we as a nation were now to borrow ten millions of money in order to help science by putting up buildings and endowing professors, we should get the money back in the course of a generation a hundredfold. He added that there was no better investment for a business man than the encouragement of science, and that every penny he possessed had come from the application of science to commerce.

According to Sir Robert Giffen, the United Kingdom as a going concern was in 1901 worth 16,000,000,000*l.*

Were we to put aside 24,000,000*l.* for gradually organizing, building and endowing new universities, and making the existing ones more efficient, we should still be worth 15,976,000,000*l.*, a property well worth defending by all the means, and chief among these brain-power, we can command. If it be held that this, or anything like it, is too great a price to pay for correcting past carelessness or stupidity, the reply is that the 120,000,000*l.* recently spent on the navy, a sum five times greater, has been spent to correct a sleepy blunder, not one whit more inimical to the future welfare of our country than that which has brought about our present educational position. We had not sufficiently recognized what other nations had done in the way of ship building, just as until now we have not recognized what they have been doing in university building.

Further, I am told that the sum of 24,000,000*l.* is less than half the amount by which Germany is yearly enriched by having improved upon our chemical industries, owing to our lack of scientific training. Many other industries have been attacked in the same way since, but taking this one instance alone, if we had spent this money fifty years ago, when the Prince Consort first called attention to our backwardness,

the nation would now be much richer than it is, and would have much less to fear from competition.

Suppose we were to set about putting our educational house in order, so as to secure a higher quality and greater quantity of brain-power, it would not be the first time in history that this has been done. Both Prussia after Jena and France after Sedan acted on the view:

> "When land is gone and money spent,
> Then learning is most excellent."

After Jena, which left Prussia a 'bleeding and lacerated mass,' the King and his wise counsellors, among them men who had gained knowledge from Kant, determined, as they put it, 'to supply the loss of territory by intellectual effort.'

What did they do? In spite of universal poverty, three universities, to say nothing of observatories and other institutions, were at once founded, secondary education was developed, and in a few years the mental resources were so well looked after that Lord Palmerston defined the kingdom in question as 'a country of damned professors.'

After Sedan, a battle, as Moltke told us, 'won by the school-master,' France made even more strenuous efforts. The old University of France, with its 'academies' in various places, was replaced by fifteen independent universities, in all of which are faculties of letters, sciences, law and medicine.

The development of the University of Paris has been truly marvellous. In 1897–8, there were 12,000 students, and the cost was 200,000*l.* a year.

But even more wonderful than these examples is the 'intellectual effort' made by Japan, not after a war, but to prepare for one.

The question is, shall we wait for a disaster and then imitate Prussia and France? or shall we follow Japan, and thoroughly prepare by 'intellectual effort' for the industrial struggle which lies before us?

Such an effort seems to me to be the first thing any national or imperial scientific organization should endeavor to bring about.

RESEARCH.

When dealing with our universities, I referred to the importance of research, as it is now generally acknowledged to be the most powerful engine of education that we possess. But education after all is but a means to the end which, from the national point of view, is the application of old and the production of new knowledge.

Its national importance apart from education is now so generally recognized that in all civilized nations except our own means of research are being daily more amply provided for all students after they have passed through their university career, and more than this, for all who can increase the country's renown or prosperity by the making of new knowledge upon which not only commercial progress, but all intellectual advance must depend.

I am so anxious that my statement of our pressing, and indeed imperative, needs in this direction should not be considered as resting upon the possibly interested opinion of a student of science merely, that I must trouble you with still more quotations.

Listen to Mr. Balfour:—

"I do not believe that any man who looks round the equipment of our universities or medical schools, or other places of education, can honestly say in his heart that we have done enough to equip research with all the costly armory which research must have in these modern days. We, the richest country in the world, lag behind Germany, France, Switzerland and Italy.

Is it not disgraceful? Are we too poor or are we too stupid?''*

It is imagined by many who have given no thought to the matter that this research should be closely allied with some application of science being utilized at the time. Nothing could be further from the truth; nothing could be more unwise than such a limitation.

