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Scientists Under Fire?

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During the past few weeks various art journals, newspapers, and on-line media have published articles about the high number of art fakes concerning the Russian Avant-Garde. Besides the fact that some of the authors of these articles did not necessarily have the intention to inform but rather to denigrate certain persons, their poor knowledge of the possibilities and tasks of scientific examination and analysis became clearly evident. Whether this was really due to lack of knowledge or simply to tactics remains an open question. Because of this, it now seems extremely necessary to give a short description and explanation about what a scientific examination concerning the authenticity of paintings can do, and what it cannot do.

A scientific investigation identifies materials, pigments, binding media, and supports used in painting. From the results of these examinations, together with the knowledge of the history and usage of the materials, conclusions can be drawn. That is, the assumed artist of the painting could have used the materials only if they were known and available at his or her time. If, for instance, pigments are identified which did not yet exist at the assumed time of origin or during the creative period of that artist, the object must be a fake without any doubt. On the other hand, if the identified pigments were known and well-used at the time of origin this is not a definite proof of authenticity. Systematic examinations of materials used by an artist during his or her whole artistic period are very helpful. The comparison of the identified pigments with the artist's well-known palette gives us more reliable results and more certainty. Unfortunately, only few systematic examinations of artists[1] palettes exist. Their results are published and therefore can be used (Turner, Modigliani, some Impressionists and some of van Gogh).

The analysis of materials used in painting is complicated. Besides having good facilities, an in-depth experience together with the fundamental knowledge of artists' materials are essential. Therefore it is not reasonable to commission a laboratory that normally does not deal with the analysis of objects of art to do such examinations.

The first decisive step in the analytic examination is the thorough investigation of the painting, because it is necessary to take samples only from certain areas which can definitely be attributed to an original area of the painting. Later treatments such as retouches, consolidations in the course of a restoration, or coatings, will probably falsify the results. It is also very important to analyse all the paint layers because it might be that the materials on the surface are unsuspicious whereas the materials of the lower layers are contradictory. This can be the case when an old canvas or painting is reused. That is the reason why samples must be taken for the analysis. Some non-destructive methods (for example UV/VIS – Ultraviolet-spectroscopy or MUSIS analysis) investigate only what is found on the surface of the composition and give no information about the stratigraphy.

The identification of the samples is carried out with the help of the well-established analytic methods, modified according to the often extremely small amounts of material (pigment samples, glues, binders, etc.). Among the most important methods are the x-ray fluorescence analysis and the infrared-spectroscopy. The x-ray fluorescence identifies chemical elements and this helps to define the corresponding

pigment. The infrared-spectroscopy identifies molecules, which means it not only defines pigments but also binding media and varnishes. Besides these two there are also micro-chemical and chromatographic methods (for example gas chromatography coupled with mass spectroscopy for the identification of binding media).

It is essential to state that scientific examinations are provable. They are provable, for instance, in the form of spectra, which result from investigations, or with the help of reference material consisting of unused and archived samples. This means that all the examinations can be carried out and verified again at any time.

All responsible scientific examinations into the authenticity of paintings – no matter how they are carried out – always result in **an attribution to the time of origin and not in an attribution to a specific artist**. Therefore the result must read: "The scientific analysis of the materials are not contradictory to a specific period of time and therefore not contradictory to an attribution to the artist". It must **not** read, "The scientific examinations prove the authenticity of a painting" as, for instance, some art auction houses have rephrased the results.

Three Common Misconceptions

The uninformed collector, museum, gallery, or auction house can be extremely vulnerable to bold and, apparently, authoritative statements about questions of authenticity. Such claims may seem to be reasonable and as the listener does not know whether to believe them or not, may prefer to err on the side of caution and either accept the claims to be true, or at least possibly true.

Three of these most common claims are:

■ "All works on paper must be fakes because old papers are still available in Russia."

Certainly old papers can still be had in Russia, just as there are old (but dried out) pigments. So it is not so much a matter of analysing the age of the paper (although this is done, of course), but of analysing the pigments, binding medium, and surfaces.

There, the scientific expert excels, analysing pigment samples in various ways, and using non-destructive technologies (digital technologies) to analyse the surface, the condition of the binding medium (water, gum arabic), underdrawing, and so on.

■ "Oil paintings can be falsely aged by heating or cold conditions."

This is true, just as it is true that this false ageing can be detected by the scientific expert. Oils age in a process called "polymerisation", that is, they bond over time. This is due to the chemical components found in the oils which could be affected by the pigments. There are pigments that accelerate the polymerisation process of the oils such as lead and cobalt, while others slow it down such as copper and iron.

Most oil paintings are not fully bonded until they are about 60 years old. This is one of the reasons that the scientific expert can definitely prove that a painting is a fake because the lack of bonding, or polymerisation, can be detected.

As different pigments polymerise at different rates, heating or extreme cold conditions affect the pigments in different ways. This may cause part of the painting to be polymerised while another part is not at all. This is what scientific experts look for, and easily pick up.

Another effect of the artificial ageing of paint layers is that they show an overall characteristic condition (e.g., crackles, etc.), which often can be seen by simple microscopic examination.

A scientific examination can definitely prove that a painting is a fake, but it cannot prove that it is authentic. A responsible scientist can never authenticate a painting and he wouldn't even try.

■ "The colours in the paintings are too fresh."

There can be several reasons for being surprised at the brightness of the colours in a Russian Avant-Garde painting, the most obvious one being that it is little realised that these artists liked and used very clear and vibrant colours.

If a painting has been kept in good atmospheric conditions in which there was no dust, smoke, or damp that would leave deposits on the surface, thereby darkening it, the lovely singing colours will still appear in all their original glory.

These are the colours that appear after a painting has been responsibly cleaned and restored.