be that this statement alone guaranteed the successful cloning of the AT gene which occurred just a few months after the publication of the book (K. Savitsky *et al.*, *Science* **268**, 1749 [1995]). Studies on DNA repair and mutation are indeed proceeding rapidly. What is impressive is how well Friedberg, Walker, and Siede have done in presenting an overall point of view that will remain useful even as new details are added.

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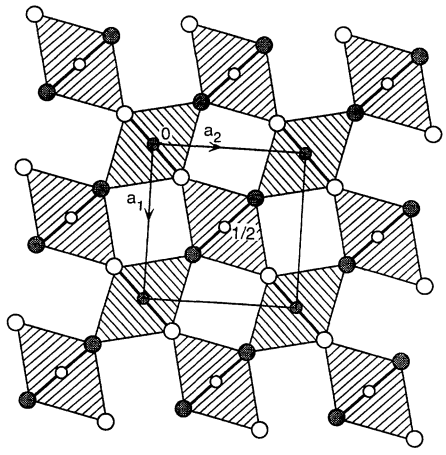
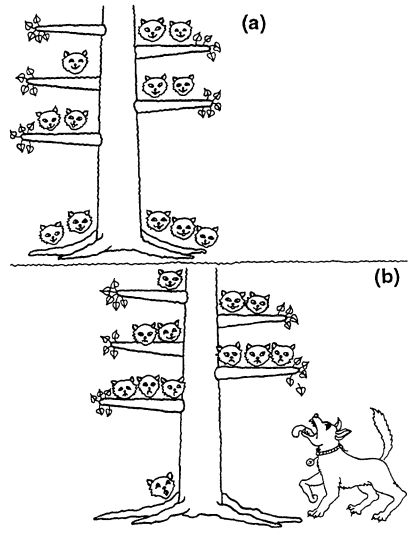
Geocrystallography

Physics and Chemistry of Earth Materials. ALEXANDRA NAVROTSKY. Cambridge University Press, New York, 1994. xiv, 417 pp., illus. $79.95 or £55; paper, $34.95 or £22.95. Cambridge Topics in Mineral Physics and Chemistry, 6.

As new technological materials become increasingly complex in structure and bonding, they are beginning to resemble the materials that make up our planet. Perovskite-type crystals are a case in point, defining the structures of both the high-temperature superconductors and the predominant mineral of the Earth. Such novel materials as fullerenes and chemical-vapor-deposition diamond have even been found in rocks and meteorites millions of years old. Thus materials scientists have more in common with geologists than ever before.



"The structure of rutile, TiO_2. The tetragonal structure consists of edge-sharing chains of TiO_6 octahedra running parallel to the *c*-axis. Octahedra in adjacent chains are joined at their corners. This polyhedral representation is a projection down the *c*-axis, parallel to the chains. The shaded symbols are atoms at a *z*-coordinate of 0, and the open circles are at $z = 1/2$. The unit cell is outlined." [From *Physics and Chemistry of Earth Materials*]



"Schematic of a population inversion. (a) Without an external driving force, the particles (cats) are distributed in the lower-lying energy levels (branches) according to the Boltzmann distributions. (b) With external pumping of energy (dog), the particles populate higher energy states (higher branches) more than lower ones. Lasing action may be likened to an upper branch breaking, returning its occupants to their ground state in a coherent pulse." [*From Physics and Chemistry of Earth Materials*]

Physics and Chemistry of Earth Materials is a unique monograph at the interface between the disciplines. Written by one of the leaders in combining mineralogical and materials research, it illustrates how basic approaches of materials science, solid-state chemistry, and condensed-matter physics can be used to understand what makes up our planet, and maybe even how it works on the inside. One might characterize the book as "elementary" in that it contains few equations, derivations, or details of the underlying physics. Yet it touches on many of the key concepts, as well as the experimental and theoretical methods used in current materials research.

One of the high points of the book is the extensive chapter on crystal chemistry, which contains a superb discussion of how complex crystal structures are related. The rich diversity of both earthly and superconducting perovskite-like crystals is described, as are defect, modulated, and biopyribole-type structures. Insights attained through years of research are incorporated into these pages, and it is vintage Navrotsky to use spinel as a recurring theme throughout the book: this deceptively simple (cubic) crystal structure accommodates a great variety of complexity, including crystallographic disorder, nonstoichiometry, and variable valences.

The overview of chemical bonding is pleasing in the comparisons made between the "chemist's" (molecular, real space) and "physicist's" (infinite crystal, reciprocal space) traditional approaches, but the discussion of theoretical methods now available is less satisfying; though it is useful to have short definitions of the numerous acronyms plaguing theorists, the underlying approximations are not really clarified. Still, the point is well made that simple geometrical models of crystals, such as ionic radii and Pauling rules, remain useful, even in this day of sophisticated "first-principles" calculations.

I have found that the book can work well with two very different audiences: geology or materials students being introduced to modern methods and concepts of materials science, and the more experienced materials researchers, who can enjoy seeing revealed the close analogies between their work and current studies of our planet.

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