Surely all the laws of nature will be ultimately of service, and, therefore, there is much more future help to be got from a study of the unknown and the unused than we can hope to obtain by continuing the study of that which is pretty well known and utilized already. It was a King of France, Louis XIV., who first commended the study of the *même inutile*. The history of modern science shows us more and more as the years roll on the necessity and advantage of such studies, and, therefore, the importance of properly endowing them, for the production of new knowledge is a costly and unremunerative pursuit.

Years ago we had Faraday apparently wasting his energies and time in playing with needles; electricity now fills the world. To-day men of science in all lands are studying the emanations of radium; no research could be more abstract; but who knows what advance in human thought may follow or what gigantic world-transforming superstructure may eventually be raised on the minute foundation they are laying?

If we so organize our teaching forces that we can use them at all stages from the gutter to the university to sift out for us potential Faradays—to utilize the mental products which otherwise would be wasted—it is only by enabling such men to continue their learning after their teaching is over that we shall be able to secure the greatest advantage which any educational system can afford.

It is now more than thirty years ago that my attention was specially drawn to this question of the endowment of research, first by conversations with M. Dumas, the permanent secretary of the Academy of Sciences, who honored me by his friendship, and secondly by my association with Sir Benjamin Brodie and Dr. Appleton in their endeavors to call attention to the matter in this country. At that time a general scheme of endowment suggested by Dumas was being carried out by Duruy. This took the form of the 'Ecole spéciale des Hautes Etudes'; it was what our fellowship system was meant to be—an endowment of the research of post-graduate students in each seat of learning. The French effort did not begin then.

I may here tell, as it was told me by Dumas, the story of Léon Foucault, whose many discoveries shed a glory on France, and revived French industry in many directions.* In 1851, when Prince Napoleon was President of the Republic, he sent for Dumas and some of his colleagues and told them that during his stay in England, and afterwards in his study of the Great Exhibition of that year, he had found there a greater industrial development than in France, and more applications of science, adding that he wished to know how such a state of things could be at once remedied. The answer was that new applications depended upon new knowledge, and that, therefore, the most direct and immediate way was to find and encourage men who were likely by research in pure science to produce this new knowledge. The Prince President at once asked for names; that of Léon Foucault was the only one mentioned during the first interview.

* *Nature*, May 30, 1901.

* See *Proc. R. S.*, Vol. XVII., p. lxxxiii.

Some time afterwards, to be exact at about 11 in the morning of December 2, Dumas's servant informed him that there was a gentleman in the hall named Foucault who wished to see him, and he added that he appeared to be very ill. When shown into the study, Foucault was too agitated to speak, and was blind with tears. His reply to Dumas's soothing questions was to take from his pockets two rolls of bank notes amounting to 200,000 francs and place them on the table. Finally, he was able to say that he had been with the Prince President since 8 o'clock that morning discussing the possible improvement of French science and industry, and that Napoleon had finally given him the money requesting him to do all in his power to aid the State. Foucault ended by saying that on realizing the greatness of the task thus imposed upon him, his fears and feelings had got the better of him, for the responsibility seemed more than he could bear.*

The movement in England to which I have referred began in 1872, when a society for the organization of academical study was formed in connection with the inquiry into the revenues of Oxford and Cambridge, and there was a famous meeting at the Freemasons' Tavern, Mark Pattison being in the chair. Brodie, Rolleston, Carpenter, Burdon-Sanderson were among the speakers, and the first resolution carried was, 'That to have a class of men whose lives are devoted to research is a national object.' The movement died in consequence of the want of sympathy of the university authorities.*

In the year 1874 the subject was inquired into by the late Duke of Devonshire's Commission, and after taking much remarkable evidence, including that of Lord Salisbury, the Commission recommended to the Government that the then grant of 1,000*l.* which was expended, by a committee appointed by the Royal Society, on instruments needed in researches carried on by private individuals should be increased, so that personal grants should be made. This recommendation was accepted and acted on; the grant was increased to 4,000*l.*, and finally other societies were associated with the Royal Society in its administration. The committee, however, was timorous, possibly owing to the apathy of the universities and the general carelessness on such matters, and only one personal grant was made; the whole conception fell through.

