formed of rows of integumental scales, and that they are thus the same sort of organ as are the bands of the armadillo carapace, which Newman finds so convenient for the comparison of individuals.

The last and longest chapter, Chapter VII., gives a detailed study of the results of both lines of investigation, and presents, with numerous illustrations the strange correspondences in detail in the external characters of monozygotic twins, whether found in the carapace of the armadillo, or in the palm and sole ridges of man. These two series of studies serve to strengthen each other, and are shown to be essentially similar phenomena, of great biological significance. In the facility with which embryonic material of every stage may be obtained the armadillo has a decided advantage over man as a *Versuchstier,* although in the enormous amount of detail presented by human palms and soles, and the readiness with which they may be compared in the form of prints, there are certain distinct advantages in the study of man. If once the essential identity of the phenomenon of polyembryony in *Dasypus* and *Homo* be generally recognized, those parts of the history of human duplicate twins (and perhaps, of double monsters as well) which are beyond our power to observe directly, may be satisfactorily supplied through the study of the corresponding stages in the armadillo; while the correspondences in the friction-skin configuration of human monozygotic twins may be added to those observed in the carapace of the armadillo to show the amount of power possessed by the germplasm, or some other element or elements of the egg, to determine the details of the adult soma. H. H. W.

*Economic Geology.* By Heinrich Ries, A.M., Ph.D. Fourth edition. John Wiley and Sons.

The appearance of the fourth edition of this excellent and standard book on the subject, in the midst of a year of battle largely as to supplies of war materials, deserves attention, since the change of publishers has been marked by thorough rewriting and extensive additions.

The statistics and references are brought down to 1914–15, showing the first effect of the war, but not the rebound. Not only are there 25 per cent. more illustrations, but many of the less legible ones are redrawn and greatly improved. Compare, for instance, those on pages 529 and 545 of the new with the corresponding figures on pages 367 and 378 of the old. A large number of half tones taken by the author show that the descriptions of the various ore deposits are not mere compilations. This is perhaps the main use of some of them, for undated views of a mine do not show what now is. Would it not be well if in scientific works the date of views were always given?

The main improvement of the book, however, is that it now includes descriptions, in but slightly smaller type, of the chief rival ore deposits in other countries, and thus makes possible a much more comprehensive handling of the great question of ore deposits. For instance, the Swedish deposits of Kiruna receive first-hand treatment, and there is a plate of a section of Luxembourg iron ores. While the treatment is and must be brief, there are always one or two recent references to start one on further search. The summaries of different views as to the origin of ores, for instance, Cuban ores, though brief, are well done. While the author does not hesitate at times to express his own views, yet he gives rival views. The account, for instance, of the oölitic iron-ore deposits could hardly be improved for so brief a statement.

While of course the publications of the United States Geological Survey have been largely used, they are by no means the exclusive source, and the various publications of the mining engineering societies have been also duly consulted.

The table of geographic and geologic distribution of coal in the United States is a new and valuable feature, and the general subject of coal receives very satisfactory treatment. If the source of the analyses of coal on pages 8 and 9 is given it has been overlooked by the reviewer.

The treatment of copper has been brought to date by reference to the Nonesuch Lode.

But in the footnote at the bottom of page 609, by the term "Lake ore" the writer really means "Lake copper" and his statement that "the term has now lost its original meaning" is hardly justifiable, since in the first place for "ore" one should read "copper," and in the second place, that western copper should have been almost fraudulently sold as Lake copper does not signify that the term has lost its meaning; otherwise there would have been no object in the trick. In fact the difference in selling price between Lake copper and electrolytic copper has been unusually great at times during the last three years.

Although of course, the book is primarily a text-book, yet the summaries of different theories as to ore deposits (see, for instance, the discussion of Mississipi zinc), often largely based upon original studies, are so valuable that no one interested in its field can afford to be without the book.

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## SPECIAL ARTICLES

### EXPERIMENTS WITH A FOCAULT PENDULUM

In the issue of SCIENCE for March 16, last Dr. Carl Barus, under the above title, described certain measurements of the rotation of the plane of oscillation of a Focault pendulum. The present note gives, for the same determination, another method that is simple, direct and of fair accuracy.

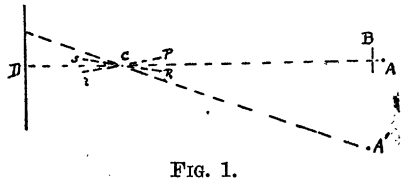


FIG. 1.

If in Fig. 1 the point $A$ represent an arc lamp that, through the slit $B$, illuminates a portion of the scale $D$; and if $PQ$ represent the plane of vibration of a Focault pendulum at a given time, it is evident that the diffraction pattern of the wire will travel up and down the scale as the pendulum oscillates. Further, as the plane of the vibration rotates about the center at $C$, the amplitude of the motion of the shadow on $D$ will decrease, and will become zero at the instant when the oscillation plane includes the line $DCA$. This amplitude of the shadow's motion will increase again as the plane of vibration continues its rotation towards the position $RS$. If the position on the scale of one edge of the central band be taken at each successive elongation of the pendulum; and if these readings be plotted against the time (in terms of the period of the pendulum) two approximately

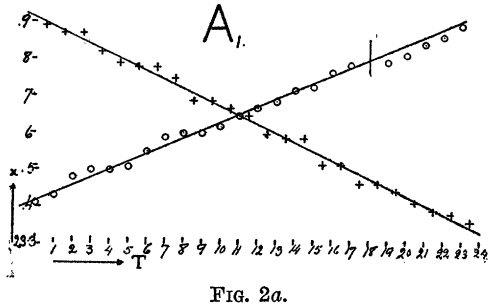


FIG. 2a.

straight lines will be obtained. The coordinates of the intersection of these lines will give (1) the point on the scale where it is cut by the vertical plane that includes the line $AC$; and (2) the time (in terms of the period of the pendulum) of the coincidence of the plane of vibration with the vertical plane defined in (1) (see Fig. 2, $a$ and $b$).

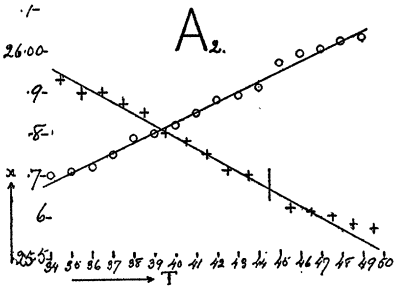


FIG. 2b.

If, next, the lamp be moved to a position indicated in Fig. 1 by $A'$ a similar set of observations will determine a second vertical plane and the time of passage of the plane of vibration through it. The number of oscillations that elapse between a given observation of the first set and a given observation of the