has rounded off many a truly angular contour line into an inexpressive curve.

The objection that is sometimes made against this view of a topographer's education and work is that, if he tries to sketch what he thinks he understands, he will sometimes sketch what is not really before him. There may be a certain amount of truth in this, but there are sufficient answers to it. A topographer who is too far guided by his imagination has been badly taught, or else he is of a mental quality that will prevent his ever becoming a good topographer, quite apart from whatever education he has had. The well taught topographer will make no larger share of mistakes on account of being well informed on his subject than will the well taught systematic botanist or zoölogist. The few mistakes of interpretation that the well taught topographer may make will, I believe, be far outweighed by excellence of the other part of his work.

It is perhaps because I have a higher idea of a topographer's work than ordinarily obtains that I should like to see him generally better educated for it. To my mind, a map is so far from being a copy of nature that I should prefer to call it a graphic description of nature, and in the making of this graphic description the topographer should study his subject and his graphic signs with the same care that a writer should study his thoughts and the words he employs to represent them. Instruments, to which some topographers seem to give their first attention, ought to have about the same place in their real work that a typewriting machine has in the work of a literary man.

The chief subject of the topographer's study should be the form of the land before him; and until this is recognized in engineering schools and enforced by a careful course of preparatory physiographical study, I believe we shall not have the best maps that can be made. Even further, it is as impossible to make a good topographer by merely teaching him about plane tables and stadia and logarithms as it is to make an essayist by teaching him about writing and spelling. It seems to me, in fine, that Professor Merriman's interest in the mathematical aspects of the art of topography leads him to place too low a value on the importance of studying the chief subject of the topographer's attention, the forms of the land.

W. M. DAVIS.

CAMBRIDGE, MASS., April 30, 1895.

THE HELMHOLTZ MEMORIAL.

A FEW months ago Hermann von Helmholtz died, one of the greatest scientific geniuses of all time, whose name will not be forgotten as long as men care for the knowledge of Nature. His invention of the ophthalmoscope made the success of the modern oculist possible; his papers on the conservation of energy gave the strongest impulse to modern physics; his books on seeing and hearing became the basis of modern psychology.

It seems a matter of course that the present generation should express its gratitude in a lasting monument. Not only his friends and pupils all over the world, but men of science and physicians everywhere have supported this idea, and so last month an International Committee was formed to collect money for the erection of a great Helmholtz monument in Berlin, where for the past twenty-five years he lived and worked. The plan has nothing to do with local patriotism; America, France, England, Italy and Russia are represented on the Committee; not a decoration of the city of Berlin is in question, but a universal expression of devotion to the spirit of natural science.

No doubt America will take a very high place in the list of givers. There has been seldom such an opportunity to show that the United States does not stand behind any

other country in intellectual interests. But America has a special reason for paying her respects to the genius of Helmholtz, since Helmholtz in his seventy-second year paid his tribute of respect to the genius of America. One year before his death he crossed the ocean to study and to enjoy the scientific institutions of this country from the Atlantic to the Rocky Mountains, certainly the most famous European who has visited America for many years, and nobody who saw his noble personality in New York or Boston or Baltimore, in Philadelphia or Washington or Chicago, will ever forget him.

The American members of the International Committee are Dr. Wolcott Gibbs, President of the National Academy of Sciences; Dr. Herman Knapp, Professor of Columbia College; and Dr. Hugo Münsterberg, Professor of Harvard University.

Contributions may be sent before May 25th to the undersigned Secretary and Treasurer of the American Committee. The lists of contributors will be published weekly in SCIENCE.

HUGO MÜNSTERBERG.

38 QUINCY STREET, CAMBRIDGE, MASS.

SCIENTIFIC LITERATURE.

Manual of Geology. By JAMES D. DANA. Fourth Edition. American Book Co. 1895.

The announcement, a few months ago, of a new edition of Dana's Manual filled geologists with liveliest expectations. It is needless to say that these expectations are more than realized. The Manual is so well known that a full account is wholly unnecessary—geologists need no urging to buy it. They simply must have it; they cannot do without it. I write this, therefore, not to call attention to the book; but partly because I am glad to have this opportunity to express my unstinted admiration for the author and for the book; and partly because I wish to draw attention to the author's position on some important questions which have come into prominence since the last edition.

1. Every geologist will be gratified to see that the author now comes out frankly for evolution; not, indeed, evolution in a materialistic sense, but in a reverent, theistic sense. In a certain Agassizian sense he has always been an evolutionist, but he has been often quoted by the *opponents* of evolution as now understood (*i. e.*, 'origin of organic forms by descent with modifications') as sustaining their position. In this edition his utterances are not to be any longer mistaken; although he is, perhaps, more nearly Lamarckian than Darwinian, or, at least, than Neo-Darwinian. Surely such plasticity and open receptiveness of mind retained even to the very last is a noble evidence of the true scientific spirit.

2. In this edition he separates the Palæozoic into two primary divisions with *Eo-Palæozoic*, including the Cambrian and Lower Silurian, and the *Neo-Palæozoic*, including the Upper Silurian, Devonian and Carbonic. Thus he makes the greatest break occur between the Lower and Upper Silurian. If this be so, would it not be better to use Lapworth's term 'Ordovician' for Lower Silurian, retaining the term Silurian for the Upper Silurian alone? Probably this would violate the priority-rule of nomenclature; but, perhaps in this, as in many other cases, rules too strictly interpreted stand in the way of a rational classification.

3. He accepts the probability of a Permian glaciation, especially in the Southern Hemisphere; and of an elevation and enlargement of an Antarctic continent and its connection with the southern points of South America, South Africa and Australia as a cause of such glaciation. These great changes of physical geography and climate, and consequent wide migrations of faunas and floras, would go far to account for the