

all of California. Especially interesting is a series of maps showing the Sea's sediment contaminants and the map of earthquake epicenters. The latter uses proportional circles for quakes over 5.5 on the Richter Scale and dots for 5.5 and below. The resulting dot map is a dramatic explanation of why California is called "earthquake country."

It would have been useful if the maps had included more explanatory text. For example, the map of Public Lands shows numerous areas with distinct "checkerboard" patterns, especially around Palm Springs. A reader might assume that these alternating squares are symbols for areas of shared ownership whereas the squares actually represent a pattern of alternating square miles of Indian reservation land. A brief explanation and history would be useful.

Many smaller scale maps refer to "Southern California," but do not extend as far as Los Angeles, which is usually considered a part of Southern California. Since Los Angeles is generally not relevant to the subject of the atlas, I am not troubled by its exclusion, but the authors could perhaps have chosen a different name for the area shown.

There are profiles of various portions of the lake and the authors point out the usefulness of profiles as decision-making tools. However, these tools would be more useful if the vertical exaggeration was indicated. A rough calculation showed that the vertical exaggeration of these profiles was 40 times. If the user is not familiar with profiles, as the authors seem to assume, then some explanation is necessary.

The climate maps use data from the period 1961 through 1990. While another 10 years of data probably would not change the averages to a significant degree, I do wonder why data through 2000 were not used. There are some

maps that compare 1999 and 2000, so the data would seem to be available. These complaints, however, are minor and do not detract from the overall interest and usefulness of the atlas.

My one major complaint concerns the page layouts. Most subsections consist of two-page spreads, often focused on the Sea. The introduction describes how the plates were designed and the sketches show that they were visualized as single pages. Unfortunately, this resulted in the page gutter cutting through the central object. Thus, the gutter obscures many of the representations of the Salton Sea. Whether the designers weren't aware of how the plates would be bound, or forgot to take that into account, the result is some frustration for the user and mars an otherwise exceptional work.

The atlas is an excellent reference and a spectacular "coffee-table" book that has as its stated objective "to make information available to decision makers, regulatory agencies, environmental organizations, stakeholders, and the concerned public..." This it certainly does, but there is an unstated subtext that becomes clear in the introductory material. The atlas is a showcase for GIS; early pages explain what GIS is, how GIS is used, and its importance in decision making. One two-page spread details the processes that were involved in creating the atlas from data gathering through storyboarding and plate design. The creators clearly wanted to show how GIS can be used for such projects. And that is why it is of interest to readers of *Cartographic Perspectives* and worth the \$80—it serves as an excellent model and example of what can be accomplished when GIS, cartography, and art are combined.

### **Cholera, Chloroform, and the Science of Medicine: A Life of John Snow**

By Vinten-Johansen, P., Brody, H., Paneth, N., Rachman, S., and M. Rip. NY and London: Oxford University Press. 2003. ISBN 0-19-513544-X

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Vinten-Johansen and his colleagues' study of John Snow, his life, and work presents a curious challenge to medical cartographers and geographers. It is the best study of Snow's work, including his maps, to date. It is comprehensive, rigorous, and intellectually complete. It also sees Snow's iconic maps as largely irrelevant to Snow's work and concludes more generally that medical mapping is a sloppy and largely irrelevant partner to the rigorous consideration of disease incidence.

The high quality of this 437-page tome makes the charge serious. The authors are serious dudes whose research is generally impeccable. And, heaven knows, the challenge is offered boldly. Here are the authors in their consideration of Snow's cartographic legacy, and especially the legacy of his Broad Street study:

"This mythical Snow seems an attractive figure to those GIS Aficionados who see themselves as standing up for the public health in the face of the jeering throng and as rushing out into the real world to save real lives while the stodgy, plodding scientists fussily demand more evidence before they are willing to act. Maintenance of this Snow myth also has survival for GIS. Advocates of disease map-

ping can point to no other incident in which the construction of a map played a pivotal role in identifying the cause and cure of a disease."

Ouch. They argue the myth of Snow as a pioneering cartographer is fostered for its survival value by well-meaning but clueless medical mappers who don't understand the "real" data. They insist the Broad Street map was a minor afterthought but even where it is critical to Snow's work it was "unique," the only map to date that actually served in disease identification.

Before considering the judgment, and the challenge it presents, consider the book itself.

*Cholera, Chloroform, and the Life of John Snow* begins with the little that is known of Snow's birth and early years. It really takes off when it describes the early training of Snow, the son of a Yorkshire farmer, as a medical apprentice in Newcastle in the early 1830s. It was here that Snow first encountered cholera, here that he learned the habits of both medicine and science that would advance his life's clinical and intellectual work. In York and Newcastle, he cared for miners and their families affected in the first cholera pandemic of 1831-33, never forgetting the relation he perceived between the lack of sanitation, crowding, and the spread of that disease. Geographers interested in the social context of illness are here provided with a superb example, alas one few cite or have carefully considered.

The authors then track Snow through his varying apprenticeships into London and his qualifying exams, and eventually his medical degree. Again there is a sense of place in the writing, a familiarity not only with the medicine of the nineteenth century but the intellectual life with which it was entwined. These were the years of the then developing medical societies and journals in which the debate between miasmatic and

transmissible disease advocates would be played out. Snow was a habitué of the medical societies then forming, a familiar who presented papers and critiqued those of others. His first publications were in the new medical journals then being published in London, beneficiaries of new printing technologies and the Crown's liberal mail system of the 1840s.

