

THURSDAY, SEPTEMBER 16, 1875

THE SCIENCE COMMISSION REPORT ON
THE ADVANCEMENT OF SCIENCE*

WE pass now to the fourth and last head, which deals with

The Central Organisation which is best calculated to enable the Government to determine its action in all questions affecting Science.

The Commissioners discuss two questions separately under this head. (1) The appointing of a Minister of Science. (2) The establishing of a Council of Science.

Extracts from the Evidence relating to the Appointment of a Minister of Science.

The Commissioners observe—

“We have received a large amount of evidence in favour of the appointment of a Minister of Science. There has been almost complete unanimity among the witnesses on this point.”

Indeed, the necessity for such a minister is the one theme never lost sight of throughout the bulky volume of evidence. Scarcely a proposal is made which does not either involve or imply this necessity. Expunge all the recommendations that a Minister of Science should be appointed, and there will scarcely remain a recommendation that can be practically carried out, or that is not, on its face, almost a confessed absurdity.

The extracts which we append from evidence on this question form but a very small portion of the representations submitted to the Royal Commission, of which they must be considered only samples.

Prof. Owen :—

“I conceive that the recommendation by Bentham in the last century of such a minister can hardly fail to be practically adopted before the close of the present century, and that the necessity of having a minister for such a purpose will be recognised.”

Sir W. Thomson :—

“Would you contemplate that a new department of the State should be constituted for directing the scientific work of the Government?—It would be quite necessary to have a Minister of Science; it is indeed, I think, generally felt that a Minister of Science and scientific instruction is a necessity.”

“Not a minister of other instruction?—Specially of scientific instruction, and not under any national education board, but a minister of science and scientific instruction. The minister would necessarily be in Parliament and a political man, but it would be very rare that he could also be a scientific man, and perhaps not desirable that he should be a scientific man, but he must have able scientific advisers always at hand.”

“Could any such duties be well assigned to any existing department of the State?—I believe not.”

“You spoke of the necessity for having a Minister of Science; do you conceive that it would be requisite to have a cabinet minister for education and a second cabinet minister for science, or would you contemplate that the minister for education should be the minister for science?—I do not wish absolutely to fix it beforehand; on the whole I think, however, that the title of Minister of Education would not suffice. If there is to be a minister it must be a minister of science and education. There might be a minister of science and education, with a chief secretary or under minister for national and elemen-

tary education, and another for the advancement of science and for the higher scientific instruction. But naturally the minister of education must act for the masses; that must be his great duty, and however much he might wish to act for science, he has still a great duty to the masses. On the whole I think it would be preferable to have a distinct minister of science and scientific instruction. A minister of science and scientific instruction, as a subordinate to a chief minister of science and education, might probably be a very good arrangement.

“The Minister of Science administers knowledge to the whole country.”

Col. Strange :—

“It seems to me that in the first place there should be some means of bringing science fully before the nation through Parliament. I know of no means of doing this that is in accordance with our constitutional procedure, except through a minister of State; and therefore assuming science to be a matter of enormous national importance, I think it is essential that it should be all brought under one minister of State, who should be responsible to Parliament for everything which is done in the name of the nation to further science, and who should frame his own estimates and keep them distinct from those of departments which have little or nothing to do with science. . . . I think that there should be an estimate for science just as there is an estimate for the army and for the navy. . . .

“What I should be glad to see would be a minister for science; but I dare say that if proper assistance were given to such a minister, he might superintend other departments as well; for instance, as on the Continent, he might superintend education and the fine arts. I think it would be preferable that he should be for science only. I think there is quite enough for him to do in England, for it to be done thoroughly; but rather than have no minister I would assign to him also education and the fine arts.”

“There would be a difficulty, would there not, in defining the boundaries between the duties of the minister for science and the minister for education?—I think not. I think one would relate to education, which is quite a distinct thing from national research, and I think that they should be kept as distinct as possible. I think one great evil now existing is the mixing up of those two things. Throughout my evidence I have here and there expressed the same opinion that they should be kept distinct, one being the means, the other the end; instruction I conceive to be the mode of growing a certain number of persons fit to investigate.”

