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A Review of: "Number Theory and the Periodicity of Matter, by J. C. A. Boeyens (University of Pretoria, South Africa) and D. C. Levendis (University of the Witwatersrand, South Africa)"

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Book Review

Number Theory and the Periodicity of Matter, by J. C. A. Boeyens (University of Pretoria, South Africa) and D. C. Levendis (University of the Witwatersrand, South Africa), Springer B. V., Heidelberg, 2008; xvi + 375 pages; $139.00; ISBN 978-1-4020-6659-7.

As with other books by the first author (Jan C. A. Boeyens), the current volume has been written for readers at diverse levels of scientific and mathematical education as well as an exceptionally wide range of interests in natural phenomena. The reviewer recalls an uncited seminal essay by the theoretical physicist and Nobelist Eugene Wigner, "The Unreasonable Effectiveness of Mathematics in the Natural Sciences," as well an overarching sentence in the book's preface. "Numbers are at the roots of magic, superstition, religion, and science." Rather than attempting to review all of mathematics and its role in all of the preceding disciplines in a single "package", the authors have chosen to discuss but one branch of mathematics, "number theory," and human endeavor, the physical sciences. Number theory uses as its "elements" the integers and asks questions such as, "Is the sum of two primes always even?" (Yes, if two is excluded as a prime) and "Is any even number the sum of two primes?" (Goldbach's conjecture in 1742, still unproven as of 2008). While number theory is rarely studied as a formal discipline by most scientists, many (such as the reviewer) have dabbled in it while being well aware of its seeming simplicity and awesome subtleties. The authors wisely give a 50-page primer on this discipline.

They also devote almost 60 pages to the periodic table of the elements. This section combines history as well as classical chemistry and relativistic quantum mechanics, and so adds to the readability and usefulness of the volume for the diverse readership aimed for. These sections alone make the current book a valuable contribution to one's library. There are also sections on particle theory and the most fundamental components of matter; on the stability, abundance and radioactivity of atomic nuclei; of diatomic molecules and chemical periodicity; and of superconductivity, superfluidity, and related issues of condensed phase matter. It is wonderful to see all of these topics

presented in one book and so encourage the reader to transcend the boundaries of disciplinary and departmental distinctions.

And even more wondrous are discussions of the universe in the large—how and when did it begin, why is there asymmetry—between matter and antimatter (why is there so much more of the former, or more strongly, the latter "is nowhere observed?"), between light and dark (Olbers' paradox "why is the sky dark at night?"), between left and right. Established data and well-tested literature models are interwoven with the authors' conjectures and mathematical constructs. The reviewer congratulates the authors for their interdisciplinary approach, their confidence, and dare I say courage and chutzpah in presenting all of this in print. The reviewer recommends that the reader join him with the authors on this adventure.

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