

silliness" is to be regretted chiefly for his own sake. He has injured his reputation for common-sense, and this even a great genius cannot afford to do.

THE NATIONAL SCIENCE COLLECTIONS

THE following Report of a Committee appointed by the Government to consider the housing of the objects illustrating the physical sciences belonging to the nation has recently been printed and circulated. The Committee consisted of Sir F. Bramwell (Chairman), Lord Lingen, Colonel Donnelly, C.B., and Mr. Mitford, C.B. :—

1. We, the Committee appointed by the Lords Commissioners of Her Majesty's Treasury to consider certain questions that have arisen in regard to the Scientific and Technical Collections at South Kensington, now beg leave to present to their Lordships our Report thereon.

2. The appointment of the Committee included the name of Sir Francis Sandford, K.C.B. ; but this gentleman, in consequence of the pressure of other public business, has been unable to attend any of our meetings, and he has authorised the other members to proceed with the inquiry, and to report, in his absence.

3. Our instructions were conveyed in a letter, dated January 14, 1884, and a memorandum accompanying it, from Lord Richard Grosvenor to the Chairman, and were to the following effect :—

"It will be the duty of the Committee (1) to consider and report upon the scope of the Scientific and Technical Collections, including the Patent Museum, and the space required for them, immediately and prospectively ; (2) to suggest plans for housing these Collections in the existing galleries to the south of the Horticultural Gardens, or in new galleries to be built upon their site, and the adjacent ground now the property of the Government."

PRESENT DISPOSAL OF THE SCIENCE COLLECTIONS

4. Before we enter on the consideration of these questions, it will be convenient to explain how the collections are at present housed.

They are contained in five buildings which are shown on the accompanying Plan, Drawing No. I., and are marked A, B, C, D, E ; whereof A, B, C, and D are on the west, and E is on the east side of Exhibition Road.

The buildings A, B, E, coloured yellow on the plan, and their sites, are the freehold property of the Government ; the buildings C, D, coloured blue, and their sites, are the property of the Royal Commissioners of 1851, from whom they are rented by the Government.

5. C is a block forming the centre portion of the galleries to the south of the Horticultural Gardens. It is about 292 feet long, 55 feet wide, and two stories high. It contains 22,000 square feet of available floor-space.

This building is the property of the Royal Commissioners of 1851, and is at present leased from them by the Government for 1500*l.* per annum. The lease terminates in 1890 or 1897, with a power up to January 1888 of purchase for the sum of 30,000*l.*, or, at the option of the Commissioners, for such sum, not exceeding 35,000*l.*, as may be fixed by the President of the Institute of British Architects.

6. A and B are the southern wing-galleries, the former on the east, and the latter on the west side of the central block C, and having short returns or spurs, A' and B', to the northward, at their external ends.

These wing-galleries extend about 280 feet in length on each side of the central block ; they are about 26 feet wide, and two stories high.

The returns at each end are each 72 feet long, and one story high.

The whole contain about 29,500 square feet of available floor-space.

These buildings, and their sites, are the property of the Government.

7. D is a building known by the name of the Western Gallery. It is 600 feet long, 33 feet wide, and two stories high. It contains about 36,560 square feet of available floor-space.

This building is the property of the Royal Commissioners of 1851, and is at present rented from them by the Government for the sum of 2000*l.* per annum. We believe, however, it is desired to give up the tenancy if possible.

8. E is a temporary building one story high, abutting on the south end of the permanent buildings of the Museum on the eastern side of the Exhibition Road. It contains 7500 square feet of available floor-space.

It is the property of the Government, but we understand it must be pulled down before long, to make way for more permanent erections.

9. These buildings are not altogether devoted to the Science collections.

The National Portrait Gallery at present occupies 19,040 square feet, partly in the two floors of the eastern wing A (a portion of the freehold), and partly in the eastern section of the central block C (the leasehold portion), of the south galleries. A space of 7500 square feet in the upper floor of the central leasehold block C, is also reserved for examination-rooms.

A portion of the ground floor of the western gallery, D, has been, up to the present time, occupied by the Pitt-Rivers Loan Collection, but this collection is in course of removal to Oxford.

