The great majority of senior members of the university welcome these gifts as, of course, they deserve to be welcomed. A few complain that they will alter the character of the university considerably and, probably, for the worse; a few wish the offer had been entirely unconditional or, alternatively, that their own department or subject had been in the position of medicine, physical chemistry or social studies. As regards the last, it is realized that the success or failure of the new college will depend much on the start it gets and, in particular, on the first warden and fellows. A long and carefully drafted letter from Lord Nuffield to the Vice-Chancellor gives some ideas of the intended college and its fellows, and others have been got from some of the principal Oxford men who are concerned. The new college is to be mainly a post-graduate one, like All Souls', with accommodation for, say, fifty residents, and principally for research and investigation. It need not be entirely devoted to social studies; other subjects may be considered. It is not intended that it be a teaching institution in the ordinary sense or that it should train undergraduates for business careers, still less that it should be a place where the newly graduated may start to research according to their fancy. It is hoped that the fellows will be mature workers, brought back after they have been out in the world for some years, to do large-scale team work on those social subjects on which research is urgently needed. The new college, it is hoped, will not merely be a center for these activities in economics, politics, anthropology, sociology and the like, but also a place where men of business and affairs, by residing there, will have an opportunity of contributing their experience to the common fund. This cooperation of academic and non-academic persons in attacking problems in the social sciences is regarded as valuable by those who, with Lord Nuffield and the Vice-Chancellor, have been thinking of the welfare of the new college. It remains to be seen how Oxford makes use of these gifts, which bring, of course, their difficulties and responsibilities with them. That it will rise to the occasion no one who knows the temper of young Oxford at the present time will question.—*Nature.*

SCIENCE AND DEMOCRACY

YOUR recent editorial "Science and Democracy" begins with the words "Science as we know it is the child of democracy." From the point of view of a man of science the family relationship is here reversed: Democracy is the child of science. I quote from a convocation address with the same title as your editorial given at the University of Indiana in 1912:

> Without science our present civilization would not have been possible. It is the application of science to commerce and the arts that has created democracy. So long as food, clothing and dwellings were produced and transportation carried forward by unaided manual toil, so long as plague and famine, disease and premature death, were unchecked, it was impossible to give equal opportunities to all. Plato had to provide slaves for his republic; serfs and peasants have been partly emancipated only in our own time. It is the applied science of the past hundred years that has made child labor needless and universal education possible, that has made the still existing semi-slavery of industry wanton and intolerable.

You call attention to the proposal made in England that the British and American Associations for the Advancement of Science unite to draft "a magna charta, a declaration of independence," proclaiming that freedom of research and of exchange of knowledge is essential, and add, "Will the American association heed the appeal of its British counterpart?" At its meeting in Boston in 1933 the American association adopted the following "Declaration of Intellectual Freedom":

> The American Association for the Advancement of Science feels grave concern over persistent and threatening inroads upon intellectual freedom which have been made in recent times in many parts of the world.
>
> Our existing liberties have been won through ages of struggle and at enormous cost. If these are lost or seriously impaired there can be no hope of continued progress in science, of justice in government, of international or domestic peace or even of lasting material well-being.
>
> We regard the suppression of independent thought and of its free expression as a major crime against civilization itself. Yet oppression of this sort has been inflicted upon investigators, scholars, teachers and professional men in many ways, whether by governmental action, administrative coercion, or extralegal violence.
>
> We feel it our duty to denounce all such actions as intolerable forms of tyranny. There can be no compromise on this issue, for even the commonwealth of learning can not endure "half slave and half free." By our life and training as scientists and by our heritage as Americans we must stand for freedom.

J. MCKEEN CATTELL, *in the New York Times*

SCIENTIFIC BOOKS

ASTRONOMY

Text-Book on Spherical Astronomy. By W. M. SMART. Published January 5, 1937, in Cambridge: At The University Press, in New York: by the Macmillan Company. $5.50.

