

Book Review

Solved and Unsolved Problems among Different Philosophies

Milan Randic, Marjana Novic & Dejan Plavsic: *Solved and Unsolved Problems of Structural Chemistry*, Boca Raton: CRC Press, 2016, 472 pp. [ISBN-13: 978-1-4987-1151-7]

by Haruo Hosoya

This is an unusual and amazing book, as the authors declare in the Preface that “This book speaks about a number of overlooked, misunderstood, unrecognized, or unaccepted and unknown observations and findings in science.” Thus this book is not recommended to those who want to begin to study structural chemistry, especially mathematical chemistry.

In order for the readers of this review to grasp what kind of structural chemistry is meant here, the titles of all the fourteen chapters will be given below.

1. Introduction, 2. Mathematical Chemistry, 3. Graph Theory and Chemistry, 4. Characteristic Polynomial, 5. Structure-Activity, 6. Molecular Descriptors, 7. Partial Ordering, 8. Novel Molecular Matrices, 9. On Highly Similar Molecules, 10. Aromaticity Revisited, 11. Clar Aromatic Sextets, 12. Renormalization in Chemistry, 13. Graphical Bioinformatics, 14. Beauties and Sleeping Beauties in Science.

Among them the first author puts special emphasis on Chapters 6 (connectivity index), 10 (conjugated circuit), and 13 (graphical representation of DNA sequence). After these chapters in the main part of the book, 23 appendices follow in bold face, among which several titles will be introduced here.

- A1. Early Hostility toward Chemical Graph Theory,
- A2. Editorial Alert to Reviewers on Graph Theoretical Manuscripts,
- A6. The First Page of the Book of Euclid,
- A7. Full Quote of Immanuel Kant,
- A14. Conjugated Circuits for the Remaining Five Symmetry Nonequivalent Kekulé Valence Structures of Coronene,

- A15. Hostile Reports of Anonymous Referees on Novelty in Graphical Bioinformatics,
- A23. Late Hostility toward Chemical Graph Theory.

For those who do not know the career and accomplishment of the chief author, Milan Randic, a brief introduction is given here. Born in 1930 in Serbia, he grew up as a theorist in chemical physics in Croatia and Britain. Then after establishing the Theoretical Chemistry Group at the Institute Rudjer Boskovic in Zagreb, he flew to the United States and had been working mostly in Drake University, Iowa, as one of the leading pioneers of mathematical chemistry based on the application of graph theory to chemistry and physics. After retiring from Drake his academic stage has been shifted to Slovenia until now.

Now go back to this book. Many of the chapters and appendices given above seem to be attractive, but it is very difficult to read them through. However, you do not have to do so. You can pick up some chapters and appendices carrying interesting or unusual keywords in the title, such as, beauty in science, sleeping giants, hostility, pragmatism, *etc.* While you read this book here and there by ruffling it in this way, you will realize that the chief author, Milan Randic, wanted to convey the behind curtain dramas on the ‘solved and unsolved problems among different philosophies’ to you, irrespective of the title of this book as it stands.

Now we need to consider the relation among chemistry, mathematics, and philosophy. As the authors are arguing against Immanuel Kant, who more than 300 years ago repelled chemistry from being a ‘proper science’ simply due to its intrinsic empiricism and lack of mathematical reasoning. Although many years later he softened his attitude to chemistry slightly, the issue posed by him at that era was not misdirected. Lavoisier who had set free the pre-modern chemistry from the spell of alchemy was executed in the French revolution just two years before Kant published his monumental message.

The above-mentioned three disciplines, namely, chemistry, mathematics, and philosophy, have been growing, moving, and fighting fiercely with each other in the long history of science from the time of Babylonia and Greece until today and to our unpredictable future. Further, even within the society of chemists, the spectrum is so crazily diversified in their mathematical and philosophical way of thinking. On this matter, please, consult the Special Issues of *HYLE* on ‘Chemistry and Mathematics’ (Vol. 18, No. 1, and Vol. 19, No. 1) and Restrepo & Schummer 2014.

The readers of this book will behold the realistic stages of this kind of struggles fought among the chemists of different philosophies especially in the way of mathematical thinking. The present reviewer strongly recommend to the readers of this journal to take a look at this book to witness the vivid stage.

Although he also has been struggling with the same problems for more than forty years in the same research field as the chief author, the term ‘hostility’ has not bubbled out from the mind of this reviewer, but ‘ignorance’ or ‘indifference’ came out. In this sense this is a precious document which should be stored somewhere in the corner of his bookshelf not to be forgotten by occasional glimpse. This should also be the case with other theorists in chemistry, physics, information and computer sciences, including those who are interested in the philosophy and history of scientific research in general. One copy is not required for each person, but you can share this book in some public libraries to be disseminated.

This book has another role to be stored in a library. That is it contains many important items which are historically famous but not easily accessible, such as A6 (Euclid) and A7 (Immanuel Kant) as listed above. Beside them the following items may be interesting to readers, although many of them are not historically important necessarily but randomly chosen by the authors.

- Hilbert’s 23 problems as the target of mathematics (partly introduced),
- 11. Outstanding mathematicians writing poetry,
- 14. Milestones in graphical bioinformatics,
- 19. Areas of physical chemistry and chemistry in general in which topological indices have found applications,
- 23. Problems of structural chemistry presented in this book,
- 25. Beauties of chemistry, etc.

As the readers have already noticed, the authors of this book are stuck to numbers, especially 23, of course, coming from Hilbert’s 23 challenging and outstanding problems in mathematics delivered at the turn of the 20th century to be studied by world-wide mathematicians .

Finally a question arose in a corner of the brain of the present reviewer. Do those referees quoted in A 15 still remember the vicious comments thrown to the author? If not, then the loser is the author, who had to live long being unable to forget a scratch caused by a small stone. The reviewer believes that this is not the case with Milan Randic, who has already established his own kingdom in Mathematical Chemistry.

Reference

Restrepo, G. & Schummer, J.: 2014, ‘Philosophical Aspects of Mathematical Chemistry’, *MATCH: Communications in Mathematical and in Computer Chemistry*, 72 (2), 589-599.

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