Books

Field Notes on Science & Nature

Edited by Michael R. Canfield
Harvard University Press, 2011

The practice of taking systematic and detailed field notes enabled the rise of scientific disciplines including paleontology, evolutionary biology, and ecology. The 19th-century journals of Lewis and Clark, Darwin, and Thoreau are still read for their scientific insights and literary grace. Today, because the scientist may never get the chance to revisit a particular spot in the Sierra Nevada or Papua New Guinea, field notes are still required to document research. And in our era of environmental crisis, they provide a baseline for measuring change over time.

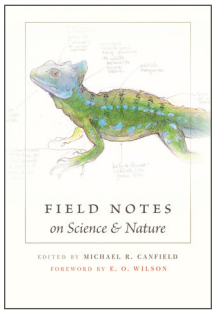
Field Notes on Science & Nature contains 12 essays by leading scientists celebrating the enduring role of the field notebook—an essential tool for all scientists who work outside the laboratory. Each essay provides a window into a different scientist's mind by describing his or her note-taking methods and the experiences that shaped those methods. We read about Kenn Kaufman's childhood bird lists, Karen Kramer's mapping of Mayan villages, and Roger Kitching's harrowing trial of carrying a researcher with a broken leg down a mountain river in Borneo.

One fascinating chapter, "Letters to the Future," by John Perrine and James Patton, describes the fieldwork of early-20th-century teams led by the pioneering ecologist Joseph Grinnell. Their notes were so detailed that scientists today can restudy the same places to show how human activities have affected California ecosystems over the past century.

Field notebooks are also seedbeds of speculation, where new lines of research and theory can germinate. Bernd Heinrich describes how his studies of animal behavior often arise from some oddity he has seen and scribbled down. "When I am in the field collecting information, I am on the outlook for the nascent, the new, and the unexpected that may spring out of the familiar."

Many scientists rely on drawings to record information and express ideas. *Field Notes* contains splendid reproductions of entire notebook pages, where sketches and diagrams alternate with text. Jonathan Kingdon, an authority on African wildlife who also trained as an artist, sees an affinity between science and art: "Learning to discriminate between what is significant and what is irrelevant … is an essential part of field studies, and just such discrimination is integral to the art of drawing."

The contributors to *Field Notes* are mostly staunch defenders of the paper notebook. But the references to photography, computer databases, and GPS mapping make one wonder about the future of field notes in the digital age. Like the architect's sketchbook, the field notebook may endure or vanish or more likely transform itself in unimaginable ways. But the need to look closely and think about what one sees will remain central to science, as it will to design.



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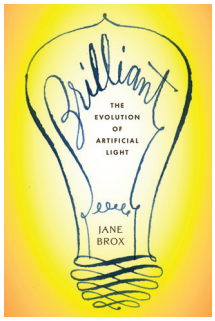
Brilliant: The Evolution of Artificial Light

by Jane Brox
Houghton Mifflin Harcourt, 2010

When the sun is out of view, we surround ourselves with small-scale replacements—curving forms that emit light and heat. Before centralized energy distribution, our sun substitutes also conveyed the passage of time. Flames danced through each passing second, and the fuel source (tallow or beeswax, kerosene or whale oil) steadily retreated over the course of hours. The development of gaslight in the 1800s converted artificial light into a constant and separated it from responsibility, making possible a new concept: "nightlife." We build now with the expectation that there will be light whenever it is wanted, wherever we wish it.

In her absorbing book *Brilliant: The Evolution of Artificial Light*, Jane Brox narrates luminary progress starting with the light of a sandstone bowl containing a bit of moss tucked into animal fat in the hands of the earliest interior designers, the creators of elaborate cave paintings; the history extends to the OLEDs around the next corner. To describe that which describes everything without itself possessing a physical form, Brox interweaves compelling observations, sensory descriptions, and statistical data in an approach well suited to a story that parallels the blossoming of empirical science. From Baudelaire, we gain a writer's perspective of what it was like to be a pedestrian at the dawn of nightlife: "A kaleidoscope equipped with consciousness." In Thomas Edison's lab notebooks, we glimpse the rigor



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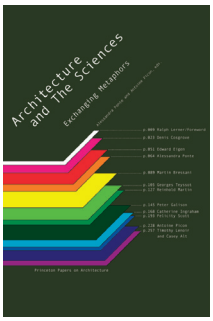
applied to the refinement of the incandescent bulb.

