must be undertaken deliberately, planned by human intelligence, and achieved through human effort.

The author discusses, in a broad and philosophic manner, a great body of questions in which civilized man is deeply interested. He has therefore written for a wide reading; and happily his style, in its essential characteristics, will not repel those to whom it is presented.

GEOLOGY OF SOUTHERN PENNSYLVANIA.

Second geological survey of Pennsylvania. — Report of progress T². — The geology of Bedford and Fulton counties. By J. J. STEVENSON. Harrisburg, *Survey*, 1882. 15+382 p., 2 maps. 8°.

PROFESSOR STEVENSON has made a detailed survey of the district, which has led to but few material changes in the map of the first survey. The descriptions of the structural geology are careful, plain, and easily understood; and the second part of the report, consisting of a day-book of observations along the roads, with reference to outcrops, mines, and quarries, will doubtless prove very useful.

It is well that Professor Stevenson has not completely neglected paleontology in his descriptions of the various formations; but this feature of his report is capable of much improvement, only about sixty species being cited as occurring in a section that extends from the upper coal-measures to the calciferous. The value of his determinations, and the scientific interest of his work, would have been much increased, if care had been taken to collect and determine the fossils found in each group, and lists of them published, together with the localities in which they occurred. It is not meant to infer that Professor Stevenson's determinations are incorrect, but simply that he gives no evidence in support of them. For instance: he says, "Some of these layers contain fossils which are *distinctly Chemung*, none whatever of Portage type being present; but, owing to the weathering, the forms can be identified only generically." The writer does not think he is alone in doubting whether there are any fossils which are distinctively Chemung. At any rate, it would be interesting to know what these genera are. He mentions no fossils in his Hudson River group, and in the Trenton mentions only three forms, which are also very common at the top of the lower Silurian. The director of the survey, in his letter of transmittal, makes the following curious remark, which seems to indicate a peculiar conception of the objects of paleontology. He says, "Paleontologists will find it an easy task to copy out from the index, separately, the whole list of fossil names, and arrange them afterwards to suit their own purposes." Certainly, paleontologists do not want to arrange fossils to suit themselves, but to find out how nature has arranged them. The two maps accompanying the report are of very indifferent quality, as it is difficult, especially over the Broad Top area, to follow on the maps the descriptions in the text. Mr. Stevenson disclaims responsibility for several things in them, which may account for the discrepancies between the text and the maps. Professor Lesley seems to think that the maps may be easily followed by a person familiar with the country; but the maps should have been constructed so that others, also, may be able to understand them. He seems to apply preconceived notions of orography, whether it agrees with the geology as studied in the field or not; and, if the responsibility of preparing the maps rested with the same person who has done the field-work and prepared the text, the result would probably be more intelligible. Mr. Stevenson mentions a bed 195 feet above the Pittsburg coal. This would apparently belong to the upper series, considered Permian in other reports of the survey; but this does not appear to be represented anywhere on the map.

WEEKLY SUMMARY OF THE PROGRESS OF SCIENCE.

ASTRONOMY.

Eclipses of Jupiter's satellites. — Cornu proposes to observe these eclipses photometrically, comparing the light of the satellite during the time while it is entering or emerging from the shadow with that of an artificial satellite visible in the same field, and made to vary in brightness at pleasure by an adjustable 'cat's eye,' so called. He shows that the moment when the light of the satellite is *half* that of its unobscured condition is the one which can be most accurately determined, and urges that the photometric observations should be so arranged as to give an automatic record. Admiral Mouchez has authorized the application of the necessary apparatus to one of the large equatorials of the Paris observatory.

M. Cornu does not seem to be aware that a very similar, but really more precise, method of observa-