rate of discovery of new reserves, and an assumed level of ultimately recoverable reserves. But problems with the geographic distribution of China's energy resources, limits on China's capability to absorb foreign technology and equipment, continued reluctance to allow significant foreign participation in energy development, and lack of economic incentives to raise low levels of efficiency of energy resource utilization are glossed over. These and other complex factors will be the major determinants of China's energy production and should absorb the efforts of those who wish to predict China's energy future.

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Terrestrial Processes

The Continental Crust and Its Mineral Deposits. A Volume in Honour of J. Tuzo Wilson. Proceedings of a symposium, Toronto, May 1979. D. W. STRANGWAY, Ed. Geological Association of Canada, Waterloo, 1980. viii, 806 pp., illus. $30. Geological Association of Canada Special Paper 20.

The concept of crustal mobility or "plate tectonics" opened a new era in the earth sciences by offering a single global process that could account for a remarkable range of geologic features. One landmark paper that brought together evidence from many disciplines within the geologic sciences, "Did the Atlantic close and then re-open?" (*Nature* **211**, 676 [1966]) by J. Tuzo Wilson, laid the groundwork for recognizing the effects of continental rifting and collision. As illustrated by many of the 41 papers contained in this book, Wilson's ideas on the importance of continental drift to crustal evolution have flourished in the earth sciences.

The papers in the volume are grouped into six sections. Section 1, The Early Earth, provides an informative discussion of the mechanics and thermal consequences of planetary accretion and core formation. Surprisingly lacking in this section is reference to evidence obtained from the study of other terrestrial planets, particularly the moon, where the effects of early planetary differentiation and meteorite bombardment on crustal formation are clearly displayed. The absence of these observations leads to discussions of early isotopic and tectonic evolution of the earth that are both incomplete and overly simplified.

Some of these deficiencies are remedied in section 2, Evolution of the Precambrian Crust, which vividly illustrates the diversity of opinions concerning the origin and evolution of the materials that make up the continental crust. Various papers stress the importance of "gravity" or vertical tectonics as opposed to "Wilson cycle" lateral mobility. With respect to the subject of continental "growth" and the rates thereof, estimates are presented that range from constant erosion by sediment subduction to continual growth by the addition of new, mantle-derived, sialic material. Enough pertinent data are presented that the reader may judge the strengths and weaknesses of the various arguments.

The structure of the crust is the subject of the third section. One paper discusses the intriguing observation that continental fragmentation seems to reoccur predominantly along pre-existing zones of crustal weakness. However, on the subject of crustal structure, this section contains only a single paper utilizing seismic refraction and reflection data and lacks any discussion of field evidence relating to this subject. Hence it does not give the reader a true feeling for the variable and complex structure of the continental crust.

The next section, Crustal Motions, details the evidence for, and results of, continental mobility. By the use of paleomagnetic, geochronological, and field structural data and biogeographic constraints, the various papers provide interesting and informative descriptions of a wide range of complex structural configurations interpreted as resulting from continental drift. There are also a series of papers dealing with the association of certain petrologic and metallogenic conditions with different plate tectonic environments. These discussions perhaps would fit better into the next section, The Global View, which also examines the effects of plate motions in determining the structural regimes that control magmatic and metamorphic conditions along plate boundaries.

The final section concerns itself primarily with the genesis of sulfide ore deposits. These papers give an interesting overview of ore genesis in a manner that keeps the presentations comprehensible to readers outside the field of economic geology. Again, though, this section concentrates on the origin of particular ore types and should not be considered a thorough discussion of the many mechanisms involved in ore genesis in the crust.

In summary, the papers contained in the book provide discussion of a broad range of topics from a variety of disciplines. However, by putting so little emphasis on important topics such as the crustal sedimentary record and the variable and complex nature of crustal structure and on crustal features in areas outside the Precambrian of North America, the book does not adequately represent several critical aspects of the nature and evolution of the continents. As long as the reader realizes that the volume concentrates on a rather limited region of the continents and that some of the papers present rather controversial interpretations, the volume and the comprehensive reference lists that follow each of the papers provide a good starting point for the study of various aspects of the continental crust.

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Theoretical Particle Physics

Unification of the Fundamental Particle Interactions. Proceedings of a conference, Erice, Italy, Mar. 1980. SERGIO FERRARA, JOHN ELLIS, and PETER VAN NIEUWENHUIZEN, Eds. Plenum, New York, 1980. xii, 728 pp., illus. $79.50. Ettore Majorana International Science Series (Physical Sciences), vol. 7.

The currently accepted theories of electromagnetic, weak, and strong interactions are all "gauge" theories. They view the fundamental interactions as being mediated by vector bosons (the photon, weak bosons, and gluons), which are coupled to the currents implied by the local symmetries of these theories. The general theory of relativity, which describes the gravitational interactions, has a similar mathematical form, at least classically. Since the structure of these theories is so similar, it is easy to speculate that there should exist some super theory that manifests all the known interactions in a correct and unified way. The search for that theory is more difficult. It has attracted much attention, and there has been some progress. There are theories proposed to unify electromagnetic, weak, and strong interactions that incorporate observed results in an economical fashion and predict novel effects such as proton decay and neutrino masses. The more ambitious goal of including gravity has been (so far) less successful, but there are models with gravity that appear to have a germ of truth in them. Papers discussing both of these endeavors are contained in this book; such knowledge may be necessary to carry out the search for a truly unified theory. We are in an