Mr. De la Rue :—

“I think that science ought to be recognised in the Ministry by the appointment of a Science Minister, in order that all matters relating to science might come properly under the cognisance of the Government, and that whenever the Government sought the aid of scientific men it should be through the intervention of the Science Minister. . . .”

Mr. John Ball :—

“. . . If science is to be aided effectually, and at the same time controlled effectually, there should be some permanent officer in the department of the Government that has its relation with science, whose duty it should be and who should be responsible for making himself generally aware of the state of science and the doings of its cultivators, and who should be the proper person to advise the Government, not as to the best mode of deciding a strictly scientific question, but as to where the means for solving it are to be had. I look upon it at present as being a wholly haphazard matter how questions of science or connected with science and affecting the progress of science are decided in the public offices, and I speak from

* Continued from p. 392.

some slight personal acquaintance with the matter during the short time that I was in the public service in Parliament."

"You stated, did you not, that you thought it desirable that there should be some permanent official to represent and advise the Government in its relations to science?—Decidedly."

General Strachey :—

"The first conclusion that I arrive at is that all questions relating to scientific matters that arise in the operations of the Government should be dealt with by one of the chief ministers of the Crown, and the officer at the head of the Education Department seems to be the most suitable of such officers. It has been, I know, suggested by some persons that it would be better if there were a separate department for science. That I venture to doubt"

"Under such an education and science department there would be a natural division of the duties, which would probably lead to the appointment of some permanent officer in the position of an under secretary of State, who would have specific charge of the scientific duties of the department as distinguished from the educational duties, which constitute a distinct branch of administrative work. . . ."

"The principal officers in the proposed scientific branch of the department should be, by their scientific qualifications, capable of disposing of the ordinary current business under their charge. . . ."

Dr. Sclater :—

"Do you agree with [Col. Strange's] views as to the creation of a Minister of Science and a Council of Science?—Yes, I agree generally with his views; I think that it would be very desirable for the interest of science."

"Do you think it would be desirable that the existing State scientific institutions should be removed from the control of the Admiralty, the Office of Works, and other departments under which they are now placed?—I think it would be a very great advantage that they should be removed from those departments and placed under one minister."

"Have you any opinion as to whether the work could be done by a Minister of Education, supposing such a minister were appointed?—I think it would hardly be expected that a minister should be appointed only for science; and as I believe it is the case in continental countries that that department is given to the Minister of Education, I think that we could not follow a better example here."

Prof. Balfour Stewart :—

"I think it [the Ministry of Science] might form a division, perhaps, of the Ministry of Education."

Mr. Farrer :—

"I dislike very much the idea of establishing new departments of the Government. If it were possible that this business could be placed upon the Minister of Education, who is becoming more and more important, I think that would be much better than establishing a separate department for the purpose."

Sir George Airy is perhaps the only witness of authority who does not seem able to perceive that any advantages would follow the creation of a Science Minister. The following is his evidence on the question :—

"Do you see any inconvenience arising from the several scientific institutions that are more or less connected with the Government being under different departments?—Not that I am aware of."

"You are content that the Royal Observatory at Greenwich should remain under the Board of Admiralty. You do not require to have a Minister of Science, or a Minister

of Education?—No; we are naturally connected in these respects with the Admiralty. . . ."

The Astronomer Royal appears to have confined his attention to the wants of the great Observatory of which he has so long been the distinguished director. It is to be regretted that he abstained from enunciating his views on the larger question of the administration which an extension and systematisation of national science would render necessary.

The Proposal to establish a Council of Science.

A proposal to establish a Council of Science was brought before the Government by the Royal Society in 1857, upon a Report from the Government Grant Committee of that society.

The object of the Committee was (evidence of Sir E. Sabine, qu. II, 117) to determine "whether any measure could be adopted by the Government which would improve the position of science or its cultivators in this country."