Meantime, however, opinion has become more educated and alive to the extreme importance of research to the nation, and in 1891 a suggestion was made to the Royal Commission which administers the proceeds of the 1851 Exhibition that a sum of about 6,000*l.* a year available for scholarships should be employed in encouraging post-graduate research throughout the whole empire. As what happened is told in the 'Memoirs of Lord Playfair,' it is not indiscreet in me to state that when I proposed this new form of the endowment of research, it would not have surprised me if the suggestion had been declined. It was carried through by Lord Playfair's enthusiastic support. This system has been at work ever since, and the good that has been done by it is now generally conceded.

It is a supreme satisfaction to me to

* In order to show how history is written, what actually happened on a fateful morning may be compared with the account given by Kinglake:—"Prince Louis rode home and went in out of sight. Then for the most part he remained close shut up in the Elysée. There, in an inner room, still decked in red trousers, but with his back to the daylight, they say he sat bent over a fireplace for hours and hours together, resting his elbows on his knees, and burying his face in his hands" ('Crimean War,' I., p. 245).

* See *Nature*, November and December, 1872.

know that in this present year of grace the national importance of the study of the *même inutile* is more generally recognized than it was during the times to which I have referred in my brief survey, and, indeed, we students are fortunate in having on our side in this matter two members of His Majesty's Government, who two years ago spoke with no uncertain sound upon this matter.

"Do we lack the imagination required to show what these apparently remote and abstract studies do for the happiness of mankind? We can appreciate that which obviously and directly ministers to human advancement and felicity, but seem, somehow or another, to be deficient in that higher form of imagination, in that longer sight, which sees in studies which have no obvious, necessary or immediate result the foundation of the knowledge which shall give far greater happiness to mankind than any immediate, material, industrial advancement can possibly do; and I fear, and greatly fear, that, lacking that imagination, we have allowed ourselves to lag in the glorious race run now by civilized countries in pursuit of knowledge, and we have permitted ourselves so far to too large an extent to depend upon others for those additions to our knowledge which surely we might have made for ourselves."—Mr. Balfour, *Nature*, May 30, 1901.

"I would remind you that all history shows that progress—national progress of every kind—depends upon certain individuals rather than upon the mass. Whether you take religion, or literature, or political government, or art, or commerce, the new ideas, the great steps, have been made by individuals of superior quality and genius who have, as it were, dragged the mass of the nation up one step to a higher level. So it must be in regard to material progress. The position of the nation to-day is due to the efforts of men like Watt and Arkwright, or, in our own time, to the Armstrongs, the Whitworths, the Kelvins and the Siemenses. These are the men who, by their discoveries, by their remarkable genius, have produced the ideas upon which others have acted and which have permeated the whole mass of the nation and affected the whole of its proceedings. Therefore, what we have to do, and this is our special task and object, is to produce more of these great men."—Mr. Chamberlain, *Times*, January 18, 1901.

I finally come to the political importance of research. A country's research is as important in the long run as its battleships. The most eloquent teaching as to its national value we owe to Mr. Carnegie, for he has given the sum of 2,000,000*l.* to found a system of endowments, his chief purpose being, in his own words, 'to secure if possible for the United States of America leadership in the domain of discovery and the utilization of new forces for the benefit of man.'

Here is a distinct challenge to Britain. Judging by experience in this country, in spite of the magnificent endowment of research by Mond and Lord Iveagh, the only sources of possible competition in the British interest is the State, which certainly could not put the 1/8000 part of the accumulated wealth of the country to better use, for without such help both our universities and our battleships will become of rapidly dwindling importance.

It is on this ground that I have included the importance of endowing research among the chief points to which I have been anxious to draw your attention.

THE NEED OF A SCIENTIFIC NATIONAL COUNCIL.