10. The Science collections are now contained in the western part of the ground floor of the leasehold central block C ; in the ground floor and in part of the upper floor of the western freehold wing B ; in the northern end spurs A' and B' ; in the two floors of the western gallery D ; and in an unsightly wooden passage K.

This passage runs outside the southern wall of the south gallery, and forms the only approach from Exhibition Road to the Science collections, it not being possible to allow the public to use the Portrait Gallery as a thoroughfare.

The "Patent Museum" is contained in the temporary building E.

11. The total floor-space now occupied by the Science collections is therefore about as follows :—

	Square feet
Total space in C	22,000
" " A, B, and A', B'	29,500
" " D	36,560
" " E	7,500
	95,560
Deduct Portrait Gallery	19,040
" Examination-Rooms	7,500
	26,540
Total occupied by the Collections	69,020

12. The Drawing No. I. also shows (marked G and coloured red) the area of land which belongs to the Government south of the present south galleries, which land is implied in our instructions to be available for buildings to house the collections.

SCOPE OF THE COLLECTIONS, AND SPACE REQUIRED FOR THEM

13. We may now proceed to report on the first subject submitted to us, namely :—

The scope of the Scientific and Technical Collections, including the Patent Museum, and the space required for them, immediately and prospectively.

14. A Museum of Science was contemplated as an integral part of the Science and Art Department from its creation in 1853.

Objects were gradually collected, and when the Department was removed to South Kensington in 1858 these objects were, for the first time, arranged together in the Museum for public inspection. They were mentioned by a House of Commons Committee in 1860 as "well worth preserving."

These collections, however, were not developed as much as the Art collections. Some objects were sent away to other establishments; and for want of space in the South Kensington Museum, the greater portion of the remainder were removed to the galleries on the western side of the Exhibition Road, where they have remained till now.

But public attention was frequently called to the subject.

The Royal Commission on Scientific Instruction and the Advancement of Science, in their Fourth Report (1874), treated somewhat largely of these collections; they noticed many interesting objects which they contained, but they pointed out the striking contrast between them and other British National collections. They expressed their regret that there was no National collection of the instruments used in the investigation of mechanical, chemical, or physical laws, although such collections were of great importance to persons interested in the experimental sciences. This defect in our collections was, they said, already keenly felt by teachers of science, and high authorities had assured them that, on the Continent, collections of scientific apparatus, when combined with lectures accessible to workmen, had exerted a very beneficial influence on the development of the skill of artisans.

The Commission suggested, in conclusion, that the collections should be completed and consolidated, and placed under the authority of a Minister of State.

In 1876 a Loan Collection of Scientific Instruments and Apparatus was exhibited in the galleries of the Horticultural Gardens. It excited much attention, and a memorial was presented to the Lord President, signed by 140 of the best known men of science in the country, suggesting that it might be utilised in the formation of a National Science Museum. Some of the objects were left in the care of the Department, but no general action was taken.

The question of the development of the Science Collections of the Department remained in abeyance till 1881, when the Lord President, Earl Spencer, stating that "the importance of having a Museum for Scientific Apparatus was amply established," set on foot a series of inquiries to which we proceed to refer.

15. For the purpose of these inquiries, the existing collections were divided into six heads:—Objects for the illustration of Science generally; Naval Models; Objects illustrating Building Construction; Objects bearing on Fish Culture; Educational Objects; and Mechanical Objects.

Committees, composed of persons having specific knowledge in each of these branches, were appointed to examine the several collections, and expressed opinions on their condition, on the development which it would be advisable to give to them, and on the space required.

As copies of the Reports on each head are reprinted in an Appendix (B), it will suffice to give here a general outline of the opinions and recommendations they contain.

Collections of Objects for the Illustration of Science generally

16. The Committee consisted of Mr. Wm. Spottiswoode, President of the Royal Society, Professors Frankland, Goodeve, Guthrie, Huxley, Judd, Chandler Roberts, and Warington Smyth, Mr. Norman Lockyer, and the chief officers of the Science Department. They expressed the opinion that this question was of great importance in relation to the education, the industry, and the science of

the country; they reported that the present collection was suitable for a nucleus of the contemplated Museum, and they recommended an examination, by the several Professors and other members of the Council of the Normal School, of the various classes of apparatus and appliances relating to their own subjects respectively.

