lery in the British Museum, in the July number of *Natural Science* (p. 10):

"No museum has hitherto solved the difficulty of exhibiting the outward form of the various kinds of whales which baffle the taxidermist's art on account of the oily nature of their skin. At last, however, Sir William Flower has solved the problem in a most satisfactory manner, and the result is a unique addition to the Department of Zoology in the museum over which he presides."

The solution referred to consists in exhibiting *papier maché* casts of one-half of the exterior of the various cetaceans, colored as in life, and placing the skeletons in the concavities of the casts.

Sir William Flower would, I am sure, disclaim originality for this excellent mode of exhibiting cetaceans, as it has been in use in the National Museum for more than fifteen years. In the Report of the Smithsonian Institution for 1882 (p. 125) will be found the following statement:

"Mr. Joseph Palmer, chief modeller, has been engaged during a large part of the year in mounting the skeleton and cast of a humpback whale, 33 feet in length, which now stands in the south main hall. This is the largest cast of an animal that has yet been made, and is unique in conception. Viewed from the left side, the visitor sees the cast of a whale in the attitude of swimming through the water. Standing on the right, he sees the concavity and inner outline of the half cast, in which against a suitable background is mounted the articulated skeleton of the animal."

This interesting specimen is now in the south hall of the Museum, where it has been exhibited since 1882. The idea of showing exterior and skeleton together originated, I believe, with Professor Baird, who took great interest in the specimen referred to, and never failed to point it out to his friends when passing through the Museum.

The Museum has a large series of painted casts of the smaller cetaceans, some of which were made as early as 1874, and a number of replicas were shown at the Berlin Fisheries Exhibition in 1880 and were afterwards taken to London at the time of the Fisheries Exhibition in 1883. Some of these, if I remember correctly, were left in the British Museum by Dr. Goode at the close of the latter exposition.

FREDERICK W. TRUE.

U. S. NATIONAL MUSEUM,
July 11, 1898.

SCIENTIFIC LITERATURE.

A Treatise on Magnetism and Electricity. By ANDREW GRAY, LL.D., F.R.S., Professor of Physics in the University College of North Wales. Macmillan & Co. 1898.

The first volume of this treatise awakens a strong desire in us to see the second volume which is promised. The author in his preface states that his effort has been to produce not a work on the mathematical theory of electricity merely, but also to describe the fundamental phenomena, and "to show how they fall into their places in the general scheme of electrical action, and to point out the consequences to which they lead."

There have been many attempts to simplify and amplify Maxwell's great work, and the student now has various aids to enable him to comprehend it, which were not accessible twenty years ago. A distinguished professor of physics once pointed out to me two editions of Maxwell's book, worn and dilapidated by constant use, and remarked: 'I am proud of them.' That treatise certainly contained strong food. Long grappling with it and night oil burned in studying it led to a certain grip of the subject, the evidence of which we see in such books as Professor Gray's. The student now has Poincairé's treatise; Helmholtz's lectures on the electrodynamic theory of light, Drude's Physik des Ethers; Oliver Heavyside's work; Professor J. J. Thomson's Electricity and Magnetism, Hertz's Modification of Maxwell's fundamental equations, Webster's Electricity and Magnetism, and the work before us.

A critic should carefully examine the aim of the author and should not take him to task for omissions that were made designedly, and should not endeavor to instruct him in regard to what he should have done, but rather should aim at weighing what has been accomplished. One should, therefore, carefully read Professor Gray's preface, and heed its words in regard to

the limits to which he has confined himself. One will find in this work a strong appreciation of the remarkable papers of Oliver Heavyside and valuable chapters on the Elements of Hydrodynamics. Teachers will highly appreciate the introduction of such chapters in a work on electricity, for one of the principal difficulties in reading Maxwell's book arises from his obscure use of hydrodynamical equations. Indeed, I am tempted to regard this portion of Professor Gray's book as the most valuable to the student, leading him to see the importance in the modern treatment of electrical theories, of hydrodynamics, and compelling him to grapple with Lamb's classical work on this subject.

The author has embodied without essential change Hertz's mathematical discussion of electric waves, and further discussion of this subject is promised in the second volume. We, therefore, cannot venture to criticise his treatment of this subject. It is evident that he intends his treatment of this growing subject to be a full one, for the first volume before us contains Lorentz's remarkable theoretical prediction of Zeeman's discovery of the doubling and tripling of spectral lines in the magnetic field. We know of no other text-book at present which has incorporated the work of Lorentz, or one which contains such a well digested account of the fundamental equations of the electrodynamical theory of light. We confess to a certain feeling of disappointment at the author's treatment of electrostatics and of the vexed subject of displacement currents; perhaps in the imperfect state of our knowledge no better or fuller treatment is possible. Possibly the second volume will contain an analysis of Professor J. J. Thomson's theory of polarization and tube of force, and of Helmholtz's theory of ions.

The author has selected fundamental experiments with care, and the practical electrician will find much apart from the mathematical treatment which will interest him, notably a full account of Lord Kelvin's mariner's compass. A young electrical engineer who studied Maxwell's treatise with me ten years ago told me that when he first entered into the employment of a great electrical firm he was afraid to leave his copy of Maxwell where it might be seen, for fear that he would be considered a man in the clouds, unfitted by the study of mathematical theories to cope with practical problems of electricity. He now, however, leaves his copy boldly on his desk and in the workshop. Such has been the advance in the study of electricity among the new schools of electricians. And probably a copy of Professor Gray's treatise will be seen in the workshop along side that of Maxwell.

JOHN TROWBRIDGE.

Review and Bibliography of the Metallic Carbides. By J. A. MATHEWS. Smithsonian Miscellaneous Collections, 1090. City of Washington, 1898. 8vo. Pp. 32.

The Chemical Section of the American Association for the Advancement of Science in 1882 appointed a Committee on Indexing Chemical Literature, and in 1884 the Chairman of that Committee reported an agreement entered into with the Smithsonian Institution whereby the latter consented to publish Indexes to Chemical Literature upon recommendation of the Committee. The booklet under review forms one of this series. Mr. Mathew's plan has much to approve; he gives a synopsis of the methods of preparation, physical and chemical properties of the known carbides, considering them in alphabetical order, and following each are the references to the literature bearing thereon.

Examination of this review shows that Henri Moissan has contributed more to our knowledge of the metallic carbides during the last five years, thanks to his electric furnace, than all chemists had done in previous years. The production of acetylene gas from calcium carbide seems to have been announced first by Wöhler in 1862. No commercial use was made of this fact, however, until about 1893, when the Willson Aluminum Company, in this country, while experimenting upon the reduction of the alkali earths by means of carbon, found that calcium carbide was formed; this was regarded as a waste product until its properties of readily decomposing with water and yielding acetylene gas established its commercial value. Mr. Mathews, writing in 1897, says: "The cost of production is still rather high and the chances of acetylene gas being generally introduced for lighting pur-