A HUNDRED years ago the only physical character-

istic of the stars which was observed, the brightness, merited only a brief paragraph in the text-books. Attention was directed almost entirely to problems of spherical astronomy and dynamics. In contrast the great majority of modern books and papers deal with problems in astrophysics, stellar statistics or stellar dynamics. The newer topics receive this attention because they promise more rapid progress and the application of many new branches of knowledge. The older problems of position astronomy are no less important to-day than formerly. In fact, they are even more important, since through them are defined the fundamental reference systems used in many of the other analyses. As a result of this change of interest very few modern books on spherical astronomy are published and it is a pleasure to call attention to an excellent discussion of this field.

The second edition of Dr. W. M. Smart's text "Spherical Astronomy" is nearly identical with the first. In addition to the standard topics of spherical astronomy discussions are included of planetary motions, heliographic coordinates, star positions by photography, binary star orbits and occultations and eclipses. These additional chapters are of especial value, for the topics covered have seldom been discussed in texts or at best only partially considered. As in the first edition numerous clear illustrations are found throughout the book. A few errors in the text have been corrected, and three new appendices have been added. These treat the "Method of Dependences," "Stellar Magnitudes" and the "Coelostat." The first and third of these appendices are satisfactory, although some comment upon the relative accuracy of the "Method of Dependences," and the standard form of reduction could have been added with profit. The brief appendix on "Stellar Magnitudes" seems unnecessary in as much as magnitudes are not discussed anywhere in the text. It is unfortunate that the orbital elements of Pluto listed in Appendix C were not revised, for more precise orbits have been derived since 1931.

"Spherical Astronomy" deals only with the mathematical solutions of various problems. No attempt has been made to evaluate the relative advantages of the different solutions presented. Thus the author avoids controversy, but the reader is forced to rely upon some other source for aid in discrimination. This situation could have been partially remedied by more complete references to the original papers from which some of the analyses were drawn. The relations between the specific problems and the general problems of fundamental astronomy are not considered, and wisely so, for the book is designed as a text of working methods, not as an essay on problems in astronomy. For these reasons the book should be studied in the classroom or by students who have some general knowledge of the problems considered.

As a concise discussion of the solution of various problems in spherical astronomy Dr. Smart's book has no superior. It should be in the library of every serious student of astronomy, whether beginner or professor.

Fletcher Watson, Jr.

Harvard Observatory

SEISMOLOGY

Introduction to Theoretical Seismology, Part I, *Geodynamics.* By J. B. Macelwane, S.J. New York. Wiley, 1936. x + 366 pages. $6.00.

Seismology — the science of earthquakes — has grown out of its infancy in this country during the last decade or so. The graduation is fittingly marked by the publication of the first considerable text- and reference book on the subject in English.

The author has spared no pains to write a full and elementary account of the subjects treated. The classical theory of waves in an elastic solid is well presented in the first five chapters. Chapter VI, written by F. W. Sohon, S.J., treats the elements of the theory briefly by the methods of vector analysis. Chapter VII contains a beautifully written discussion of the methods of Zöppritz and Knott on the energy relations involved in the reflection and refraction of elastic waves.

The first part of Chapter VIII is not quite so clear. The effort to give an elementary account of the integral equation has involved the introduction of so much notation that the essentials of the theory are somewhat concealed, so that, for example, the equation of the Volterra type is spoken of as a Fredholm equation. The treatment is of course correct, nevertheless, although some improvement in detail could be effected, such as the abandonment of Simpson's rule in favor of better methods of quadrature. The later parts of this chapter present a summary of the important results on the interior of the earth which have been obtained in recent years by Macelwane and his co-workers. The schematic section of the earth as obtained by Dahm, pictured on page 227, is most interesting, and illustrates the rapid changes that are taking place in our conception of the interior of the earth.

The last three chapters treat the interpretation of seismograms, the determination of epicenters, and the problems of depth of focus. These chapters and the tables and curves will be very helpful to the practical seismologist, who still meets many puzzles in the task of unraveling the complex messages on his seismograms.

The theory of seismic waves is not an easy subject, and a very effective effort has been made to bring it