This examination was afterwards undertaken by a Committee of the various Professors, and the results, as already stated, are given in the Reports. Recommendations were made as to the objects in each department of science, and the following estimate was given of space necessary to be provided:—

	Square feet
Chemistry	6000
Physics	6000
Mechanics	5000
Metallurgy	2500
Geology and Mineralogy	2500
Astronomy, Meteorology, and Geography	7000
Agriculture	4000
Biology	4000
	37,000

The Committee also estimated that a further space of 3000 square feet (making 40,000 in all) would probably be sufficient for any reasonable increase within ten years.

Naval Models

17. A Committee consisting of Lord Ravensworth, Sir E. J. Reed, K.C.B., M.P., Mr. W. Baskcomb, Mr. J. H. Morrison, and Mr. Joseph D. A. Samuda, considered this collection, and reported on it on March 1, 1883. They expressed a strong opinion as to the utility of such a collection, gave some general suggestions upon it, and proposed to have it carefully examined in detail.

This examination was carried out, and on April 4, 1883, the Committee based upon it a statement that a space of 10,500 square feet was at once required, and that 10,000 square feet additional should be provided for the increase during the next ten years, making 20,500 square feet in all.

Structural Collection

18. The Committee for this consisted of Mr. (now Sir) Charles Hutton Gregory, Past-President of the Institution of Civil Engineers, Mr. G. E. Street, President of the Royal Institute of British Architects, Mr. James Abernethy, President of the Institution of Civil Engineers, and Major H. C. Seddon, R.E., Examiner for the Science and Art Department in Building Construction. They reported, in 1881, that this collection was of great value in many respects, and recommended its maintenance, revision, and development.

In July 1883 another Committee, consisting of Mr. C. H. Gregory, Mr. Horace Jones, President of the Royal Institute of British Architects, Mr. James Brunlees, President of the Institution of Civil Engineers, and Major Seddon, took up the matter. They put forward detailed proposals in regard to the constitution and arrangement of the collection, and gave an estimate of 15,000 square feet of floor-space for it, to be increased to 25,000 square feet in ten years.

Fish Culture

19. The Committee for this collection were Prof. Huxley (Government Inspector of Fisheries), Sir J. R. G. Maitland, Bart., Mr. E. Birkbeck, and Dr. Francis Day.

They expressed the opinion that it was highly desirable that the existing specimens should be developed into an economic Fish Museum, and they estimated about 5000 square feet as the space required.

Educational Objects

20. The Committee for this were Dr. J. H. Gladstone, Rev. J. W. Sharpe, Mr. J. S. Fitch, Mr. J. Iselin, and Mr. H. A. Bowler.

They stated that the collections would be of great value to School Boards, managers, and teachers, and they estimated 7000 square feet of surface as necessary, not including any allowance for the library.

Mechanical Collections

21. The Committee appointed to consider these collections were Mr. John Slagg, M.P., Sir W. G. Armstrong, Sir J. W. Bazalgette, Mr. James Brunlees, Mr. E. A. Cowper, Prof. T. M. Goodeve, Sir Charles Hutton Gregory, Mr. John Hick, Mr. James Howard, M.P., Mr. Charles Manby, Mr. J. Hinde Palmer, Sir E. J. Reed, M.P., and Mr. (now Sir) B. Samuelson, M.P.

They carefully examined the collections, including the "Patent Museum" (which, under the Patent Act, 1883, had been transferred to the care of this Department on January 1, 1884), and made a comprehensive report, embodying suggestions for the improvement and the arrangement of the whole.

They estimated that from 40,000 to 50,000 square feet of space would be required.

22. Considering that the members of these Committees were selected, on the responsibility of the Government, for their competence as authorities in their respective branches of science, and considering the detailed nature of their inquiries, we assume their conclusions as the basis of our recommendations.

We may also add that similar Committees are permanently retained, under the name of "Committees of Advice and Reference" for the several collections.

23. We need not enlarge on the desirability that such a country as Great Britain should possess a thoroughly good and complete National Collection of Scientific and Technical objects, any more than that it should possess a Museum of objects of Art or of Natural History.

When it is considered how much the prosperity of the nation is bound up with industrial enterprises and occupations, and how largely these depend, for their success, on practical applications of science, it needs no elaborate reasoning to prove that the public exhibition of well-selected and judiciously arranged scientific and technical collections, particularly when used in connection with efficient courses of instruction, justifies its cost.

