In a new edition, which ought certainly soon to be demanded, two omissions might be advantageously repaired, by adding accounts of the development of the ear bones and of the pulmonary arteries.

The defects, of which some examples have been given, can not any of them be regarded as fundamental. Some such defects are inevitable in a first edition of a text-book dealing with a science, like embryology, in which research is so active that almost every week brings important additions to knowledge of the subject. The only part of the work which seems to the reviewer radically inadequate is that on the formation of the germ-layers.

Professor McMurrich's volume will be eagerly welcomed by students and teachers alike, and its special distinction is the thorough recognition it displays of the morphologically essential aspects of embryology. It ought to exert a wide and helpful influence on the advancement of anatomical science in America. C. S. Minot.

Field Astronomy for Engineers. By George C. Comstock. New York, Wiley & Sons. 1902. Pp. x + 202. Price, $2.50.

Wiley & Sons have just published an excellent text-book on astronomy written by Professor George C. Comstock, professor of astronomy in the University of Wisconsin, a text-book which undoubtedly will meet with cordial approval from that body of teachers whose duty it is to teach astronomy in technical schools. For many years there existed no concise manual of the subject, the teacher being obliged either to use an elaborate treatise like Chauvenet's, or else employ the unsatisfactory method of presenting the subject entirely by lectures. The present work is the third attempt to supply the deficiency, other similar publications of recent date being those of J. F. Hayford, formerly of Cornell University and now of the U. S. Coast Survey, and of W. W. Campbell, director of the Lick Observatory.

The peculiarity and advantage of the present book are that it omits entirely that portion of the astronomical theory and instrumental niceties beyond the needs of engineering students and, on the other hand, lays special stress on the methods by which only sufficient precision is attained to meet engineering requirements. This general plan of the author enables him to discuss, and he does it with much skill, the question of the inter-relation of accuracy of results with instrumental manipulation, and should give the student a clear insight into the proper methods and formulæ to use on any particular occasion. At the same time the author emphasizes the necessity of methodical computation and insists on a habit of checks, so desirable a habit for engineers in all kinds of computations. In some cases it may be necessary to elaborate verbally some of the theory involved, and to explain, as doubtless the author does to his own classes, much of the instrumental manipulation, so that the book is essentially one to be used by an instructor whose own astronomical training includes much not in the book; but as this is always, at least theoretically, the case, it should not stand as a criticism against the book.

The plan of the book includes, after a discussion of the fundamental concepts of coordinates and the transformation of one system into another and of the various methods of noting them, methods of observation and computation for the determination of time, latitude and azimuth. Each determination is carried out according to the requirements, either roughly, approximately or accurately, in each case modifying the formulæ and the use of instruments as required. For example, for the rough determination of time, use is made of an engineer's transit to observe on Polaris at any instant, the correction to the meridian being given by the use of tables. For the approximate determination, the method given is that of making a series of altitude observations with a sextant on a known star or on the sun when that body is near the prime vertical. For the accurate determination, the method of double altitudes is explained, and a whole chapter is devoted to discussing the transit instrument with its errors and corrections. In each of these cases, as well as in the similar series for latitude and azimuth, the detail of work, the

proper form for notes, suggestions for computations, and the probable error of the result are all given in a satisfactory manner.

Altogether, the book is a careful evidence of a thorough appreciation of the needs of engineering students and of the comprehensive knowledge of the distinguished author.

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PROFESSOR HEILPRIN ON MONT PELÉE.

THE twentieth century Pompeii in Martinique attracted men of science from all points of the compass. Notes have been published by Lacroix in Paris, Flett and Anderson in London and Hovey in New York, and magazine articles by Russell, Hill, Diller, Curtis and others have familiarized the public with the main facts. Two books of note have appeared, the one by a distinguished traveller and correspondent describing vividly and accurately a layman's impressions of the phenomena and the wreck. The second, entitled 'Mont Pelée and the Tragedy of Martinique,'* is by a well-known geologist and geographer, Angelo Heilprin, and his work is the first book that purports to be a scientific study.

The book was published in December, 1902, and the author had left the field only three months before. In view of this fact the work is a remarkable piece of rapid book-making, well executed by the publishers, and illustrated with half-tone photographs. It is essentially the journal of an explorer, with records compiled in the field of the disasters of May 7 and 8, and four scientific essays. The subjects treated are the author's impressions of Martinique, a description of the ruins of St. Pierre, the narrative of the last days of the city, the author's travels in the interior, his ascent of Pelée at the end of May and his second visit to Martinique in August. Professor Heilprin personally observed the great eruption of August 30, and from a distance he saw the eruption in St. Vincent September 3. His experience in August is especially valuable and unique, because at that time he kept the only scientific record.

* J. B. Lippincott Co., Philadelphia, 1903, pp. 336.

The scientific chapters deal with a comparison of St. Pierre and Pompeii, the geography of Mont Pelée, volcanic relations of the Caribbean basin and the phenomena of the eruptions. In the first of these Pliny's account of the Vesuvian eruption of 79 is discussed; Dion Cassius and later historians refer the destruction of life and property in Pompeii to ashes, cinders and gases. The tumble of ruins in Pompeii has commonly been attributed to earthquakes, but it is possible that there too a destroying blast annihilated the population almost instantly, as in St. Pierre; this accounts for bodies found in attitudes of action or indifference to danger. Heilprin questions the decapitation of Monte Somma at the time of the eruption of 79; he calls attention to Pliny's description of the phenomena as follows: 'On the land side a dark and horrible cloud charged with combustible matter suddenly broke and shot forth a long trail of fire in the nature of lightning, but in larger flashes.' And again, "I looked back; a thick dark vapor just behind us rolled along the ground like a torrent and followed us. The ashes now began falling, although in no considerable quantity." The similarity of this description to that of bystanders in the case of the Caribbean eruption is remarkable. The fact that Pompeiian bodies are largely without clothing, and were huddled together in basements, and that pottery and glassware have been found deformed and discolored, suggests that there was a hurricane blast and conflagration similar to the one which destroyed St. Pierre.

It is questionable whether the Lac des Palmistes, on the summit of Mont Pelée, was really a crater lake. Heilprin concludes that the greater part of the water of this shallow pool after the first eruption was steamed off by the heated ejecta that were thrown into it. These are in part angular blocks of andesite, trachyte and diorite, with here and there scattered boulders of large size and composite character, representing the ancient stock of the volcano. This conclusion is a significant one, contrasted with the supposition of Drs. Flett and Anderson, who were sent out by the Royal Society, that a great