This Report, after enumerating the various matters connected with science which should properly come under the supervision of the Government, concludes by naming two bodies under whose advice that supervision might be conducted. They say :—

"11. Assuming that the above proposal should meet with the approval of her Majesty's Government, it will be desirable to ascertain what mode of constituting such a board would inspire them with most confidence in its recommendations. Two modes may be suggested in which such a board might be organised. First, the Government might formally recognise the President and Council of the Royal Society as its official adviser, imposing the whole responsibility on that body, and leaving it to them to seek advice when necessary in such quarters as it may best be found, according to the method now pursued in the disposal of the Parliamentary grant of 1,000*l.* The second method would be to create an entirely new board, somewhat after the model of the old Board of Longitude, but with improvements. The question as to which alternative shall be adopted is properly a subject for the consideration of the Government."

Upon this the Commissioners state as follows :—

"The proposal to establish a Council of Science has recently been revived by Col. Strange.

"Amongst the witnesses who recommend the appointment of a Council, there is a great diversity of opinion as to its constitution and limits of action. As regards its constitution, it will be seen from the summary of evidence which we shall give subsequently, that while some of the witnesses are in favour of a Council very limited in numbers, others would desire to have it sufficiently numerous to include representatives of nearly every branch of science, as well as men of known administrative ability.

"In regard to its limits of action, the main difference arises on the two questions, whether the Council should or should not have the power of initiating inquiries, either directly or by suggestion to the Minister, and whether or not it should itself undertake the actual work of investigation required for State purposes.

"As to the mode of remuneration, the opinions vary between those which advocate annual payments to permanent officials, and those which are in favour of payments for attendance at meetings.

"The opinions of the witnesses who are opposed to any such Council are based, in the main, upon one or more of the following objections :—

"1. That Government can get the best advice without it.

"2. That it would be liable to come into collision with Ministers.

"3. That it would not work harmoniously with our general system of administration.

"The evidence of three eminent statesmen possessing great administrative experience—Lord Derby, Lord Salisbury, and Sir Stafford Northcote—is in strong contrast (so far as the proposal to establish a Council of Science is concerned) with that which we have received from many persons holding official positions in various branches of the public service. The opinions of these latter, as to the inefficiency of the organisation of their respective services in regard to questions affecting science, we have already quoted in the first part of this Report, and it will be seen from the quotations we are now about to give, that they in general consider the creation of a Council to be the proper remedy."

The Commissioners preface their extracts from the evidence laid before them on this subject by saying :—

"We fear that no mere extracts from the evidence of Col. Strange would represent in an adequate manner the views which have led him to recommend the formation of a large and highly-paid Council of Science. It would scarcely be fair to him, as the most prominent advocate of the proposed measure, to do otherwise than refer to his evidence at length, pp. 75 to 92, and 125 to 135, vol. ii. of Evidence."

When we say that Col. Strange's evidence constitutes a complete and carefully arranged scheme for the scientific administration of the country, it will be readily understood why the Commissioners refer to it as a whole, rather than cite detached portions of it from which no conception of its systematic and comprehensive character could be formed. With respect to the Council, Col. Strange first points out its necessity and then defines its functions. His next step is to so construct it as to fit it for performing these functions satisfactorily. And finally, he enters fully into the mode of its election, its remuneration, and its relation to the Minister of Science and to the various departments and institutions concerned with scientific questions.

Though, like the Commissioners, we find it impossible to give a just idea of this scheme by means of extracts, we think that as the composition of the Council suggested by Col. Strange was made by the Commission the foundation of their examination of almost every witness who spoke on that subject, it is desirable that the sketch of Col. Strange's Council should precede the short extracts from evidence on the subject which we shall lay before our readers. It stands thus :—

Sketch of Proposed Council.

