ers and readers. Outside the professional audience the issue will not be color versus black-and-white, but rather how to use color effectively.

For the most part, Schmid is content with the task of explaining, taking the reader step by step through the field of graphics. His text is clear and complete enough to be useful to anyone who wants to understand the problems of graphic design—and ways to cope with them.

One of Schmid's themes is that graphics can be used for some rather ordinary purposes and still live up to the highest standards of truthfulness, accuracy, clarity, and aesthetics. The test of good graphics is whether the audience gets the message clearly, accurately, and memorably. Thus, Schmid's concern with research extends to empirical studies in cartography, psychology, and related fields aimed at assessing readers' responses to different graphical approaches. So far the results have not been as helpful as he had hoped, but he is optimistic about the payoff from further experimentation.

In his concluding chapter Schmid turns to the efforts that have been made to cope with the important problem of representing statistical error in graphics presentations. His approach to this subject is thorough and informative. His examples range from simple modifications of conventional graphics (such as using black and gray bars to differentiate between data that are statistically significant at the 95 percent confidence level and those that are not) to more ambitious innovations, some similar to some of those shown by Tufte.

The essential problem in presenting statistical information is deciding what to express in words, what to express in tables, and what to show in graphs—and how to integrate these three modes of communication to convey a message most effectively. Tufte turns to the matter of integration in his concluding chapter. He deplores the tendency to treat charts and tables as if they were entirely independent of the text and suggests how words and pictures can work together. His discussion is sensible. But unfortunately, in applying his precepts to his own book, he strains too much for integration, running text and charts together in ways that are not effective and failing to provide well-conceived headings for charts that must stand alone. Overall, the layout of the book reflects considerable ingenuity, but it creates enough problems to increase one's respect for some of the conventions of bookmaking. The design of complicated books is an exceedingly difficult task. Tufte as author, co-designer, and publisher of his book was able to lavish attention on design details and quality of production. If he fell short of achieving his goals, he must be credited with a dedicated effort to produce a handsome and unconventional book.

The Tufte and Schmid books can hardly be considered companion volumes, but neither can they be considered substitutes for one another. Anyone who peruses them both will surely gain a broader perspective on the status of and trends in graphics.

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Nectar Production

The Biology of Nectaries. BARBARA BENTLEY and THOMAS ELIAS, Eds. Columbia University Press, New York, 1983. x, 260 pp., illus. $33.50.

In this brief overview of the biology of nectaries the editors have brought together much of the new and exciting research dealing with these interesting nectar-secreting organs of the flowering plants. Detailed knowledge of how nectaries work and what their potential significance is has been unfolding during the past few decades, and the unfolding has accelerated in recent years with the dramatic advances in instrumentation. However, questions as apparently fundamental as how nectar is secreted from these glands are still unresolved. The mechanism by which nectar moves from the site of production (gland) to the area of presentation (exterior of plant) is a matter of controversy. The alternatives are transportation via vesicles that fuse to the plasmalemma and release their nectar into the wall area (granulocrine secretion) and transport of individual sugar molecules across the membrane by some carrier molecule (eccrine secretion). That it does not present a decision between these alternatives is not a weakness but a strength of this work. By objectively reviewing the possibilities the authors whet the reader's appetite for further investigation into these intriguing problems.

Some of the other questions that are posed by the various authors but left unanswered include: What is the switch mechanism that determines when nectar secretion starts and stops, as in the case when secretion ceases when "some critical amount" is reached and resumes after some of the nectar has been removed by floral visitors? What is the mechanism that allows some flowers to regulate the concentration of sugar in nectar so that the viscosity of the solution remains relatively constant during the day? Is there any taxonomic significance to the distribution of extrafloral nectaries among the families of angiosperms? Can extrafloral nectaries that are found on certain crop plants attract sufficient numbers of predators to offer an effective alternative to the use of pesticides in tropical agricultural systems?

Possibly one of the most valuable aspects of this book is the exposition in the last chapter of what questions to ask, what data to collect, how to collect your data, how to calculate the amount of sugar per flower, and what field equipment you will need if you plan to study nectar.

Overall this book should, as the editors indicate, serve the function of stimulating more research into the biology of these fascinating nectar-secreting organs. I enthusiastically recommend it to anyone interested in the ecological and coevolutionary relationships that exist among plants and animals.

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The Activated Sludge Process. Fundamentals of Operation. Randy Junkins, Kevin Deeny, and Thomas Eckhoff. Ann Arbor Science (Butterworths), Woburn, Mass., 1983. xvi, 136 pp., illus. $29.95.

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