who had the original inspiration for the project, did not live to see its completion. This is a shame because the finished book is so much more than the sum of the parts that she knew. The photographs, introduction, keys, and descriptions are combined in such an appealing way that the volume makes lichens almost better than they could possibly be.

Even if such a carefully produced masterpiece cost a small fortune, I would recommend it for every serious professional and amateur lichenologist and for every public and university library. But with its reasonable list price every person interested in natural history should have a copy. I only hope that the publisher decides to reprint the keys separately, so I can take them into the field and preserve the book for my coffee table. Enjoyment of North American lichens has long been restricted to professionals and the most determined amateurs. This superior guidebook will make them accessible to all.

BOOKS: OPTICS AND ART

Framing the Evidence

Patricia Fara

Like searching for the holy grail, retrieving lost secrets from the past has always been a tantalizing, alluring quest. Isaac Newton immersed himself in arcane alchemical lore as he obsessively pursued the uncorrupted knowledge of the ancient Greeks, and Immanuel Velikovsky shot to infamy by rewriting science to explain biblical miracles and Egyptian mysteries. Now David Hockney, a prominent British artist who lives in California, claims to have discovered why pictures became far more realistic in the 15th century. In Hockney's version of the history of Renaissance art, neither divine inspiration nor the skill of genius caused this dramatic shift. Instead, lenses and mirrors provide the hidden explanation of how Caravaggio, Holbein, Raphael, Giorgione, and van Dyck were able to produce paintings that are as deceptively natural as photographs.

Secret Knowledge Rediscovering the Lost Techniques of the Old Masters
by David Hockney
Thames and Hudson, London, 2001. 296 pp. £35, ISBN 0-500-23785-9. Viking Studio, New York. $60, C$87. ISBN 0-670-03026-0.

Does the use of optical devices mean that the great masters were cheating? Their desire to avoid detection might provide one reason for the lack of written historical evidence to support Hockney's argument. Disturbing though his conclusions are, they deserve to be taken seriously because he is himself an artist. By ferreting out forgotten tricks of the trade, Hockney seems to undermine his own status as a celebrity painter. His reliance on visual rather than textual evidence forces even his critics to reconsider how they view great masterpieces.

The extent to which artists used lenses and mirrors is an old debate. Some art historians have tried to reconstruct the optical techniques of Vermeer, who worked in Delft during the second half of the 17th century.

Tell-tale skull? Hockney suggests that the distorted skull in the foreground is just one of the clues in Hans Holbein's *The Ambassadors* (1533) that the artist used optical tools.

Hockney wants to take the story back to 1430 and into Italy as well as northern Europe. Initially prompted by his own attempts to draw like Ingres, Hockney scoured catalogs for hints that artists might have used optical aids. For scholarly support, he recruited two experts: Martin Kemp, an Oxford art historian who traced out the pre-photographic pedigree of cameras, and Charles Falco, an American scientist, whose explanation that a concave mirror can act like a lens helped Hockney overcome some technical stumbling blocks.

Hockney is a man of few words. In the book's lavish first half, he offers a collection of marvelous pictures as arguments in their own right. He devotes the plainer second half to textual evidence. This evidence includes an assortment of historical documents and an edited selection of correspondence with curators and his two academic guides that logs the progress of his investigations "over more than a year"—a surprisingly short period of time for formulating such a revolutionary thesis.

Hockney's major rhetorical technique is to juxtapose pictures depicting similar scenes and claim that the stylistic differences between them result from optical innovations: angels' wings start to gleam with near-photographic realism, suits of armor gain shiny reflections, rich fabrics acquire luster and volume. Another of his tactics is to argue that optical assistance would have made the painter's task much easier. The foreshortened chandeliers, lutes, and skulls that conventionally advertise artistic dexterity here imply that a lens has intervened. Unable to muster the logical, fact-based proofs that scientists are accustomed to evaluating, Hockney argues by persuasion. He starts with certainty, and then proceeds by supposition. Leonardo da Vinci knew about lenses, so it is not "too far-fetched to imagine" that he wanted to recreate the beauty of projected images. Mirrors alter the highlights on a basket of fruit, an effect "surely" known about by Caravaggio.

Hockney's unfamiliar modes of argument immediately sound all sorts of alarm signals. Unlike scientists who present only their final results, Hockney invites his readers to accompany him on a personal odyssey of discovery into the past. By guiding them along the route that he has taken, he skillfully sets out to convince them that no other route is possible. When facts don't fit his case, he devises convenient suppositions. Dürer, he suggests, chose to draw a perspective machine that was already out of date, although no reason is offered for this strange decision. For science's most famous picture, Joseph Wright's *An Experiment on a Bird in the Air Pump*, Hockney shifts ground, maintaining that although Wright might not have used a lens himself, optical technology was so widespread by the mid-18th century that people now demanded pictures of lens-like naturalism.

It is too easy to condemn Hockney for demoting the great masters to technicians who faked their skills by copying. Art museums are the secular temples of modern society, and it seems sacrilegious to challenge the genius of great artists. By rejecting this reverence, and restoring artists to their former status as master craftsmen (and women do only appear as subjects), Hockney allows interesting themes to be explored. During his own career, he has creatively incorporated photomechanical techniques, and he draws on this personal practical experience to propose convincing new solutions to long-standing problems of perspective. Exasperating though *Secret Knowledge* may seem, when it comes to pictures, we should look hard at an artist's visual arguments.

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The author is at Clare College, Trinity Lane, Cambridge CB2 1TL, UK. E-mail: pf10006@cam.ac.uk