

voltage has been deliberately used to shorten the exposure time, which was 6 seconds. The use of such a high voltage will, of course, lower the contrast of the radiograph, and looking at the reproduced X-radiographs it does appear that they are rather dense and lacking in contrast. It would be interesting to know if there were other reasons for the high voltage.

There are 36 radiographs reproduced in the monograph, 12 of which are a series with their photographic image alongside for comparison, giving complete coverage across the painting along the line of the series of portrait heads. These are accompanied in the text by a discussion of El Greco's technique of painting them. The remaining X-radiographs are examples from various areas of the painting to illustrate particular points, including some showing areas of fairly considerable paint loss, but none of these are compared with their photographic image.

The final section is a short biography of Matias Moreno, the artist who restored the painting in about 1873. It includes reproductions of some of his paintings and also those of his daughter. This section is rather irrelevant to a study of the 'Burial of Count Orgaz', as it gives only the briefest mention of Matias Moreno's work on the painting; or perhaps this could be a new trend for the future—all studies of major paintings will include a biography of the restorer!

In summary this monograph, the first of the series to be published in English and Spanish, provides some useful information for those interested in studying El Greco's technique and materials, and also a good case history of how an improved environment can be provided for a large painting without removing it from its original context. However, it will not give those interested in painting conservation much insight into the conservation methods employed to consolidate and restore this painting.

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GARRY THOMSON, *The Museum Environment*, Butterworths, 1978, pp. 270 + xiv, figs 102, tables 33, plates 16, refs 260, £16.00.

Exactly the size of *Studies in Conservation* but five times its thickness and hard-bound, my copy remained unopened until I had studied the cover-design: both a successful solution to the problem of presenting visually that abstraction 'museum'; and a quiz for curators, its twenty-

seven solutions given within. After that, the book opened easily and stayed flat, as a book should that is destined to be consulted frequently.

'Environment' is an all-embracing term. The author has limited himself to its major elements—light, humidity, and air-pollution—topics with which he has been intimately concerned as a physicist advising a picture gallery. In contrast, the animate elements—bacteria, moulds, moths—receive only a paragraph here and there when relevant. Man himself, although pervading the text as scholar, scientist, engineer or consumer of technology, is not presented in his role of interactor with objects. In other words, the book concerns essentially steady-state conditions, not catastrophes. This is important, because in a well-managed museum its steady state will control the destiny of its millions of objects, whereas the catastrophe, one hopes, will affect only one. Nevertheless, a list of the many things that can go wrong with complex machinery, such as water dripping out of air-ducts and diffusers, would have been instructive.

Written in a scholarly manner, the book is made in two parts. First, the essentials are presented, without mathematics, in a series of some seventy clearly-written sections that reflect close acquaintance with real-life needs, both of practice in the museum and of presentation in the class-room. This section includes numerous summaries that could profitably be collected together to form a Guide to Practice. After Part I we have our reward in the form of sixteen artistic colour plates, then we face Part II.

Part II contains the data and the mathematics that made the earlier part possible. Cross-references from one to the other help the serious reader. Invaluable to a scientific conservator, this part presents in thirty-three sections some actual problems that are worked through to solutions, each to illustrate some particular point. Experimental verification or support is offered whenever it is available. This reviewer, after following one intricate argument through four pages of consideration and calculations about the probable effect of people on Relative Humidity and Temperature, found comfort in a graph showing that the predicted results did in fact happen, a prediction confirmed by records from his own experience. It is a strength of the book that it both presents answers to questions that have been asked already and it also provides graphs and tables, methods and references, that will enable new

questions to be considered sensibly. There are some slips in production, but fewer than the five per cent that physicists allow when evaluating the degree of confidence to be placed in their experimental results. For example: one page reference not entered, another wrong; 'too' instead of 'to'; 'if' instead of 'is'; 'Axon' for 'Rixon'; 'SO₂' instead of 'SO₃'; lithium fluoride (which is not deliquescent) for lithium chloride (which is); 'red' when the colour is actually green. The latter was perhaps a Freudian slip by an editor who saw that red would have been better: the green lines used in diagrams almost vanish when viewed in tungsten light, just as is explained on page six—'all colours are reflected, green merely more than others'—so much more in fact as to become scarcely distinguishable from the white page.

Other slips in emphasis, however, may have serious repercussions on the well-being of objects. Thus, the caption to Fig 47 permits readers to believe that a closed case buffered against change in Relative Humidity by its displayed wooden instrument is acceptable. The fact that in this situation overall stability is achieved because moisture moves in and out of the buffer is, in fact, explained, but the reader is not expressly told that use of the object itself as the reservoir of moisture allows to happen those very dimensional changes that we wish to prevent.

Again, it is said that 'in a healthy situation, exhibition cases do not have to be ventilated'. If this be true, we should regard all of our

situations as unhealthy, except those, Mona-Lisa like, for which chemical analyses and ageing tests have been provided for every part of the case—wood, lacquer, paint, cloths, mounts, lettering, other objects—which come into contact with the air bathing the principal object of display. Few actual cases are so 'healthy' as to prevent contagion resulting in growths of unsightly and substance-consuming crystals on the object. The author's own reference 181 warns expressly about the problem. Yet prevention is so easy: simple ventilation! This avoids the alternative time-consuming and expensive preliminary analyses and thought. It is quite possible that buffering silica gel will actually sorb some of the unwanted vapours but we do not know the duration of such protection or even whether it will actually occur in gel already containing some 28 per cent of water. Perhaps the author will study this particular question in readiness for the next edition of this book that will undoubtedly be wanted.

Viewed in perspective, in uncoloured illumination, without the heat of disagreement and the humidity generated by close study, this book can be seen to serve as a buffer for the conservator, stabilising him in his struggles with an often adverse environment that is mediated largely by that legendary man Murphy who saw that 'if it can go wrong, it will'. The thorough understanding that will be generated by this text in its attentive reader should remove many causes for things to go wrong.

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