Pure Mathematician (the Professor of Mathematics at Oxford and Cambridge alternately. These should be "Regius Professorships").....	1
Mixed ditto (Astronomer Royal for the time being)	1
Chemists (one to be the Director of the proposed Chemical Laboratory).....	2
Meteorologist (Director of Meteorological Department).....	1
Physical Astronomer (Director of proposed Physical Observatory)	1
Metallurgist (Director of proposed Metallurgical Laboratory).....	1
Geologist (Director of Geological Survey)	1
Physicists (one to be an Electrician)	2
Naturalist (Head of Natural History Department of British Museum).....	1
Physician (Medical Officer of the Privy Council)	1
Surgeon	1
Physiologist.....	1
Naval Architect.....	1

Civil Engineer	1
Mechanical ditto.....	1
Mining ditto	1
Statist	1
Royal Engineer Officers.....	2
Royal Artillery ditto (one for Field Artillery, the other for heavy Ordnance)	2
Royal Navy ditto (one for Navigation, the other for Gunnery)	2
Infantry Officers	2
Merchants (one a shipowner)	2
Agriculturist	1

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Colonel Strange remarks on the above :—

"Of course I give that sketch of the Council as a mere indication of the sort of Council that I think is desirable. It is something that I put before the Commission in order to be torn to pieces and put into shape ; it is a mere sketch of a possible Council. I have given it a great deal of thought, and it does not appear to me that there are any superfluous members in it, nor do I know of any that have been omitted. I may say generally that one of my great objects was to place in this Council the heads of institutions, in order that they might be concerned in the directions given to their various institutions. I think it would hardly do (in a former part of my evidence this matter was alluded to) to have a separate body directing men of eminence as heads of institutions ; it would be felt to be an interference, but if those heads were part of the governing body, then the interference would not be felt."

Though Colonel Strange's sketch was freely discussed and criticised, no witness pointed out specifically its omissions or redundancies, nor was any definite counter-proposal submitted to the Commission.

Sir W. Thomson's evidence with reference to the establishment of a Council of Science contains the following :—

"Do you think that a single body would be better than a number of small committees for advising the Government on the great variety of questions which from time to time would be likely to arise? Yes, certainly."

"The questions which might be referred to such a Council would differ very much from one another, and extend over a wide range, would they not? Yes, but there would be an unity of design and action, with a multiplicity of knowledge and skill at command, secured by a single Council, and those conditions cannot, in my opinion, be secured at all by occasional committees, or committees working separately and independently of each other. . . ."

"A scientific Council would relieve the Government of all responsibility in such matters, and would be responsible itself in a general way for all its proceedings to a political chief and to Parliament. . . ."

"Would you be so good as to inform us whether you have formed any opinions as to the best system of appointing such a Council?—The Council ought to represent the different branches of science and the practical applications of science. Pure mathematics ought to be represented in the Council ; mixed or applied mathematics, according to the old-fashioned nomenclature as generally understood, ought also to be represented ; chemistry cannot be shut out ; physics must of course be represented, and ought to be represented separately ; astronomy, both what was formerly called physical astronomy and of course the new science of astronomical physics, ought to be represented. I do not believe that astronomy could be properly represented under one head ; astronomical physics must, in my opinion, be separately represented. Geology should be separately represented, and also the various branches of natural history ; physiology also, and medical practice in general, should be

represented. I have spoken of applied mathematics, I meant rather mathematical dynamics than applications to art and mechanical operations. Then practical applications should be represented, mechanics and mechanical engineering; then again civil engineering and geodesy, mining engineering, statistical inquiries, and the scientific branches of her Majesty's service ought to be thoroughly represented. Engineer and Artillery officers and the navy should be represented both in its navigation department and in the department of seamanship, and the department of gunnery. The mercantile interests of the country and the agriculture of the country ought certainly to be represented. The universities ought to be represented amply—the English universities, the Scotch universities, and the Irish universities. Also practical telegraphy, which is a very distinct branch of engineering, civil engineering or mechanical engineering would not sufficiently represent it."

"Do you think that the functions which are proposed to be assigned to the scientific Council would not interfere in any way with the existing scientific departments of the Government; for example, the Medical Department of the Privy Council, or some of the other Government scientific departments?—I think it would relieve the departments from pieces of scientific work at present given to them, because there is no other body to whom they can be given, and for which they are by their organisation and *personnel* almost necessarily ill fitted and insufficiently competent."

"You would leave to these departments their administrative functions, but give them the advantage of consulting with the Council upon higher questions of science on which they desired information?—Yes, certainly; every question of science that falls under the notice of any department of the Government would naturally be referred to the scientific Council."