Houses were wired for electricity first for light, after which irons and washing machines soon followed. Personal accounts from farmwives reveal the liberation of womankind that accompanied the harnessing of electricity. "I'll tell you—of the things of my life that I will never forget, I will never forget how much my back hurt on washdays." Our ever-growing reliance on energy has placed us on a dangerous trajectory, but a return to washboard scrubbing and candlemaking is unthinkable.

Perhaps what is needed is a reassociation of light and time. At my grandparents' house in Vermont, a small red light was installed on a switchplate in the 1970s; when the light is off, demand is low and a reduced rate is charged. My grandmother, who grew up mindful of all consumption during the Depression and World War II, moderates her use of electricity according to the time of day because she has a visual reminder of the energy source.

Brox wonders "whether we are hampered more by brilliance than our ancestors ever were by the dark." It is an important question, especially for designers. Can we achieve a sense of tranquility in a world awash in artificial light? It is not just the visibility of the Milky Way that we are missing but the opportunity to reflect on the Milky Way, or the mesmerizing movement of a small flame.



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Architecture and the Sciences: Exchanging Metaphors
Antoine Picon, Alessandra Ponte, editors
Princeton Architectural Press, 2003

The notion of scientific metaphor in design frequently conjures images of a material expression of a familiar object in nature, such as Herzog & de Meuron's "Bird's Nest" stadium for the 2008 Beijing Olympics or Frank Lloyd Wright's treelike columns in the Johnson Wax building. The use of biological interpretations like these to shape built form can provide a symbolic significance in design. Alternatively, science can more deeply influence the methods and even the purpose of architectural endeavors. In *Architecture and the Sciences: Exchanging Metaphors*, a collection of 11 essays by historians and scholars, editors Antoine Picon and Alessandra Ponte present the relationship between science and design in terms of the quantifiable, analytical, and innovative methods used to advance each field.

The first theme addressed is the influence that natural science has had on the composition of structural form and the relationship between site and architecture. Perhaps the best-known historical example is Vitruvius's writings on spatial order governed by nature and the importance of site, discussed here by Denis Cosgrove. Vitruvius, as did subsequently the astronomer Ptolemy in his study of the cosmos, attempted to create a framework to define space through empirical measures to rationalize form. A later essay by Ponte depicts the influence of scientific advances on form and site, describing geometric craters created from nuclear testing. In this essay, nuclear development highlights both the destructive and creative capabilities of science. The physical destruction at the testing site, undeniably horrific, is also perceived by some as art—as an altered landscape form—while possibly offering a positive effect by prompting the analysis of structures that could survive a nuclear blast.

Natural sciences such as anatomy and biology also played a role in the development of architectural documentation, as the 19th-century architect Viollet-le-Duc attempted to objectify the architecture of the Middle Ages through a novel scientific approach: studying buildings as a bodily dissection. Anatomical explorations of exploded skull drawings, as well as other cranial studies, influenced architectural drawing and the art of perspective as a way to understand and define architecture. In the 20th century, anatomical and biological metaphors were replaced by metaphors from the physical sciences as, for example, crystalline structures and geometric patterns were reflected in the designs of architect Buckminster Fuller.

In the 21st century, it is digital technology that is the scientific tool most linked with design; the three-dimensional capability of the computer drawing package may serve, much like its 19th-century anatomical and biological precursors, to provide entirely new approaches to the study of buildings. But the ability to layer site data with programmatic representations, such as architect Greg Lynn's "animate design" process, allows even more: the ability to investigate multiple options and to understand the implications of design decisions. As the interconnections of architecture and science continue, we can expect to witness an accelerating evolution in methodologies for research-based design.