PAINT ANALYSIS

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The investigation of historic architectural paints and coatings is more commonly called a paint analysis. It is a specialized form of research which uses a variety of microscopic and occasional chemical and ultra-violet bleaching techniques to analyze, determine and evaluate the nature and original color of historical surface coatings on wood, plaster, metal and masonry. The information that this often very time consuming investigation seeks to determine concerns:

- Numbers of layers of coatings (including prime and finish coats)
- Original colors (recorded in notations of the Munsell Color System)[1]
- Distribution of colors and coatings
- Decorative painting (i.e. graining, marbling, stencilling etc.)
- Types of coatings (i.e. oil or water base paints/stains/glazes/varnishes or wallpapers)
- Physical characteristics (i.e. gloss and texture)
- Approximate date or period of each layer

In the process of compiling and evaluating this data for each area of a building, if there have been any later architectural changes which were not readily apparent, they can be determined by carefully comparing differences in numbers of layers of coatings with those on original features. Through this comparative analysis, the approximate date of the changes can be calculated. In this light, the paint analysis performed by a specialist[2] can be an invaluable tool to the architect, or others, who may be preparing a Historic Structure Report. Both investigative efforts should be undertaken in conjunction with each other in order to coordinate findings and conclusions and eliminate possible contradictions. The best time for the paint analysis to begin is after all historical (documentary) research[3] is complete and the structure has been measured and drawn. Experience has shown that it must be considered absolutely essential to have the analysis performed on the entire building at one time because when any areas are studied in isolation or out of context with the whole, the benefits of comparing layering sequences and colors found on similar features in different areas (and picking up on possibly overlooked or misinterpreted information) are forsaken. The potential for arriving at erroneous conclusions is substantial if the analysis is not done in this comprehensive way. A very important responsibility of the architect or administrator is to provide the paint specialist with as much information on the structure as possible — working with and questioning the preliminary findings closely in order to bring out all of the subtle nuances in the building that are presently known or can be discovered.

A microscope must be used for a paint analysis because many surface coatings (especially 18th century paints) are too thin or degraded to be discerned by the naked eye or even with a handheld magnifier (5X to 8X). An inexpensive binocular microscope (15X to 30X) is usually taken along for the on-site investigation so all of the many samples removed for analysis can be examined immediately to determine whether or not they have good paint evidence on them. This helps to keep transportation costs low by reducing or eliminating the need for return trips. The complete micro-analysis with a high quality binocular stereo zoom microscope (10X to 70X) is done back in the laboratory.[4] There the extracted samples can be carefully examined for recording all of the information that can be found on them in relationship to the seven catagories listed above.

Distance, time or financial constraints may sometimes make an on-site investigation by a consultant impossible. In such a case, paint samples can be taken by others and forwarded to the consultant for analysis. However, it must be realized that the samples sent may not be truly representative. They might be missing some paint layers, be a poor sample for matching the original color, or as can happen frequently, have no original paint evidence left on them at all. Because of this, the results — naturally — can only be as good as the samples themselves. Many times, new samples must be taken.

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It is the responsibility of the consulting paint specialist to take all of the technical data gathered in the paint analysis and present it in a concise format which can be readily understood by the architect or administrator client.[5] Documentary support such as color photomicrographs taken of important samples and small "chip"[6] size Munsell color standards of the recommended restoration period colors can be included in the final report along with recommendations about paint removal, methods for conservation and preservation of original finishes and types of paint for restoration repainting.

The comparative microscopic paint and color analysis is an essential part of the investigation of a historic building. The concluding report and its recommendations provide a significant part of the documentation required for a complete Historic Structure Report.

Footnotes

1. The Munsell Color Company in no way deals with paint manufacture or paint analysis. It only exists to serve the international needs of art, architecture, business and industry by providing a constant system for describing and identifying *color*. The Munsell system is used because the color systems or color names of the multitude of paint manufacturers can and do change often (usually for marketing purposes) and are therefore totally unacceptable for the standardized and constant identification system required for historic preservation. The Munsell system was developed by Albert H. Munsell (1815-1918) and was introduced by the publication, *A Grammar of Color*, in 1921. Through the years it has proven itself to be the most superior quality commercial color system available.
2. The individual conducting a comparative microscopic paint and color analysis should be knowledgeable and very familiar with current and past methods of paint manufacture, house and even furniture painting practices and techniques of the 18th, 19th and 20th centuries. This extensive knowledge is essential for correctly and thoroughly interpreting the evidence which is being investigated *in situ*, then removed and analyzed microscopically. Therefore, familiarity with American building technology, social and cultural influences, the art of housepainting, paint chemistry, color, microscopy and conservation of historical finishes is required.
3. The chain of title, insurance surveys, correspondence and early views and photographs are valuable historical reference sources for attempting to put a circa period date on the paint layers.
4. Occasionally it is necessary to identify the pigments used in a paint film. Polarized light microscopy is best suited for this type of analysis. (See: Palenik, Skip, "The Polarizing Microscope: A Valuable Analytical Instrument in Conservation." *Technology and Conservation*, Summer, 1977.)
5. The findings and conclusions of a paint analysis should never be considered as "absolute" because of the possibilities of judgmental error. Therefore, if any new evidence is ever uncovered at a later time which would amplify or change the consultant's original conclusions, they should always be notified to allow for further evaluation.
6. "Chip" size is $^{11}/_{16}$" × $^{13}/_{16}$".

Bibliography

The Association for Preservation Technology has published 18 articles or supplements since 1969 on the subject of architectual paints and their analysis. They are listed here and can be obtained from the Executive Director in Ottawa, Ontario, or at any library which is a member of APT.

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