

the witches their scent or the means of indentifying them. The savage who refuses to allow his picture to be taken, and the felon who objects to having his 'mug' adorn the walls of Rogues's gallery, are not so far apart, if we can bring our minds to identify the devil of the former with the detective of the latter. O. T. MASON.

#### PROFESSOR NEWBERRY ON EARTH-QUAKES.

PROFESSOR NEWBERRY'S paper on earthquakes is, in the words of the author, "a brief review of what is known and believed in regard to the phenomena and causes of earthquakes by those whose opinions on this subject are most worthy of confidence." After defining the word 'earthquake,' he proceeds to give a summary of the facts upon which he bases his definition, carefully elaborating and illustrating the subject from the point of view of a cooling and contracting sphere, with a relatively thin crust, and fluid or viscous interior. The latter part of the essay is treated under the headings, 'Earthquakes and volcanoes as measures of the thickness of the earth's crust,' and 'Flexibility of the earth's crust.' Finally, 'Proximate causes of earthquakes' are briefly considered, and a short bibliography is appended.

The definition, which is taken as the text, and which is really an epitome of the whole argument, is as follows: "An earthquake is a movement caused by a shrinking from the loss of heat of the heated interior of the earth, and the crushing-together and displacement of the rigid exterior as it accommodates itself to the contracting nucleus." It is then stated that the facts upon which this statement is based are so numerous and significant that the conclusion 'is not only convincing, but inevitable.' Although this broad generalization is perhaps applicable in the case of most earthquakes, and the theory as to the structure of the earth which it involves is very generally accepted by geologists, yet, in view of the fact that many eminent scientific men are not prepared to subscribe to it at all, in either case it is to be regretted that the author has not adopted the comprehensive and more non-committal definition given by Mallet, and substantially repeated as follows by Powell (in *The forum* for December): "An earthquake is the passage of waves of elastic compression in the crust of the earth." The very fact that different theories are to be found, even in the very latest utterances of eminent authorities, would seem to make it desirable to acknowledge that the subject is not one that

can be disposed of in such an *ex cathedra* statement, but rather one worthy of the most painstaking study, which, indeed, it is now receiving from the most advanced nations. The further statement that "earthquakes are neither novel nor mysterious, but are among the most common and simplest of terrestrial phenomena," is not likely to receive very wide acceptance in its entirety, and issue will certainly be taken with Professor Newberry as to there being any very great degree of unanimity in this opinion among "those whose opinions are most worthy of confidence." Similarly it must be said that far more confidence is placed by the author in the various methods of calculating the depth of origin by means of accurate observations as to time and angle of emergence than seems warranted. The problem is so complicated by the great heterogeneity of the superficial formation of the earth's crust, that the best observations we can make, give, at best, only roughly approximate results. Again, it is stated that the reported shortening of railroad-tracks in certain places near Charleston, "if verified and measured, would give a clew to the location and extent of the subterranean movements which produced the vibrations." Most authorities, however, will probably regard it, in the case of a shock disturbing so great an area, as an entirely secondary effect, along with the production of local sinks, geysers, and land-slides.

This well arranged and condensed *résumé* of the subject, from the stand-point of a geologist of Professor Newberry's reputation, cannot fail to be read with interest by the general reader as well as by the special student. The only criticism that can be made, other than favorable, seems to be that to the average reader it may leave the impression that the causes of all earthquakes, and even the nature of the earth's interior, are now so well understood as to leave very little room for difference of opinion among those best qualified to judge. EVERETT HAYDEN.

#### PHANTASMS OF THE LIVING.

THIS is a most extraordinary work, — fourteen hundred large and closely printed pages by men of the rarest intellectual qualifications, for the purpose of setting on its legs again a belief which the common consent of the 'enlightened' has long ago relegated to the rubbish-heap of old wives' tales. In any reputable department of science the qualities displayed in these volumes would be reckoned superlatively good. Untiring zeal in collecting facts, and patience in seeking to

*Phantasms of the living.* By EDMUND GURNEY, FREDERIC W. H. MYERS, and FRANK PODMORE. 2 vols. London, Trübner, 1886. 8°.

*Earthquakes.* By Prof. J. S. NEWBERRY. New York, The author, 1886. 8°.