

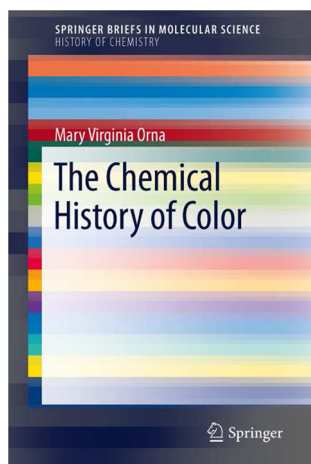
Review of *The Chemical History of Color*

Carl P. Fictorie*

Department of Chemistry, Dordt College, Sioux Center, Iowa 51250-1697, United States

The Chemical History of Color, by Mary Virginia Orna. Springer SBM: Heidelberg, 2013. Preface, bibliography, index; 153 pp. ISBN 978-3642-326417 (paperback). \$49.95.

In this short book, Orna brings together three different themes: color, chemistry, and history. The purpose of the book is to survey the nature of color and the history of the use of color, with a focus on the two-pronged approach of how color has impacted the science of chemistry and how the science of chemistry has impacted the role of color in society. While the book discusses pigments and dyes, it is not a book on the chemistry of art. While the book discusses the German dye industry, is it not a book on the chemical industry. While the book discusses the physical and chemical basis of color, is it not a textbook on spectroscopy and electronic structure theory. Rather, it is probably best viewed as a collection of stories: stories about how colors and colored substances have been discovered and used, and stories about the people whose work with color had notable impacts in chemistry and society.



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Orna begins the book with a definition of color in the first chapter. Color is a complex phenomenon that “depends on three factors: the light source, the object being illuminated, and the [usually human] receiver” (p 2). From here, Orna surveys coloring materials used in the ancient world.

Chapters 2 and 3 survey the physics and chemistry of color. Much of the content of these two chapters is based on two articles previously published in this *Journal*.^{1,2} Both chapters are historically structured surveys of the fundamental physical and chemical principles underlying color. The historical approach in these two chapters provides a number of interesting stories about the science and the scientists. On the other hand, the level of discussion of the scientific principles will not enlighten anyone educated in basic optics and bonding theory, while

anyone without this education will not be able to really understand the terminology and concepts used.

In the fourth chapter we gain a deeper understanding of some terminology that the author uses in the book. Up until this point, Orna uses the terms *coloring material* or *colorant* in reference to substances used for colors. These are meant to be broad terms that include the more common terms *pigment*, *dye*, and *glaze*. Orna prefers the general term *colorant* because pigment or dye may be confused with each other depending upon the application. The chapter as a whole is a broad brush survey of the use of colorants up until the time of Perkin, including a few specific case studies: as cosmetics, in stained glass, in painting, and in manuscripts. The well-known story of Perkin’s synthesis of mauve is much more detailed than the typical textbook version. Continuing with the historical thread, Chapter 5 is a survey of the German dye industry of the 1800s. The fifth chapter concludes with a timeline for the German dye industry and a discussion of some of the substantial impacts of the dye industry on social life.

In the sixth chapter, Orna provides a survey of the use of color in analytical techniques. There is a too-brief discussion of indicators in titrimetry, an extensive section on the origins of chromatography, and a history of spectroscopy and spectrophotometry. Orna concludes the chapter by introducing a new term: *coloristics*. She describes this term as “a catch-all general concept that can include all of the above and much more” (p 107). Whether such a term will catch on with practitioners will have to wait to be seen. The author may have tried to capture too much in one term, concluding with the comment that “coloristics includes virtually everything that has to do with color. Color is universal” (p 107).

In Chapter 7, we learn about some biological aspects of color. Paul Ehrlich is the major focus, describing his role in histological staining, chemotherapy, and the discovery of the first antibiotic, Salvarsan, and his contributions to the understanding of the interactions of dyes with tissues and their use in biomedical settings.

The final chapter includes an eclectic collection of topics that do not naturally fit into other chapters. There is a section on the use of color in food. A shorter section comments on the use of colors in pharmaceutical pills. Film photography is discussed in general terms. Photoluminescence is described, and applications in fireworks and lasers are included. A section is devoted to the notion that humans derive fun and enjoyment from our interactions with color.

Many topics are packed into a little book of 153 pages, which includes a large number of references and an index. Given the story-telling nature of the book, readers will not find a lot technical depth. In those cases where the author focuses on a

particular individual, the stories are very detailed and interesting. Even though the book itself lacks sufficient depth to be useful as a primary reference, the book does contain an extensive set of about 350 citations to primary sources.

To conclude, I recommend this book to the readers of this *Journal*. The stories will enlighten and deepen readers' understandings of the history of color and of chemistry. General readers may be confused in the technical sections, but in most cases, one need not understand the scientific details to get the point and enjoy the read. Students can use it as a starting point for further research into color and related topics.

■ AUTHOR INFORMATION

Corresponding Author

*E-mail: carl.fictorie@dordt.edu.

Notes

The authors declare no competing financial interest.

■ REFERENCES

- (1) Orna, M. V. Chemistry and Artists' Colors. Part I: Light and Color. *J. Chem. Educ.* **1980**, *57*, 256–258.
- (2) Orna, M. V. Chemistry and Artists' Colors. Part II: Structural Features of Colored Compounds. *J. Chem. Educ.* **1980**, *57*, 264–267.