

## SCIENCE FOR THE CONSERVATOR AND THE CURATOR

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**Abstract**—The nature, cost, and use of three levels of scientific analysis of the materials of art and artifacts are described, with their relevance to both the conservator and the curator discussed.

THIS IS A RESTATEMENT of a suggestion made briefly at the 1980 Annual Meeting of the American Institute for Conservation during discussion of analytical services that a possible National Institute for Conservation might provide. It concerns means of providing scientific services to conservators either within or outside a National Institute.

... .Because scientific services are expensive;  
... .because conservators need a wide range of services, varying from simple confirmation to investigation in fields not hitherto explored;  
... .because one conservator may have a very slight acquaintance with science and its methods while another may be an expert in a relevant field of science;  
... .because the new conservator needs to learn for himself while the experienced one, though already knowing what he sees, can always develop new insights:  
there should be several levels of service.

Level A could make use of an analyst somewhere who is engaged in routine operations, perhaps in quality control for a metals company or for a paint manufacturer or for wood science or for what you will. This analyst could accept another sample like the many he already has, pass it through his operation like all of the others, and report it to the conservator instead of through his normal channels. The cost of this service would be almost negligible. It could be aptly described as "mindless analysis." The conservator would attend to sampling, to documentation according to AIC Standards of Practice and ICOM Conservation Committee recommendations, to selection of the appropriate analyst, and to interpretation of results: he would provide all of the "mind" for sampling and interpretation, so the extra cost of the analysis could be small. "Mindless analysis" is far from implying a "mindless analyst": he might turn his full attention to this stranger sample and observe in it far more than in the other familiars in the batch. Equally, many a scientist beset with problems would welcome a run of productive automatism while his mind comes to terms with his difficulties.

The value of the results obtained might be sufficient: the result might confirm expectations, for example, that the black nodule on silver was indeed silver sulphide, not silver chloride. On the other hand, it might be puzzling—only part of the truth—or just plain wrong and out of alignment with other observations made during examination or later treatment: for example that it did not dissolve in a silver dip. In the latter cases the conservator with enough experience might choose a different kind of analyst at level A or he might elect to obtain more of the scientific mind by a new beginning at level B.

Level B requires that the conservator state his problem and allow the scientist

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to see the object. The scientist in turn considers it and discusses it in detail in order to view the problem from all sides. He then either passes it to another, more knowledgeable, scientist in a particular field or goes ahead: decides what literature-searches, research work or analytical techniques will be most likely to yield the required results expeditiously. An example might be white growths on leather. These could be variously: crystal growths; exuding waxy material; or moulds. Three different specialists might be needed to answer this question with certainty and each would probably like to select his own sample in case the observed growth contained a mixture of substances. The conservator would also wish to be present to make sure that aesthetic liberties were not taken with the object during selection of site for sampling.

The cost at level B will be considerable unless experience suggests short-cuts. For the first-time case there is the preliminary consideration; then the time needed to bring perhaps four people together for sampling, documentation—perhaps including photomicrographs—and further consideration; then actual analyses by the three specialists; followed possibly by a few repetitions under different conditions to improve the “signal-to-noise ratio” (or whatever the instrumental limitation may happen to be) and a final conference to compare the results and to interpret them in the context of the question. Perhaps the analyses would suggest that moulds had been growing on a vegetable wax because hygroscopic salts in the leather had raised the water content abnormally, or that the salts had crystallised out during unusually dry winter conditions. The report could state the hypothesis and suggest that further work be done to prove or disprove its truth. Clearly, this example of level B contains a quantity of thoughtful science at least one and possibly two orders of magnitude greater than that of the “mindless analysis.” It must be correspondingly costly both in dollars and in time. Even if a laboratory is found that specialises in the required subject and contains the particular group of experts needed—this offers the best hope of accurate and rapid analysis with little ‘start-up’ time—perhaps a month or three must elapse before a report can be made. This contrasts with analysis at level A, which might take only days if a sample caught a batch just about to go through.