24. There has long been a National Scientific and Technical Museum in France, well known under the name of the Conservatoire des Arts et Métiers, and this has often been referred to as a type of the institution of a similar nature which ought to be established in England.

We reprint, in Appendix C, an article published in the *Times* newspaper of October 5, 1876, which gives a full account of the nature and scope of the Conservatoire, and we have also received, through the courtesy of the Directors, full information as to the present contents and arrangements of the Museum.

The premises are situated in an area contained between the four streets, Rue St. Martin, Rue Vaucanson, Rue du Vert Bois, and Rue Réaumur. This area is about 200 metres wide by 140 metres deep, thus containing 28,000 square metres, or about 7 acres. These 7 acres are not at present entirely occupied by the Conservatoire, but an enlargement of the buildings is in progress, which will extend them, including the necessary courtyards, passages, &c., over the whole area.

The objects exhibited belong to a great variety of subjects, the following being only a brief indication of their general classification:—

Motors.—Horse-machines, water-motors, wind-motors, steam-engines, hot-air engines. Details and accessories.

Hydraulic Machines.—Pumps, &c.

Descriptive Geometry.—Forms of curves; teeth of wheels. Machines for producing special forms.

Metallurgy.—Working of mines. Minerals. Metallurgical processes. Metals.

Calculating and Counting Machines.

Instruments for Surveying.

Astronomy, &c.—Almanacs and Calendars.

Chronometry, ancient and modern; movements; tools.

Arts of Construction.—Materials, processes, workmen's tools, &c. Constructions under water.

Kinematics.—Machinery. Mechanism. Elements of machines.

Dynamometers and instruments for mechanical observations.

Cranes and other constructions for lifting and removing weights.

Machine Tools of various kinds. Presses, &c.

Engraving, Lithography, Typography, Printing, &c., and paper-making.

Porcelain, Glass, and Pottery.

Physics.—Mechanics. Molecular actions. Heat. Magnetism. Electricity. Acoustics. Optics. Meteorology. Electro-chemistry. Telegraphy.

Agriculture.—Apparatus of all kinds.

Weights and Measures.—French and foreign. Weighing-machines. Instruments of comparison.

Locomotion and Transport on ordinary roads, on railways, and on rivers, canals, and the sea.

Manufactures, various.—Gunpowder. Arms. Chemicals. Bread. Sugar. Cements. Cutlery. India-rubber.

Spinning and Weaving.—Textile manufactures generally.

Preparation, Dyeing, and Printing of Fabrics.

Chemical Arts and Products.—Preservation of Timber. Gas. Distilling. Brewing. Tanning, &c.

Industrial and Fine Arts.—Prints; designs. Photography.

Pictures and Drawings, illustrative of Scientific and Technical matters; a very large collection.

There are in all about 10,000 objects. The collection is remarkably rich, both in historic apparatus and in the most recent inventions. The machinery is shown in motion two days in the week. The objects are used, when required, for the lectures given in the Conservatoire.

Nothing is added unless it can be utilised for teaching; sometimes orders are given for models to be made, and sometimes objects are purchased. When anything is offered as a gift, it is not accepted unless one of the professors will state that it is really required.

The collection is not in any way a Patent Museum. Formerly certain models of patented inventions were exhibited there, but this is no longer done.

(To be continued.)

NOTES

THE meetings held yesterday at St. James's Palace and the Mansion House, to which we have not time to refer at length this week, indicate that from the Prince of Wales downwards all interested in the proposed memorial are willing to allow the necessity of making the Institute one on a broad scientific basis. An admirable speech by Prof. Huxley at the Mansion House, following that of the Prince of Wales at the first meeting, shows that there is now no chance of the importance and of the necessity of collecting and arranging *knowledge* being overlooked.

FRENCH geologists have cause to regret the blow which their science has received in the premature death of the well-known geologist of Lyons, C. F. Fontannes, on December 29, at the age of forty-eight. He is best known by his important monograph on the "Stratigraphy and Palæontology of the Tertiary Deposits of the Basin of the Rhone"—a work of laborious research and of great value from the minuteness and accuracy of its details. He established a claim on the gratitude of geologists by the infinite pains he took in the organisation and working of the Inter-