Dr. Frankland thus deals with Col. Strange's proposal:—

"Are you acquainted with Col. Strange's proposal for the establishment of a consultative council of science?—Yes, I have heard from him some of the chief ideas that he entertains on that subject."

"Are you disposed to consider that such a Council would be desirable?—I think so. I am not prepared to say that it should be constituted exactly in the way that Col. Strange mentioned, but a Council of that description would be exceedingly desirable, on many grounds, for furnishing the Government with trustworthy scientific opinions in cases requiring them. . . ."

"Are you of opinion that the advice of such a Council, even on matters to which the larger proportion of the members of the Council had not paid special attention, would be valuable?—Yes, I think it would, because those members of the Council who were thoroughly acquainted with the subjects would be expressing their opinion to men conversant with scientific methods, and they would be able to convince their colleagues with respect to the opinion that the Council generally ought to give upon the matter. It would be a very different thing from that of convincing a Parliamentary Committee, for instance, upon a scientific point, because all the men upon the Council would have received a scientific training and would understand the bearing of scientific arguments."

"Have you considered at all how such a Council could best be appointed, whether would you leave it to one of the Ministers to appoint and select the proper persons to serve on the Council?—I should think that it must ultimately fall upon the Minister, but he might be assisted by the presidents of different learned societies or by the Council of the Royal Society, in whom I think everyone would have confidence."

(To be continued.)

THE IRON AND STEEL INSTITUTE

EVERY friend of science and true patriot must heartily welcome the sound and steady progress of the Iron and Steel Institute. The proceedings at the Manchester meeting last week, as also its Journal, just received, containing the papers read at the last London meeting, show that it is doing exactly the kind of work which is now becoming quite necessary for the maintenance of the dignity and prosperity of British industry. It also displays a very important feature of industrial progress. One need not be grey-headed to be able to remember when iron-workers and iron-masters, in common with other artificers, were nearly unanimous in believing that their trade interests were best served by each man hugging up to himself every bit of newly acquired trade information, and keeping his competitors as much as possible in the dark respecting it. Indentures of apprenticeship still describe our common trades as "mysteries," and bind the pupil to abstain from revealing the secrets of the craft which his master solemnly agrees to communicate in return for the premium and seven years' servitude. The ceremonials, secrets, and degrees of freemasonry are based on the old practice of hoarding the arcana of a "craft" and communicating them in various degrees of profundity to certain privileged individuals, who were bound under dreadful penalties to reveal these sacred mysteries to none but the initiated.

Contrasted with these lingering shadows, these penumbral fringes of the old passing darkness, the meetings of the Iron and Steel Institute are full of hopeful suggestion, by displaying the magnitude of the revolution which modern science is gradually effecting. In the still older and still darker times all knowledge was made a mystery and a craft, and was selfishly held by the initiated few who used it for the oppression of their fellow-men. Abstract or pure science was first thrown open; learned societies were formed for the discovery and diffusion of natural truth by the open and world-wide co-operation of philosophers; their discoveries threw new light into the dark mysteries of trade, and now we see the craftsmen themselves emulating the philosophers, and offering freely to all the world the best results of their technical knowledge, their laborious investigations, and hard-earned technical experience. This is the true chivalry of trade, that only needs its full development in order to place industry fairly upon the throne of its natural and proper dignity.

The Manchester meeting, under the presidency of Mr. W. Menelaus, has been as successful as could possibly have been wished. Although the papers read were too purely technical to be referred to at length in NATURE, still they are all evidences that the iron and steel industries are being more and more rigidly conducted on scientific methods. The papers read were few, but they were all of a thoroughly practical kind, and along with the discussions which generally followed, were well calculated to promote the objects for which the Institute has been established. The first paper read, and which gave rise to a warm discussion, was by Mr. Daniel Adamson on "The Application of High-pressure Steam to Quadruple Engines." Mr. I. Lowthian Bell's paper on "The use of Caustic Lime in Blast Furnaces" is likely to prove of great value to