

*Alexander Borodin: Composer, Scientist, Educator. A Biography.* William Vijvers. Digital Printing Partners, Houten, Netherlands, 2013, 365 pp, ISBN 9789081226905.

The book is the result of long-term researches of the author dedicated to professional and personal life of Alexander Borodin (1833-1887), prominent Russian scientist and man of art of the second part of the 19th century. Thanks to researches in the field of organic and physiological chemistry conducted by Borodin in the period from 1858 to 1886 he became widely known both in Russia and abroad already during his lifetime. But in due course his musical fame as a composer outshone the activities of Borodin, scientist. The name of Borodin is met in many concert programs all over the world up to now.

Vijvers's research is developed on the basis of the published but not always readily accessible sources as well as considerable use of Borodin's letters published by Sergey Dianin in four volumes during the period 1927-1950 (*The Letters of A. P. Borodin*, in Russian). Wide quoting of personal correspondence not only substantiates the selection and angle of the factual material's presentation in the book but adds to it bright lively accents allowing reconstruction of the narration's character in more details. Simultaneously, detailed study of all biographical materials ever published about Borodin enabled the author not only to provide their comparative evaluation but also to make a critical revision of some information about this scientist given in several famous publications. In this respect, the heritage of Russian historians of science and art has been considerably reconsidered.

In the introductory note to this edition the author points out that music and science were intertwined in Borodin's life. Thus the book, consisting of 25 chapters, is built up in chronological order in correspondence with the professional and personal life of Alexander Borodin. The material related to his scientific activity and musical creative work is presented in chapters simultaneously: they show the longstanding tossing of the scientist between two of his life's hypostases. Three appendices and the list of quoted literature are added to the book. Appendix 1 contains information on musical works of Borodin, which includes description of two most prominent works: opera-farce "Bogatyr" ("The Athletes") and "Prince Igor" (based on the Russian epic "The Tale of Igor's Campaign") as well as his symphonic music. Appendix 2 provides an exhaustively reconciled list of scientific publications of Borodin, scientist. In particu-

lar, publications of the Soviet period did not provide a complete list.

Appendix 3 discusses different aspects of works about Borodin published before 2010, including their strengths and weaknesses. The author notes that the majority of published works "are one-sided:" they mainly reflect activity of Borodin as composer or "as an example of the unquestionable superiority of Russian art and science." In this respect, from my point of view, the main advantages of this book are exactly the well-balanced selection of the material touching upon both scientific and musical productivity of Borodin, the author's thoughtful and prudent analysis, and the attraction of a wide range of sources.

As is shown in Vijvers's work, the attention of the scientific community was primarily attracted by works of Borodin in the area of aldehydes, namely development of the general method of aldehyde condensation in the presence of sodium and potassium metal, analysis of the composition of products received on its basis, and discovery of the aldol reaction independently from Charles-Adolphe Wurtz. For the first time the book considers the genesis and detailed results of pioneer researches of the scientist in the area of fluorination of organic compounds, including material from his Italian publication dated 1862. As it turns out, some of Borodin's developments were applied in practice up to the mid of 20th century, for example, the analytical method (as well as the device) for determination of urea in the animal body (1876).

The main component of Borodin's activity was practical classes in chemistry arranged by him for students including their scientific researches within the framework of the Medical-Surgical Academy where he was a professor. The scientist regularly reported about results of his students' works at meetings of the Russian Physical-Chemical Society, promoting in such manner their further research activity. A separate chapter also illustrates Borodin's contribution in development of female education in Russia, his participation in arranging and teaching scientific courses for midwives at the Medical-Surgical Academy.

In spite of his serious attitude to composing, Borodin defined it as "a favorite leisure activity." This relationship with composing determined specific features of his creative development in music. His first symphony (in E flat major, completed in 1867) opened new horizons for Borodin, composer, having won his fame in Western Europe. In the circle of colleagues he took a special, independent position. Undoubtedly Borodin "has earned a

place among the “immortals,” considers the author when evaluating his musical heritage.

Vijvers’s book offers to readers a fascinating opportunity to plunge into the epoch of the social rise of Russia in the 1860s and post-reform time. On the one hand, one can become familiar with Borodin, liberal, who had become famous as a progressive social reformer

and outstanding pedagogue of female education. On the other hand, one can understand and accept new arguments in evaluation of his actual contributions to the development of chemistry and of new musical forms and musical language.

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*Organic Chemistry Principles in Context: A Story Telling Historical Approach*, Mark M. Green, New York, Science from Away, 2012, 452 pp, ISBN 978-0-615-70271-1, \$25.

In writing this textbook, Mark Green has completely overturned the accepted organization that has dominated organic chemistry textbooks for decades, rejecting the organization by functional group in favor of a contextualized, story-telling approach. Nearly all the basic information contained in traditional textbooks is present, but readers familiar with organic chemistry will need to immerse themselves in the book to find them, since Green has presented each one in a way that highlights a particular real-world chemical context in which it becomes relevant. The goal is to make organic chemistry less dry and more relevant to its everyday applications in polymers and biological systems. Every chapter mentions prominent chemists who were involved in some way with the chemical concepts discussed, and there are numerous portraits, several of which I had not seen before. Each chapter has problems for students, and there is a companion website with solutions to the problems and videos of Green lecturing on the material. In contrast to traditional textbooks, there are substantial amounts of unbroken narrative text and the chapters do not contain an overwhelming number of chemical reactions listed one after the other. This book appears to be self-published, and is clearly a labor of love, created after years of using this material in the classroom. Concepts are extensively cross-referenced by chapter and section.

The material is divided into twelve chapters that use either an industrial or biological example of organic chemistry. The first chapter uses the polymers of glucose—cellulose and starch—to illustrate principles of hybridization, stereochemistry and structure. Chapter two outlines mass spectrometry and IR and NMR spectroscopy. Chapter three uses galactosemia to introduce the conformational isomerism of six-membered rings, and carbocations are introduced in chapter four using the example zeolite catalysis of petroleum to increase octane levels of gasoline. Chapter five continues discussion of carbocations, using the biological synthesis of terpenes and lanosterol. The history of benzene and aromatic chemistry form chapter six, and carbonyl chemistry is treated in chapters seven and eight, using the metabolism of fatty acids and sugars. Acyl substitution and free radical reactions are introduced in the context of forming polyesters, nylon, polypropylene and low density polyethylene. Chapter ten begins with the industrial production of adipic acid and hexanediamine to explore kinetic and thermodynamic control of reactions, nucleophilic substitutions, and biological and non-biological reducing agents. Chapter eleven returns to polymer chemistry and elastomers, specifically the molecular structure of natural rubber and the synthesis of polycarbonates and spandex. The book concludes with a lengthy chapter on organic synthesis with two examples. Green first treats the highlights of R. B. Woodward’s 1952 total synthesis of cholesterol, along the way explaining the Diels-Alder and Grignard reactions and more carbonyl chemistry. The second example is E. J. Corey’s 1969 total synthesis