Where the book really shines intellectually is in arguing the relationship between Snow's early fame as an anesthesiologist and his historical fame in terms of his cholera studies. Anesthesiology made Snow's name in the later 1830s through the 1840s. He authored the first critical textbook of the use and administration of ether, for example. All this was preparation, however, for the work that began with the second cholera epidemic of 1849 and the first edition of his book, *On the Mode and Transmission of Cholera*. Largely ignored by modern writers, here that short tract is given the attention it deserves.

Vinten-Johansen and his colleagues argue, correctly, I believe, that Snow's theory that cholera was water-, not airborne sprang from his background with anesthetic gases. The pattern of disease appearance in towns where there were concentrated outbreaks was not that of an airborne phenomenon, not evenly distributed along air currents. And here Snow gives the evidence. He argued clinically that the disease was "in the gut," diarrheic, and not pulmonary, in the lungs. It had to be from something ingested rather than something inhaled.

Thus, before the epidemic of 1854, Snow had published a theory based on clinical evidence that the disease was water- and not airborne. The theory did not spring from his 1854 studies and the maps that resulted. They instead provided a medium to distill the research he carried out in an attempt to test the hypothesis earlier formulated.

This is a critical point, one that insists upon Snow (and the mapping he did), in a broadly scientific rather than narrowly cartographic frame.

The authors do great service to an understanding of the 1854 Broad Street outbreak, even mapping Broad Street and the cases that occurred upon it. They carefully, lovingly detail Snow's "shoe-leather epidemiology," the way he traversed the neighborhood in search of the survivors whose information would help him determine whether the deceased had drunk from the pump he believed complicit. The work was not easy and, for any who think mapping determines medicine without careful investigation, the authors are right. The research that went into Snow's "topography" of the outbreak was hard, exemplary, and critical.

The authors do an inestimable service in considering other maps by Snow's contemporaries, especially the one by Rev. Henry Whitehead, which joined his in an official parish report. They do an almost equally impressive job in considering Snow's great South London study, one in which he and colleagues considered the potential complicity of water companies supplying South London in the greater epidemic. Here, alas, they make little mention of the map Snow included with that report, the most comprehensive of his studies. And, no wonder. The map is difficult, even confusing. Its colors are muddied and its details obscure. Still, it would have been nice had it been more carefully considered, its analysis given an attention similar if not equal to the Broad Street map.

The whole is a terrific corrective to the simple-minded use of the iconic map and the fairy tale story of Snow-as-Discoverer that many if not most geographers accept. He wasn't the only man who used maps. He was one of many. Snow

was a collegial if not a gregarious man. He was not a lone genius generations ahead of his time but quite simply a man of his time. Nor, of course, did he convince his contemporaries of his theory of disease origin. That would take decades of frustrating work and the dawn of bacteriology in the 1880s.

The authors are correct as well to savage, as they do in their last chapter, those who use versions of the Snow map, altered for editorial purposes, as if they were Snow's own. Here, in a partial list, one can name geographers as diverse as Gilbert (1958), Monmonier, (1991), Tufte (1972), and the US. Center for Disease Control (2000) whose Epi Info software package includes a vastly incorrect version of the Snow map.

Here, then, is the challenge the authors present: Are they correct in their marginalization of medical mapping, and the potential of medical cartography? A partial and personal answer based on my own research and publications follows.

Their argument that Snow's famous 1894 map was an afterthought is among the weakest in the book. The map was certainly important to the 1854 and 1855 publications. Indeed, in the mid-1850s, mapping was a critical part of almost every cholera study and of many disease-related studies generally. They ignore the cost and time Snow spent on the maps, and especially the one published in an 1855 parish report in which he included an irregular polygon defining the "cholera area" of the Broad Street area. The cost alone of the map accompanying the South London study—and a colored map in those days was not inexpensive—suggests an importance that Snow gave to the mapping that the authors do not recognize. At best, their devaluation of the Snow map is debatable, at worst simply wrong.

The suggestion that this is the only map that ever served prac-

tically is one easily dismissed. Against their position stands a wealth of maps beginning with one I know made in 1690. There were the maps of Seaman (1790) and Pascalis (1820) that argued the origin of yellow fever in New York City. Later, one might add MacClellan's maps of the 1870s cholera outbreak in the USA, maps that detailed its progress up the Mississippi and in individual towns can be noted. So, too, one might note in passing Burkitt's mapping in the 1960s of the lymphoma named after him. In a more modern vein, there is a range of studies of the diffusion of diseases like influenza, and the work of Gould et al. on AIDS, modeling that remains, well, a model of rigorous medical cartography.

The authors are right, however, that medical cartography requires a real knowledge of medicine and disease ecology that is too often absent in much of the contemporary work. They may be right that mapping often is used today by those with a social agenda but without the necessary background, or the inclination to hard work, that disease studies require. But bad work by individuals does not necessarily mean an approach is invalid. Vinten-Johansen and his colleagues earned the right to their over-blown assessment about medical mapping through the otherwise careful detailed research that pervades the body of this work. I think they are dead wrong on medical mapping generally, but I applaud their criticisms of what they perceive as shoddy, uninformed work. Medical cartographers and geographers can now prove them wrong through the careful, slogging, often exhausting research that substantive disease studies require, or not. My guess is that, if the work warrants it, these authors will then cheerfully admit their error.