
Glacial Geology of Clinton County, Ohio. *James T. Teller.* Report of Investigations No. 67, Ohio Geological Survey, 1207 Grandview Ave., Columbus, Ohio 43212, 1968. Folded, colored map, scale 1:62,500, with text on sheet. $1.14.

Clinton County, in southwestern Ohio, has deposits from at least two periods of glaciation. The map shows the southwestern part of the county to be covered by deposits of the Illinoian glacial advance and the rest of the county by deposits of the later Wisconsin glacial advance. The glacial outwash in the stream valleys is a valuable source of sand and gravel and serves as a reservoir for ground water. Mineral industry operators, water well drillers, and others concerned with the land will find this map valuable.

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BOOK REVIEWS

Chemical Equilibrium. *Allen J. Bard.* Harper and Row, New York, 1966. (Harper's Chemistry Series). xi+202 p. $7.50.

Bard designed his volume for use either by freshman chemistry students or, if the instructor is prepared to supplement the text with more detailed material, by sophomores. The equilibrium state is introduced by a very brief excursion into thermodynamics and chemical kinetics. A guide to the classical paradigms for equilibrium calculation follows, using mathematical exemplars. Acid-base equilibria, solubilities, complex ions and redox equilibria are all presented. Brønsted definitions are sensibly used in the acid-base sections, but the discussion of buffer calculations is very short, especially in light of how often students encounter them in their subsequent scientific work. For solubility equilibria, Bard relies chiefly on discussion of the K_{sp}, without any intimation of the practical difficulties that may arise from such reliance; fractional precipitations are concisely and neatly handled. Classic sulfide separations by pH variation are also discussed. The section on complex-ion formation is one of the best in the book, and Bard provides the student with a useful synthesis of ideas about proton transfer, complex ion formation, and solubility. Oxidation-reduction equilibria are studied, using reduction potentials. These potentials are interpreted, without mention of galvanic cells, as a measure of "electron-pulling" ability. Equilibrium constants are calculated from them, but there is no mention of why it is the *logarithm* of K to which E° is related.

Activities and activity coefficients, along with graphical methods for the solution of equilibrium problems, are considered in the second half of the book. A brief section on computer methods for solving problems posed by competing and simultaneous equilibrium reactions then concludes the work.

Each chapter has a selected list of references which a student could profitably pursue, as well as a collection of numerical problems, for some of which answers are provided. Students should find this work useful and helpful, especially as an ancillary text.

J. Z. FULLMER

Imagination and the Growth of Science. *A. M. Taylor.* Schocken Books, New York, 1967. vii+110 p. $3.95.

In 1964–65, A. M. Taylor, professor of Physics at the University of Southhampton, delivered the Tallman Lectures at Bowdoin College. The four chapters of this short work developed from those lectures, augmented by thirty-three pages of thumb-nail biographies for sixty-five physicists. Each chapter provides an overview of the history of a special area of physics: astronomy, electricity and light, particle and wave theory, and the structure of matter. Taylor's professed aim was to show that science is a "search for the understanding of nature," and that the scientist, who is characterized by "dedicated enthusiasm," "inspired imagination," and "courageous perseverance in the teeth of an apparent contradiction", "seeks the Holy Grail." He borrows his point of view from Karl Popper, and decries the influence of Ernst Mach on physicists and philosophers of science, alike. Hearing the lectures was doubtless a pleasant experience; their compilation in this permanent form, however, reveals them to be a dubious combination of science popularization and historical allusion. The essays are not successful as history or as popularization. Historians will cringe at sentences like "What Newton called a *corpuscle* . . . we today call a *photon*." Scientists will be repelled by the purposive behavior ascribed to inanimate nature, e.g., "A proton is so startled [by certain energetic events] that it turns into a neutron and a positron." While the book may provide an uneasy hours' reading on a snowy evening, the reader will put it down neither edified, entertained, nor, alas, even tolerably amused.

J. Z. FULLMER

Bedrock geology of the Minerva Quadrangle, Stark, Columbiana, and Carroll Counties, Ohio. *Richard M. DeLong.* Report of Investigations No. 65, Ohio Geological Survey, 1207 Grandview Ave., Columbus, Ohio 43212, 1967. Folded, colored map, scale 1:24,000, with text on sheet. $1.14.

The Minerva quadrangle lies mostly in north-central Carroll County, but includes the southwestern corner of Columbiana County and the southeastern corner of Stark County. The bedrock is Pennsylvanian and consists mostly of shale, with same sandstone and thin beds of coal, clay, and nodular limestone. The Upper Freeport (No. 7 coal is the most important coal bed in the area; it has been mined at several localities. This report consists of a colored geologic map, a columnar section of the bedrock, a cross section illustrating the geology across the quadrangle, and a discussion of the mineral resources.

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