

and the absence of surface-pressure maps attributable to Wilhelm Brandes despite his stipulated plan to achieve this early last century. Likewise, Monmonier gives a detailed description and careful cartographic analysis of weather maps constructed by various acknowledged pantheons of the meteorological community. There is no reproduction of Admiral Fitzroy's highly speculative but remarkably insightful portrayal in the mid-1800s of a family of mid-Atlantic storms. This omission might well be an indication of the author's commendable cartographer's concern for fidelity to the available data.

But the author's underlying cartographic theme is difficult to sustain for two reasons. First, technological developments now provide the forecaster with quasi-continuous data from satellite-based instrumentation and ground-based radar. So cartographic maps become subordinate to film loops, and at one point the author concedes that, for him, "few media are as persuasive as film". In the same vein, his brief consideration of pollutant distribution, ozone depletion and climate change are more indulgent diversions than intellectual excursions. Indeed, his statement that "our best defence against catastrophic climate change rests on a four-fold strategy of monitoring, modelling, archiving, and visualization" should be treated with reservation.

Second, and far more trenchantly, meteorological cartography should be motivated and underpinned by physical considerations. The task is to select the most insightful atmospheric fields and to display them with clarity in two, three or four dimensions. The book has little to say on the relative value of difference atmospheric fields, while the narrative is pedestrian and sparse in its discussion of weather prediction.

Contrast this with the study of the young Halley mentioned above. On the one hand, scholars rank Halley's wind chart among the most important in the history of cartography. On the other, his objective is evident in the title of the accompanying paper — "An historical account of the trade-winds and monsoons observable in the seas between and near the tropics with an attempt to assign the physical cause of the said winds".

A potential buyer will have to assess whether the book's charm outweighs its shortcomings. □

Huw C. Davies is at the Institute for Atmospheric Science ETH, Hönggerberg HPP, CH-8093 Zürich, Switzerland.

More on the atmosphere

The Stratosphere: Phenomena, History, and Relevance

Karin G. Labitzke & Harry Van Loon
Springer, £37.50, \$62

Science in culture

Lucid looking

David Hockney's drawings using the camera lucida
Martin Kemp

What are we to think when one of the greatest draughtsmen of our age resorts to a drawing device patented in 1806 and primarily intended to provide assistance to 'amateurs'? The artist in question is the renowned British painter, maker of photo-works, stage designer and master of the pencil, David Hockney. The device is the camera lucida invented by William Hyde Wollaston, physician turned chemist and optician, as a way of overcoming his inability to depict admired scenery.

The camera lucida stood in a long line of descent from various optical drawing devices, ranging from mechanical perspectographs to lens-based camera obscuras. Indeed, its name played on the fact that it did not need the 'dark chamber' of the camera obscura and could be used in any light conditions. The convenient and readily portable camera lucida used a four-sided prism, two faces of which are set at 135°, to send a twice-reversed image to the eye via two internal reflections. Wollaston explained how a draughtsman could simultaneously see both the object to be portrayed and a horizontal drawing surface, providing the eye is "so placed that only a part of its pupil may be intercepted by the edge of the prism". This difficult trick was facilitated by a hinged eye-hole, while supplementary lenses helped with the problem that the eye was required to focus on both the object and the image plane.

Used by some professional draftsmen, including the sculptor Sir Francis Chantrey, as well as by countless hopeful novices, the camera lucida largely passed out of service with the spread of photography. Wollaston's prism was a demanding device to use, requiring considerable ocular control. Even then, an unskilful artist would achieve only "lamentable results" — to quote William Henry Fox Talbot, whose failure to produce decent landscape drawings with the camera proved to be a powerful goad to his invention of calotype photography. By contrast, the astronomer Sir John Herschel, adept at using his eyes with telescopes and well equipped with draughtsman's skills, achieved beguiling results.

Hockney, who has consistently been concerned with issues of seeing, representation, perspective, space and the camera, has recently



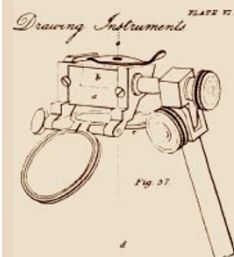
Hockney's camera lucida drawing of Barry Humphries (courtesy of Annelly Juda Fine Art), on exhibition at 23 Dering Street, London, until 18 September.

seized on Wollaston's invention to undertake a series of drawn portraits. Unlike an inexperienced artist, who is likely to attempt a laboured tracing of contours, Hockney uses the instrument as a sighting device, briskly demarcating key points of the features, such as the corners of the eyes and line of the mouth. The advantage is that such key registers of expression can be rapidly established before the sitter's expression freezes or sags. Removing the device, he then directly delineates the shades and highlights through an intense process of observation and depiction, in which his gaze incessantly 'tick-tocks' from face to paper at intervals of no more than two seconds. Being portrayed by Hockney is, as I can testify, to be machine-gunned by an ocular marksman of the first order.

The results share something of the quality of photographs, while not looking like photographic images. They remain, recognizably, drawings in Hockney's style, yet they are discernibly different from the entirely 'free-hand' portrait drawings from earlier in his career. They exhibit a combination of fresh immediacy (the short exposure) and unrelenting intensity (the long exposure) that entirely validates the artist's surprising adoption of the camera lucida.

The results also feed back into the history of the device. Hockney took advantage of his recent visit to London from his home in California to scrutinize the portrait drawings by the French Neo-classical artist Jean-Auguste-Dominique Ingres, then on exhibition at the National Gallery. His intuition is that Ingres used a camera lucida to facilitate the making of drawn likenesses of visitors to Rome in the second decade of the nineteenth century. It is a happy intuition that, in my capacity as a historian, I hope to explore further. □

Martin Kemp is in the Department of the History of Art, University of Oxford, 35 Beaumont Street, Oxford OX1 2PG, UK.



Optical pieces of a camera lucida, from Cornelius Varley's *A Treatise on Optical Drawing Instruments*, 1845.