In referring to the new struggle for existence among civilized communities, I pointed out that the solution of a large

number of scientific problems is now daily required for the State service, and that in this and other ways the source and standard of national efficiency have been greatly changed.

Much evidence bearing upon the amount of scientific knowledge required for the proper administration of the public departments and the amount of scientific work done by and for the nation was brought before the Royal Commission on Science presided over by the late Duke of Devonshire now more than a quarter of a century ago.

The Commission unanimously recommended that the State should be aided by a scientific council in facing the new problems constantly arising.

But while the home Government has apparently made up its mind to neglect the advice so seriously given, it should be a source of gratification to us all to know that the application of the resources of modern science to the economic, industrial and agricultural development of India has for many years engaged the earnest attention of the Government of that country. The Famine Commissioners of 1878 laid much stress on the institution of scientific inquiry and experiment designed to lead to the gradual increase of the food-supply and to the great stability of agricultural outturn, while the experience of recent years has indicated the increasing importance of the study of the economic products and mineral-bearing tracts.

Lord Curzon has recently ordered the heads of the various scientific departments to form a board, which shall meet twice annually, to begin with, to formulate a program and to review past work. The board is also to act as an advisory committee to the Government,* providing among other matters for the proper coordination of all matters of scientific inquiry affecting India's welfare.

Lord Curzon is to be warmly congratulated upon the step he has taken, which is certain to bring benefit to our great dependency.

The importance of such a board is many times greater at home, with so many external as well as internal interests to look after, problems common to peace and war, problems requiring the help of the economic as well as of the physical sciences.

It may be asked, What is done in Germany, where science is fostered and utilized far more than here?

The answer is, there is such a council. I fancy very much like what our Privy Council once was. It consists of representatives of the Ministry, the universities, the industries and agriculture. It is small, consisting of about a dozen members, consultative, and it reports direct to the Emperor. It does for industrial war what military and so-called defence councils do for national armaments: it considers everything relating to the use of brain-power in peace, from alterations in school regulations and the organization of the universities, to railway rates and fiscal schemes, including the adjustment of duties. I am informed that what this council advises generally becomes law.

It should be pretty obvious that a nation so provided must have enormous chances in its favor. It is a question of drilled battalions against an undisciplined army, of the use of the scientific spirit as opposed to the hope of 'muddling through.'

Mr. Haldane has recently reminded us that 'the weapons which science places in the hands of those who engage in great rivalries of commerce leave those who are without them, however brave, as badly off as were the dervishes of Omdurman against the Maxims of Lord Kitchener.'

* *Nature*, September 4, 1902.

Without such a machinery as this, how can our Ministers and our rulers be kept completely informed on a thousand things of vital importance? Why should our position and requirements as an industrial and thinking nation receive less attention from the authorities than the headdress of the Guards? How, in the words of Lord Curzon,* can 'the life and vigor of a nation be summed up before the world in the person of its sovereign' if the national organization is so defective that it has no means of keeping the head of the State informed on things touching the most vital and lasting interests of the country? We seem to be still in the Palæolithic age in such matters, the chief difference being that the sword has replaced the flint implement.

Some may say that it is contrary to our habit to expect the Government to interest itself too much or to spend money on matters relating to peace; that war dangers are the only ones to be met or to be studied.

But this view leaves science and the progress of science out of the question. Every scientific advance is now, and will in the future be more and more, applied to war. It is no longer a question of an armed force with scientific corps, it is a question of an armed force scientific from top to bottom. Thank God the Navy has already found this out. Science will ultimately rule all the operations both of peace and war, and therefore the industrial and the fighting population must both have a large common ground of education. Already it is not looking too far ahead to see that in a perfect State there will be a double use of each citizen, a peace use and a war use, and the more science advances the more the old difference between the peaceful citizen and the man at arms will disappear; the barrack, if it still exists, and the workshop will be assimilated, the land unit, like the battleship, will become a school of applied science, self-contained, in which the officers will be the efficient teachers.

I do not think it is yet recognized how much the problem of national defence has thus become associated with that with which we are now chiefly concerned.