The value of work at level B is that of a customised approach to the question. It may reasonably be expected to answer the question unless the conservator cannot afford to pay for final proof of the hypothesis or for other reasons opts to live with some uncertainty. “Reasonable expectations,” however, may be dashed, collection objects having frequently survived some very odd treatments that confuse later scientific investigation. Then, unless one of the analysts becomes piqued by the problem and gives of his own time to study it, or obtains a research grant, a full-scale scientific study may become desirable: level C.

Level C serves the problem that is so new, so intransigent or intangible that the conservator (or, at this level, the art-historian or the archaeologist) finds difficulty in translating it into scientific terms. After presenting his question to all of the scientists he knows, one by one, he will acquire a few frameworks in which to discuss it and will discover whether it arouses any interest among them. If it does, then it might be tackled by the following sequence of events: a) identification of scientists who have knowledge, skills and facilities applicable to the problem and some interest in it (Once some scientific terms have been formulated the scientists might be identified through a literature search in the journal *Archaeometry* and its congeners or through the Science Information Exchange.); b) identification of other conservators or curators or archaeologists who have insights into the problem or who have access to samples or to objects of known provenance for use in comparative studies; c) identification of curators, art-historians or other scholars who can provide

the scholarly background against which the objective findings of the laboratory can be assigned meaning, and may also have access to comparative material; d) generation of a plan of action as a result of discussions among the foregoing; e) selection of someone with the interest and skills who can perform the research and arrangement for continuing contact between him/her and advisors; f) funding the work; g) review of the results and change of the direction of the enquiry if needed; h) attainment of some defensible conclusion(s); i) publication; j) the holding of the team together to handle the misunderstandings or justifiable strictures of reviewers and peer-commentators.

The cost at level C, involving perhaps: searches, communication, meetings, seminars, grants, overheads, contracts, research, advisory bodies, publication, will be higher than at level B, again by one or two orders of magnitude, if not more. Its value to the conservator/scholar might be great: perhaps a breakthrough sufficient to reorient the thinking of all object-oriented scholars everywhere. This kind of study, however, is more likely to result in the creation of a new tool for use in authenticity studies, for example, neutron-radiography of paintings, or in the establishment of new data applicable to studies of provenance, for example, the time-scale and mode of separation of a copper-rich phase at ambient temperatures from silver-copper alloys such as those used in the fabrication of ancient silver vessels.

The time needed for response to a specific question at level C could vary from two to fifteen years.

The three levels described above are, of course, only particular selections from a continuum. Intermediate situations can be visualised and do in fact occur. It is important to recognise that one or other kinds of science can be injected into object-oriented activities almost always, but that the product of the injection can range from the education of a single inquisitive conservator to the education of an entire world of interested people. Also, that the costs are commensurate, ranging for one enquiry from free to perhaps twenty dollars at level A, to several thousands at level B, and to tens to hundreds of thousands at level C.

The milieux suitable to the various levels are also worth considering. Level A as described requires only a wide acquaintance with sympathetic technicians, each engaged steadily in a different analytical technique. The more bored each is with his routine work the more likely he is to undertake the odd unfamiliar item at minimum cost. Face-to-face contact with the conservator is probably necessary, so these facilities should not be excessively distant from him. A large industrial town with quality-control laboratories and professional societies is likely to contain these facilities.

Level B does necessitate a grouping of knowledgeable scientists. This would be found in a large laboratory associated with museum work or perhaps in a sympathetic university department. Since the end of an analysis that at first sight appeared simple can be very far from what was expected, such a laboratory needs professional contacts that are quite wide-ranging and near at hand. If the laboratory serves a wide area that generated a large and steady flow of work, some of it at level A, then reasonably expeditious service at level B could result. If a laboratory is too small and does not handle floods of work, then the need to 'tool-up' for each request could slow response to an intolerable duration.

Level C belongs in a graduate school or similar research facility having skills in organising and funding the acquisition and broadening of knowledge. Access to the most elaborate and costly of analytical techniques seems to be necessary to attract the needed quality of worker. Also, associated with expensive equipment are found mechanisms for funding, for symposia, for calculation, for lecture preparation, for

publication, etc. For the purposes under discussion such scientific centres need to be associated with scholars of the humanities and with collection resources such as are to be found in university museums, so possible locations are limited. In particular, if any large flowering of results is desired, then some mechanism is needed to make association between the disparate disciplines natural, so that fellowships established for the studies can be viable.