These, then, are some of the reasons which compel me to point out that a scientific council, which might be a scientific committee of the Privy Council, in dealing primarily with the national needs in times of peace, would be a source of strength to the nation.

To sum up, then. My earnest appeal to you is to gird up your loins and see to it that the science of the British Empire shall no longer remain unorganized. I have endeavored to point out to you how the nation at present suffers from the absence of a powerful, continuous, reasoned expression of scientific opinion, urging in season and out of season that we shall be armed as other nations are with efficient universities and facilities for research to uphold the flag of Britain in the domain of learning and discovery, and what they alone can bring.

I have also endeavored to show how, when this is done, the nation will still be less strong than it need be if there be not added to our many existing councils another, to secure that, even during peace, the benefits which a proper coordination of scientific effort in the nation's interest can bring shall not be neglected as they are at present.

Lest some of you may think that the scientific organization which I trust you will determine to found would risk success in working on such large lines, let me remind you that in 1859, when the late Prince Consort occupied this chair, he referred to 'impediments' in scientific prog-

* *Times*, September 30, 1902.

ress, and said: "they are often such as can only be successfully dealt with by the powerful arm of the State or the long purse of the nation."

If the Prince Consort had lived to continue his advocacy of science, our position to-day would have been very different. His early death was as bad for Britain as the loss of a great campaign. If we can not regain what we have lost, matters can not mend.

I have done what I feel to be my duty in bringing the present condition of things before you. It is now your duty, if you agree with me, to see that it be put right. You can if you will.

NORMAN LOCKYER.

THE EXPEDITION TO THE BAHAMA ISLANDS OF THE GEOGRAPHICAL SOCIETY OF BALTIMORE.

IN October, 1902, a number of citizens of Baltimore met at the residence of Dr. Daniel C. Gilman and organized the Geographical Society of Baltimore. The officers elected at that time were:

President—Daniel C. Gilman.
Vice-Presidents—Bernard N. Baker, Rev. John F. Goucher and Lawrason Riggs.
Treasurer—Robert Garrett.
Secretary—George B. Shattuck.

The purpose of organizing this society was the accumulation and distribution of geographic knowledge. The society rapidly increased in numbers, and within a few weeks included about 1,750 members, most of them citizens of Baltimore. A course of six lectures was given before the society in one of the large auditoriums of Baltimore. Early in the winter steps were taken to equip an expedition which should visit the Bahama Islands for the sake of prosecuting scientific work in that region. Several thousand dollars were quickly raised from various sources and the writer was asked to act as director of this expedition.

A large two-masted sailing vessel was chartered, provisioned and equipped for the work in hand and left Baltimore on the evening of June 1. The expedition was gone two months, arriving in Baltimore on the morning of July 30. With the exception of the inevitable seasickness, which many of the party experienced on the way out, the health of the entire company was excellent, not a single case of sickness arising.

The governor and residents of the Bahama Islands were advised of the purpose of the expedition many weeks before it left Baltimore and cooperated in every way possible to make the work successful.

The Johns Hopkins University in Baltimore, the National Museum, the United States Coast and Geodetic Survey, Agricultural Department, United States Weather Bureau and the Fish Commission of Washington and the University of Iowa also cooperated by either men, equipment or advice toward the success of the expedition.

The tide gauge now in operation at Nassau and the magnetic instruments used throughout the cruise were kindly loaned by the United States Coast and Geodetic Survey. Deep-sea thermometers, seines and other paraphernalia for marine work were loaned by the Fish Commission. The kites for high atmospheric work were loaned by the United States Weather Bureau.

The men who composed the scientific staff and took part in the investigations are as follows:

Dr. George B. Shattuck, director and chief of geological staff.

Dr. B. L. Miller, associate professor in Bryn Mawr College, associate geologist.

Dr. Clement A. Penrose, vice-director and surgeon of the expedition, chief of the medical staff.

Messrs. H. P. Cole, E. B. Beasley and T. H. Coffin, of the Johns Hopkins Medical School, assistants to Dr. Penrose.